

**Your Biodiversity in My Backyard:  
Key Local Stakeholders' Perceptions of Biodiversity  
Conservation in Gorontalo, Indonesia**

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Gorontalo's iconic mammals and birds of global conservation value. From the top left, clockwise: the incubator bird *maleo* (*Macrocephalon maleo*), crested black macaques (*Macaca nigra*), the pig-deer *babi rusa* (*Babyrousa babyrussa*), the red-knobbed hornbill (*Aceros cassidix*), and dwarf buffalo or anoa (*Bubalus* sp.). (All photos are used with permission from M.F. Kinnaird, except of the *babi rusa* by C.M. Clayton).

## Abstract

The establishment of protected areas (PAs) has been the key national strategy in biodiversity conservation, through preserving the unique wildlife and ecosystems in Indonesia. As well as their status as sites rich in biodiversity, PAs are also important for socio-economic interactions. Hence the management of PAs has been fraught with technical, social and economic problems. To ensure greater local participation and support in tropical forest conservation initiatives, it is vital to understand how local stakeholders perceive them. This research was undertaken in Gorontalo Province by examining the views of local stakeholders through a combination of qualitative interviews and quantitative ranking exercises. The findings revealed that respondents only understood the concept of biodiversity on a general level. Most respondents defined biodiversity in terms of its elements; only a few were able to describe the interactional attributes, by which biodiversity functions within the ecosystems. Their appreciation of forest biodiversity was primarily due to economic and ecological benefits they derive from local forests. Accordingly, respondents ranked the provision of ecological services from the forests as the strongest reason for protecting it.

Using Wood et al. (2000) analytical framework to examine the root causes of biodiversity loss, the findings indicated respondents' familiarity with human-induced forces resulting in the degradation and loss of natural forests, and they understood how these affect local biodiversity, both within and beyond the forest. Some critical disconnections between national policy in forest conservation and the reality of the local use of forest resource became apparent. At the core of these disconnections was an unequal share of benefits of such policy to local stakeholders. They identified extraction of species and physical alteration of the forest ecosystem as direct drivers of forest loss; these were perceived as rooted in poverty, institutional failures in forest management, ignorance of the wider forest functions, and conflict of development policies at the local level. The main reason for biodiversity loss can be summed up as widespread and persistent failure to properly understand, quantify, or value the goods, services, functions and capital value of the natural forests, at both national and local levels. Overall, most respondents held negative attitudes towards protected forests and their positive attitudes towards conservation activities were linked with tangible benefits they enjoy from the forest. A key finding of this study is that the conservation of biodiversity cannot be considered in isolation from broader patterns of natural resource use and the socio-political context in which people carry out their lives.

This study suggests that the implementation of the centrally-controlled and preservationist conservation approach in Gorontalo has been ineffective in achieving conservation goals. This is due to the lack of a clear connection between this policy and the reality of local forest users.

**Keywords:** conservation policy, perception, biodiversity, Sulawesi, Indonesia.

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## Abbreviations and Acronyms

AAC	Annual Allowable Cut
ANTAM	<i>Aneka Tambang</i> (the State-owned Mining Company in Indonesia)
BAL	Basic Agrarian Law (Undang-Undang Pokok Agraria)
BAPI	Biodiversity Action Plan for Indonesia 1993 (see IBSAP)
Bappenas	<i>Badan Perencanaan Pembangunan Nasional</i> (National Development Planning Agency)
BFL	Basic Forestry Law, revised as Forestry Law
BKSDA	<i>Balai Konservasi Sumber Daya Alam</i> (Natural Resources Conservation Bureau)
BPDAS	Badan Pengelolaan Daerah Aliran Sungai (Watershed Management Agency)
BPS	<i>Badan Pusat Statistik</i> (Statistics Indonesia)
BTN	<i>Balai Taman Nasional</i> (National Park Bureau)
BWNP	Bogani Nani Wartabone National Park
CBD	Convention on Biological Diversity
CBNRM	Community-based natural resources management
CEPF	Critical Ecosystem Partnership Fund
CITES	Convention on International Trade of Endangered Species of Flora and Fauna
COPs	Conference of Parties
DAK	<i>Dana Alokasi Khusus</i> (Special Allocation Fund)
DAU	<i>Dana alokasi Umum</i> (General Allocation Fund)
DGF	Directorate General of Forestry of the Ministry of Agriculture
DPR	<i>Dewan Perwakilan Rakyat</i> (House of Representatives)
DR	<i>Dana Reboisasi</i> (Reforestation Fund)
FAO	Food and Agricultural Organisation
FBL	Fiscal Balancing Law
FWI	Forest Watch Indonesia
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFW	Global Forest Watch
GNP	Gross national Product
GN-RHL	<i>Gerakan Nasional Rehabilitasi Hutan dan Lahan</i> (National Movement for Forest and Land Rehabilitation Programme, popularly known as <i>Gerhan</i> )
GoI	Government of Indonesia
Golkar	Golongan Karya
GPI	Genuine Progress Indicator
GR	Government Regulation
HDI	Human Development Index
HPH	<i>Hak Pengusahaan Hutan</i> (Right of Forest Exploitation)
HPI	Human Poverty Index
HTI	<i>Hutan Tanaman Industri</i> (Plantation Forest)
IBSAP	Indonesian Biodiversity Strategy and Action Plan (2003-2020)
ICDP	Integrated Conservation and Development Projects
IHPH	<i>Iuran Hak Pengusahaan Hutan</i> (license fee for forest exploitation)
IPCC	Inter-governmental Panel on Climate Change
IPK	<i>Ijin Pemungutan Kayu</i> (a special timber exploitation permit)
IPKTM	<i>Ijin Pemungutan Kayu di Tanah Milik</i> (small-scale logging permits on privately owned land)

IUCN	International Union of Conservation of Nature and Natural Resources
KKN	<i>Korupsi, Kolusi dan Nepotisme</i> (Corruption, Collusion, and Nepotism)
KUD	<i>Koperasi Unit Desa</i> (village co-operatives)
LIPI	<i>Lembaga Ilmu Pengetahuan Indonesia</i> (the Indonesian Institutes of Sciences)
MDM	Matchstick Distribution Method
MEA	Millennium Ecosystems Assessment
MoF	Ministry of Forestry
NCA	Nature Conservation Areas ( <i>Kawasan Konservasi Alam</i> , e.g., National Parks, Grand Forest Parks, and Recreational Parks)
NFCP	Nantu Forest Conservation Programme
NGO	Non-governmental organisation
NPA	Natural Protected Areas ( <i>Kawasan Suaka Alam</i> , e.g., Strict Nature Reserves Wildlife Sanctuaries, and Biosphere Reserves)
NTFPs	Non-Timber Forest Products
NWS	Nantu Wildlife Sanctuary
NWS	Nantu Wildlife Sanctuary ( <i>Suaka Margasatwa Nantu</i> )
PAD	<i>Pendapatan Asli Daerah</i> (Regionally Generated Revenue)
PAs	Protected areas
PDAM	<i>Perusahaan Daerah Air Minum</i> (District Water Company)
PETI	<i>Penambangan Tanpa Ijin</i> (mining without license)
PHKA	<i>Perlindungan Hutan dan Konservasi Alam</i> (Conservation and Protected Areas)
PNR	Panua Nature Reserve
POLRI	<i>Polisi Republik Indonesia</i> (the Indonesian Police Force)
PRP	<i>Program Reboisasi dan Penghijauan</i> (National Reforestation and Afforestation Programme)
PSDH	<i>Provisi Sumber Daya Hutan</i> (Forest Resource Rent Provision or previously known as <i>Iuran Hasil Hutan, IHH</i> )
RAL	Regional Autonomy Law
REDD	Reduced Emissions from Deforestation and Forest Degradation
SHDI	Sustainable Human Development Index
TEV	Total Economic Value
TGHK	<i>Tata Guna Hutan Kesepakatan</i> (Consensus of Forest Land Use Plan)
TNC	The Nature Conservancy
TRA	Theory of reasoned action
UNCED	United Nations Environment and Development Programme
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WCED	World Commission on Environment and Development
WCMC	World Conservation Monitoring Centre
WRI	World Resources Institute
WSSD	World Summit on Sustainable Development
WWF	World Wildlife Fund for Nature

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Perceptions of biodiversity and its value vary widely among individuals and groups. The worldviews that people have, their life experiences, education, and the way in which the biophysical environment has been used by different societies are some of the factors that influence their perceptions (Spellerberg & Hardes 1992). The topic of my doctoral research stems from my own work experience over the past decade. Since attaining my MPhil in Environment and Development from Cambridge University in 1995, I have worked in environmental and natural resources management in various international research and development agencies in Indonesia. In 2003, I was part of the team of writers for the Indonesian Biodiversity and Strategy and Action Plan, funded by the Global Environment Facility (GEF). Coming from a natural science background, this latest work to support the mainstreaming of biodiversity conservation in development has heightened my conviction that the success of conservation efforts largely depends on socio-political relations, and the attitude and behaviour of people in their interactions with nature.

As one of the few *megadiversity* countries in the world, Indonesia began to actively promote the establishment of protected areas in the late 1980s. However, the conservation paradigms, for which protected areas (PAs) establishment is a key strategy, are applied with little regard to the reality of intense human pressures to meet basic needs of communities living in or around PAs. This has raised many social justice issues, which under former president Suharto's four decade authoritarian regime, were largely suppressed. Nevertheless, illegal extractive activities continue. Consequently, many of the protected forest areas are degraded, and the resource bases on which millions of rural people rely for their livelihoods and well-being, are at a breaking point.

Recent socio-political developments in Indonesia have decentralised forest resource management policy to the locals whose voices were previously ignored in the conservation and development planning within their jurisdictions. Given the new power that local stakeholders have in their hands to manage the local natural forests and the importance of forest biodiversity for their socio-economic development (see Sections 1.2 and 3.1) my overall research aim was to understand how key local stakeholders perceive the conservation of biodiversity. I was curious to know the extent to which decentralised forest management can bring greater socio-economic benefits to local communities. I was particularly interested in looking at how global policies and strategies to conserve biodiversity (i.e., the establishment of protected areas) are implemented at the local level, what barriers the local stakeholders face in doing so, and the ways these barriers affected rural livelihoods and their consequences in terms of social justice and environmental stability.

In human ecology literature, the term 'local' is generally applied to members of specific communities (e.g., a village in the periphery of a protected area) while the term 'stakeholder' generally means every person that has a stake (interest) in an activity and who can affect or be affected by decisions made for that activity. Based on the provision of the United Nations'

Convention on Biological Diversity (Section 1.2 and 1.3) everyone has a stake in the state of biodiversity, from the local to the global environment, but not necessarily the power to influence the decisions for its management. Specifically, given the history of centralised forest management in Indonesia, members of local communities generally have little say in the formal decision-making of land- and forest resource-use despite the fact that their every day actions can directly impact upon local biodiversity. It is the local elites (Section 5.3) who hold the key for such decision-making processes. For this reason, this thesis uses the term ‘key local stakeholders’ to apply to meso-level stakeholders, distinct groups of respondents at the province, district, and sub-district levels, who by virtue of their profession, have more apparent influence in the state of biodiversity than members of the general public at the village level. The term ‘local’ is thus used to contrast it with the stakeholders at the ‘national’ or ‘global’ levels. Within the context of this political transition in forest resource management, understanding key local stakeholders’ perceptions is important as their roles and responsibilities are increasing in the decision-making of resource uses, which in turn will determine the sustainability of the protected areas in their jurisdictions. To this end, a case study of forest conservation in the context of socio-economic development was a logical way for me to identify gaps, synergies, and tensions that arise in pursuing sustainability.

## **1.2 The importance of biodiversity**

The essential roles of biodiversity in producing goods and environmental services to sustain the well-being of planet Earth and its inhabitants are recognised globally in the Convention on Biological Diversity (CBD) – one of the important outcomes of the Conference on Environment and Development in Rio de Janeiro (the Earth Summit) on June 5, 1992. This global policy came about two decades after the United Nations’ conference on Humans and the Environment in Stockholm in 1972 acknowledged the detrimental effects of human activities on the biophysical environment, including loss or degradation of biodiversity. Global policies advancing the conservation of biodiversity began to receive international support in the 1980s, particularly after the publication of the *World Conservation Strategy* (UNEP, IUCN, WWF 1980), *The World Charter for Nature* (UNEP 1982) and *Our Common Future* (WCED 1987). Scientific evidence of the decline of biodiversity during the intervening decades is well documented (McNeely et al. 1990; UNEP 1993, 1995; WCMC 1992; WWF 1999) and brings forth the current knowledge of the roles and values of biodiversity into the public arena.

As a framework for governing global biodiversity, the CBD’s primary goals are to conserve biodiversity, to promote its sustainable use and to ensure that the benefits arising from it are shared fairly (Article 2). It is well supported, as indicated by the 187 countries (referred to as Conference of the Parties - COPs) that rapidly ratified it as part of their national policies (UNEP 2006). This support demonstrates their willingness to collaborate in ensuring that current and future economic developments take place in a more sustainable manner.

At the global level, the promotion of biodiversity conservation has achieved considerable progress to date. According to Chape et al. (2003), areas set aside for conservation purposes worldwide have increased tenfold, from 2 million km<sup>2</sup> (in 10,000 PAs) in the 1960s to 18 million km<sup>2</sup> (in more than 100,000 PAs) in the late 1990s. There has also been a considerable shift of conservation paradigms, especially in the densely populated tropical countries, from focusing on species to ecosystems and from ‘protectionist’ to more integrative approaches that incorporate social concerns (Wells et al. 1992; Wells et al. 2004). Many laws and regulations in support of conservation have been created. Furthermore, financial resources to

assist conservation in economically poor but biologically rich countries are provided through international funding mechanisms, such as the Global Environment Facility (GEF) (Lovejoy 2002; Wood 2000). These enabled many member states to conduct national biodiversity inventories and produce action plans to ensure that the current and future patterns of biological resource use are more aligned with the productive and assimilative capacity of the environment (UNEP 2006).

However, at the sixth COP meeting in 2002 the parties acknowledged that the rate of biodiversity loss was still accelerating. A set of pragmatic and coherent targets was agreed to reduce the current rate of loss at the global, regional, and national levels by 2010 (UNEP 2006). The targets form the core of the eight objectives of the United Nations' Millennium Development Goals,<sup>1</sup> which were endorsed by the Heads of States and Government at the World Summit on Sustainable Development (WSSD)<sup>2</sup> in 2002. Two of these goals, eradicating extreme poverty and ensuring environmental sustainability (Goals 1 and 7, respectively) have strong links with biodiversity conservation in developing countries, where the world's richest biodiversity is located.

Despite international and national political support for biodiversity conservation, CBD implementation at the local level has been fraught with problems. These are often highly complex, rooted in the fundamental fact that rights to access biodiversity and its valuable resources have been highly contested among different stakeholders at local, national, and global levels. The increasing pressures that arise from the diverse socio-economic needs of these stakeholders have led to the loss and degradation of biodiversity (Daily 1997; Koziell & McNeill 2004). In 2005 a global assessment<sup>3</sup> on the performance of key natural ecosystems concluded that more than half of the ecosystem services (15 out of 24) that make a direct contribution to human well-being are in decline (Millennium Ecosystems Assessment 2005). The report attributes this decline to human activities in pursuit of economic development over the past five decades.

Despite the economic achievement in some regions, analysts regarded these activities as having failed to secure improvements in average levels of human well-being, particularly in the poorer regions of the world (Fisher et al. 2005). The MEA also warns that the drivers of ecosystem degradation are showing no evidence of decline and many have intensified over time. Unless the direct and underlying causes of the degradation are addressed, the resulting disturbance to the natural systems will make them less able to support human society and the life of the planet Earth itself (Daily 1997; Koziell & McNeill 2004; McNeely 1992; McNeely et al. 1990; Tacconi 2000; Wilson 1992; Wilson & Peters 1988). Further, the most recent

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<sup>1</sup> These goals include: 1) Eradicating extreme poverty; 2) achieving universal primary education; 3) promoting gender equality and empowering women; 4) reducing child mortality; 5) improving maternal health; 6) combating HIV/AIDS, malaria and other diseases; 7) ensuring environmental sustainability; and 8) developing a global partnership for development.

<sup>2</sup> The seven focal areas adopted at the 2004 COP include: 1) reducing the rate of loss of biodiversity components; 2) promoting sustainable use of biodiversity; 3) addressing the major threats to biodiversity; 4) maintaining ecosystem integrity; 5) protecting traditional knowledge and practices; 6) ensuring the fair and equitable sharing of benefits arising from the use of biodiversity; and 7) mobilising financial support and technical resources for developing countries to implement the CBD strategic plan.

<sup>3</sup> The comprehensive assessment of the status of the world's natural resources was conducted for five years (1999-2004) by 1360 scientists in 95 countries worldwide.

worldwide assessment on CBD implementation (UNEP 2006) concluded that little progress has been achieved in improving the public's understanding of the importance of biodiversity, one of the CBD's goals. The report attributed this to insufficient public awareness-raising on the part of signatory countries to make clearer links between biodiversity conservation and sustainable socio-economic development. Conservation and development analysts warn that this gap must be taken seriously, because the loss of biodiversity, and the associated loss or degradation of the ecological services they perform, can undermine every nation's efforts to sustain their development (Daily 1997; Koziell & McNeill 2004; UNEP 2006), a key tenet of the CBD (Article 1).

### **1.3 Minding the gaps in CBD implementation**

As noted above, much of the ecological work on the scale and rate of biodiversity loss has been instrumental in formulating global conservation policies and strategies (McNeely et al. 1990; UNEP 1993, 1995; WCMC 1992; Wilson 1992; Wilson & Peters 1988). However, biodiversity conservation represents only one of many interests in the same resource; the perspectives of other relevant stakeholders have either been ignored or overlooked in the decision-making process of the use of biodiversity. Moreover, because conservation is essentially a socio-political action (Brechin et al. 2002; Ghimire & Pimbert 1997), the knowledge, attitudes and perceptions of all stakeholders must be understood, and the socio-economic context considered, if conservation actions are to succeed. For example, in Indonesia governmental agencies managing public lands typically hold views different from those of other stakeholders, including different sectors in the same government. Vast natural forests in many islands of Indonesia (e.g., Sumatra, Kalimantan, Sulawesi and Western Papua) are of high global conservation value. They are legally owned by the central government and large parts are 'locked' as protected areas (PAs) (see Chapter 2). Yet, the same forests have been the source of livelihoods for thousands of local communities and few alternative sources are generally available. Nor can local government generate much revenue from them. Consequently, the management of PAs becomes a source of conflict between individual resource users, state apparatus, the private commercial sector, and sections of the public at large. This is reflected in persistent illegal activities that occur in and around such forests (Tacconi et al. 2004a).

To sustain the benefits of biodiversity conservation, multi-stakeholder management requires an understanding of the perceptions and attitudes of all stakeholders – not just government officials dealing directly with forest management (Burger 2003). However, social science research of this kind, particularly on the broad topic of biodiversity, has only received attention recently (Holl et al. 1995; Hunter & Brehm 2003; Kellert 1993a, 1996). Further, much of this research has been undertaken in developed countries, where the socio-economic context is very different to that of developing countries that rely heavily on natural ecosystems to support the majority of their population. For national and local governments, as well as local communities, extraction of biological resources represents a dominant type of demand on biodiversity as these can be readily converted into cash to finance socio-economic development activities. The conservation and extraction of the same biological resources typically have competing objectives in the short term. Inevitably, a society is required to make choices about how biodiversity is used (Salafsky & Wollenberg 2000). The trade-offs are influenced by the values and meanings associated with biodiversity (Blaikie & Jeanrenaud 1997; Perlman & Adelson 1997; Rolston 1994).

While the loss of biodiversity is considered a global phenomenon, it occurs at the local level as a result of people making decisions about resource use (Perrings 1995). These local individual actions are influenced by physical resource extraction, their attitudes towards the natural environment and the values they assign to it, and the fundamental socio-economic processes that underpin them (FWI/WRI/GFW/2001; Geist & Lambin 2002; Robinson 1991) (see Section 3.3.3). Furthermore, these processes typically operate both locally and beyond the physical boundary of a particular site (Contreras-Hermosilla 2000; Perrings 1995, 1997; Perrings et al. 1992; Vayda 1983; Wood et al. 2000).

Attempts to integrate conservation and socio-economic activities, such as community-based resource management (CBRM) and integrated conservation and development projects (ICDP) that were promoted in the 1990s in some developing countries showed little evidence of improvement in achieving conservation goals (Fisher et al. 2005; Wells et al. 1997; West & Brockington 2006). Nevertheless, these authors and many sociologists believe that a better understanding of the social dimensions of biodiversity conservation can improve the efficacy of ICDPs (Brechtin et al. 2002; Furze et al. 1996; Ghimire & Pimbert 1997; Kant & Lee 2004; Machlis 1995; McNeely 1995a, 1996; Shiva et al. 1991).

The complex causal factors of biodiversity loss have led many conservationists to recognise that the scientifically-driven conservation approaches (primarily through the establishment of PAs) implemented until the 1990s are inadequate to achieve biodiversity conservation goals (Gunarso & Davie 2000; McNeely 1994; McNeely 1995, 1996; Wells et al. 1992; Wells et al. 1997; West & Brockington 2006; Wilshusen et al. 2002; Wood et al. 2000). The examination of direct and root causes of biodiversity loss requires multiscale analysis. In order to understand the linkages among the driving factors of biodiversity loss in Gorontalo, the political ecology framework developed by Wood et al. (2000) was applied as a tool to uncover its perceived direct and underlying causes.

#### **1.4 Why do local perceptions matter?**

As noted in Section 1.1, determining local perspectives on conservation is important because local people are among the main agents that affect the state of biodiversity (Perrings 1995; Purnomo et al. 2005; Robinson 1991). The assessment of differences in perceptions among stakeholders is also needed as trade-offs are inherent in the decision-making process and in building consensus. An important tenet of this study is that the conservation of biodiversity cannot be considered in isolation from local people and broader patterns of natural resource use. Nor can it be separated from the socio-political context in which people carry out their lives.

Over decades of centralised regime that dominated Indonesian politics, the management of the country's forests have been characterised by regulatory approaches (see details in Chapter 2). Moreover, Indonesia's conservation agendas have primarily been driven by the global scientific community or the national government (e.g., the establishment of PAs or the protection of unique or endangered species of wildlife). These were generally implemented against the interest of the local users (Colchester 1997; Colchester & Lohmann 1993), who often have more detailed knowledge of local biodiversity and the various pressures impinging on it, although they lack a broader perspective (McNeely 1995a, 1996). The government commonly treats conservation as a matter of keeping local people out of large nature reserves (Colchester 1997; Colchester & Lohmann 1993; Fisher et al. 2005; Gunarso & Davie 2000; MacKinnon 1995; Wells et al. 1997; Wiratno et al. 2004). This highly centralised

management of PAs has led these authors to conclude that the PAs have been ineffective in achieving its conservation goals, and many are regarded as ‘paper parks’ only.

Furthermore, conservation of biodiversity depends neither on biologists nor resource managers alone and the worldview of other stakeholders, and their interactions with the living environment, need to be considered. This is particularly so for those who interact directly with, and have high stakes in biodiversity (e.g., through subsistence livelihoods). In addition, because conservation of biodiversity is essentially a social action (Wilshusen et al. 2002), its implementation requires local support and cooperation. Therefore, it is important, in the spirit of decentralisation currently being implemented in Indonesia, that local stakeholders’ perceptions about biodiversity are known, understood, and incorporated in the planning and management of the resources they depend upon. In order to participate in biodiversity conservation more fully, local stakeholders must have sufficient knowledge and comprehension of the related issues. Studies have shown that accurate knowledge about an environmental problem is the single strongest predictor of intentions to adjust behaviour although it does not always lead to behavioural changes that lessen the negative impacts on the environment (Beedell & Rehman 2000; Bord et al. 2000). Thus, examining perceptions of stakeholders can provide some insights into these powerful groups of people who influence the state of biodiversity in their locality and also help to bridge the gaps that prevent effective management of biodiversity locally.

Furthermore, for the purposes of policy making, it is necessary to integrate local narrative and discourse with scientific knowledge to fully understand the problems of environmental change. Often, the local ‘voice’ is concealed during national/global discussions, and yet there are clear links between the well-being of local people and the environmental health of their locality (Daily 1997; Koziell & McNeill 2004). So, local people have a real stake in the sustainability of their environment and the resource base (Hunter & Brehm 2003). For example, people who live in the vicinity of protected areas in Indonesia generally depend on biodiversity for their livelihoods and subsistence needs (e.g., food, medicine and materials for housing construction) (Colfer et al. 2001a; Sheil & Wunder 2002). Because of these immediate interests in the sustainability of their environment and the resource base, an acknowledgement of local voices can foster a more respectful relationship with nature, which can enhance its protection for the benefit of both humans and nature. In the Indonesian context, this, in turn, has the potential to: (1) reduce potential conflicts over resources; (2) identify policy interventions that might be used to advance social justice and to balance economic imperatives with ecological considerations; and (3) redress the injustices of past centralised management practices. Many conservation and development experts consider giving local stakeholders a larger role in the planning and implementation of conservation approaches as instrumental to their success (Barber 1995; MacKinnon 1995; Pimbert & Pretty 1997; Tacconi 2000; Wells et al. 1992; Wells et al. 1997; Wiratno et al. 2004), although the extent to which the involvement of local stakeholders is possible is still being experimented (Bowe 2006; McNeely 1995a, 1996). This is particularly in line with article 10c of the COP that requires countries to protect and encourage the application of traditional cultural practices that are compatible with conservation or sustainable use of biological resources (Colchester et al. 2004). This research explores the ways by which these can be achieved in Gorontalo.

Finally, within the current political change in Indonesia (Chapter 2) and the various, often conflicting, interests in forest resources, local stakeholders have an important role in the framing of local policies and in the decision-making regarding the use of biological

resources. Their understanding of the relatively new scientific concept of biodiversity, and the multiple roles that biodiversity plays in sustaining local socio-economic activities, warrants examination because the costs and benefits of local decisions – to prevent further loss and mitigate impacts of degradation – must be borne by the general public (Kempton 1991). More importantly, it is often the poorest who have to bear most of the costs and suffer the harshest consequences of biodiversity loss (UNEP 2005). Understanding the relationship between these aspects of human behaviour and the environment is a key for facilitating behavioural changes in favour of conservation (MEA 2005; Wilson 1992; Wilson & Peters 1988). The case study of Gorontalo offers a rich field of research inquiry, critical analysis, and theoretical reflection.

## **1.5 Research approach**

To gain an understanding of how key local stakeholders perceive the conservation of biodiversity, this work is based on a case study of Gorontalo, a newly established province in the Indonesian island of Sulawesi. This region is rich with forest biodiversity of high global conservation value. However, due to limited availability of other resources, the same forest represents the main fruit basket of its population. As biodiversity covers a broad range of ecosystems, this study uses the natural forest ecosystem as its focus.

In order to find out this ‘local voice’, this study employs several complementary qualitative and quantitative research techniques (see Chapter 5). The primary tool for generating data was semi-structured in-depth interviews, supported by extensive field observations, document analysis, and a quantitative ranking exercise, commonly known as a Pebble Distribution Method (PDM) (Colfer et al. 1999). The application of these tools provides opportunities for crosschecking and triangulation that, in turn, increased the rigor and reliability of the data and findings.

The specific questions that guide this doctoral research are outlined below.

- How is the scientific concept of biodiversity understood by the local stakeholders?
- What values do key stakeholders assign to natural forests?
- To what extent are these stakeholders aware of the forces that threaten forest ecosystems?
- What attitudes do these stakeholders have on forest conservation?

Specifically, the objectives of the study were to:

- Identify and interview key stakeholders in order to document their understanding of the concept of biodiversity, and the values or benefits they derive from it;
- Assess key stakeholders’ knowledge of major local biodiversity, their awareness of its current state and of issues surrounding its management;
- Explore key stakeholders’ perceptions of the direct drivers and underlying socio-economic circumstances that lead to biodiversity loss or degradation at the research site;
- Identify and examine local and external (e.g., national, international) factors that might have direct/indirect influence on the management of biodiversity at the research site; and
- Analyse potential implications of stakeholders’ perceptions, knowledge and existing policies for development activities in Gorontalo;
- Provide some recommendations to address the current problems of forest conservation.

## **1.6 The Importance of the study**

Investigating answers to those research questions are academically valuable for the following reasons. The findings provide empirical evidence of: (1) local stakeholders' knowledge about the scientific concept of biodiversity; (2) their understanding of ecological principles that serve as the basis for conservation actions; and (3) the application of theories of environmental change and the factors that influence people in making decisions regarding the use of forest resources. Furthermore, the compilation of shared perceptions of the benefits of forest biodiversity has several pragmatic applications in designing activities that can demonstrate the practical benefits of its conservation and in improving the distribution of costs and benefits of conservation actions. The aggregated perceptions resulting from the study can also help to bring about greater participation in decision-making regarding the use of biological resources, which in turn can improve local support for the conservation of forest biodiversity. All of these are very important for conservation efforts to succeed and for preventing environmental crises resulting from biodiversity loss. Overall, by listening to local voices and concerns that may have been neglected or overlooked in previous conservation planning, the power in the national and local debates around forest biodiversity will be more balanced (see further detail of the contribution of this research in Section 10.2).

## **1.7 Thesis Overview**

This thesis is structured in ten chapters. Following this introduction, Chapter 2 introduces the socio-economic context of this inquiry by reviewing key policies and practices for forest management in Indonesia. Chapter 3 reviews the relevant key concepts and current knowledge of biodiversity, the argument for its conservation, and the driving forces known to lead to its degradation or loss in Indonesia. Chapter 4 sets the scene by providing an overview of Gorontalo province. The methodology adopted in this research, including the theoretical foundations, approach, and methods on which this study was conducted are described in Chapter 5.

Chapter 6 begins the presentation of findings by describing participants' understanding of the concept of biodiversity, their knowledge about local biodiversity, and how it has changed over time. Chapter 7 details the perceived values of natural forests in supporting the socio-economic development of Gorontalo. Respondents' views on the main challenges to maintain these benefits are presented in Chapter 8. Their attitudes to key conservation policies and activities are elaborated in Chapter 9. Chapter 10 draws together the main findings and suggests some recommendations for future research.

## **CHAPTER 2**

# **FOREST MANAGEMENT POLICIES AND INDONESIA'S ECONOMIC DEVELOPMENT: AN OVERVIEW**

As a tool for sustaining the benefits of biodiversity, effective conservation actions require a good understanding of how ecological systems work and how they interact with the social system. Key scientific concepts of this interaction are reviewed in Chapter 3. The chapter also underlines that it is the social system that primarily determines which scientific facts have any relevance to society and how the goals of biodiversity conservation are achieved (Millennium Ecosystems Assessment 2005; Watson et al. 2004). This chapter describes the social system to provide the context for forest management in Indonesia, where this research was conducted. First, it provides an overview of the country's rich and unique biodiversity, including its diverse cultures, and its importance for the nation's economy. Then it outlines major socio-political changes that have taken place since independence in 1945. The section focuses on key national policies for managing the forest, including conservation policies, to achieve the nation's economic development goals over the past six decades (1945-2005). This research focuses on forest biodiversity because the forest is the main natural habitat for wildlife. More importantly, forest ecosystems host many actual and potentially valuable resources that are important in supporting the social, cultural, and economic well-being of Indonesian people. They also harbour unique biodiversity of high global conservation value. As described in Chapter 4, Gorontalo reflects these attributes, yet they are increasingly under threat from human activities that tend to fragment, denude, and reduce their biodiversity.

### **2.1 The land of many diversities**

With over 17,000 islands straddling the equator, Indonesia is regarded as the world's largest archipelago. It is widely accepted that geologically, the western and eastern islands are distinctly different, resulting in high diversity of flora and fauna between them. The western islands of Java, Sumatra, Kalimantan (Indonesian Borneo), and Bali, known as Sundaland, were once connected with one another as parts of the Sunda Shelf, an extension of the Asian continent. To the east of the Sunda Shelf are the islands of Sulawesi, the Moluccas, Lesser Sundas, and the western part of New Guinea,<sup>4</sup> which together form eastern Indonesia. These islands have never been part of a major landmass, except for Papua, which was formerly a part of the northern Australian continent (Whitten & Whitten 1992).

Consequently, the two zones are biologically distinct, as reflected in their wildlife and plant life. Whereas the western zone shares similar wildlife with the south-eastern part of Asia (e.g., characterised by large mammals that were able to migrate across the islands and the main continent when the sea level was low during the geological past), the Papuan avifauna and small marsupials are of distinctly Australian origin. This marked difference between

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<sup>4</sup> The whole island is known in English as New Guinea, with the western half, Papua (formerly known as Irian Jaya) is politically part of Indonesia.

Asian and Australian fauna was first identified by Alfred Russel Wallace, the nineteenth-century British naturalist, who spent eight years on expedition within the Indonesian archipelago (Monk et al. 1997). He showed that the distribution of larger Asian animals ended on the western side of the imaginary line – now known as Wallace’s Line – separating Kalimantan from Sulawesi, and Bali from Lombok. In between this line and Papua island lies the transitional zone, known as Wallacea, where Sulawesi is located in its centre. Owing to the large number of small islands and their more complex geological history (see a detailed review by Audley-Charles 1987 in Whitten et al. 1987), the Wallacean fauna is neither entirely of Asian nor Australian origin, nor is it a mere mixture of the two major groups. In fact, many unique creatures have evolved there that are found in neither of the two main biogeographic zones. For example, Sulawesi has several species of primates (characteristic of Asian fauna), marsupials (characteristic of Australian fauna), and two large mammal species that are endemic to this island (see Section 4.3) (Monk et al. 1997; Whitten & Whitten 1992).

Although the whole archipelago occupies only 1.3% of the total land mass on Earth, it harbours a very high faunal diversity. On the basis of number of species in key groups of organisms and their limited global distribution (i.e., their level of endemism), Mittermier et al. (1997) listed an impressive record of Indonesia’s biodiversity. Globally, it has the second richest populations of mammals (515 species, 39% endemic); it ranks fourth in reptile diversity (511 species, 29% endemic); fifth in bird diversity (1531 species, 26% endemic); sixth in amphibian diversity (270 species, 40% endemic), and third in freshwater fish diversity (a total of 1400 species) (Kottelat et al. 1993).

In addition to having a complex geological history and unique biogeographic position, Indonesia is part of the ‘ring of fire’, with 155 active volcanoes scattered around its islands. These volcanoes have largely had a positive impact by creating fertile lands through lava flows and ash deposits, especially in Java and Bali, the most volcanically active regions in the world (Whitten et al. 1996). Altogether these physical conditions, the islands’ varied topography, and their location in the humid tropics – with abundant sunlight and rainfall throughout the year – provide a rich environment where a high diversity of plants flourish in about 90 types of known ecosystems (Whitten & Whitten 1992). Within these ecosystems live 10% of the world’s known plant species, 55% of which are endemic. Indonesia is thought to have nearly 60% of all tropical forest in Asia, and at the global level, it has had the richest forest in terms of commercial timber production (FWI/WRI/GFW/ 2001; World Bank 1990). Of particular economic importance is the timber-producing family of Dipterocarpaceae, which has a total of 300 species, 155 of which are endemic to Kalimantan (Newman et al. 1999a, 1999b, 1999c), and the palm family with the highest species diversity in the world (477 species, 225 are endemic). The high diversity of plants has also placed Indonesia in the top rank among the megadiversity countries (Mittermeier et al. 1997).

Historically, the country’s natural wealth and its location as the hub of an important trade region – between Australia in the south and Asia in the north, and between the Indian and Pacific Oceans – have attracted explorers and traders, primarily from Europe, the Middle East, China, and South Asia, to travel and settle (Colfer & Resosudarmo 2002). They brought with them their cultures of Hinduism, Buddhism, Islam, and Christianity. In major parts of the country these have been, to various degrees, mixed with or have totally replaced the original animistic beliefs (Geertz 1960), forming a rich mixture of cultural traditions. For example, in Sulawesi, the coastal cities in the south and Gorontalo in the north are primarily influenced by Islamic traders; the highland of Toraja in the south and the Minahasa Peninsula in the north have had a strong Christian influence from the Dutch, who excelled in

developing plantation cash crops there (Whitten et al. 1987). The Palu region in the centre has had an equal mixture of both Islam and Christianity (Li 2007). Indeed, globally Indonesia is identified as the third most culturally diverse country, with at least 336 distinct cultures recognised (Mittermeier et al. 1997).

As well as being culturally diverse, the people of Indonesia are known as the most ethnically diverse in the world, with approximately 300 ethnic groups. The two dominant ethnic groups are Javanese (40.6%) and Sundanese (15%) on Java, but every other main island is dominated by different ethnic groups (CIA 2007). For example, despite its relatively small size and population, Sulawesi has seven main ethnic groups, with the Bugis being the largest (2% of the national population). Other groups are the Minahasa, Toraja, Gorontalo, Luwuk-Banggai, Bunku-Mori, and Muna-Buton (Whitten et al. 1987).

The combination of ethnic and cultural diversity has led to a high diversity of languages, with more than 500 languages and dialects spoken countrywide. However, this was seen as a hindrance in the nation's fight for independence from the Dutch, and led Indonesian leaders to unite all people of different ethnic groups and languages. In 1928 they declared the country a single nation with one common Indonesian language: *Satu Nusa, Satu Bangsa, Satu Bahasa* ('One country, One nation, and One language'). Since independence (17 August 1945), the country's national motto has been 'Unity in Diversity', based on the state ideology of *Panca Sila* (the Five Pillars of the Republic of Indonesia). The first vice-president of Indonesia, Mohammad Hatta, stated that the common ground for striving for unity was the feeling of a common fate and plight (*perasaan senasib sepenanggungan*) among groups of people who, for three and half centuries, had been under colonial powers (Lanti 2001).<sup>5</sup> Despite the turbulent and often violent periods in certain parts of the country (particularly in Aceh, Papua, and Jakarta) the diverse nation has held together over the past six decades. The government has made great strides in making Bahasa Indonesia<sup>6</sup> the national language through its national education system, and now most people speak it (CIA 2007).

In 2005, Indonesia (with a land area of 1,860,359 km<sup>2</sup>) supported a population of 219.2 million people, making it the fourth most populous country in the world (BPS 2005/2006; CIA 2008). However, the population density varies greatly across the islands. For example, Java occupies about 7% of the total land area, but it is inhabited by 59% of the total population, with a density of 1,002 people/km<sup>2</sup> (13,102 people per km<sup>2</sup> in the capital city of Jakarta). The island has the most fertile soils and is thus able to support and feed many more people compared to the Outer Islands,<sup>7</sup> which are characterised by extensive swamps, highlands, and steep mountains (Whitten & Whitten 1992). By contrast, Sulawesi (10.4% of total land area) has an average density of 83 people/km<sup>2</sup> and Papua (22% of total land area) is only occupied by 7 people/km<sup>2</sup> (BPS 2005/2006). Clearly, these figures mask the differences between rural and urban areas. The combination of uneven distribution of its people and

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<sup>5</sup> The Dutch began in the mid-1600s until 1945, with a brief interval of the British in the late 1800s, particularly in Java, and the Japanese occupation from 1942 to 1945. The Portuguese colonised the eastern part of Timor and the surrounding small islands from the beginning of the 16<sup>th</sup> century.

<sup>6</sup> It was devised as a *lingua franca*, rooted in the Malay language with a mixture of local languages such as Javanese and many adaptations of English, Dutch, and Portuguese vocabulary.

<sup>7</sup> Defined as those islands other than the densely populated Java and Bali (Colfer et al. 2001).

varied natural endowment across the islands has strongly influenced the general pattern of socio-economic development in Indonesia, briefly described in Section 2.2.

## **2.2 The importance of forest in Indonesia's economy**

Since the country's independence in 1945, the forest has continued to play a role in financing the nation's development activities (Barr 2001; Gillis 1988; Kartikasari 1995; Sunderlin 2002) by providing economically valuable goods. First, revenues from timber extraction and the associated processing industry rank second after the oil and gas sector. Second, the extraction of numerous non-timber forest products (NTFPs), such as fuel wood, rattan, resin, bamboo, wild honey, fruits and nuts and wildlife products provide livelihoods, both for subsistence needs and sale, for at least 20 million people (or 10% of the total population) in the 1990s (Barbier et al. 1994a; Sunderlin et al. 2000). Third, there are numerous wider economic and social benefits associated with timber production and trade, such as rural infrastructure development, expansion of agricultural land, transmigration programmes, a significant impact on regional development (Burgess 1993), and opportunity for tourism in conservation areas (Direktorat Jenderal PHKA 1999).

Equally important are many ecological services that forest ecosystems provide, such as hydrological regulation for the surrounding watershed areas, protection of soil against erosion and nutrient losses, fixation of carbon, provision of habitats for globally important wildlife, as well as the preservation of valuable genetic resources. Because of the difficulty in assigning a monetary value to these services, they are often undervalued or even ignored when accessing the benefits derived from the forest and yet they are irreplaceable once the forest is gone. Examples of recent work to demonstrate the monetary value of these services in some major conservation areas during the 1990s are available in the Indonesian Biodiversity Strategy and Action Plan 2003-2020 (IBSAP) (National Development Planning Agency 2003).

Despite these contributions, natural forests are under increasing pressure from socio-economic activities. The management of forest and its resources has long been centrally controlled since the Dutch occupation in the mid-17<sup>th</sup> century right through to when the New Order Government collapsed in 1998 (Gunarso & Davie 2000; Peluso 1992). Key national policies that reflect this are outlined in Section 2.4.

## **2.3 Major economic and political changes**

As noted in Section 2.2, extraction of and international trade in natural resources such as spices, horticultural crops (mainly sugar, coffee, and indigo) and, later on tropical timber, were the main attraction for other nations to come to Indonesia at the beginning of the sixteenth-century. Indeed, the Dutch funded their economy primarily from these activities in the *Dutch East Indies* – the name of the regions that, since independence, have been known as Indonesia (Dick 2002). This region was richer than many European nations before the arrival of colonialism in the 1600s (Reid 1980). However, at independence in 1945, the country as a whole was in a state of bankruptcy; limited forms of 'development' only occurred in Java and Sumatra (Booth 1998; Geertz 1963a).

Post-independence development has been characterised by three distinct governments: the Old Order (under Soekarno, from 1945 to 1966), the New Order (under Suharto, from 1966 to 1998), and the Reform period (1998 to the present).<sup>8</sup> Each of these has its own political doctrines and economic approaches, as summarised in Table 3.1. Soekarno's was a socialist approach to economic development that emphasised domestic investment and co-operative models instead of competitive capitalism (Dick 2002). This meant that there was a lack of investment for the newly born country to progress economically, which led to macro-economic instability. Politically, Soekarno's strategy of 'guided democracy' of integrating nationalism, religion, and communism (*Nasakom*) did not succeed in curbing the political instability that marked many parts of Indonesia in his two decades of presidency. This reportedly culminated in the failed coup by the Communist Party in September 1965, which ended Soekarno's rule in 1966, leaving Indonesia's economy at a standstill, with soaring inflation of 636% and 25% unemployment, and a ballooning foreign debt (Glassburner 1988).

The second period of development began under General Suharto's leadership. His approach was the opposite of his predecessor's social, economic, and political policies. To bring the chaotic nation back to some form of stability, Suharto promoted a development doctrine popularly known as the Three Pillars of Development (*Trilogi Pembangunan*): political stabilisation, economic growth, and distribution. To achieve the goals of the first pillar, he reduced the many political parties (a total of 34) that characterised the Old Order into three, with *Golongan Karya* (*Golkar*) as the strongest one. *Golkar* received its primary support from a compulsory membership for all civil servants, which provided a platform for Suharto's administration.<sup>9</sup> He was also supported by the military, although only in Java because the Indonesian military was divided internally (Barr 2001). To gain support from the Outer Islands he used the rich forest there, which remained largely intact until the 1970s (see Section 2.4), as a strategic and valuable resource for generating badly needed foreign exchange. It was distributed through informal patronage networks of military leaders, business tycoons, and a small number of family members, who, in return for their support for Suharto, were generously rewarded with business concessions, tax exemptions, and bank loans (Barr 2001; Colfer & Resosudarmo 2002; Osgood 1994).

The second pillar, economic growth, was characterised by agricultural intensification, known as BIMAS or 'mass guidance', and development of a strong industrial sector, again primarily on Java. The former, which escalated Indonesia from being the world's largest rice buyer to being self-sufficient (Whitten et al. 1996), has been considered the most impressive achievement of the New Order government (Booth 1998). The latter, specifically in the Outer Islands, was primarily based on extensive extraction of natural resources (see Section 2.4). Both programmes were supported by high foreign investment and the windfall profits from exporting oil, which in the 1970s contributed to about a sixth of the nation's GDP (Gillis 1988; Schwarz 1994). Indeed, under this capitalist approach many parts of the country prospered. As a result, the country as a whole was transformed from an agricultural nation to

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<sup>8</sup> Whereas the first two presidents were each in power for decades, in the Reform period Indonesia has been led by four different presidents in one decade: B.J. Habibie (1998-1999), Abdulrahman Wahid (1999-2001), Megawati Sukarnoputri (2001-2004), and Susilo Bambang Yudhoyono (2004-present).

<sup>9</sup> The five general elections that took place during the New Order era, all of which were won by Suharto, thus bore little resemblance to the true democratic process (Colfer et al. 2001a).

**Table 2.1 Main features of economic and political changes during post-independence Indonesia**

Main features	Old Order (1945-1966)	New Order (1966-1998)	Reform (1998 to present time)
Development ideology	Socialist, rejection of colonialism and western capitalism	Three Pillars of Development: political stabilisation, economic growth, and distribution of revenues.	Rejection of centralised political and economic power by strengthening people's political power.
Model of economic development	Co-operative as a basis for people's social welfare	Introduction of systematic five-yearly development plans known as 'Pelita',	People-centred economy focusing on equity of economic growth.
Political system	Guided democracy to fit with indigenous norms. There were 34 political parties. Political conflicts occurred in many parts of Indonesia.	Reduction of political parties from 34 to 3 parties, dominated by the Golkar	Encourages many parties (48) with a decentralised political system. The link between central and regional government is of co-ordination, not instructional as dictated by the previous regime.
Development platform	Integration of nationalism, religion, and communism.	Neo-liberal, return to western capitalism, heavy reliance on foreign loan and investment.	Democracy and decentralised management of resources.
National stability	Poverty and diverse culture hampered radical economic and political approaches.	Conducive for economic growth but repressive regime that progressively diminished the existence of diverse political aspirations.	Ongoing struggles towards real democracy. Direct election of the president for the first time.
Macro-economy	Instability, rocketing rate of inflation, lack of investment, structural rigidity.	Establishment of long-term development plan that integrated budgetary, fiscal, monetary, and balance of payment policies, began in 1969.	Slow recovery from a multi-dimensional crisis of 1997 and stronger role of international financial institutions in the recovery of Indonesia's economy.

Sources: compiled from Booth (2003; 2001) and Sabandar (2005).

a newly industrialised one in less than two decades (World Bank 1990, 1994). Overall, the economy grew at 7% annually until 1981, and then declined to 4.3% during the 1980s, but picked up again at 7% in the 1990s until the financial crisis hit in 1997.

However, critics have said that this impressive growth was achieved at the expense of the environment and human rights. When the depreciation of natural resources, such as forest, is incorporated into the traditional economic valuation, the real growth in the 1970s was only 4% (Repetto 1989). Moreover, the eastern regions are rich in natural resources, such as minerals, oil, and timber, but 80% of the GNP originated from economic activities in the western regions; hence, there was a wide gap between these regions.<sup>10</sup> For example, in 1997, Jakarta's economic size was as large as the whole of eastern Indonesia (Booth 2000) or 42 times that of South-east Sulawesi (Sabandar 2005).

The problems associated with a highly centralised political system and unequal distribution of benefits from high economic growth were addressed by introducing the Development Acceleration Programme for Eastern Indonesia (Haeruman 2000). However, the policy had limited success because the central government retained the power to plan the region's development programme and controlled the distribution of the development fund, for which the western region enjoyed a much stronger political connection<sup>11</sup> (Sabandar 2005).

Overall, during the Suharto period the people enjoyed high economic growth and social development. For example, the proportion of the population living below the poverty line was reduced from 70% in the 1970s to 15% in the mid-1990s (Schwarz 1994). However, the triad of corruption, collusion, and nepotism (*Korupsi, Kolusi, dan Nepotisme* – KKN) became systematically embedded during his presidency. The bureaucracy was characterised by an informal philosophy of *bapakisme* or *asal bapak senang* (ABS) where obedience to and pleasing one's boss were deemed virtuous. The ABS contributes to the KKN because, for instance, bad news is not reported, preventing problems from being addressed, and freedom of speech was strongly suppressed by Suharto's military support (Colfer & Resosudarmo 2002). The KKN affected the use of state funds. For instance, in 1999-2000 alone about US\$20 billion (46% of the total) was unaccounted for due to 'irregularities' (Barber 2002), and the World Bank estimated that 30% of the loans allocated during the Suharto government were lost to corruption. In 1997 the financial crisis occurred in Southern Asia, with Indonesia being hardest hit. Its status dramatically changed from a newly industrial country to one of the poorest: per capita income was more than halved, from US\$1,000 to US\$480 (Thee 2002) and the GDP contracted by 13.7% (ibid). Consequently, the proportion of the population living below the poverty line increased to 24% in 1998. This figure, however, reflected the poverty level in urban areas only; it is believed that the percentage in rural areas was as high as 72% (Sunderlin et al. 2000).

When Suharto was forced to resign in 1998, and B.J. Habibie took office, the country was politically unstable. There was widespread violent conflict in support of demands to dismantle or reshape the policies, practices, and institutions associated with Suharto's New Order regime. Habibie accommodated the demand for political reform by allowing a

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<sup>10</sup> The two regions, western (Java, Sumatra, and Bali) and eastern (Kalimantan, Sulawesi, Papua, Mollucas and Lesser Sunda Islands), are geographic terms, but the latter was introduced as a political term and a formal development term – Kawasan Timur Indonesia (KTI) – in President Suharto's Annual Budget speech (Chauvel 1996 in Sabandar 2005).

<sup>11</sup> The provincial governors were 'hand picked' by the Ministry of Home Affairs, the military commanders were under a close watch from Jakarta, and the local legislature had little influence on the planning and implementation of development in their regions (Booth 1998).

democratic general election in 1999, with 43 political parties contesting for the nation's leadership. During Habibie's presidency, the reform process started and progressed rapidly. Most importantly, freedom of expression (particularly by the press) was dramatically increased and the central government began the preparation of decentralisation policies.

**Table 2.2 Major national policies affecting forest administration in Indonesia, 1957-2004**

Name of Law/Government Regulation	Main features
The National Constitution (Article 33) of 1945	Central government's control over all forms of natural resources.
Government Regulation No. 64 on the Transfer of Partial Authority in the Field of Sea Fishing, Forestry, and Community Rubber Production to Autonomous Region Level 1 of 1957	Decentralised authority to issue permits for small-scale timber extraction in the Outer Islands parallel with central government's control over forest.
The Basic Agrarian Law (5/1960)	Rights to land were officially classified, with recognition of land ownership under <i>adat</i> regulations.
The Basic Forestry Law (5/1967)	The central government has a comprehensive legal-regulatory control over all types of natural resources, including forests.
The Investment Laws (1/1967 and 6/1968)	Promoting domestic and foreign investment for exploitation of natural resources.
Various Government Regulations banning the export of logs	Log export ban (1980 to 1992 to encourage the development of domestic timber processing industry); Prohibitive tariffs (1992-2001, and reimplementations of export ban in 2002).
Government Regulation 62/1998 and 6/1999	Decentralising authority to issue small-scale permits for extraction of timber and other forest products.
The Regional Autonomy Law (22/1999)	Decentralising governance of all matters to the regions, except in relations to foreign policy, national security and justice, and monetary and fiscal policy.
The Fiscal Balancing Law (25/1999)	Regulating the distribution of revenues between the national and regional governments.
Forestry Law 41/1999	Revising the Basic Forestry Law of 1967, in practice recentralised control over forest estate, although various customary systems of forest management were provisionally legitimised.
Government Regulation 34/2002	Revoking the regional authority to issue timber extraction permits; all forest planning must be approved by the MoF.
Government Regulation 35/2002	Regulating the allocation, administration, and utilisation of the Reforestation Fund.

Source: Barr et al. (2006).

In 1999, two important policies were enacted: Law 22 on Regional Autonomy<sup>12</sup> (RAL) and Law 25 on Fiscal Balancing between Central Government and Regional Governments (hereafter FBL).<sup>13</sup> How these policies play out in the swings of the pendulum of control over the nation's forest are described in Chapter 8. One of the immediate effects of the RAL was the creation of new provinces, districts, and villages; by 2001 five new provinces had been created, including Gorontalo (Chapter 4). Some suspected that the creation of administrative units was to give local government officials an opportunity to benefit financially from the new FBL (Colfer & Resosudarmo 2002). Evidence from the forestry sector showed that local bureaucrats took up similar corrupt practices, in various forms, to those formerly practised by the central officials (see Section 2.5 and Chapter 8). The successive governments were tasked with reforming Indonesia. However, during Wahid's administration the country was still struggling after the financial crisis in 1997 that led to crises in other dimensions. Politically, at least two provinces demanded independence (Aceh and Papua) and the heavy hand of the military was questioned. Owing to the greater press freedom, several of Suharto's cronies were identified in major corruption scandals, although none was prosecuted. Wahid's assistants were implicated as a result of a series of corruption cases. He was succeeded by Megawati Soekarnoputri in July 2001. During her term of office, and that of Susilo Bambang Yudhoyono who subsequently replaced her in 2004, the GoI desired to return the economic platform to a people-centred economy (*ekonomi kerakyatan*). However, this was hampered by many factors, including the high level of external debt (Barr 2001), the larger role of international institutions (the World Bank and IMF) in determining the structural adjustment programme, and the basic lack of alternative visions of economic development among the country's leaders (Rice 1999).

## 2.4 Rights and control over forestland

The Indonesian legal framework which governs the use of forestland is highly complex, with ambiguous and often contradictory rights to the resources within it (MacKinnon 1995; Wrangham 2002). This section provides a brief summary of the laws and regulations, focusing on the legality of ownership and rights to forest and its resources and the distribution of benefits derived from it. This research primarily covers the period from the beginning of the New Order (1966 to 1998) to the beginning of the Reform period (1998 to 2005), but the Old Order (1945 to 1966) is described briefly because of the enduring effect of national forestry policies created during that period. Key policies issued over this period that have an immediate effect on forest administration are summarised in Table 3.2. It is intended that this brief outline will help readers understand the problems associated with forest conservation described in detail in Chapters 6 to 9.

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<sup>12</sup> Law 22/1999 principally delegates the government authority from the central government to autonomous regions (defined as provincial, and district/municipalities). The hierarchical relationship between central, provincial, and district levels is changed, with the role of provincial government now being co-ordinative, instead of instructive (Barr et al. 2006).

<sup>13</sup> Law 25/1999 on Fiscal Balancing regulates the distribution of revenues between the national and regional governments. Under this law, the latter have a greater authority and responsibility to manage their own budget and raise their own revenue to fund their own regional development. More specifically, in the forestry sector, the local governments' share of the Forest Resources Provision (PSDH) was increased from 45% to 80% and they receive a share of 40% of the Reforestation Fund (DR), all of which was previously retained by the central government (Colfer & Resosudarmo 2002).

### 2.4.1 The dichotomous control over forests

The legal framework adopted in 1945 by the newly independent government was largely predisposed to timber production, based on the principle of scientific forestry as the Dutch had applied it on Java since the late nineteenth century (see a detailed review in Peluso 1992). By contrast, Dutch interest in the Outer Islands was focused on controlling the non-timber resources, while the management of forest was left to indigenous rulers through traditional right systems (*adat*), to which the Dutch gave minimal recognition (Djajapertjunda 2002 in Barr 2006).

At independence in 1945, this legacy was strengthened in the Constitution (Article 33), which stipulated the rights and responsibilities of the state to control (*menguasai*) all forms of natural resources for the general well-being of the people. Indeed, since then this article has been the basis for justifying centralised management of natural resources, including the forest.<sup>14</sup>

Under the Old Order, it was only in 1957 that the administration of state land outside Java was officially defined through the issuance of Government Regulation (GR) No. 64 on the Transfer of Partial Authority in the Field of Sea Fishing, Forestry, and Community Rubber Production to Autonomous Region Level 1 (province).<sup>15</sup> This policy gave authority to provincial government to issue small-scale (from 5,000 ha to 10,000 ha) timber extraction permits and licences to harvest non-timber forest products (NTFPs). Provincial Forestry Services (*Dinas Kehutanan Propinsi*) were also allowed to extract taxes and royalties from these activities in their jurisdictions. Parallel to this decentralised system, however, the central government extended its arms through the Regional Forestry Office (*Kantor Wilayah Kehutanan*) in all provinces. Thus began the isolated experiment of decentralisation<sup>16</sup> and deconcentration of forest administration that lasted four decades until 2001, when the RAL took effect. Under this dual administrative system, the central government's role was to provide guidance to provincial officials in forest management matters and to control timber exports. However, in implementing these, the latter had to adhere to the forest management classifications defined by the former (Barr et al. 2006).

While GR 64/1957 clarified the management authority, it did not define the ownership and control of sizeable forests, which for generations had been managed by local communities.

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<sup>14</sup> Under this legal provision, rights to land, including forestlands, fall into three categories: (1) *adat* (based on unwritten traditional/customary law, which varies across the country) that include both communal and individual rights; (2) land registered under the Indonesian Civil Code (later the Basic Agrarian Law 5/1960); and (3) state land, defined as all land that could not be proved to be owned and thus could be leased for plantations. The fact that these state lands, primarily in the Outer Islands, had been occupied by local communities for generations, often led to conflicts. Nevertheless, these local rights were at least recognised on paper (Resosudarmo et al. 2006).

<sup>15</sup> This policy came about when the relationship between the central and regional governments was strained, when several military commanders protested at Sukarno's attempt to abolish Parliament. It was suggested that this policy was largely to appease the regions and to assure them that Jakarta would not exert claims over the timber resources in the Outer Islands, like it did for petroleum reserves in the 1950s (Thiesenhusen et al. 1997).

<sup>16</sup> The literature defines decentralisation as 'any act in which a central government formally cedes power to actors and institutions at lower level in a political, administrative, and territorial matters?'. Two types of decentralisation are known: Deconcentration or administrative decentralisation and political decentralisation. While the former involves the transfer of administrative responsibilities, the latter occurs when decision-making power and control over resources are transferred to local authorities (Ribot 2002).

Access rights to resources therein, which in many parts of Indonesia represent the core of livelihoods, were left to be regulated by local rulers under *adat* systems. The co-existence of statutory and *adat* rules, which under the Dutch legal system had been allowed (Li 2007), continued until 1960 when the Basic Agrarian Law (BAL) was issued<sup>17</sup> (Wrangham 2002). The BAL recognised the various rights under *adat* systems but only as long as they did not interfere with state or national interests, one of which is production of forest commodities (Potter 1991; Thiesenhusen et al. 1997).

Forest resources featured prominently in the Old Order seven-year national development plan in 1960, which aimed at generating US\$52.2 million in foreign exchange earnings. However, towards the end of Sukarno's rule (1965) Indonesia exported only 209,000 m<sup>3</sup> of hardwood logs, generating US\$2.6 million (FAO Yearbook various years, cited in Barr 2006).

#### 2.4.2 Centralised forest management (1967-1997)

As noted in Section 2.3, when Suharto took over power in 1966 the country was in a state of bankruptcy. He turned to the forest in the Outer Islands as the main source of revenue to fund economic development during the three decades of his term of office. The Basic Forestry Law of 1967 (*Undang-Undang Pokok Kehutanan* No. 5, hereafter the BFL) was issued, giving the state comprehensive legal-regulatory control over 143 million ha (75% of the nation's land area) that was designated as 'forest estate' (*Kawasan Hutan*) (Barr 2001). The Ministry of Agriculture (via the Directorate General of Forestry – DGF) was tasked with fulfilling a range of objectives for the management of the forest estate,<sup>18</sup> including production of timber, watershed protection, and conservation of flora and fauna. The immediate objective of the BFL was for forest exploitation (*pengusahaan*) rather than management (*pengelolaan*), and the needs of local communities were further sidelined (Wrangham 2002).

To accelerate the extraction of resources within this vast state land, the government aggressively promoted foreign and domestic investment by issuing three laws within less than a year: 1) Basic Mining Law No. 11/1967; 2) Foreign Investment Law No. 1/1967; and 3) Domestic Investment Law No. 6/1968. In addition, two government regulations specifically related to forests were issued in 1970: Forest Exploitation Rights and Forest Products Harvesting Rights (GR 21/1970) and Forest Planning (GR 33/1970).<sup>19</sup> Together, the BFL, the

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<sup>17</sup> Under this Law, rights over land were differentiated into four: (1) right to own (*hak milik*); (2) rights to cultivate state land (*hak guna usaha*, e.g., for plantation, logging that may be granted for up to 35 years and may be extended); (3) rights to build and own buildings (*hak guna bangunan*); and (4) rights to use or collect products from state/private land for a certain period (*hak pakai*).

<sup>18</sup> The forest estate is classified based on its functions as 'Production Forest', 'Protection Forest', 'Nature Conservation Forest', and 'Recreation Forest'. In the late 1980s, another category, 'Conversion Forest' was added to cover degraded forest lands designated for permanent conversion to other uses (Barr 2006). Definitions of category of forest: Nature Conservation Forest is set aside for conservation of flora and fauna (biodiversity). 'Protection Forest' is intended primarily for watershed protection. Restrictive felling is only allowed in the Limited production forests. Permanent production forest can be commercially exploited. Conversion forest indicates that the forest land may be converted into agricultural and other uses.

<sup>19</sup> The planning procedures: inventory, survey, boundary determination and marking to classify the forest estate were detailed in Government Regulation 33/1970. However, systematic forest classification did not take place until 1984, when the Directorate General of Forestry (DGF, then under the Ministry of Agriculture) sent a memorandum to the Governors of all provinces, informing them that the DGF would prepare a 'Consensus of Forest Land Use Plan' (*Tata Guna Hutan Kesepakatan*, TGHK), in co-operation with all agencies involved with land use at the provincial level (Barber 1990, as cited in Barr 2006).

investment laws, and the two government policies became the framework for systematic large-scale timber extraction; 50 million ha of forest estate were made available for this (Barr 2006). Furthermore, to facilitate the exploitation of this vast production forest, the DGF was given the authority to issue a 'Right of Forest Exploitation' (*Hak Pengusahaan Hutan, HPH*)<sup>20</sup> to state-owned corporations and private companies. These concession holders were required to apply the 'Indonesian Selective Cutting System' (*Tebang Pilih Indonesia*) to ensure a sustainable harvest of timber; provisions for replanting the logged forest are part of this system. Under the HPH system, the BFL basically strengthened the central government's control over forestland, and restructured the relationship between the national and provincial governments. The former's access to forest in the Outer Islands and its authority to grant rights for its exploitation expanded considerably (for areas larger than 10,000 ha), but the latter's licensing authority remained the same as stipulated in Government Regulation 64/1957.

Government revenues from the forest sector were generated primarily from the collection of various taxes, two of which were license fees (*Juran Hak Pengusahaan Hutan, IHPH*) and the Forest Resource Rent Provision (*Provisi Sumber Daya Hutan, PSDH* or previously known as *Juran Hasil Hutan, IHH*) that are divided between the central and regional governments according to various formulae.<sup>21</sup> The shares of these revenues prior to 1999 received by the central, provincial, and district governments were: 30%, 56%, and 14% respectively. In 1980, another fee, the Reforestation Fund (*Dana Reboisasi, DR*), was introduced as a bond to support reforestation of logged-over forests and forest rehabilitation activities. Unlike the other two sources of revenue, however, Jakarta took full control of the DR and also of the timber export tax (set at 10% of the value of logs exported) although the former was restructured through Law 20/1997 on Non-Tax State Revenues (Resosudarmo et al. 2006). The provincial and district state forestry agencies also collected a variety of lesser fees, including a regional development royalty, log pond and grading fees, as well as transport and port fees (Barr 2001). On the whole, this rent collection system was criticised (FWI/WRI/GFW/ 2001; Gillis 1987, 1988) as it under-priced the timber both in terms of the value of the timber and in relation to the fees that logging companies were required to pay in neighbouring timber-producing countries. In this system, the majority of timber rents generated from a logging concession flowed to HPH holders instead of to the state, which received less than a third of the total rent generated (Gillis 1988).

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<sup>20</sup> Under Government Regulation 21/1970 the HPH contract provided the concession holders with non-transferable exploitation rights to a given area for a period of 20 years.

<sup>21</sup> The IHPH is a one-time area-based fee paid at the commencement of an HPH contract. The amount of fee per ha varies between regions. In 1998, for example, the fee in Kalimantan was Rp 50,000/ha or about US\$500,000 for a 100,000 ha concession. The PSDH or IHH is a volume-based royalty on each cubic metre of timber harvested. The rate was set at 6% of the reference price determined by the Ministry of Industry and Trade. For example, the reference price for *Shorea spp.* logged in Sumatra, Kalimantan or Sulawesi was set at US\$5/m<sup>3</sup>, so the fee for each cubic meter of log harvested was about US\$3.54. The DR is a volume-based fee on each cubic meter of timber harvested. The rate is set in US dollars but the amount varies according to the type, grade, and location. For example, the DR for *Shorea spp.* in Kalimantan in 1998 was US\$16/m<sup>3</sup>. Furthermore, the DR was managed by MoF and it was not included in the national budget; its use was under the full discretionary control of President Suharto until 1997, and it was used, for example, to fund Habibie's airplane industry, among other things (Resosudarmo et al. 2006).

The BFL and other implementing regulations effectively transformed the state of the Outer Islands' natural forests in the ensuing three decades (1967 to 1997), with active involvement from both the central and provincial governments. This was achieved through two distinct programmes described below: the expansion of commercial timber extraction in the 1970s and the development of domestic forest-based industry from the 1980s to the end of 1990s.

#### *Expansion of timber exploitation*

Immediately after the BFL was implemented, the DGF allocated 10 million ha of forest well-stocked with high-value Dipterocarp timber (e.g., *Agathis* spp., *Shorea* spp., and *Dipterocarpus* spp.) for large-scale logging operations. At the same time, provincial and district governments issued numerous small-scale logging permits in their jurisdictions, which altogether accounted for 2 million ha. The high demands for tropical hardwood and its abundant supply in East Kalimantan (one of the regions rich in forest), for example, led to a proliferation of log speculators who benefited from a rapid and high return on investment. The reported log production in this province alone accounted for 60% of the total (Manning 1971; Peluso 1983). In many cases the small-scale operators outcompeted the HPH permit holders by selling logs more cheaply because of their lower operational and transportation costs. They did so by applying non-mechanised timber extraction methods and rafting logs down rivers during storm floods – hence the name *banjir kap* (literally ‘floods of logs’) (Obidzinski 2005).

On the basis of perceived unfair competition between large- and small-scale operators, in 1971 the central government stopped the *banjir kap* system, revoked provincial government's authority to issue logging permits, and required the minimum size of a logging area to be at least 50,000 ha (Barr 2006). The official reasons for this policy were the small-scale operators' poor logging practices and the difficulty in monitoring their enormous numbers. Contrary to the imminent central government plan for industrial forestry development, it was also unlikely that they would be making long-term investments as required in the HPH contracts. The policy provided political advantages to the central government, in terms of patronage. So, on environmental, economic, and political grounds the *banjir kap* system was deemed unsustainable and the distribution of permits effectively became centralised (ibid).

Overall, national log production increased almost fivefold, from 6 million m<sup>3</sup> in 1966 to 28.3 million m<sup>3</sup> in 1973, generating US\$562 million (18% of total foreign exchange earnings, second after oil) that contributed 2.9% of the GNP. Moreover, by 1979 Indonesia became the world's main exporter of tropical timber, supplying 44% of the world market share and earning US\$2.1 billion (Gillis 1988). However, the central government's hegemony in forest resources exploitation meant that the largest share of revenues from this sector was taken to Jakarta. Furthermore, only a small portion (15%-27%) of the foreign exchange earnings went into the government treasury; most of it (63%-85%) went into the hands of the private companies (Barr 2001).

In addition to having lucrative profits, the HPH holders were known to have harvested approximately twice the reported volumes of cut timber (Kartodihardjo 1999; McCarthy 2000; Obidzinski 2005). It was not uncommon that they cut areas outside their approved

annual work plans as well as in areas outside their concessions. This illegal practice went unchecked and continued during the next stages of forest-based industry growth due to the following structural factors: (1) lack of specific guidelines in the HPH contract for companies to follow during the 20-year leases;<sup>22</sup> (2) lack of human and institutional resources within the forestry department to effectively monitor the vast areas of forest under concession; and 3) the widespread involvement of state and military elites in the timber operations, providing the companies with regulatory immunity, which made enforcement of HPH contracts very difficult (Kartodihardjo 1999). In this centralised timber exploitation system, this type of collusion also occurred at local government level where regional military commanders and forestry officials frequently worked together to extract monies from timber companies within their jurisdiction in return for the 'protection' they provided and the corrupt handling bureaucratic of services (Barr 2001, 2006; McCarthy 2000; Obidzinski 2005).

With timber exploitation continuing at a high rate, the GoI made a dramatic decision to phase out the export of logs in 1981, which eventually led to a total ban in 1985. Meanwhile, the poorly controlled timber expansion started to show its negative environmental impacts, such as deforestation due to failures of replanting after the timber is extracted and decline in biodiversity (Meijaard et al. 2005; Rijksen et al. 2001). The rate of deforestation during this period was estimated to be around 600,000 ha annually and in 1980 the GoI imposed a Reforestation Fee of US\$4 for each cubic metre of log harvested. This refundable fund<sup>23</sup> was collected by the MoF, based on satisfactory replanting by loggers. However, this policy was ineffective since the fee was far too low compared to the cost of replanting (Gillis 1998). This led to a great concern for the future supply of raw materials as well as the sustainability of the resource base; with a limited supply of wood coming from plantation forests, it can be inferred that most was harvested from natural forests.

The policy to ban log exports was intended to create a higher and more stable price for timber exports and to assist domestic timber-processing plants by ensuring a constant supply of raw materials. It forced timber companies to invest in plywood production if they wanted to maintain the lucrative profits they had enjoyed previously. It also led a large number of foreign companies leaving Indonesia and HPH holders either sold their concession rights or aligned with larger firms. This reduced the number of HPH holders to only ten timber conglomerates, controlling 27 million ha of forest (or 42% of the total 64 million ha allocated for timber production). These groups later controlled 40% of the total plywood production capacity (Brown 1999, cited in Barr 2001). Consequently, government revenue dropped due to the cheaper price of logs diverted from export (amounting to US\$15/m<sup>3</sup> at the world price) that was not compensated for by any gain in value added due to inefficient timber processing (representing a further annual loss of earnings of about US\$130 million from 1979 to 1982). Moreover, the ban led HPH holders to sell almost all the timber they produced to the processing industry at a price far below the international market price, hence promoting both inefficient harvesting and processing operations (Manurung & Buongiorno 1997). Meanwhile

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<sup>22</sup> The Annual Allowable Cut (AAC) was set as 1/35 of the total concession. This had encouraged timber companies to log areas outside the approved work plans so that they could fully exploit their concession during the contract period of 20 years. Actually the contracts themselves were not bad - they just weren't enforced (c. Colfer, pers.comm.)

<sup>23</sup> In 1989 this was restructured as a nonrefundable forest levy (Barr 2001).

forest product prices were falling worldwide and the net loss in annual export earnings was between US\$725 million and US\$850 million between 1981 and 1984. Overall, the log ban led to a decline in the forestry sector's contribution to GDP; by 1990, the forest sector only contributed 0.9% to Indonesian GDP compared to 2.9 and 2.4 in 1970 and 1980 respectively (Barr 2001).

Although Indonesia's export earnings suffered a sharp decline in 1986, which in turn caused a significant deterioration in its current account balance, its ability to draw on external sources of capital ensured that this did not generate insurmountable payment problems. Meanwhile, 1984-1989 was marked by a steep decline in oil prices and the depreciation of the US dollar after 1985. These hit Indonesia very hard because 60% of the country's external debt was in US dollars. In 1986, the Rupiah was devalued again by 45% and the development of a domestic capital market was accelerated. In addition, the restrictions on foreign direct investment were relaxed, followed by further deregulation of trade in 1988 and 1990 (Barr 2001).

#### *The development of forest-based industry*

With the wood-processing industry expanding in the late 1980s, the country's forest-based industry diversified further into pulp and paper (P&P) production. This was motivated by the vast wood supply from natural forest at a comparatively cheap price. Moreover, domestic demand for paper increased among the population that grew from 120 million people in the 1970s to 200 million in the mid-1990s (BPS 2001). The growth in this industry made Indonesia the world's ninth largest P&P producer, with an annual production multiplied sevenfold from 0.9 to 7.2 million tonnes during that period; one third of this total production was exported in 1996 (Barr 2001). By 1997 ten paper mills were in operation, producing 4.9 million tonnes annually or 68% of the industry aggregate capacity (APKI 1997 cited in Barr 2001). In contrast to the paper mills, which are concentrated in Java, some pulp mills expanded in Sumatra and Kalimantan, where the supply of raw materials was abundant.

In order to sustain and guarantee a long-term supply of fibre for these fast-growing industries, the GoI also promoted the development of industrial timber plantations (*Hutan Tanaman Industri, HTI*)<sup>24</sup> in the 1980s, by allocating a large area of conversion forest to HTI operators. Under a special permit (*Ijin Pemungutan Kayu*) HTI concession holders were allowed to cut timber from this forest estate and use it to supply fibre until the plantations were in full production (Barr 2006). To facilitate this development, financial subsidies were also made available to conglomerates engaged in this sector.<sup>25</sup> By 2000, 4.5 million ha had been allocated for HTI development but only 20% had been planted with fast-growing single tree species (MoFEC 1999 in Barr 2001).

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<sup>24</sup> The HTI initiative primarily aimed at restoring logged-over areas, by using fast-growing tree species, particularly in formerly forest-rich regions (e.g., Kalimantan and Sumatra, but much less so in Sulawesi).

<sup>25</sup> This included 14% of the project total costs as a non-refundable Reforestation Fund (DR) and over 30% of non-interest and non-collateral loan from the DR for the ten year payment period.

From 1967 to the mid-1980s the New Order focused on timber exploitation (*pengusahaan*) rather than on management of forests, the maintenance of economic value created by the forest's protective function, or provision of NTFPs. Its highly centralised policies outlined above (e.g., the BFL) effectively marginalised local communities by rejecting the latter's access to the forest and denigrating their management practices (e.g., swidden agriculture and forest gardens) (de Foresta et al. 2000; de Jong 1997; Dove 1985).

Only in the mid-1980s did the central government develop social forestry programmes in several islands, but the state's views toward local communities and their roles and status remained the same until 1997 (Lindawati 2002). Over this period, problems in forest lease enforcement, as noted earlier, and conflict of rights between concessionaires and local communities caused resentment (Potter 1991). Government's response has typically been focused on policing access to forests, relocating forest dwellers outside the forest, and changing their mode of production from shifting to sedentary agriculture (Dove 1983). Politically, different government agencies dealing with forestry issues have tended to regard local communities as a threat, destroyers of natural forests, and trespassers on state or concession forests (Colfer & Dudley 1993; Wrangham 2002).<sup>26</sup> The lack of legal structure clearly linking the forest resources to its users, limited capacity for restricting access to virgin forests, combined with ineffective enforcement of timber concession agreements and increasing demographic and economic pressures to open up forest lands (Pearce et al. 1990) have given rise to an Indonesian version of the 'tragedy of the commons' (Gillis 1988).

By the mid-1990s the forestry industry was operating beyond the capacity of natural forests to supply raw materials. Annually it consumed an aggregate of 70 million m<sup>3</sup> of wood although the official figure for annual sustainable harvest was only between 22 m<sup>3</sup> and 25 m<sup>3</sup>. Hence, the illegal supply of timber was at least three times the legal source (FWI/WRI/GFW/2001).

In response to the forest degradation that had begun in the outer islands, in 1976 the government introduced a centrally funded national *Program Reboisasi dan Penghijauan* (Reforestation and Afforestation Programme – *RAP*),<sup>27</sup> although its management became more intensive in the mid-1980s under the MoF's Directorate General of Land and Forest (MoF 2004). Furthermore, in 1984, the central and provincial governments created a joint classification system of forest functions (*Tata Guna Hutan Kesepakatan, TGHK*) (see Box 8.9) which became the basis for the design and control for HTI development (see below) and forest rehabilitation.

A comprehensive assessment of the PRR through HTI showed that instead of replanting the logged-over forests, generally with fast-growing single-species, HTI exacerbated forest degradation because the realisation rate was low (Nawir et al. 2007). In fact, many companies that obtained HTI concessions did not develop a plantation forest, but continued to clear cut the remaining standing stock of timber in their allocated forests; once they had harvested the

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<sup>26</sup> For example, in a joint decree from Ministries of Agriculture, Home Affairs, and Transmigration (SKB 480/Kpts-II/1993) forest dwellers who practice shifting agriculture were described as destroyer of forest resources (Resosudarmo et al. 2006).

<sup>27</sup> The reforestation is implemented inside state forestland, whereas the afforestation is applied to community lands.

timber, the logged-over forests were simply abandoned (Barr 2001). The combination of inadequate supervision of programme implementation and the large number of logging permits being revoked in the early 1990s (see Section 2.4) led to an increase in degraded forest areas that became subject to illegal activities. The revoking of the HPHs meant even less supervision of the area than when the HPH had at least tried to protect the area it still had some interest in. The programme was put on hold and the MoF handed over approximately 5.5 million ha of logged-over forests to the provincial governments, without funding or staff support (Nawir et al. 2007).

Only after 1999 did this top-down programme become more conceptually participatory when the RAL was put into effect. In response to the increased size of degraded forest, in 2000 the MoF prepared the Master Plan for Forest and Land Rehabilitation (*Master Plan Rehabilitasi Hutan dan Lahan* or *MP-RHL*) as the basis for planning. In 2003 the programme's name was changed to the National Movement for Forest and Land Rehabilitation Programme (*Gerakan Nasional Rehabilitasi Hutan dan Lahan – GN-RHL*, popularly known as *Gerhan*), with a heavy emphasis on community involvement in its implementation. Its regional implementation is co-ordinated by the Watershed Management Agencies (*Badan Pengelolaan Daerah Aliran Sungai – BPDAS*), the regional arm of the Directorate of Land Rehabilitation and Social Forestry within the MoF (MoF 2004).

*Gerhan's* primary objectives are to facilitate community participation in rehabilitation activities (by providing assistance with designing the activities), to develop community institutions and provide technical assistance in implementing the planned activities (MoF 2004). It was planned for a five-year period, with a total target of rehabilitating 3 million ha of degraded forest in 29 water catchments located in 145 districts and municipalities (Walhi 2004), including those in Gorontalo province. Its funding comes from the central government's portion of the reforestation funds (DR). Under the current government regulation on DR, 40% of the funds are to be reallocated (through DAK) to the 'contributing provinces',<sup>28</sup> and the other 60% is controlled by the MoF to finance rehabilitation projects in non-contributing provinces. The funds are allocated to co-operatives, forest farmer groups, and other organisations with the legal status to implement the rehabilitation project on the ground. This arrangement has been in place since 2001, under the co-ordination of the district governments. However, the bureaucratic procedure for accessing the fund is very complicated;<sup>29</sup> in many cases the whole process takes about a year, which leaves little time for adequate preparation between budget realisation and actual implementation (see Chapter 9).

This highly centralised control over forest resources, through its various policies that facilitated rapid industrialisation in the forestry sector, has led to an alarming and unprecedented rate of deforestation. Given Indonesia's global importance for biodiversity (see Section 2.1) this has caused serious concern, particularly among the international

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<sup>28</sup> Provinces that contribute to the central government's Reforestation Fund, generated from logging taxes; the 'non-contributing' provinces are those with no contribution to the central government's Reforestation Fund.

<sup>29</sup> The working plans composed by the MoF for this programme must pass through a series of discussions with, and be approved by, the House of Representatives (*Dewan Perwakilan Rakyat – DPR*), National Development Planning Board (*Badan Perencanaan Pembangunan Nasional – Bappenas*) and the Ministry of Finance.

community. Although estimates of the rate of loss of forest cover vary, it is widely accepted that by 2005 the rate was 1.8 million ha/year (FAO 2007), rising six fold from 300,000 ha/year in the 1970s (FWI/GFW 2001). Specifically, under the HPH system forest loss outside Java has been ten times faster in forest areas that are ten times larger. In Java, for example, it took two centuries to clear 650,000 ha of its forest; outside Java, 60 million ha of tropical forest have been cleared in less than three decades (Wiratno et al. 2004). Another 40 million ha of natural forest are believed to have been lost, and a much larger area of forest is degraded. The illicit practices of timber extraction noted earlier became intensified and well-organised and the volume of illegally cut timber skyrocketed (Telapak Indonesia & EIA 1991). Based on the rate of timber exploitation and conversion of natural forests for plantations, the World Bank (2001) estimated that the lowland forest in Sumatra, Kalimantan, and Sulawesi would disappear by 2010. As timber in these islands began to be exhausted, logging moved to the Moluccas and West Papua in the early 1990s.

National socio-economic conditions and the political transition that Indonesia finds itself in since the multidimensional crises of 1997 present a greater challenge to sustaining development activities than ever before (National Development Planning Agency 2003; Resosudarmo 2005). The multi-party processes of decision-making have become more complex as there are many conflicting interests, perceptions, and claims over the same resources (Purnomo et al. 2005). Moreover, in the current political environment, the shift towards decentralised resource management can be interpreted as both an opportunity for improvement as well as a new threat to biodiversity. This is largely because the general inaccessibility of many areas has led to their conservation by default, but with decentralisation and plans for increased infrastructure, many of these areas are now threatened. Some evidence suggests that decentralisation has had a negative effect on the fate of forests and local (Tacconi et al. 2004a; Wandoyo & Wardoyo 2004; Wollenberg et al. 2004), although some argued that it has had a short-term positive effect on the livelihoods of local communities (Tacconi 2007).

The struggling forest industry, the increased rate of deforestation, the social impacts of forest administration thus far, and the financial crisis in 1997, forced Indonesia to undertake a structural adjustment programme (SAP), led by the IMF and the World Bank, to revive its economy. The SAP included a number of reforms in the forestry sector (World Bank 2003). As noted in Section 2.3, these helped to bring an end to Suharto's government and together they heavily influenced the central government's policy response to the growing demand for greater autonomy in 1999. The primary driver of this demand was provincial and district governments, whose jurisdictions are rich in timber and oil. While their contribution to the national economy was large over three decades, their regions remained under-developed (World Bank 2003). Until 1999, the central government kept turning a deaf ear to the regions' calls for a fairer share of benefits from local natural assets and greater control over their management (Barr 2006).

#### 2.4.3 Post-1997 reform in the forestry sector

As noted above, reform was an essential part of the SAP, involving a loan agreement of US\$43 billion between the World Bank, IMF, and the GoI (Barr 2002). Habibie's government responded to the intensive demand for reform, from both the domestic and the international community, by issuing several regulations. Two of these directly related to the forestry sector: Government Regulations 62/1998 and 6/1999. The former gave authority to district governments to oversee the management of Privately Owned Forest (*Hutan Milik*) and the latter allowed them to issue permits to extract forest products (McCarthy et al. 2006).

The regulations effectively decentralised the control of forests again to the regions. Indeed the regions responded speedily, by issuing a large number of small-scale timber extraction and forest conversion permits,<sup>30</sup> similar to the *banjir kap* that occurred in the early 1970s (Barr 2006).

Later in the same year, the RAL was also enacted. Indeed there were many uncertainties between the central and regional governments about the division of authority over forest (e.g., boundaries, technical and management capacity of district governments to implement RAL) (Moeliono & Dermawan 2006). While the implementing regulations were still being prepared for the RAL to take effect on January 2000, many district governments used the RAL as the legal basis to take control over forests within their jurisdictions. Many of them did so without fulfilling their responsibility to maintain environmental sustainability as stipulated in this law (Article 9). For example, within less than a year the districts of Malinau and Berau in East Kalimantan province allocated 56,000 ha and 59,444 ha for small-scale logging, respectively. In Berau, this involved issuing 585 small-scale permits that authorised timber extraction from privately owned land on the immediate boundaries of forest estates (Barr 2006; Barr et al. 2001).

However, observations in many forest-rich districts indicated that the districts had limited technical and human capacities to supervise the implementation of permits they had issued (see a full review in CIFOR's publications of a series of case studies on 'Decentralization and Forest in Indonesia' from <http://www.cifor.cgiar.org>). It was also not uncommon for the permits to be issued for sites that overlapped with areas that had been previously assigned to HPH holders or within the boundaries of national parks and other protected forests. Critics remarked that, to a certain extent, the local forest administration had actually 'legalised' the illegal extraction of timber (Casson & Obidzinski 2002; Smith et al. 2003; Tacconi et al. 2004b).

Findings from these case studies also showed that while the small-scale logging permits benefited local communities through income they received from providing labour for timber extraction and forest conversion, most of the benefits of decentralised forest management were enjoyed by small groups of local elites (McCarthy et al. 2006). One factor contributing to this was that the upward accountability, which existed during the New Order Regime, had not been channelled to direct accountability to local constituents. For example, the allocation of timber and forest conversion permits was largely done with minimal transparency and little or no public consultation. Meanwhile, the same ineffective enforcement of logging regulations that characterised the HPH operations remained. Consequently, forest resources were depleted more rapidly while the benefits are unlikely to be sustained (Barr et al. 2006).

In the same year, the BFL was also revised as 41/1999 on Forestry Law (FL). Under the FL customary systems of forest management, which for decades had been officially denied, were partially legitimised (Wollenberg & Kartodihardjo 2002). Critics remarked, however, that the

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<sup>30</sup> The names of the locally-issued permits vary between regions. For example, Timber Extraction and Utilisation Permit (*Ijin Pemungutan dan Pemanfaatan Kayu*—IPPK) in East Kalimantan, Customary Community Timber Extraction Permits (*Ijin Pemungutan Kayu Masyarakat Adat*) in Papua, Timber Extraction Permits on Privately Owned Land (*Ijin Pemungutan Kayu Tanah Milik*) in Berau District of East Kalimantan and in Gorontalo (see Chapter 6).

revised law essentially reaffirmed central government's role in administering the nation's forest resources. For example, while the law recognised the expanded authority of district and provincial governments detailed in the two regulations noted above, these governments are prohibited from issuing timber extraction permits in areas that have been allocated to HPH holders. Plans for conversion of forests are also subject to central government's approval (Patlis 2002, cited in Barr et al. 2006, McCarthy et al. 2006).

The Fiscal Balancing Law (FBL) was also enacted in 1999. A more equitable distribution of revenues, particularly from natural resources, is the core of this policy. In the forestry sector, for example, prior to 1999 government revenue from major forestry taxes and fees averaged about US\$700 million between 1995 and 1998, reaching a peak at US\$810.14 million in 1996, but in 1998 it significantly dropped to US\$578 million. Out of this average, the proportion of DR was the largest (about US\$480 million) while the license fees and timber royalties (IHPH and PSDH) each generated about US\$230 million annually. Of these, the central government took the full amount of the DR, 55% of the PSDH, and 30% of the IHPH (Resosudarmo et al. 2006). As well as having a much smaller share of these revenues, regional governments had limited opportunities to raise their own revenues during the New Order. However, the FBL restructured the distribution of these revenues and now the regional governments share 80% of both the IHPH and PSDH; their share for the DR is 40% (ibid).

At the same time, the FBL required regions to generate a significant portion of their income to fund their development activities. The two most important sources of funds that are directly relevant to forest administration are the Balancing Fund (*Dana Perimbangan*), allocated from the national budget, and the regionally generated revenue (commonly known by its Indonesian acronym, PAD – *Pendapatan Asli Daerah*). Included in the DP are the General Allocation Fund (*Dana alokasi Umum, DAU*) and Special Allocation Fund (*Dana Alokasi Khusus, DAK*).<sup>31</sup> The reforestation fund (DR) falls under DAK, with the specific objective of financing the rehabilitation of degraded forests and land (see Section 2.5 and Chapter 9). For provinces like Gorontalo, the DAK represents a significant portion of its annual income. For example, during the fiscal years 2001-2003 on average Gorontalo received US\$2 million annually or about 1% of its GDP (BPS Gorontalo 2003; Resosudarmo et al. 2006).

As with the PAD, regional governments are authorised to apply various types of levies and taxes as long as they do not duplicate those extracted by the central government and do not affect the environment negatively. Many district governments used the forest in their jurisdiction to generate PAD, for example through small-scale logging licence fees as well as from the amount of timber harvested. A detailed study in East Kalimantan revealed that the Malinau District generated about US\$6.2 million in 2000, almost ten times its budget for that year (Barr et al. 2001).

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<sup>31</sup> While annual allocation of the DAU is on a fixed basis, highly favouring the districts over the provincial government (90% and 10%, respectively), primarily to pay salaries of civil servants, the DAK is based on special needs of the regions (e.g., the development of transmigration sites and investments in physical infrastructure) that are not covered by the DAU and the amount is subject to availability of fiscal resources.

The proliferation of small-scale permits and the generation of fast cash from the forest were short-lived. By the end of 2000 the MoF had blocked the regional licensing system by requiring a review of permits that were issued regionally and by establishing new standards for issuing various permits for extraction of forest resources (Kepmen 05.1/KPTS-II/2000) (McCarthy et al. 2006). These effectively brought the pendulum of control over forest administration back to Jakarta. This was done through issuing Government Regulation 34/2002 on Forest Administration and the Formulation on Forest Management, Forest Utilization, and the Use of Forest Estate. Under this regulation, forest classification was simplified into three: production forest, conservation, and protection forest, authority for the management of which is held by the MoF: for example, regional forest planning must be approved by the MoF, including the authority to control timber extraction in production forest (McCarthy et al. 2006).

Clearly, over the past four decades the Outer Islands' forests have had an important role in the nation's economy. It is generally acknowledged, however, that the dynamics of forest loss involve a complex interaction of different socio-economic activities (FWI/GFW 2001; Wood et al. 2000). The environmental impact of commercial logging often receives much more attention for at least two reasons. Directly, the method of harvest often leads to soil erosion and compaction, and damage to residual stands. Careless operation of heavy equipment and felling can damage between 10% and 70% of the standing stock (Braga 1992, Potter 1991, Repetto 1988). This contribution of logging to deforestation often affects the delicate balance of tropical forest ecosystems; commercial logging is accused of promoting conditions that may contribute to ecological disaster (Braga 1992). For example, some argue that the 1982/83 forest fire in East Kalimantan that burned 3.6 million ha was exacerbated by over-logging (Johnson 1984).

Indirectly, the building of roads and logging tracks as well as other infrastructure opens up the forest for other economic activities to penetrate. Thus, despite its small contribution to deforestation, it is clear that the environmental impact of logging may be significant (see Chapter 8). It is also understood that environmental problems resulting from deforestation can be caused by market and policy failures (FWI/GFW 2001; Wood et al. 2000). Inadequate property rights and tenure security both for farmers and commercial loggers are often stated as the main causes of over-logging. These factors, often exacerbated by insufficient up-to-date data, make it difficult to determine exactly how much and at what rate the forest is being depleted. While remote sensing seriously improves the potential for doing this, the technology is often too expensive for local governments. Therefore, it is technically difficult to allocate the land properly according to the most socially, economically and ecologically beneficial uses (see Chapter 9). Such up-to-date information is essential for strengthening Indonesia's forest management. Recently some international organisations, like the World Bank have provided financial assistance for a comprehensive forest resource inventory (FWI/GFW 2001; Hart 1991).

Moreover, the institutional framework governing forest utilisation contributed to deforestation in other ways. There are at least nine different government agencies involved in the management of the forest (Appendix 3.1); their policies also affect the state of the forest. Each of these agencies has its own mission and interests, and they are often poorly coordinated or in conflict with each other (Barber 1995; Barbier et al. 1994a; MacKinnon 1995). Thus, the reality of conflicting interests and the lack of technical skills and an integrated long-term vision on the use of forest resources have made integrated implementation impossible.

Overall, the basic problems of sustainable forest management have remained in the reform era, largely due to policy and institutional failures. Historically, Indonesia's leaders have regarded the forests primarily as a storehouse of raw materials to be converted to cash or a reserve of land for conversion to other uses. Forests have not been considered as a valuable renewable resource and production system in their own right, which could be managed for the sustained, long-term, production of a variety of goods and services (National Development Planning Agency 2003). Some corrective measures, however, at both national and international levels, are being developed to encourage sustainable forest management through improved logging practices, certification, and eco-labelling, but little is known about how these influence forestry practice on the ground. With such a high rate of forest loss to date, the absence of replanting, and the slow growth of plantation forests initiated in the early 1990s, degradation and loss of forest biodiversity was inevitable. Efforts to conserve forest biodiversity against a long history of timber exploitation are presented next.

## 2.5 Forest Conservation Policies

Historically, the region known as Indonesia today was governed by small independent kingdoms throughout the archipelago. Animistic traditions, with the notion of nature conservation implicit in the human-nature relationship, were once dominant (Section 3.3). This relationship is governed primarily by respect arising out of fear of the spirit of nature, expressed in many forms of taboo. Nature was considered sacred and leaders conducted regular rituals to display respect to nature's guardians. For example, the Malang Inscription (1395 AD), written during the period of the Majapahit Kingdom, governed the protection of Mt. Ledjar, near Malang (East Java). Resource collection activities around this area, which served as an important catchment area for the surrounding cities and towns (Wiratno et al. 2004), were also regulated by traditional systems.

Similar traditional systems of resource conservation and sustainable use were also apparent among communities in some of the islands. Swidden agriculture among the Dayak people in Kalimantan (Dove 1985; MacKinnon et al. 1996; Sardjono & Samsudin 2001) and the Kenyah (Colfer 2008; Colfer et al. 1997), the Lauje people in Donggala, Central Sulawesi (Whitten et al. 1987), the *subak* water use system in Bali (Mitchell 1997), and the various forms of *sasi* in the Mollucas (Monk et al. 1997) are examples of these traditional resource regulations that have been regarded as economically and environmentally sustainable. While some of these are still working today, they are increasingly eroded as many traditional communities have become more integrated with the modern lifestyle through contact with 'outsiders' (Geertz 1963b). In the Indonesian context, this has come about since the forests were opened for large-scale timber extraction (Section 2.4) and also through the state-sponsored transmigration programme that moved people from the densely populated islands of Java and Bali to other less densely populated Outer Islands (MacKinnon et al. 1996; Monk et al. 1997; Whitten et al. 1987).

The preservation of charismatic wildlife and unique ecosystems started to receive official attention in response to massive and unsustainable timber exploitation, about two centuries after the Dutch set foot in Java in the mid-sixteenth century (Boomgaard 2007). In 1899, for example, Mt. Gede Pangrango in West Java was established as the first nature reserve (Wiratno et al. 2004). Many of the conservation areas in today's Indonesia are the legacy of this colonial effort because very little progress was made in nature conservation until early 1980s. As occurred in many parts of the world, the preservation approach was dominant, primarily treating nature as a static monument (Adams & McShane 1992; Ghimire 1994;

Ghimire & Pimbert 1997). The shift from preservation to conservation<sup>32</sup> that occurred in the western world in the mid-1950s did not have much influence in Indonesia. In the early 1970s the importance of establishing national parks as a means of conserving forests and wildlife started to be recognised among a small number of foresters. However, the government's focus on timber exploitation has made their efforts (Appendix 4.3) seem futile. This still continues (see Chapter 8).

Since its participation in the 1972 Stockholm conference on Human Environment, Indonesia has been striving to meet its conservation commitment in the global pursuit of sustainable development. Professor Emil Salim, the first Indonesian and three times State Minister for Environment (1972-1992), is quoted as saying:

As a developing country, Indonesia faces the necessity of having to start sailing while still building the ship. We do not have the time to wait until all the concepts are well established; until the theories are completed. The problems cannot wait until we can think these problems through. Problems come so fast that one has to find their solutions instantly (Salim 1988).

However, in light of forest-based economic development outlined above, conservation was of low national priority throughout this decade. A comprehensive national conservation plan, based on the biogeographic regions, was developed in the early 1980s with technical and financial assistance from international organisations, such as the Food and Agricultural Organisation/United Nations Development Programme (FAO/UNDP), the World Wildlife Fund (WWF), and the International Union for Conservation of Nature and Natural Resources (IUCN). The conservation plan for Sulawesi is presented in Volume 6 of the National Conservation Plan (MacKinnon & Artha 1981). Most notably the change has taken place in the establishment of protected areas (see Box 2.1).

One of the major obstacles for Indonesia has been an acute lack of basic information about the biophysical aspects of the vast and culturally diverse country accessible to decision makers (Kusumaatmadja 1996). Only in the early 1980s did major works produce information to assist the planning and management of the nation's rich biodiversity. These works range from identification of priority sites (hotspots) to surveys of species and ecosystems of high conservation values. Major publications to make information about Indonesia's diverse natural wealth accessible, both in English and Indonesian, were produced in the *Ecology of Indonesia* book series<sup>33</sup> (MacKinnon et al. 1996; Monk et al. 1997; Tomascik et al. 1997; Whitten et al. 1984; Whitten et al. 1987; Whitten et al. 1996) and the *Freshwater Fishes of Western Indonesia and Sulawesi*<sup>34</sup> (Kottelat et al. 1993).

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<sup>32</sup> In contrast to preservation, which prohibits human use of elements of nature (e.g., landscape, wildlife), conservation includes the dynamic feature of the human-nature relationship that involves multiple uses of nature and its resources for the benefit of humankind. Preservation, maintenance, sustainable use, recovery and improvement of the quality of nature are included in the definition of conservation that is adopted internationally. Although this shift has a strong influence internationally, its influence in Indonesia has been weaker.

<sup>33</sup> The *Ecology of Indonesia* series was produced under the Canadian International Development Agency (CIDA)-funded Environmental Management Development in Indonesia project, for which the researcher served as Publication Advisor (1987-1989) and series editor (1991-1994) for the Indonesian-language version.

<sup>34</sup> The researcher was a co-author.

Another set of important publications on Indonesia's biodiversity were many volumes of the field-guides of flora and fauna of Indonesia, published by the Indonesian Institute of Sciences (LIPI) during the late 1990s (Beehler et al. 2001; Coates et al. 2000; Djajasasmita 1999; Holmes 1999; Holmes & Nash 1999; Holmes & Phillipps 1999; Iskandar 1998, 2000; Kinnaird 1995; Kottelat et al. 1993; Mogeia et al. 2001; Nasution & Yamada 2001; Newman et al. 1999a, 1999b, 1999c; Noor et al. 1999; Payne et al. 2000; Supriatna & Wahyono 2000; Susanti 1998; Suyanto 2001; Widjaja 2001a, 2001b; Wiratno et al. 2004).<sup>35</sup> These field-guides were produced with financial assistance from the Global Environment Facility (GEF) as part of the Biodiversity Conservation Programme, particularly to reach the Indonesian-language audience. Moreover, the bioregional conservation planning approach has been attempted by conservation NGOs, such as the WWF in East Kalimantan and the Nature Conservancy (TNC) in Sulawesi in the early 2000s (Summers et al. 2006).

Indonesia's commitment to biodiversity conservation has been made clear through the ratification of major international conventions as well as at national policy level. The government enacted the Conservation Law in 1990 (Conservation of Living Resources and their Ecosystems, henceforth the Conservation Law) to consolidate the legal position of various categories of PAs (MoF ( Ministry of Forestry) & WWF (World Wide Fund for Nature) 1990), three of which are relevant to this research (Box 2.1).

Moreover, Law No. 24 of 1992 provides the legal basis for spatial planning and gives a mandate for provincial and district governments to prepare spatial plans to ensure that development projects are located in accordance with these plans (Caldecott 1996). This policy makes a clear link between biodiversity conservation and spatial planning, as most elements of biodiversity will have a greater chance of survival if their natural habitats are set aside and managed for conservation purposes. Some convincingly argued, however, that species diversity can also thrive and even be enhanced in used landscapes, such as plantations and agroforest systems (de Foresta et al. 2000; Michon 2005; Soemarwoto 1987).

Furthermore, in 1993 the Government of Indonesia (GoI) produced the Biodiversity Action Plan for Indonesia (BAPI) (Ministry of National Development Planning 1993; State Ministry of Environment 1993), which was revised as IBSAP in 2003 (Ministry of National Development Planning 2003). Another notable change took place through the establishment of PAs (e.g., national parks, wildlife sanctuaries and nature reserves). By 1995, Indonesia had 175 protected areas,<sup>36</sup> covering about 9.7% of the total land area of 1.9 million square kilometres (Caldecott 1996; MacKinnon 1995). Within a decade the total area and the number of PAs have almost doubled; by 2005, Indonesia had 241 terrestrial Strict Nature Reserves (4.5 million ha in total), 71 Wildlife Reserves (a total of about 5 million hectares), and 43 national parks (a total of 12.3 million hectares) (MoF 2006), representing about 10.4% of total land area.

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<sup>35</sup> The researcher served as the series-editor.

<sup>36</sup> Based on the UN World List 1994 these include only areas greater than 1,000 ha with established management and assigned to IUCN categories I-V (MacKinnon 1995).

## Box 2.1 Categories of Conservation Areas in Indonesia

According to the Conservation Law 5/1990, conservation areas are broadly classified as Natural Protected Areas (NPA – *Kawasan Suaka Alam*) and Nature Conservation Areas (NCA – *Kawasan Konservasi Alam*). This law defines NPA as areas with special features, either terrestrial or marine; the main functions are to conserve and maintain floral and faunal diversity, natural ecosystems, and life-support systems. The main difference between NPA and NCA is that sustainable use of natural resources and ecosystems is allowed in the latter. The NPA includes Strict Nature Reserves (*Cagar Alam*), Wildlife Sanctuaries (*Suaka Margasatwa*), and Biosphere Reserves (*Cagar Biosfer*) whereas the NCA includes National Parks (*Taman Nasional*), Grand Forest Parks (*Taman Hutan Raya*), and Recreational Parks (*Taman Wisata*) (MoF 2004).<sup>37</sup> The specific management goals for each type of these three protected areas, along with the associated IUCN conservation category (see McNeely and Miller 1984 for these categories) are as follows; for the definition of other categories please refer to MoF (2004):

*Strict Nature Reserves (Cagar Alam): small to large sized (5000-130,000 ha), usually undisturbed areas and with outstanding natural and high conservation values (degree of endemism, species diversity, rareness, ecosystem representativeness, and naturalness). Designated to preserve and maintain ecological/natural processes. Level of protection: high/strict (IUCN Category Ia).*

*Wildlife Sanctuary (Suaka Margasatwa): medium sized areas (20,000-160,000 ha) with a specific conservation goal of protecting certain plant/animal groups. Level of protection: varies from medium to high (IUCN Category Ib).*

*National Parks (Taman Nasional): medium to large sized (50,000-130,000 ha) undisturbed areas of outstanding natural values, high potential for recreation, and easy access for visitors. A national park is managed through various zoning systems [i.e., core zone, wilderness zone, and intensive use zone in a descending degree of limitation for human activities – see Table 9.2], the core zone is for protection, and the intensive use allows recreation activities and visitor access (IUCN Category II).*

Within the MoF, the jurisdiction of NPA and NCA issues falls under the Directorate General of Conservation and Protected Areas (Dirjen PHKA: *Direktorat Jenderal Perlindungan Hutan dan Konservasi Alam*). However, some management aspects of PAs are not directly under the Dirjen PHKA. For instance, mapping and boundary delineation of protected areas is under the Directorate General of Forest Inventory and Mapping. This arrangement often creates difficulties in the management of protected areas in Indonesia (de Fretes 2007). Prior to the enactment of Law No. 22/1999, the MoF established its representative in the province through the Regional Forestry Office (*Kantor Wilayah Kehutanan*) to administer its work (particularly in timber production) in the province.<sup>38</sup> As for the conservation of forest, Dirjen PHKA maintains two main representatives in the province or region: the Natural Resources Conservation Bureau (BKSDA: *Balai Konservasi Sumber Daya Alam*), and the National Park Bureau (BTN: *Balai Taman Nasional*). The BKSDA manages all conservation area categories within the NPA, whereas the BTN is in charge of all categories within NCA. Currently there are 44 BTN and 32 BKSDAs in Indonesia (de Fretes 2007).

These PAs were selected specifically to ensure the inclusion of viable representative samples of most of the nation's ecosystems and populations of most native species (Caldecott 1996). Consistent with this commitment there has also been a shift in the priority of the conservation programme, to focus not only on the statutory PAs (*in-situ* strategy), but also on agro-ecosystems and the broader landscape, and to encourage the integration of traditional knowledge towards more sustainable use of biological resources (Gunarso & Davie 2000;

<sup>37</sup> Throughout this thesis, the term 'conservation area' is used interchangeably with 'protected area' although the latter officially is more restricted to three categories. When a specific conservation area (or protected area) in Gorontalo is mentioned, the proper protected area category is used, for example, Nantu Wildlife Reserve, Panua Nature Reserve, and Bogani Nani Wartabone National Park.

<sup>38</sup> The provincial offices were abolished when the Regional Autonomy Law (RAL) was enacted in 2001.

Ministry of Forestry 1997). Among the more recently applied strategies are multilaterally funded integrated conservation and development projects (ICDPs) in some national parks throughout the country (e.g., in Gunung Leuser, Kerinci Seblat, Gede-Pangrango, and Lore Lindu). Other site specific social approaches to conservation (e.g., community forestry and community-based forest management) were implemented in areas under state-owned forestry company management, both in and outside Java. Some district governments declared themselves as *Kabupaten Konservasi* (e.g., in Jambi, Kutai Barat and Kapuas Hulu).

However, many conservation analysts regard Indonesia's commitment to nature conservation as being on paper only (i.e., 'paper parks') with little tangible evidence of this protection (Barber 1995; Gautam et al. 2000; Wells et al. 1997). Gunarso and Davie (2000) suggested three reasons for the limited success of the centralised approach to the management of PAs in Indonesia. First, the country has been governed in an authoritarian style since its independence in 1945. Second, many protected areas were created in the past two decades as a result of foreign-inspired plans, by applying a preservationist approach. The application of this western approach, without proper adaptation to local norms, traditions and social conditions, has led to an increase in conflict between the government apparatus and local communities (Wulan et al. 2004). Third, conservation activities have been developed by botanical and zoological experts and reflect a natural science approach, with little or no input from the social sciences. The combination of these factors has resulted in a decline in both the quality and quantity of resources; intensified conflicts between humans and wildlife, with the latter commonly becoming the victim (MacKinnon 1995).

While forest rehabilitation is progressing (Section 2.4.2), along with various forest conservation approaches outlined in Chapter 1, heavier pressures upon the forest in the past four decades have inevitably affected Indonesia's biodiversity. As noted in Chapter 3 the root and direct causes of biodiversity loss are very complex (FWI/WRI/GFW/ 2001; National Development Planning Agency 2003). Specifically, in Indonesia, these primarily include increasing human population and policy and market failures. The latter is closely associated with the large-scale and high rate of resource extraction from the forests and forest conversion (e.g., for agricultural and industrial development) described in detail in Section 2.4. More recently, the introduction of exotic species and high-yielding agricultural crops poses a further threat, particularly to agro-biodiversity, with many traditional varieties rapidly disappearing without a chance of storing and documenting them (MacKinnon 1995). Meanwhile, contested rights and ownership of resources, and inequality in the sharing of benefits arising from the use and conservation of biological resources continue. All of these present insurmountable challenges for getting wider public support for conservation.

## **2.6 Chapter Summary**

Indonesia is well endowed with natural and cultural riches. Specifically, the Outer Islands' forests have been instrumental in financing the nation's economic development over the past six decades. The control over the forests has been highly centralised (1945-1997). The post-1997 reform gave regional government greater control over timber extraction in their jurisdiction, but it was short-lived. Key centralised forest management policies that support large-scale logging and the eventual development of forest-based industry have had many unintended effects on the forest environment. Over the past four decades, about half of the forest area has already gone, and about a quarter is degraded or converted to other uses. The illegal logging that supplies raw materials for forest-based industries is estimated to have been at least three times the volume reported from legal sources.

While timber from production forest has been exhausted, growth in plantation forest to sustain the existing forest industries has been very slow and so have results from forest rehabilitation efforts. In fact, implementation of a key policy to redress this through decentralising timber production to local government indicated that it has exacerbated the problem of forest degradation and intensified the pressure on the remaining forests under official legal protection. The lack of local capacity to manage the forests sustainably and the focus on generating local revenue from forest has led to more rampant illegal forest activities, the economic, social and environmental costs of which are difficult to assess. Despite the growth in number and size of protected areas since the 1980s, the nation's economy is still largely dependent on extraction of natural resources.

Overall, in the strong wave of timber exploitation, forest conservation has never been prominent in the economic development agenda, either the pre- or post-reform eras. The resulting dwindling timber resource is jeopardising the future supply of material for the forest industry. More importantly, the degradation of the forests' life-supporting function is threatening the sustainability of development activities. Challenges to sustain the economic, ecological, and social benefits from the forests are indeed much greater now. The Gorontalo case study examines these challenges in order to provide suggestions for changes toward a more sustainable society. A review of key concepts and analytical frameworks for the case study is provided in Chapter 3.

## CHAPTER 3

### A REVIEW OF KEY CONCEPTS AND ANALYTICAL FRAMEWORKS

As noted in Chapter 1, the global community acknowledges that human activities have caused the downward trend in the world's biodiversity (MEA 2005). This recognition, however, only exists because human society, or part of it, has considered or perceived loss of biodiversity as a problem in sustaining the flow of benefits it receives from biodiversity (Tellegen & Wolsink 1998). Yet, the political support to address the loss or decline in biodiversity can be generated only when the public, and particularly those who are privileged to make decisions on behalf of wider society, understand the multiple functions of biodiversity and the importance of its conservation (UNEP 2006).

As indicated in Chapter 2, the natural forest in Indonesia hosts a rich biodiversity of global conservation value that at the same time plays multiple roles in the country's socio-economic development processes. Thus, even from a purely utilitarian point of view, access and rights to forest resources have been highly contested among different stakeholders at local, national and global levels. However, there is little information available about how these stakeholders understand and value forest biodiversity or about their attitudes towards its conservation versus other types of uses (Bright & Stinchfield 2005; Purnomo et al. 2005). Naturally, the knowledge, values and attitudes about forest biodiversity vary amongst different stakeholder groups within the same or across various geographical scales. These differences may also be influenced by their socio-economic conditions (Perrings 1995; Robinson 1991; Wood et al. 2000).

The purpose of this study is to find out what local stakeholders know about biodiversity, how they view forest conservation in particular, and what constraints they have to face in order to use forest resources sustainably. In answering these questions, the natural scientists among the stakeholder groups might use their scientific point of view to assess the value of biodiversity and the merits of its conservation. However, having been involved in several community conservation efforts, both in Indonesia and overseas, I have become more aware of the limitations of the predominantly biological approach, often referred to as the 'protectionism approach' to biodiversity management. In response to the resurgence of this approach in international biodiversity conservation, Wilshusen et al. (2002) argued convincingly that biodiversity conservation is as much a social process as it is an ecological process. The socio-economic factors that influence decisions on forest resource use at the local level, where loss of biodiversity occurs, are often highly complex and are inadequately incorporated in conservation design (Forester & Machlis 1996; Noss & Cooperrider 1994; Perrings 1995, 1997; Perrings et al. 1992; Soule 1991; Wells et al. 1992; Wells et al. 1997). These factors can play a major role in determining who 'wins' or who 'loses' in achieving the objectives of various types of resource use, of which conservation is one.

The case of *babi rusa* conservation in the Nantu Forest in Gorontalo can illustrate the different views and values that local stakeholders have of biodiversity and how the social context frames resource use. To an ecologist, the existence of this rare and endangered species represents a biological treasure that warrants protection for its intrinsic and scientific values. To local wild game hunters, the same animal is a source of free meat, not for their own consumption but for the regional market, and therefore represents their livelihood. Likewise, the lowland forest, as habitat for this wild pig and other species of plants and

animals, is perceived by local governments as a valuable resource to finance socio-economic development activities. Communities living around the protected forest may share government agencies' views because they rely on forest resources for their subsistence. Educators and other community leaders may desire protection of the forest to provide opportunities for research and education as well as for maintaining the cultural values associated with the forest for both present and future generations. The desire to protect such forest for its intrinsic value or to harvest it for its economic utility determines the actions taken, and may produce a very different result for the forest.

The key concepts that link the science of biodiversity conservation and the social factors, particularly the values that humans attribute to biodiversity, are the focus of review in this chapter. The first section explains the scientific concept of biodiversity, its key features and essential roles for supporting the well-being of the planet Earth and its inhabitants. The history of biodiversity conservation and the justifications for its implementation as a strategy for achieving sustainable development goals are reviewed in the second section. The third section describes the role of values and perceptions in implementing biodiversity conservation, by focusing on the theoretical links between values, perceptions, and conservation actions. The final section explains the conceptual framework or 'lenses' of political ecology as a tool for analysing the direct and underlying factors that influence stakeholders' decisions on forest use and hamper biodiversity conservation.

### **3.1 The Scientific Concept of Biodiversity**

Diversity of life or biodiversity has been a central theme of biology. Its relevance can be found in almost every aspect of human activity since humans started to inhabit the Earth. The book of Genesis tells a story of the first man, Adam, whose very first job was identifying the animals and plants and their respective roles in sustaining life (Jeffries 1997). Scriptures of major world religions can also testify to the existence of the idea of biodiversity and its importance for the survival of *Homo sapiens*. As human culture and its relationship with living things developed further, many modern philosophers and natural scientists over the last few centuries developed a scientific approach of grouping organisms. Likewise, many traditional communities around the world have their own ways of broadly differentiating the variety of living creatures into groups that are relevant to their life (Monk et al. 1997).

The term 'biological diversity'<sup>39</sup> or its contraction 'biodiversity', however, only came into existence in the 1980s (Lovejoy 1980; Norse & McMannus 1980; Wilson & Peters 1988). It started being used in the sense applied in the Convention of Biological Diversity (CBD) in 1986, six years before this convention was adopted (Harper & Hawksworth 1995). It is a complex topic, covering many aspects of biological variation and is often equated to the whole of 'nature' or 'wilderness'. Although there are many published definitions of this scientific term (see Appendix 4.1), this study adopted the CBD's 'official' definition, as follows:

... the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD, Article 2).

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<sup>39</sup> For practical reasons of space, the short form of 'biodiversity' is used in this thesis.

The term covers a wide range of scales, from the smallest (micro-organisms) to the largest scale (the entire world – the biosphere). Biologists use the definition to include both living organisms and the ways in which they interact with each other and with the physical environment as a functional unit (i.e., ecosystem). These interactions over hundreds of millions of years make planet Earth habitable for the forms of life that exist today (Wilson 1992).

Biodiversity was introduced to highlight the fundamental importance of nature's diversity and interdependence, and to expand the conservation focus beyond species (Spellerberg 1996). The publication of the book *Biodiversity*, edited by E.O Wilson (1988), introduced and popularised this term to a wider audience (Harper & Hawksworth 1995; Jeffries 1997; Magurran 2004; Perlman & Adelson 1997). The Stanford Encyclopaedia of Philosophy describes the ascent of popularity of this term this way:

In 1988 'biodiversity' did not appear as a keyword in the *Biological Abstracts*, and 'biological diversity' appeared once. In 1993, 'biodiversity' appeared seventy-two times, and 'biological diversity' appeared nineteen times'. Now 'biodiversity' is used widely by scientific and popular writers, policy makers and others. While the history of this term is relatively short (compared to other scientific terms covered in this encyclopaedia), it has raised important biological, philosophical, socio-economic, conservation and political issues; some are rooted in what biological diversity is.

The rapid acceptance of this term in science and popular culture indicates its importance (Gaston 1996). One of the unfortunate consequences of the variations in definition is the widespread claims that biodiversity can be both used and conserved (Redford & Richter 1999). However, the inclusive meaning of the term is a source of confusion because many writers do not specify the level of biological organisation being discussed and assume that their audience shares the same understanding of the term (Magurran 2004).

The CBD and other global policies (UNEP 1993, 1995, 2006; WRI et al. 1992) recognise that within these multiple interconnections or webs of life, humans are an integral part of the ecosystem, sharing the same planet and dependent upon the same storehouse of biodiversity. Therefore, human culture is closely linked to, and a part of, biodiversity because it exists as part of the human domain, not in isolation from it (Abramovitz 1994). However, some authors limit the definition of biodiversity to natural variety and variability, which can be distinguished from biotic patterns formed under the influence of human activity, such as species introduction and human-altered environmental processes (Noss & Cooperrider 1994; Redford & Richter 1999). Others (Hunter 1996) disagree with the latter argument as 'naturalness' of an ecosystem is difficult to assess due to the pervasiveness of human influence. If humans are considered part of nature, then the cultural diversity of human populations and the ways they interact with other living things on Earth are components of biodiversity too (Colfer & Byron 2001; UNEP 2006). For example, cultures are shaped through the surrounding environment and depend upon suitable natural habitats and resources for survival (Guthrie 1994 cited in McKessar 1995). Similarly, biodiversity is influenced by the resource management practices of different cultures, for example, through diversification of cultivars and genes to improve crops and livestock in agricultural practices, which increases biodiversity (Dasmann 1991 cited in McKessar 1995).

Given the inclusive meaning of the term, this thesis adopts the CBD definition that implicitly acknowledges the influence of humans on the evolutionary process of biodiversity in order to meet their needs (CBD, Article 2), although it can be expected that the kind of influence that

humans have on natural forest biodiversity – the focus of this research - is less than in the agro-ecosystem.

### 3.1.1 The Key Features of Biodiversity

As biodiversity can be represented in many different ways and at many different scales helpful approaches have been suggested to understand it, by stating its components, structure, composition, and attributes (DeLong Jr. 1996). For example, in studies that asked respondents to define ‘biodiversity’, they typically answered by breaking the word into its roots: ‘bio’ and ‘diversity’ (Belden et al. 1996; Hunter & Brehm 2003). However, this was only marginally helpful because while ‘bio’ is easily defined, ‘diversity’ is not (Bright & Stinchfield 2005). The *component or element* of biodiversity is categorised into three levels: *genetic* diversity (within species), which is the fundamental essence of biodiversity, responsible for variation between individuals, populations and species (Williams & Humphries 1996); *species* diversity (the number of species); and ecological diversity (diversity among biological communities) (Groombridge 1992; Norse & McMannus 1980; Norse et al. 1986). However, others add that the level at which biodiversity can be observed includes taxonomic and landscape diversity (Angermeier 1994; Spellerberg 1996). So the component of biodiversity includes genes, species/population, assemblages, habitat types, ecosystems, and landscapes.

For each of these elements, there are structural, compositional, and functional attributes (see Table 4.1) (Gaston 1996; Groombridge 1992; Norse et al. 1986; Putz et al. 2000; Redford & Richter 1999). *Structural* diversity refers to the physical organisation or pattern of elements while *composition* is described on the basis of diversity of identity and variety of elements in each of the biodiversity components. Dividing biodiversity into its attributes means that species richness (composition), habitat diversity (structure), and ecological/evolutionary processes (function) acting among the elements, are all essential in determining diversity (Bright & Stinchfield 2005). The functional aspects of biodiversity can determine the diversity of different communities and ecosystems through interactions between organisms of a population and their environment (e.g., reproductive behaviour, predation, pollination, and parasitism).

These features are useful at the conceptual level, but in reality the boundaries between elements and patterns involved in the processes are often unclear as they are constructed for human convenience and learning/understanding (Gaston 1996). For example, the number of species (i.e., species richness and abundance) is most commonly used to describe biodiversity because it is easier for most people to understand. In fact, charismatic species of plants and animals have been used to attract support for their conservation (e.g., panda and orangutan). Species diversity is a more tangible object for conservation<sup>40</sup> compared with preservation of the gene pool of a species. At the opposite extreme, ecosystem preservation is much more complex (Wilson 1992).

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<sup>40</sup> *In-situ* conservation refers to measures implemented in the natural habitat of plants and animals while *ex-situ* measures are implemented outside their natural habitats (e.g., zoos, botanical gardens, gene banks) to improve the likelihood of survival of the organisms being protected.

**Table 3.1 Biodiversity at different levels: components, examples, and attributes**

Component	Diversity	Attributes		
		Structure	Composition	Functions
		(the physical organisation or pattern of elements)	(the identity or variety of elements)	(Ecological and evolutionary processes acting among the elements)
<b>Landscape</b>	Regional mosaics of land uses, land forms, ecosystem types	Areas of different habitat patches, perimeter-area relations, inter-patch linkages	Identity, distribution, and proportions of different habitat types	Inter-patch flows of energy, species, and other resources
<b>Ecosystem</b>	Interactions between members of a biotic community and their environment	Vegetative biomass, soil structural properties	Biochemical standing stocks	Processes, including biochemical and hydrological cycling
<b>Community</b>	Guilds, functional groups, and patch types occurring in the same area and strongly interacting through biotic relationships	Vegetation structure and trophic structure	Relative abundance of species and guilds	Flows between patch types, successional processes, species interactions
<b>Species/ population</b>	Variety of living species and their components populations at the local, regional, and global scale	Population age structure or species abundance distributions	Particular species that are present	Demographic processes such as recruitment and death
<b>Gene</b>	Variability within a species, as measured by the variation in genes within a particular species, subspecies or population	Genetic distances between populations in different patches	Alleles that are present and their proportions	Gene flow, genetic drift or loss of diversity in small isolated pockets

Source: Putz et al. (2000).

Counting species is also relatively straightforward, whereas assessment of relative abundance of species in an ecosystem is fraught with uncertainty and ambiguity. This is because there are many different units of diversity at the ecosystem level, e.g., pattern of habitats in biotic communities, trophic structure, age structure of population, and relative abundance of species (Spellerberg, 1996). However, using the number of species to represent biodiversity has some practical problems. For example, measuring diversity has become such an important issue in the scientific literature because, essentially, western science is premised upon constructing knowledge in a universally understandable and applicable manner. This requires a single scientific method which uses standard measures and procedures. For ‘biodiversity’ science, the debate arises because of the variability in the tools used. Hence, scientists have often opted for ‘counting’ species because this can be used across habitats and can be understood across geographic locations. In this way, it is ‘universally’ applicable and can be replicated.

Pragmatically, counting the number of a species in a given site enables a comparison with other sites, assuming that all species, both within and across sites, contribute equally to its biodiversity. However, in reality this is not the case. A measure of the biodiversity of a site would ideally tell about the richness of its inhabitants, ranging from the variety of genes to communities of the organisms, not just by the number of species or number of individuals of a particular species that occur (Harper & Hawksworth 1995). Angermier and Karr (1994) point out that the term 'biodiversity' is often misused and equated with species diversity. This is thought to undermine the broader meaning of biodiversity and can lead to misconceptions about conservation issues. They recommend that the relevant level of diversity be specified when using this term.

Some limitations of the concept of biodiversity are still being debated. First, the concept emphasises entities or elements (e.g., individual species, populations) rather than processes (e.g., nutrient and energy flow) as shown in the most common definitions (Appendix 4.1). Second, this concept has inherent difficulty as it includes multiple levels of biological organisation, which means that what is present in a given area needs to be known. This is an impossible task, particularly if the micro-organisms are included, even at species level. Third, the definitions make no distinction between the significance of elements of biodiversity within any given level; they assume them to be equal. In reality, some 'keystone' species or genes have more dominant roles than others. Also, whereas boundaries between species can be drawn by their genetic divergence, the lines between ecosystems are often drawn arbitrarily, depending on a particular purpose or need. The diversity at landscape level can be more self-evident, but it is not necessarily true universally (Perlman & Adelson 1997).

Despite these limitations, Gaston (1996) highlighted the fundamental ideas that biodiversity can be quantified, and that its different dimensions can be quantified. He cautioned, however, that most studies were written to imply that their findings, though based only on single elements, concern biodiversity as a whole. So, clarifying what biodiversity is and what it is not is important, because in many studies, the term 'species diversity' is often conflated to mean 'biodiversity' although species richness is just a component of biodiversity. In reality, the 'variety of life', expressed across a range of scales, cannot be captured by a single variable (DeLong Jr. 1996; Norton 1994). Most work on biodiversity has concentrated on the genetic and species level, whereas the landscape level has received much less attention. This may reflect a lack of clarity as to what diversity is at this level and how to measure it (Gaston 1996).

The functional attributes (i.e., the interactions between the organisms present) of communities and ecosystems can vary in different parts of the world. Different assemblages of ecosystems can characterise quite diverse landscapes, covering large areas. There is, therefore, an important spatial component of biodiversity that is affected by climate, geology, and physiography (Redford & Richter 1999). The structural, functional, and spatial aspects of biodiversity can also vary over time; thus biodiversity has a temporal component as well. For example, there can be daily, seasonal, or annual changes in the species and number of organisms present in an ecosystem and how they interact. Some ecosystems change over time (e.g., forest ecosystems may change in size and structure because of the effects of natural fires). The period over which changes take place can vary from the short-term to the geological time-scale. For example, the processes of natural selection and species evolution, which may often be associated with geological processes, also result in changes to local and global flora and fauna (Noss & Cooperrider 1994; Redford & Richter 1999; Williams & Humphries 1996).

The promotion of the scientific concept of biodiversity is also driven by the need to extend conservation beyond species, which were failing to take into account the interdependence of biological life and the importance of species interactions and ecosystem processes. To understand both the direct and indirect effects that human activities can have on natural processes, and to maintain ecological sustainability of a system, the variability of interactions between genes, species, and the natural environment must be considered (Spellerberg 1996).

Despite its complexity and the limitations described above, the concept of 'biodiversity' has attracted both biological and multi-disciplinary studies, as shown by the explosion in the number of publications applying this term between 1986 and 2001 (Magurran 2004). This reflects the belief that the concept is not totally abstract, but can in some ways be broken down into manageable pieces to suit particular purposes. In some studies that examined the extent to which this scientific concept is understood by the public in the US, it was discovered that the public had difficulties in understanding its meaning (Bright & Stinchfield 2005). Biodiversity was not a familiar term to most people, many of whom felt that the term implied that there are 'differences' but not 'connections' (Belden et al. 1996, 2002). Hunter and Brehm (2003) also found that by dissecting the term, their respondents were able to get a general meaning but spoke only about species diversity; very few included ecosystem diversity.

This gap in understanding the concept of biodiversity in a relatively better educated public in the US, and the identification of this gap in the assessment of CBD implementation worldwide (UNEP 2006), prompted me to suspect that this might be the case for Indonesia. Since decision-making about the management of biodiversity involves stakeholders other than scientists, examining how this concept is understood by other key stakeholders in Gorontalo became the first objective of this study.

### 3.1.2 The Essential roles of Biodiversity

Human civilisation has been founded upon the interactions among the elements of biodiversity, and between them and the physical environment in which they live (UNEP 2006). Examples of the former include pollination of flowering plants by insects and birds, nutrient uptake that involves mycorrhizal fungi and roots of plants, nitrogen fixation by *Rhizobium* bacteria in the root nodules of legume plants, and decomposition and soil formation by termites and microbes. All of these help to generate goods, such as fruits, timber, fodder, and pharmaceutical products, that represent important parts of the economy (Daily 1997).

The dynamic interactions between elements of biodiversity and the physical environment also perform fundamental life-support services. Examples of these interactions can be seen in many types of ecosystems: the cycles of nutrients from soil, water, or the atmosphere, which then pass through the food web and are eventually released again with decomposition, occur through the medium of terrestrial plants. Carbon is removed from the atmosphere by plants and bound in wood, and is released again when wood is burnt or decomposed and when calcium carbonate is dissolved in ocean water. Pollutants undergo a similar cycle and may persist through many biophysical processes before being broken down or trapped in sediments (Daily 1997; Redford & Richter 1999). The roles of plants and marine organisms are thought to be instrumental in these cycles as atmospheric carbon is considered one of the major sources of global warming (Gitay et al. 2002; Hawksworth 1994). These roles are known as *ecosystem functions*. The processes through which natural ecosystems, and the

organisms that are part of them, produce goods and services to sustain and fulfil human life are referred to as *ecosystem services* (Daily 1997; Millennium Ecosystems Assessment 2005).

Clearly, the multiple functions of biodiversity play a critical role in producing goods and providing regulating and supporting services. Healthy ecosystems also underlie the development of human cultures (e.g., inspiration for education, spiritual values and beliefs) and the quality of life including health and good social relations, which together constitute human well-being at local to global levels (UNEP 1993, 1995, 2006) (see Table 3.2).

Biodiversity, as it is known and seen at present, is the primary output of four-and-a half billion years of evolution and the interactions described above. Throughout this period many species have become extinct and many new ones have arisen (Swanson 1994). However, the human-induced rate of extinction has increased the natural rate of loss 1,000-10,000 times and more than 60% of ecosystem services are degraded worldwide (Millennium Ecosystems Assessment 2005; Wilson 1992). This means that both the number of organisms present on Earth and the interactive structures that form their existence are also declining. For example, the survival of a species that depends on other species implies that when one species dies out globally, its absence affects the survival chances of others; some species may survive, but many may not.

Moreover, when one species dies out locally, the ecosystems can be affected such that recolonisation or reintroduction will become impossible; the structure in which the species functioned before is disrupted or destroyed. Consequently, the ability of ecosystems to function naturally is altered; they become more prone to shocks and disturbances, less resilient, and less able to supply goods and services for the survival and well-being of people and the planet as a whole.

Three key concepts that have been suggested to maintain ecosystems' functions are resistance, resilience, and integrity. 'Resistance' refers to an ecosystem's ability to absorb shocks and stresses, and to remain stable in the face of some environmental changes; 'resilience' is the ability of an ecosystem to recover after it has been severely disturbed, and ecosystem 'integrity' or wholeness refers to its ability to maintain a balanced and integrated community of organisms, for which the composition, diversity, and function of its elements are comparable to that of natural ecosystems. Decline or loss of biodiversity is assumed to affect the three abilities of natural ecosystems; the proposed hypotheses that link biodiversity and ecosystem functions are provided in Box 3.1 (Vandermeer et al. 1998). The extent to which biodiversity has a direct link to ecosystem function is still being debated (Hector et al. 2001; Schwartz et al. 2000; Strivastava & Vellend 2005). Despite the lack of support for this link some argued that interactions between biodiversity and ecosystem services have provided useful arguments for supporting biodiversity conservation (Hector et al. 2001).

Historically, the value of planet Earth's life support-systems has largely been undervalued until their degradation or loss incurs financial costs, or in some cases (such as extinction of a keystone species) becomes irreplaceable. Largely, this was, and is, because these services are not traded in formal markets (Constanza et al. 1997; Daily 1997). Therefore, they do not give a price signal to warn of changes in their supply. Further, awareness of the roles of natural ecosystem services in generating goods that are traded has also been limited. This led to conversion of natural ecosystems, such as forest and wetlands, to managed systems (oil palm plantations and fishponds) whose economic value is easier to grasp (Daily 1997).

**Table 3.2 Some typical functions and benefits of biodiversity**

<p><b>Ecosystem Services</b></p> <ul style="list-style-type: none"> <li>- Protection of water resources (maintenance of hydrological cycles; regulation and stabilising water runoff and underground reserve; protection of water tables, acting as a buffer against extreme events such as flood and drought)</li> <li>- Purification of water (e.g. by wetlands and forests)</li> <li>- Soils formation and protection (maintenance of soil structure and retention of moisture and nutrient levels helping to preserve soil's productive capacity)</li> <li>- Nutrient storage and recycling (of atmospheric as well as soil-borne nutrients both necessary for the maintenance of life)</li> <li>- Pollution breakdown and absorption (by components of ecosystems ranging from bacteria to higher life forms, and ecological processes)</li> <li>- Contribution to climate stability (vegetation influences the climate at the macro and micro level, maintenance of CO<sub>2</sub>-CO balance)</li> <li>- Maintenance of ecosystems (maintaining a balance between living things and the resources - such as food and shelter – they need to survive)</li> <li>- Recovery from unpredictable events (such as fire, flood, cyclones, and disasters initiated by humans)</li> <li>- Indicators for environmental change</li> </ul>
<p><b>Biological<sup>41</sup> - Production and supplier of:</b></p> <ul style="list-style-type: none"> <li>- Food (animals and plants)</li> <li>- Genes ( a huge resource which is being used, for example, to improve the quality and quantity of medicines)</li> <li>- Medicinal resources (past, present and future medicines)</li> <li>- Biological control agents (natural pesticides and herbicides)</li> <li>- Materials (timber, fibres, biopolymers, oils, enzymes)</li> <li>- Wood products (for fuel, construction and paper production)</li> <li>- Breeding stocks, population reservoirs (providing support systems for commercially valuable environmental benefits and resources)</li> <li>- Future resources (a huge 'bank' for discovered and not-yet discovered resources)</li> </ul>
<p><b>Social - Provision of cultural services<sup>42</sup></b></p> <ul style="list-style-type: none"> <li>- Research, education (knowledge systems, both traditional and scientific), and monitoring facilities (living laboratories)</li> <li>- Spiritual and religious values (aesthetic, inspirational, and spiritual)</li> <li>- Warning signs (e.g., biodiversity provides 'indicators' of environmental degradation which can help humans prevent and mitigate shortage and disasters)</li> <li>- Economic 'goods' that are exchanged for money (market systems) or other items (barter systems)</li> </ul>
<p><b>Aesthetic and Education - Supplier of Opportunities for:</b></p> <ul style="list-style-type: none"> <li>- Leisure and recreation activities, ranging from bird-watching to bush-walking or tramping</li> <li>- Sports, from orienteering to diving</li> <li>- Eco-tourism facilities</li> <li>- Novel experience through seeing, hearing, or touching wildlife</li> </ul> <p><b>Ethical and moral</b>          Providing options for future use of biodiversity resources and the natural world as a human heritage</p>

Sources: Adapted from Bryant (2000) as cited in World Bank (2000), Spellerberg (1992), and UNEP (2005).

<sup>41</sup> Most of the "biological" functions are also key economic providers as all of the examples under this type of function yield economic 'benefits', depending on how human communities use them.

<sup>42</sup> Links between people's ways of life and the environments on which they are based and depend. Cultures provide the meaning in people's lives; biodiversity is linked to cultural diversity.

Commenting on the critical roles of healthy ecosystems to the socio-economic development of the global community, Swanson (1994) asserted that when a species becomes extinct, it cannot be recreated; as a natural heritage, it cannot be replaced on any time-scale relevant to humanity.

### Box 3.1 Proposed hypotheses of biodiversity and reasons for maintaining ecosystem functions

Vandermeer et al. (1998) hypothesised that:

1. Biodiversity *enhances* ecosystem function because different species or genotypes perform slightly different functions (have different niches) and together they function better.

2. Biodiversity is *neutral to negative* in that there are many more species than there are ecosystem functions and thus redundancy is built into the system.

3. Biodiversity *enhances* ecosystem function on a long-term basis because those components that appear redundant at one point in time become important when some environmental change occurs, which means that the apparently redundant species are in fact ecosystem buffers.

Under the redundancy hypothesis (2), one species – known as the ‘keystone species’ – is likely to be the

most efficient at performing the particular ecosystem ‘task’. Therefore, all the other members of the redundant set are at least slightly less efficient, suggesting that biodiversity should actually be reduced in order to give preference to key stone species. Because far too little is known about processes of ecosystem function to ascertain the ‘redundancy’ of certain species, this concept must be applied with caution (Vandermeer et al. 1998)!

Moreover, higher biodiversity does not always mean superior ecosystem function. Studies on plant assemblages show that variation in ecosystem properties is related to differences in the functional characteristics, especially resource capture and use of the dominant plants; there is no convincing evidence that ecosystem processes are crucially dependent on higher levels of biodiversity (Grime 1997).

Biodiversity degradation is also a social justice issue as the consequences are often harshest for the rural poor who rely heavily on hunting and gathering wild products to meet their subsistence needs and provide a safety net in times of crisis, protecting them against absolute poverty and starvation (Rolston 1994; UNEP 2006). Therefore, ecosystem health is the core of environmental sustainability; one of the three pillars of sustainable development (Daily 1997; Goodland 1995; Goodland & Daly 1992; IUCN/UNEP/WWF 1990).

Increased awareness of ecosystem services has been implied through the careful management of the environment (see Section 3.3), but only relatively recently (1980s) has this understanding been made explicit to decision-makers, by assigning an economic value to some known natural services. As well as being vital to planetary health and humans’ survival, these services are free (Constanza et al. 1997; Jeffries 1997). However, the links between biodiversity and ecosystem functions are not well understood, and their critical roles to ensure ecological sustainability have been largely overlooked in pursuing economic growth (Daily 1997). This problem has been identified as a major hurdle for achieving the signatory countries’ targets to implement the CBD (UNEP 2006). For this reason, an examination of key stakeholders’ understanding of the various roles of biodiversity, specifically that of forest ecosystems, formed a major objective of this research.

## 3.2 A review of History of Biodiversity Conservation

The term *conservation* as a method of managing the natural world has often been interpreted as or muddled with *preservation* (Colchester 1997; Robinson 1993). This thesis adopts the definition of conservation from the *Global Biodiversity Strategy* (WRI et al. 1992):

The management of human use of the biosphere so that it may yield the greatest sustainable benefit to current generations while maintaining its potential to meet the need and aspirations of future generations. The goal of biodiversity conservation is to support sustainable development by protecting and using biological resources in ways that do not destroy important habitats and ecosystems. Its three key elements are: saving, studying, and using it sustainably and equably (p. 19).

Following this definition, and according to Redford and Richter (1999), ‘biodiversity conservation’ is positive, embracing preservation, maintenance, sustainable use, restoration and enhancement of nature. In other words, it means ‘consumptive and non-consumptive use, without complete destruction/conversion’ (Redford & Richter 1999: 2). This section reviews the paradigms of conservation and their rationales and limitations in achieving sustainability.

Historically, biodiversity conservation has been implemented worldwide on economic and ethical bases. As outlined in Section 3.2 the multitude of potential and actual goods and services of biodiversity have been the foundation of economic development (Constanza et al. 1997; Daily 1997; WRI et al. 1992). Conservation is, therefore, considered a necessary process for ensuring the continued flow of those benefits. Ethically, it is argued that every living being has a right to exist (Rolston 1994; Varner 1998) and the loss and degradation of biodiversity represents enormous economic, social, and environmental costs (UNEP 2006). These costs are borne by both present and future generations through the loss of unknown potential uses and reduced or lost production and absorption capacity of the ecosystems (MEA 2005). Further, conservation in many developing countries can be a matter of survival, not simply a hobby that people can do in their spare time (Campeau 1996; Hamilton 1993; Holdgate 1999; MacKinnon 1995; McNeely 1995b; McNeely & Weatherly 1996; Palmer & Finlay 2003; Salafsky & Wollenberg 2000; Stevens 1997). Lastly, conserving biodiversity means enabling humankind to adapt to the changing environment, physically, psychologically, and culturally (Colfer & Byron 2001; Colfer & Resosudarmo 2002; McNeely 1992). The amount of biodiversity that will be available to adapt to future changes (e.g., climate change and human population) ultimately depends on our values and actions in the past and now (see Section 3.4).

### 3.2.1 The Paradigms and Practices of Nature Conservation

The practice of conservation can be broadly grouped into two approaches: preservation and multiple uses. Both approaches to protect particular ecosystem or landscape have been much criticised for their lack of consideration and integration of the complex social dimensions of in the conservation design, specifically in developing countries in the tropics.

While the preservationist approach has worked relatively well in developed country contexts, where the modern conservation movement originated, the same key strategy, through the establishment of protected areas (PAs) in many countries of Africa, Asia, and Latin America has been fraught with social problems (Adams & McShane 1992; Alcorn 1993; Gadgil 1992; Wells et al. 1992). The roots of these problems can be traced from the history of the global conservation movement (see detailed review by Fisher et al. 2005). In many of the colonised countries, the state, or powerful elite minorities generally controlled the rights to the most economically valuable resources (e.g., timber, minerals, and high-value game), while rights to the less valuable products (e.g., dead timber or stumps and other minor products of the

forests) were given to the peasantry (Adams & McShane 1992; Alcorn 1993; Gadgil 1992; Sayer et al. 2005). For example, in the nineteenth century the preservationist approach placed a high value on dramatic landscape or rare plant and animal species practically, the right to which were held by the state (Colchester 1997; Sayer et al. 2005). In the European colonies and the US, nature was also regarded as a spiritually charged wilderness with the capacity to uplift the human spirit (Fisher et al. 2005). Thus, the establishment of parks to protect flagship species and special areas from the destructive influence of humans, who were considered a threat (Adams & McShane 1992), was the dominant approach to preserve nature until the early 1970s.

Since PAs were established under the state's power, practically this has involved removing or restricting local control over the resources within them. The conservation approach has often been superimposed on the local management of resources, deeply rooted in traditional rules and institutions, which have functioned well in many parts of the world for centuries, such as in Indonesia. The resulting tension has been shown in the history of forest management in many formerly colonised tropical countries (Adams & McShane 1992; Alcorn 1993; Colchester 1997; Ghimire 1997; Ghimire & Pimbert 1997; Gunarso & Davie 2000; Peluso 1992, 1993; Sayer et al. 2005; Wiratno et al. 2004). The preservationist approach failed to consider the social costs and the economic and political marginalisation of rural people (Colchester 1997; Ghimire & Pimbert 1997). Sayer et al. (2005) underlined that while centralised forestry institutions were theoretically established as protectors of forests for the benefit of the wider society, in reality forest management has often reflected a struggle between different sectors of society for land and the valuable resources therein.

Conservation literature is full of phrases justifying conservation for the common interest of humans. However, it obscures the polarity of competing interests over nature and natural resources, rarely considers the needs of poor resource users, and access to PAs typically demands social privileges. The preservationist was, therefore, considered to be elitist and to favour nature above humans (Fisher et al. 2005). When environmental degradation started to spread globally, the poor residents of PAs were blamed as its primary cause (McCormick 1995). For example, terms like 'slash-and-burn', 'wildlife poaching' and 'over-grazing' were used to describe activities of rural resource users (Fisher et al. 2005) who were, and still are, labelled as 'encroachers', 'poachers', or 'squatters' rather than 'hunters' or 'inhabitants' (Colchester 1997).

Another common practice prior to the 1970s was for the governments to enact laws to protect particular ecosystems (e.g., forest, coral reefs, and wetlands), restricting private concession agreements, and to establish zoning regulations (McNeely et al. 1990). Again, this regulatory approach has worked well in most developed countries; for developing countries, it has been much less successful. Efforts to protect areas in Indonesia, for example, have seen substantial gains in the size and number of conservation areas (see Chapter 2), but their efficacy in achieving conservation goals is still questionable due to ongoing threats while the state institutions charged with conservation lack sufficient financial and organisational resources (Wells et al. 1997).

The dominant role of central authorities in managing biodiversity has been challenged since the 1970s, largely because survival of PAs was difficult to ensure in the face of opposition and resentment by local land users (McNeely et al. 1990). Much of biodiversity also depends on habitats that could not be realistically included in the PAs (Brandon & Wells 1992; Wells et al. 1992; Wells et al. 1997). More importantly, much of the valuable biodiversity typically

existed in areas of extreme human poverty, so conservation programmes that were indifferent to, and even exacerbated this poverty, were morally indefensible (Brecht et al. 2002; McNeely et al. 1990). Many conservationists were aware that PAs would succeed in realising their conservation objectives only to the extent that they themselves are managed effectively and that the land surrounding them is managed in a way compatible with the PAs' objectives (Ghimire & Pimbert 1997; McNeely et al. 1990).

A complementary approach to PA management was applied, such as zoos, botanical gardens, and seed banks, to provide for the long-term storage, analysis, testing, and propagation of a few threatened species of plants and animals. This approach is particularly important for wild species whose populations are greatly declining; it serves as a source of materials for reintroductions to the wild and as a repository of genetic materials for future breeding programmes of domestic species. It also provides research facilities and an opportunity for public education (McNeely et al. 1990).

A peripheral method of conservation emerged in Africa in the early 1970s, which considered local livelihood needs, use of local and indigenous knowledge, cooperation and participation of local communities in planning and management, and their use of wildlife (Hillaby 1961). These considerations were later made mandatory for agencies responsible for creating new national parks (Dasmann 1976, 1984). However, the principles did not allow local people to share the land in and around PAs with the animals (Adams & McShane 1992); essentially this approach favoured western ideas of nature, ignored the rights of indigenous people, their ecological knowledge, and their social and subsistence needs (Fisher et al. 2005). While their local needs have been acknowledged, and local resource users are no longer considered direct threats to nature, they tend to be regarded as 'resources' for achieving global conservation objectives as defined by scientific experts. The inclusion of social concerns was criticised as a means to an end: nature conservation (Adams 1990; Fisher et al. 2005).

The history of biodiversity conservation shows (see Appendix 4.2) that prior to the Stockholm meeting in 1972, the driving concern and focus of global conservation was primarily species loss. The rate of loss was increasing in scope and speed to such an extent that many believed it created a crisis for the earth's biodiversity (Myers 1987; Wilson 1988). An important shift in the conservation paradigm took place in the early 1980s which reflected a change in the understanding of the people-nature relationship. This was marked by the emergence of the 'conservation with development' paradigm that viewed the two activities as interdependent, as embodied in the *World Conservation Strategy* and *Caring for the Earth* (IUCN/UNEP/WWF 1991). Conservation programmes during this period started to move away from focusing on species to ecosystems, emphasising the protection of ecological processes and life-support systems. 'Nature' began to be represented as 'biodiversity' and 'ecosystems'. Rural people were no longer blamed as the main drivers of environmental degradation and their poverty was believed to be the cause of their unsustainable practices (Brandon & Wells 1992). The contribution of indigenous and traditional people to sustainable use and conservation of nature also began to be recognised during this period (McNeely & Pitt 1985) and the management of buffer zones around protected areas through programmes such as integrated conservation and development projects (ICDPs) and community-based natural resources management (CBNRM) were seen as new solutions to the people-nature problems (Wells et al. 1992, Fisher et al. 2005).

Their key common strategy is involvement of other stakeholders in conservation, especially local communities. The core concept is that people and nature co-exist, and hence, it is

distinct from the protectionism that separates people and nature (Western & Wright 1994). It represents a bottom-up approach to resource management that stresses the heterogeneity of communities. It also recognises the potential for conflict over resource among local communities and that their local knowledge and institutions have the potential to enrich biodiversity (Pimbert & Pretty 1997; Posey 1985) and to maintain relatively stable environments (Berkes 1999; Berkes et al. 1995). Mostly applied to the management of forest ecosystems, this approach consists of a wide variety of initiatives, including community forestry and collaborative forest management. Its main objectives are strengthening management of PAs and their buffer zones, providing compensation to local people for loss of access to resources; and encouraging socio-economic development among communities around protection area boundaries. There are three overlapping strands to achieve these objectives: (1) offering alternative rural development activities to the community to compensate for the benefits forgone when PAs are established; (2) providing development packages that can reduce pressure on the natural habitat, which may be threatened by unsustainable resource-use patterns; and (3) implementing development activities that focus on increasing the value of resources from the natural areas itself. These premises can be summed up as compensation, alternatives, and enhancement (Abbot & Thomas 2001). Only when the generally economically poor communities can enjoy the tangible benefits of conservation, and they themselves are included in the management of resources, are they more likely to support conservation.

Initially, the programmes were attractive to both government and non-governmental organisations and to donors involved in biodiversity conservation. However, assessments of the theoretical linkages of integrating conservation and development implemented in the mid-1990s showed limited improvements in terms of conservation or human well-being, and even fewer have contributed to both (Chan et al. 2006; McShane & Wells 2004; Sayer et al. 2005; Wells et al. 1997). Some of the results have been considered favourable to rural livelihoods (Poffenberger 1989), but the impact of such schemes on biodiversity has been more difficult to assess (Sayer et al. 2005).

Critiques of ICDPs included the lack of systematic programmes to monitor their effect on biodiversity. In terms of social development goals, the serious lack of understanding of the social dimension of conservation has heightened the problem of empowering local actors and of building local capacity in the implementation of ICDPs. Difficulties in working with multiple stakeholders with different interests and status were very common, particularly given the intense pressure on landscapes from activities incompatible with conservation goals (e.g., illegal collection of forest products, land clearing), often supported by powerful economic and political interests. Consequently, poverty and inequalities remain acute in areas where ICDPs were implemented. Meanwhile, the economic benefits of ICDPs have usually been very small and have not been shared equally; there have been difficulties identifying the diffuse benefits of conservation, given the long period of time required to realise them (Chan et al. 2006). For example, the potential economic opportunity of ecotourism has been overrated and its benefits have been received by the wealthier people (Fisher et al. 2005).

In addition, there has been inequality associated with the sharing of benefits and costs (Balmford & Whitten 2003; Chan et al. 2006), in terms of both space and time. For example, protection of endemic mammals in Zimbabwe, through the CAMPFIRE programme (Abbot & Thomas 2001), has been regarded as successful community-based conservation but it was heavily criticised by social scientists as alienating local people and benefiting the officials administering it (Getz 1999). Furthermore, what people are willing to pay for conservation

depends on their socio-economic circumstances, culture, and worldviews (Sheil 2001). So the question about short-term poverty alleviation in comparison to long-term environmental sustainability remains difficult to answer positively.

Despite the failures reported above, and a growing body of literature that advocates the pre-eminence of the state in biodiversity conservation (Kramer et al. 1997; Terborgh 1999), some authors argue that ICDPs can still be successful with learning and modification (Brechtin et al. 2002; Wells et al. 2004; Wilshusen et al. 2002). Wells et al. (2004), for example, argue that future ICDPs need to be designed on the basis of clearly defined objectives, and that they must have explicit targets and testable assumptions. They need to be implemented through decentralised and adaptive management that is based on specific local conditions and local community dynamics, and they must be more proactive in addressing diverse stakeholder interests. Wilshusen et al. (2002) add that the limited success indicates a scarcity of knowledge, rather than a complete failure in including local communities to manage biodiversity. A review of biodiversity management inside and outside PAs in selected tropical countries produced anecdotal evidence to suggest that local involvement in forest management (e.g., forest rehabilitation) has increased the diversity of species in many places where native forests were under severe threats (Sayer et al. 2005).

In addition to setting aside PAs for conservation purposes, the global community has been supporting conservation efforts through treaties (e.g., the CBD, and the Convention on International Trade in Endangered Species of Flora and Fauna – [CITES]) and through the provision of financial assistance to biodiversity-rich countries that cannot afford conservation themselves through the Global Environmental Facility (GEF). For example, to date the GEF has invested US\$1.2 billion in 123 countries through 395 projects to implement the CBD. Moreover, from 1988 to 1999 the World Bank invested US\$1.43 billion through their lending instruments, and in collaboration with Conservation International (a US-based conservation NGO) it established the Critical Ecosystem Partnership Fund (CEPF) to fund conservation projects in biodiversity hotspot countries (e.g., Brazil, Costa Rica, Indonesia, Mexico), with a total value of US\$50 million (Lovejoy 2002).

Agenda 21, the action plan produced by the 1992 UNCED, also provides a platform for local actions. The Global Biodiversity Strategy (WRI et al. 1992) provides a broader international framework which incorporates, but goes well beyond, the legal and governmental approaches mandated by the CBD and Agenda 21. Likewise, national governments have created conservation policy and action plans – and many countries quickly adopt these, including Indonesia, but these often act as ‘window dressing’ without real money to put plans into action (MacKinnon 1995; Wells et al. 1997). Indonesia, for example, has good legislation (see Appendix 4.3) to support biodiversity conservation, but it is complicated and scattered in various separate forestry, agriculture, and environmental laws (Barber 1995; National Development Planning Agency 2003). While important as tools for action, implementation of these policies is hampered by lack of information on biodiversity, which is very common in many developing countries, limited human resources in the field of conservation, and the prevalence of poverty (Wood et al. 2000). Consequently, lack of conservation law enforcement has been considered the greatest challenge in the management of biodiversity (Barber 1995; MacKinnon 1995; National Development Planning Agency 2003; Wells et al. 1997).

### 3.2.2 Biodiversity Conservation and Sustainability

The concept of ‘sustainability’ or ‘sustainable development’ was promoted internationally in the early 1970s following the realisation that the level of economic development had been achieved at the expense of the environment. During the 1980s, the link between economic development and environmental degradation had begun to be better understood: the former cannot be sustained in the long run by eroding the natural assets that are critical for achieving development goals. Despite the reduction of the percentage of people living under the poverty line,<sup>43</sup> from 30% in 1990 to 23% in 1999, the rate of forest loss at the global level continued at 10 million ha/year. This loss occurred despite the fact that nearly 12% of the forest cover was now under legal protection (IUCN 2003). For this reason, the dominant economic development paradigms are regarded as failing to secure social and environmental improvements (Fisher et al, 2005). For example, World Bank figures show<sup>44</sup> that between 1980 and 1993, out of the 38 poor countries listed in their ‘Basic Indicators’ statistics, 23 had negative growth rates of income per capita (World Bank 1995); poor countries remained poor or had become poorer (MEA 2005). The emphasis on economic development has undermined the environment in ways that affect the long-term benefits of development (Fisher et al. 2005). In some cases, conservation activities have been regarded as exacerbating poverty by denying people living in the vicinity of PAs access to resources for their subsistence needs (Colchester 1997).

Moreover, there is some evidence that the changes in ecosystems are increasing the likelihood of nonlinear change in them, with important implications for human well-being. Examples of these are loss of biodiversity and a change in regional climate; these are increasingly apparent and affect agricultural production and cause abrupt alteration in water quality. Weather changes such as prolonged drought and more frequent rain are also evident. More importantly, the full costs associated with these changes are becoming better understood. Further, the MEA (2005) stresses the poor will likely bear most of the effects and that the (free) services provided by natural ecosystems in many developing countries are essential in meeting the poor’s subsistence needs. As a result, ecosystem degradation is considered a significant barrier to achieving the Millennium Development Goals (see Chapter 1) agreed by the international community in the World Summit on Sustainable Development (WSSD) in 2002. Without significant change in the management of these ecosystems, the harmful consequences of the current level of degradation could worsen in the next decades. On a global scale, for example, more than half of the world’s ecosystems have been converted between 1950 and 1990, primarily to agriculture; the number of species on the planet is declining and their distribution is becoming more homogenous; a similar decline is also occurring in genetic diversity among cultivated species (WRI et al. 1992). As evidence of the changes became more apparent, so did the potential associated risks. These risks could threaten nature’s ability to produce goods and services, and compromise the planet’s ability to absorb the consequent waste, thereby potentially reducing the well-being of future generations. In other words, the level of well-being of future generations will be lower if the

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<sup>43</sup> Defined by the World Bank (2001) as people living on less than US\$2 per day.

<sup>44</sup> <http://www.worldbank.org/poverty/mission/up3.htm>.

current flow of benefits from the natural assets is created by exhausting them, without saving or re-investing now (e.g., through conservation measures).

In response to the increasing evidence of the global downward trend in biodiversity, the United Nations established an independent international body – the World Commission on Environment and Development (WCED) to examine the critical issues of environment and development and to formulate policies to deal with them. In *Our Common Future* (1987), commonly referred to as the Brundtland Report, the Commission defined sustainable development as ‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED 1987 p. 43). This agreed ‘official’ definition provides a common vision for the future of all nations, and contains two key concepts: 1) *needs*, particularly those of the poor to meet their basic needs and 2) *limitations* of technology, social organisation and the capacity of the environment to satisfy those needs for now and in the future (Mitchell 1997). This principle was adopted by most nations in the form of international treaties (Agenda 21) at the ‘Earth Summit’ in 1992, when the CBD was also adopted.<sup>45</sup> Goodland and Ledec (1987 p. 36) added the principle of efficiency to the principle of intergenerational equality in the WCED’s definition.

The two principles (equality and efficiency) imply that the present generation may get as much as possible so long as future generations can have the same; the types of benefits may be different yet comparable. As natural systems, and the social and economic institutions associated with their management, might change considerably, in terms of products, this differentiation is important (Norgaard 1994). The quantity of natural resources that should be sustained, at what quality, for how long, and for whose benefit, have been the sources of debate (Bigg 2004; Daly 1990; Elliot 1994; Gale & Cordray 1994; Lele 1991b; Redclift 1987; Wood 1993).

Sustainability, then, requires the maintenance of the capacity of the natural environment so that it can be passed on to future generations and the necessary socio-economic conditions (e.g., innovation, creativity of the social systems) to ensure it. The socio-economic and environmental pillars of sustainability require (1) a non-declining production of goods and services by using natural, human and human-made resources over time;<sup>46</sup> (2) a non-declining social well-being over time, which involves the satisfaction of basic needs, equitable distribution of wealth and access to resources both inter- and intra-generationally; and (3) non-declining natural resources and services over time, which requires the maintenance of biodiversity, ecological integrity, and inter-generational equity. In other words, sustainable development demands the exploitation of natural resources within the Earth’s capacity to regenerate and absorb the waste generated in the process of resource consumption (Munasinghe 1993a, b). One of the main strategies to achieve these is by integrating economic and ecological considerations in decision-making. For this to happen, attitude changes are needed by individuals and society itself, as well as in institutional arrangements

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<sup>45</sup> Indonesia was among these nations and it adopted the guiding principle of development in the form of Act No. 5/1994 on the Ratification of the CBD.

<sup>46</sup> Real GDP per capita can be considered as a proxy of maximum per capita consumption levels that can be sustained over time (Henley et al. 1999). This requires the value of an economy’s assets to be the same at the beginning of the period as at the end (Hicks 1946 in Numan-Parsons 2000).

and laws at every level of development (Mitchell 1997). Given the varied economic, social, and ecological conditions between countries, no general blueprint or model was provided. Instead, a general principle was put forward to assist countries in developing models that are most appropriate for their specific needs, constraints, and opportunities. A summary of the principles of sustainability is provided in Table 3.3.

As a general concept, sustainable development has attracted both criticism and support. As a concept it contains many paradoxes, tensions and conflicts. Critics often claim that the definitions and interpretations are too vague, or ambiguous, allowing advocates of both economic development and of environmental protection to use it as a justification for actions (Atkinson et al. 1997; Lele 1991b; Redclift 1987; Tisdell 1999; Wood 1993). Its objectives (see above) have been criticised for being too ambitious to implement and as a means of perpetuating western capitalist systems (Mitchell 1997; Wood 1993). Others believe that the flexibility of the concept represents progress, beyond the traditional economic development paradigm, by incorporating real environmental costs and the value of environmental functions into the assessment of growth. Others cautioned on the role of technology, increased ecological information and the uncertainties associated with it, and adaptability and resistance of the natural and social systems (Dovers & Handmer 1992).

Moreover, due to its social aspects, sustainable development is regarded as a subjective concept and deemed to lack the capacity for objective measurement and monitoring (Tacconi 2000a) while environmental sustainability is objectively measurable (Huetting & Reijnders 1998). These authors argue that if the productive and assimilative capacity of ecosystems is exceeded, it will lead to a loss of environmental functions. To some extent, this kind of knowledge can be established scientifically as more research and understanding of ecosystem functions is available. However, Tacconi (2000a) contended that while this is true for some basic cases like soil erosion, at a more complex level, such as that of ecosystems (e.g., forests and other natural ecosystems), it is more difficult to agree on the objectivity of environmental sustainability. This is because while there are species and ecosystems thresholds beyond which these natural systems will collapse, these thresholds are mostly still unknown and are changing over time. So their measurement will remain a subjective issue.

For these reasons, sustainability may be regarded as a general principle guiding the use of resources, but it is important to recognise that there is no single unifying definition for its management. Consequently, the economic, social, and environmental requirements must be considered equally. These three requirements are dynamically interlinked but imperfectly known, which makes the achievement of sustainable development a matter of successfully adapting to changing circumstances rather than of preparing and implementing a blueprint for a sustainable system (Common 1995).

The context of sustainable development implies that there must be continuity over time, for more than one generation, although not for infinity (Atkinson et al. 1997). With regard to resource use patterns (i.e., environmental sustainability) two concepts for an indicator of sustainability have been proposed: weak and strong sustainability (Munasinghe 1995; Reid 1995; Tisdell 1999). In the former, it is required that the level of use of natural assets must be sustainable. In addition to this requirement, the strong sustainability concept incorporates the state of human well-being (e.g., health, education, poverty, income, crime rate).

Three main conditions of natural assets have been put forward in association with weak sustainability: the level of consumption; the introduction of technology, and the possibility of

substitution of natural assets. For this reason, some forms of the natural capital that constitutes sustainability must remain intact. Even if this is so, as observed by Page (1977 in Atkinson et al. 1997), the bequest left to future generations by the current generation will have to reflect what he terms ‘selfish altruism’, where the level of consumption now will determine the well-being of future generations. What is left for future generations will most likely be of lesser value than the resources enjoyed by the present generation. He argues further that this ‘selfish altruism’ alone would ensure future levels of well-being at least equal to that of the current generation, provided that the renewable resources are renewed to the level before exploitation. For example, a logged-over forest must be replanted to enable it to reproduce the same amount of timber harvested over the same period of time. However, for non-renewable capital, some forms of substitution must be provided: otherwise it is highly unlikely that the value of resources now will be the same after it has been depreciated. So the level of depreciation must be considered in the maintenance of any given natural asset.

**Table 3.3 Principles of sustainability**

<p><b>A. Environmental/ecological principles</b></p> <ul style="list-style-type: none"> <li>• Protect life-support systems</li> <li>• Protect and enhance biodiversity</li> <li>• Maintain or enhance ecosystem integrity, develop rehabilitative measures for degraded ecosystems</li> <li>• Develop and implement preventive and adaptive strategies to respond to the threats of global ecological change</li> </ul> <p><b>B. Socio-political principles</b></p> <p>From environmental/ecological constraints</p> <ul style="list-style-type: none"> <li>• Keep the physical scale of human activity below the total carrying capacity of the planetary biosphere</li> <li>• Recognise the environmental costs of human activities: develop methods to minimise energy and material use per unit of economic activity, reduce noxious emissions, decontaminate and rehabilitate degraded ecosystems</li> <li>• ensure socio-political and economic equity in the transition to a more sustainable society</li> <li>• Incorporate environmental concerns more directly and extensively into the political decision-making process</li> <li>• Ensure increased public involvement in the development, interpretation, and implementation of the sustainable development concept</li> <li>• Link political activity more directly to actual environmental experience through reallocation of political power to a more environmentally meaningful jurisdiction</li> </ul> <p>From socio-political criteria:</p> <ul style="list-style-type: none"> <li>• Establish an open, accessible political process that puts effective decision-making power at the level of government closest to the situation and the lives of the people affected by a decision</li> <li>• Ensure people are free from extreme want and from vulnerability to economic coercion</li> <li>• Ensure people can participate creatively and self-directedly in the political and economic system</li> <li>• Ensure a minimum level of equality and social justice, including equality to realise one’s full human potential, recourse to an open and just legal system, freedom from political repression, access to high-quality education, effective access to information, and freedom of religion, speech, and assembly.</li> </ul>
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Source: Adapted from Robinson et al. (1994: 44) cited in Mitchell (1997).

A second condition to ensure environmental sustainability is the introduction of some forms of technological progress to offset the depreciating human-made capital. This presents a problem, however, because ‘technological progress’ often requires natural resources which are taken at an unsustainable rate, thereby further contributing to negative ecological impacts. Moreover, when the source of this technology is external to the economic system, it must be purchased; investment is required for this purpose. The speed of technological advance and

application in countries relying on renewable resources is generally very slow and in most cases non-existent or unaffordable, and evidence suggests that increased population has a negative relationship with well-being per capita (Kelly 1988). Furthermore, the effect of population growth on available natural assets has generally outweighed the impact of technology on the production level (Boserup 1981). Lastly, access to technological advancement is generally unequal, largely accessible to the more economically powerful. Technological progress also has many uncertainties and surprises (Faber & Proops in Atkinson et al. 1997) for which the full implications are largely still unknown.

The third condition for sustainability is the feasibility of substitution of natural capital with human-made capital through production. However, empirical evidence concerning the degree of this substitution is at best ambiguous (Berndt & Field 1981). Also, natural assets provide many functions and services, only a few of which are valued in economic terms (see Section 3.2).

Although these three conditions for sustainability are considered necessary, they are not emphasised to achieve the goals of sustainable development. This is why the model of sustainability described above is termed 'weak sustainability'. It is the ecological services (through production, regulation, and absorption capacity of ecosystems) that raise concerns about relying on the substitution of capital, specifically since many ecologists consider some of these natural services not substitutable. Hence, strong sustainability is required (Constanza & Daly 1992; Lele 1991a; Munasinghe 1993a; Tisdell 1999).

Many indicators for assessing the social and economic progress of a country have been established and applied, albeit with many limitations. These include economic and social development indicators, which reflect social, economic, and environmental well-being, on which human well-being depends upon. A review of these indicators, for measuring sustainable development, is provided by Numan-Parsons (2000). Among these are five main indicators: 1) Gross Domestic Product (GDP); 2) Green Accounting; 3) Genuine Progress Indicator (GPI) or Index of Sustainable Economic Welfare (ISEW); 4) Barometer of Sustainability (BoS); 5) the Sustainable Human Development Index (SHDI), and also Bhutan's Human Happiness Index. A summary of each indicator's strength and weakness is provided in Table 3.4.

In particular, the indicators for environmental sustainability are more complex because they reflect the dynamic state of the natural environment. Currently, only a small part of the ways ecosystems function is well understood (Atkinson et al. 1997, Tacconi 2002a). Work on ecological economics began in the late 1980s, which integrates the study of ecosystems and economic systems; its goal is to achieve sustainability of resource use, through making some ecosystem services more explicitly valued (Constanza 2000; Constanza & Daly 1992; Constanza et al. 1997; Constanza & Bartholomeow 1991).

Some critics have argued that sustainable development, with those three requirements, seeks to achieve the impossible. Others have seen it as the main challenge for future development by recognising the inevitable trade-offs and weighing the costs and benefits to society (Lele 1991b; Redclift 1987; Tisdell 1999; Wood 1993). However, because sustainable development is not a static state to strive towards, but rather a dynamic process where adjustment is made along the way, certain marks or indicators of progress are needed to determine whether the path of development being pursued is 'on' or 'off' these marks (Common 1995). The determinants of sustainable development therefore need to be established and so the

necessary and sufficient conditions for achieving it must be known. Generally, the political and social support for implementing conservation actions – as a primary strategy for sustainable development – can only be generated when the full contribution made by biodiversity to national economies is clearly demonstrated. Hence, the worldviews, values, and perceptions of other stakeholders regarding the importance of biodiversity conservation are important factors in the governance of biodiversity. This is the focus of the final section.

**Table 3.4 A summary of indicators for sustainability**

Indicator	Strengths	Weaknesses
Green GDP	Incorporates environment into the Standard National Accounting (SNA) Simple method of calculation	Theoretical basis debated Ignores social aspect Weak sustainability rule Requires monetary valuation
ISEW/GPI	Considers social and environmental aspects Simple method of calculation	<i>Ad hoc</i> components International comparability threatened Weak sustainability rule Requires monetary valuation
SNBI	Considers social and environmental aspects Simple method of calculation	<i>Ad hoc</i> components International comparability threatened Weak sustainability rule Requires monetary valuation
Barometer of sustainability	Strong sustainability rule Simple method of calculation Employs performance scales Allows non-linear scales Considers social, economic, and environmental aspects Provides graphical display	Is a process rather than a prescription of indicators Doesn't treat all three aspects as equally important
SHDI	Simple method of calculation Employs performance scales Most data easily obtainable Considers social, economic, and environmental aspects	Requires Total Materials Input calculation Doesn't give equal weight to all aspects of sustainable development Social index only measures one aspect of social well being Arithmetic average is counter to the concept of strong sustainability

Source: Numan-Parsons 2000.

### 3.3 The roles of Values in Biodiversity Conservation

Studies about how humans value the environment have come from a variety of disciplines, from classical anthropology and sociology to relatively new studies in ecological economics (Barbier et al. 1994b; Brown 1984; Constanza et al. 1997; Engel & Potschke 1998; Ingold 2000; Kellert 1996; Perrings 1997; Rockeath 1973; Rolston 1994; Tacconi 2000a; Tickell 1996). More recently studies on values have been applied specifically to forests and biodiversity (Bengston 1994; Heatherington et al. 1994; Hunter & Brehm 2003; Hunter & Brehm 2004; Kellert 1993b; Ng 2000; Sheil et al. 2002; Sheil & Wunder 2002).

Different stakeholders, both as individuals and as groups, view and appreciate biodiversity differently (Blaikie & Jeanrenaud 1997; Kellert 1993a). The principles that guide them to

perceive an object are termed values (Rocheach 1973), which are generally categorised as being of two types: held and assigned. *Held values* are modes of conduct that relate to motives, preferences, and underlying belief systems that a person has or uses in assessing the world, undertaking an activity, investigating a matter, or protecting an object (Perlman & Adelson 1997; Tarrant & Cordell 2002). These are entirely internal to human beings and are located in human psyches, moulded by the formative influence of experience, learning, and culture (Kellert 1993, 1996). With regard to forests, Bengston (1994: 520) defines a held value more specifically as principles that guide people in perceiving the usefulness of forest ecosystems.

Reference to *assigned value*, more commonly found in the literature on economics and biodiversity studies, is concerned with the worth of particular objects in relation to other objects that have tangible benefits to human beings (Blaikie & Jeanrenaud 1997; Kellert 1996; Patel et al. 1999; Pearce & Moran 1994; Perrings 1997; Rolston 1994; Sheil & Wunder 2002; Tacconi 2000a; Tarrant & Cordell 2002; Turpie 2003). In other words, assigned value is based on human preference or biological functions of an object (Section 3.1) (Manning et al. 1999). Commenting on this preference-based value, Rolston (1994) argued that while information in wild nature travels inter-generationally on genes, information on culture is passed on through traditions, crafts, artefacts, and religious rites. Moreover, as humans are the only species that live in an ‘intentional world’, they superimpose culture on the natural objects. Rolston (*ibid*) emphasised that only humans have the capacity for this and assigned value is always and only relational, with humans as the determinants of this relationship. Nature or a natural object is value-free and only becomes valuable when humans evaluate it, or give meaning to it. In this sense, value theory says that all types of assigned values are anthropogenic (generated by humans), but not anthropocentric (centred on humans) as all the associated values are attributed to nature, and humans are rarely in the centre of those values. Because the essence of the value of biodiversity is linked to the benefits and functions it brings to humans, they are key factors in determining human attitudes and behaviour toward nature (*ibid*).

These two categories of value are not independent, and it has been suggested that assigned values reflect a person’s held values (Brown 1984). An individual assigns or attaches *worth* to an object that is external to him/herself when it satisfies or in some way matches that individual’s held values. Since different people have different (held) values, the worth of the same object can be different to different people (Kellert 1993).

Typologies of the basic values of nature and its biodiversity have been developed from a philosophical basis (Rolston 1994) and in applied studies of human-environment interactions (Kellert 1993a, 1996; Manning et al. 1999; Murray 1990). Broadly, these values can be described along a continuum of instrumental value (because of its utility) to intrinsic value (regardless of its utility) to humans. However, Callicott (1984 cited in Rolston 1994) claimed that the so-called intrinsic value in nature is rooted in the subjective feelings of humans and is directed onto the natural object or events; it ultimately depends on human valuers as there can be no value apart from an evaluator. All types of value of biodiversity are therefore humanly conferred, and they are valued when humans are inclined to perceive them. This does not mean that all values placed by humans are only of instrumental nature; they may include non-instrumental value as well. Rolston (1994) claimed that humans are likely to express concern for nature and other species only if they matter to them, and this puts humans back in the centre of valuation. But values do not lie entirely in the human experience, as he emphasises that:

Life-support and genetic information operates regardless of whether humans are aware of these things. In this case the human valuing of nature generates new values because of logical necessity, but these are superimposed on spontaneous natural values, which do not require human experiences to generate them (p. 160).

Classification of worth is important because it assists conservation decision-makers to articulate the value underlying their decisions and the types of worth they seek to protect through their efforts. It is also important to classify the worth of the components of biodiversity because worth is much more amenable to comparison, e.g., classification of worth based on species, genes, and ecosystems (Heywood & Watson 1995; McNeely 1988; McNeely 1995a, 1996, 2003; Norton 1997; Pearce & Moran 1994; Pearce et al. 1998). Typically this type of classification produces a list of types of value (worth) that humans find in various elements of biodiversity (Kellert 1993a, 1996; Rolston 1994). A brief description of the types of values attributed to nature and biodiversity is provided below; unless otherwise specified, the review is based on Rolston (1994) and Kellert (1993) (Table 3.5).

Individuals demonstrating ‘utilitarian’ orientations tend to focus on the practical uses of biodiversity, such as the material benefit derived from forests. This benefit includes goods, such as timber and other forest products, and also the potential benefits derived from the genetic properties of animals and plant species (Hunter & Brehm 2004). Recreational value also constitutes this utilitarian orientation because forests can act as an object to observe and provide recreational activities that can have a rejuvenating effect on humans. So, by preserving forests as a national park, both biodiversity and the life of humans can be preserved with respect to recreation and the provision of material goods. Forest biodiversity also has economic value because it can be converted from something useful into something of commercial value through the mechanism of markets. Thus, it serves as biological resources – the parts of biodiversity with known values for socio-economic development. For this reason, conservation of biodiversity is based on an expectation regarding the wealth of biodiversity properties that are as yet undiscovered but someday may be converted into economic value.

**Table 3.5 A typology of basic values attributed to nature and biodiversity**

Type of values	Definition
Utilitarian	Practical and material exploitation of nature
Naturalistic	Satisfaction from direct experience/contact with nature
Ecologic-Scientific	Systematic study of nature, functions, and relationship in nature
Aesthetic	Physical appeal and beauty of nature
Symbolic	Use of nature for metaphorical expression, language, expressive thought
Humanistic	Strong affection, emotional attachment, ‘love’ for nature
Dominionistic	Mastery, physical control, dominance of nature
Negativistic	Fear, aversion, alienation from nature
Moralistic	Strong affinity, spiritual reverence, ethical concern for nature

Source: Kellert (1993).

People who view forests through a ‘naturalistic’ lens generate satisfaction from direct interaction with the forest and its wildlife through outdoor physical recreation such as tramping and bird watching in the forest. Forests also provide endless objects for scientific

investigation, regardless of the sophistication of tools. The ecological or scientific value of nature is concerned with systematic study of its elements and their relationships with each other and with the physical environment; it is premised on the object of investigation as interesting enough to justify being known.

The 'aesthetic' value focuses on forest ecosystems and their wildlife that can evoke a sense of awe, such as the majestic trees reaching out to the sky, or the giant hornbill noisily flapping its wings across the forest canopy. Likewise, the use of unusual forest animals and plants as icons is a symbolic value that reflects the tendency of humans to use nature for communication and an expression of cultural identity. 'Humanistic' values of biodiversity are derived from emotional attachment to animals and plants, with the desire to 'love' them (as pets) or to domesticate/cultivate them. Related to this emotional aspect of value are 'dominionistic' and 'negativistic' values. The former focuses on mastery or dominance over the forest, while the latter reflects fear and aversion to it or no love for free animals. Moralistic, philosophical, or ethical values are based on connectedness between humans and nature. Forest and wilderness can often act as a living museum – demonstrating a remnant of processes that moved the world through the past. They can be a 'philosophical source' because wilderness affects both a traveller's soul and muscles, so it can be an instrument for generating human spiritual and religious experience.

Finally, biodiversity also has essential life-support values (Blaikie & Jeanrenaud 1997; Constanza et al. 1997; Daily 1997; Rolston 1994). In Kellert's typology of basic values, this type of value is included in the ecologic/scientific category. Humans depend on air and water flows, photosynthetic activity of plants, nutrient cycles, decomposition of bacteria, insect pollination, earthworms and genetic materials 'stored' in wild species.

There is also a temporal aspect of these multiple values. Although they are generally assigned on the basis of 'today', regardless of what happened in the past, they essentially depend on the evolutionary processes that took place within species and ecosystems that generated those values and in which they remain embedded (Rolston 1994).

Various studies based on this comprehensive model have mainly been applied in Japan and the USA (Hunter & Brehm 2003; Hunter & Brehm 2004; Kellert 1991, 1993b). A more simplified list of values was developed by Murray (1990) to assess value orientation towards tropical rain forest. Murray's category of values – with the corresponding term from Kellert's typology in parenthesis – includes: biological uniqueness (naturalistic), economic (utilitarian), aesthetic (aesthetic and naturalistic), research and education (scientific), cultural-ethical (symbolic, humanistic and moralistic), and environmental services (ecologic). Murray's typology was used to guide the identification of the different views toward the natural forest in tropical countries. His typology is used in the present study of perceptions of forest biodiversity as it provides a framework through which the qualitative data is analysed.

### 3.3.1 The Assessment of Values

The utilitarian value of biodiversity, and the ecological functions it performs, can be found by examining and identifying each ecosystem service and good produced. However

biodiversity's roles go beyond providing goods and services and include non-utilitarian values that contribute to people's cultural identity and spiritual enrichment (Jeffries 1997; King 1994; McNeely 2003; Rolston 1994) as well as providing security, resilience, health, and freedom of choice (MEA 2005).<sup>47</sup> These values can be used to justify the sustainable use of biodiversity, but the notion of intrinsic value is the most problematic justification (Norton 1997).

While economically quantifiable 'products' of biodiversity make significant contributions to national economies, as demonstrated in the case of Indonesia's forest in Section 1.2, the ecological services that act as a life-support system are equally important contributors to human well-being (Daily 1997). However, these are more difficult to measure in monetary terms (Constanza 2000; Constanza & Daly 1992; Constanza et al. 1997; Constanza & Bartholomeow 1991; Krishnamurthy 2003; Pearce & Moran 1994; Pearce et al. 1998; Tacconi 2000a) and have been largely overlooked worldwide (Daily 1997).

Thus, from the perspective of a society, the total value of biodiversity is the sum of the values of each one of its utilitarian and life-supporting functions, for the period of time over which they accumulate (Giller et al. 1997). When discussing the value of biodiversity, ecological economists often use the term 'biological resources', which means the portion of biodiversity that is of actual or potential use to people. So in this sense, valuation of biodiversity involves considerable simplification as there are still many unknown functions of biodiversity for which humans may yet assign a monetary value (Constanza et al. 1997).

The umbrella concept that some economists use to determine the value of biological resources is known as the Total Economic Value (TEV), which consists of the use and non-use values. The use value includes direct or consumptive values, which is derived from the direct uses made of environmental goods (e.g., firewood, fodder, wild meat, and medicinal plants) for a direct consumption without passing through a market. Included in this direct value is productive value, derived from products commercially harvested and marketed (e.g., timber, fish, minerals, and medicinal plants with commercially known pharmaceutical properties) (McNeely et al. 1990). In terms of its link with sustainability (Section 2.2.2), the use value is divided into current and potential values for the future (optional value).

The indirect use or non-consumptive value stems from ecosystem functions (Section 3.1.2). Also included in this indirect value is the aesthetic value (e.g., scenic view, proximity to wildlife, and ecotourism) which has health benefits resulting from recreational and other activities and the intangible values of keeping options open for the future and the pleasure of knowing that certain species exist (McNeely et al. 1990). Some ecosystem services are not easy to evaluate monetarily, and how far these ecological services support the wider life-support function of the natural environment is still not fully known. However, Rolston (1994) argued that despite limited understanding of the ways in which natural ecosystems work, there is no doubt that over time the quality of human life declines as a result of declining quality of natural ecosystems.

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<sup>47</sup> Moreover, many believe that the importance of biodiversity is beyond its use value to humans and that all forms of life have an inherent right to exist, whether or not they are useful to humanity. This is enshrined in the World Charter for Nature, endorsed by the General Assembly of the United Nations in 1991 and in the preamble of the CBD.

The non-use (intrinsic and transformative) value is linked with sustainability through the conservation of natural assets, although no use is made at present (Rolston 1994). It can thus be regarded as an appreciation of the wider indirect use value of life-support functions. This type of value is also known as intrinsic value, while the transformative value of an object occurs when it provides an occasion for examining or altering a felt preference, rather than simply satisfying it. In other words, an object has this value if it can alter our values (Norton 1997).

The classification and the different methods of assessing values of biodiversity imply that different stakeholders can attribute different kinds of worth to a single object and from radically different perspectives. Consequently, even when an object is highly valued by several individuals, each may employ a different perspective to reach an individual conclusion, and each may focus on different features of the object in question.

The values of forests refer to the benefits that people enjoy from the existence and use of forests. Several studies about forest values in general exist, but few deal specifically with biodiversity. Several studies in the US examined the economic and ecological values of forests and most found that non-commodity benefits of the forest are valued more highly than the economic benefits (Cordell & Tarrant 2002; Kant & Lee 2004; Manning et al. 1999; Patel et al. 1999; Tarrant & Cordell 2002; Tarrant et al. 2003). For example, aesthetic, recreational, and ecological values of forests are more important than the economic and spiritual values (Manning et al. 1999). Similarly, the value of forests in absorbing carbon-dioxide and providing scenic beauty in the southern states were highest, while wood production was the lowest (Tarrant et al. 2003). However, in a survey in which respondents were asked to rank benefits of biodiversity (Montgomery 2002), it was revealed that most respondents valued ecological benefits as most important, commodity-based benefits were of moderate importance and both of these ranked above recreation and aesthetic benefits. In addition, content analysis of newspapers, forestry journals, and environmental magazines showed that commodity-related forest values declined in importance while recreational value increased over two decades (1980-2001). Forests' ecological and moral/spiritual/aesthetic values, however, changed very little in importance over the same period (Bengston 1994; Bengston et al. 1999; Bengston et al. 2004). As can be expected, studies in developing countries show that forest biodiversity is most valued for its economic benefits (Sheil 2001; Sheil et al. 2002; Sheil & Wunder 2002) although studies among the Dayak forest communities in Kalimantan show that the forests are valued equally for economic and cultural/spiritual aspects (Colfer et al. 2001c; Sardjono & Samsedin 2001).

As people are more inclined to protect what is valuable to them, understanding the basic value orientation of stakeholders towards forest biodiversity helps to examine their attitudes towards its conservation. The categories of forest biodiversity values developed by Murray (1990), as noted above, can help explain the potential implications of these perceptions on resource use and the sustainability of the resource base. The relationship between the values of forest biodiversity and attitudes to its conservation is discussed below.

### 3.3.2 Perceptions of Biodiversity Conservation

The links between the concepts of biodiversity, conservation, and sustainability have received much attention globally from ecologists over the past three decades. This has considerably advanced the understanding of human-induced biodiversity. To a lesser extent, the study of

perceptions of the environment has likewise attracted interest from the disciplines of sociology and social psychology – ranging from perceptions of the environment in general (Bloom 1995; Engel & Potschke 1998; Hughey et al. 2001; Ingold 2000; Robinson 1991; Sewell & Burton 1970; Sjoberg 1989; Swanson 1970) to the level of ecosystems, such as forests and biodiversity (Cary 1995; Colfer et al. 2001c; Hunter & Brehm 2003; McNeely 2003; Purnomo et al. 2005; Sheil et al. 2002).

The terms ‘perception’ and ‘attitude’ have a range of meanings, from the physical aspect – how the eye responds to external stimuli – to the psychological aspect of forming an opinion of an object external to the human body (Schiff 1970). The kind of impressions that an individual forms are influenced or modified by the past experience of the perceiver, his/her experience with similar stimuli, and the individual’s own state at the moment of viewing the stimuli of interest (Schiff 1970). For these reasons, a single object may be viewed from radically different perspectives, as illustrated by Kellert’s typology described in Section 3.3.1.

Another factor that influences perception is habituation, which occurs when repeated presentation of the same stimulus leads to the decrease or even disappearance of the response originally made. In other words, in order to perceive something, one must first be aware of it (Tellegen & Wolsink 1998). Hence, awareness may be considered one aspect of perception. Consequently, since most of the research on perception of the environment focuses on the inferences made after the stimulus has been perceived, this conceptual distinction should be kept in mind. For this reason, Allport (1995: 312) stressed that the term ‘perception’ should be reserved for uses in which there is an actual stimulus to be perceived; when dealing with processes or collections of beliefs, the word ‘cognition’ is more appropriate as it refers to aspects of the thought process (Schiff 1970).

Although in social psychological literature the terms perception and attitude carry specific meaning, in this study these terms are used interchangeably to refer to a view or understanding or opinion toward something that may influence actions or behaviour. An attitude is learned and may be regarded as a more specific expression of a value or belief in that an attitude results from the application of a general value to concrete objects or situations (Theodorson & Theodorson 1969: 19 as cited in Manning et al. 1999). This study uses the term ‘attitude’ or ‘perception’ to mean an application of a person’s basic values (Section 3.3) to the forest ecosystem and its biodiversity.

Studies that concern with humans and the environment are generally categorised as natural science (biology or ecology) and human science (among others: human ecology, anthropology, social psychology). The former claims to study organic nature ‘as it really is’, and thus offers (seemingly) value-free description of the physical world, whereas the latter studies the diverse ways in which the constituents of the natural world figure in the imagined or so-called ‘cognised’ worlds of cultural subjects. Hence, this approach spells out the specific cultural meanings that people place upon their natural or cultural world (Ingold 2000).

How do human beings perceive the world around them? Standard anthropological accounts state that perceptions of the environment are a cultural construction. The notion of environment is, first, a relative and relational term – it is relative to whose environment it is and what relationship a human has with it (Ingold 2000; Rolston 1994). For example, *my environment is the world as it exists and takes on meaning in relation to me*. Second, the

environment is never complete – it is continually under construction through the activities of humans and other organisms (biodiversity) within the natural world. The third notion, which stems from the two above, is that the concept of environment should not be confused with the concept of nature. The world can exist as nature only for people with a positivist view, who look at it with the detached manner of a scientist who treats nature as unaffected by his/her presence (Ingold 2000). In other words, 'nature' is an object. So the distinction between environment and nature corresponds to the difference in perspective between seeing ourselves as being within a world and as being outside it; some view it externally and some view themselves as part of nature, such as the Maori in New Zealand, and forest peoples in Kalimantan, Indonesia.

Humans learn to perceive the environment and its constituents (i.e., biodiversity) through the transfer of beliefs and propositions from one generation to the next (i.e., cultural knowledge). Thus, cultural forms are encoded in the landscape just as conceptual representations are encoded in the medium of sound in linguistics (Ingold 2000; Rolston 1994). A similarly important tool of this kind of learning is through direct observation and experience of the objects of the physical world (e.g., scientific knowledge). Most anthropological analysis of the cultural construction of the environment proceeds from these assumptions (Ingold 2000). Therefore, information about the environment in itself is not knowledge, nor does one become more knowledgeable through the accumulation of information. Rather, the extent of knowledge depends on the capacity to situate such information, and understand its meaning, within the context of a direct continuous engagement with the environment and other human beings. This capacity is developed through an interplay between having things shown to us through various written, oral, and visual media so that they can be understood and our own active minds trying to make sense of it. Consequently, as it is socially constructed, humans' perceptions are influenced by their own intelligence, the availability and accessibility of such information, and their socio-economic situation (Ingold 2000; Perlman & Adelson 1997; Robinson 1991; Tacconi 2000a; Wood et al. 2000).

The importance of attitudes for conservation lies in their theoretical connection with behaviour (Ajzen & Fishbein 1980; Manfredo et al. 2004). This relationship is illustrated by a hierarchy known as the theory of reasoned action (TRA), which asserts that behaviour is influenced by intention, and that intention is influenced by both attitudes and subjective norms (perceived social pressure for a particular behaviour), and these are influenced by belief systems (Ajzen & Fishbein 1980). The importance of TRA for conservation is the possibility that positive attitudes towards conservation will lead to pro-conservation behaviour.

Demonstration of this theoretical link has, however, been very limited (Lepp & Holland 2006) and that attitudes only occasionally predicted pro-environmental behaviour. Moreover, this weak relationship completely evaporated when the behaviour in question incurred tangible costs and required commitment. For example, research on attitudes to manatee conservation had little influence whether boaters obeyed speed limits intended to protect manatees. Instead, their intentions were influenced by the perception that violating speed limits would bring punishment from law enforcers (Aipanjiguly & Jacobson 2002). It was suggested that this inconsistency was partly a result of using a general model of attitude to predict specific environmental behaviour (Kaiser et al. 1999). When using a general measure of attitude to predict general environmental behaviour, they found the predictive power is stronger. Applying the general measure of attitude toward wild land, a positive link between attitude toward preservation and intention to vote for wild land preservation was identified,

but it was not determined whether the intention to vote was translated into actual behaviour (Vaske & Donnelly 1999). Nevertheless, findings of this study confirmed a positive link between an individual's belief systems and attitude. They found that an individual whose belief system was centred more on nature was more likely to have a positive attitude toward conservation than those with an anthropocentric belief. These findings support the theory of reasoned behaviour that beliefs can influence conservation behaviour (Ajzen & Fishbein 1980; Bamberg 2003; Fujii 2006; Infield & Namara 2001; Kaiser et al. 1999).

While it is clear that the link between attitude and behaviour varies with places and cultures (Infield & Namara 2001), studies showed that even small benefits linked to conservation can improve local attitudes, even if this does not change behaviour. For example, in the studies about the changing attitudes of local people to forest conservation in the Bemenda Highlands in Cameroon, tangible benefits and solutions to the people's problems (e.g., water availability, rights to collect wild vegetables, increased agricultural yield through soil erosion control, agroforestry techniques, opportunity for bee-keeping) did change their attitudes toward conservation (Abbot & Thomas 2001).

Although many studies have confirmed that various factors influence attitude, the connection between attitude and behaviour has not been consistently confirmed. One of the explanations includes the fact that change in environmental behaviour is difficult to observe due to the covert nature of anti-conservation activities (e.g., hunting, collection of products from protected areas), and also that change may occur gradually, over a lengthy period of time, and usually beyond the time allocated for such studies (Infield and Namara 2001). Another set of factors that influence people's attitude to conservation and conservation areas is the history of protected areas establishment, particularly in the context of developing countries (Ormsby & Mannle 2006).

While measuring such behavioural change towards conservation is beyond the scope of this current study, the assessment of stakeholders' perceptions toward forest conservation can provide at least partial explanations of their behaviour. Most studies of attitude use quantitative methods, but the use of qualitative methods for measuring attitude yielded a more detailed and nuanced assessment, which in turn improved prediction of conservation behaviour (Shanahan et al. 1999). In order to understand local stakeholders' attitudes towards forest conservation, this study used a combination of qualitative and quantitative methods (see Chapter 5). While there are clear links between values, attitude, and perceptions in influencing people to make decisions on the use of biological resources, the socio-economic environment in which people live is also an important factor in influencing the state of forest ecosystems. These are discussed in the final section.

### 3.3.3 Perceptions of the Underlying Factors in Forest Loss

Detailed reviews of loss and degradation of biodiversity worldwide, and the role of humans in increasing the downward trend, are well documented (Heywood & Watson 1995; WCMC 1992; Wilson 1992; Wilson & Peters 1988; World Bank 1994; WRI et al. 1992). Although extinction of species or genetic diversity is part of a natural process, the human-induced extinction rate has been estimated to be between 100 to 1000 times the natural rate (Reid & Miller 1989). If the current trend in the loss of biodiversity continues, Reid (1992) estimates the resulting extinction rate to range between 10% and 50% of all species over the next 50-100 years.

The Millennium Ecosystems Assessment (2005) also concluded that, over the past fifty years, humans have changed the Earth's ecosystems more rapidly and extensively than in any comparable period in human history. The report stated that out of 24 ecosystem services that make direct contributions to human well-being, 15 of them are in decline. The report also emphasises that the speed of these changes, and the associated loss of biodiversity, are now faster than ever recorded and there is no sign that this process is slowing down. It has also been established that this decline world-wide is the primary cause of biodiversity loss<sup>48</sup> (WWF 1999).

The direct driver of the loss is commonly attributed to increased human population and its associated consumption of resources, over-exploitation of plants and animals, habitat loss due to large scale clearance of forest and conversion of wild lands to agricultural and urban uses, pollution of land and water bodies, introduction and spread of invasive alien species, and climate change (Lovejoy 2002; McNeely et al. 1990; Wood et al. 2000; WRI et al. 1992). All of these activities are largely to meet rapidly growing demand for resources and for economic development; this has brought substantial benefits for human welfare. While links between the activities and the loss of biodiversity are easier to comprehend, other socio-economic factors have profound effects on biodiversity at a given locality. For example, laws, markets, policies, and social norms frequently favour development patterns that put increasing pressures on natural resources and ecosystem processes and provide disincentives for more sustainable behaviour (Fisher et al. 2005; Wood et al. 2000). Moreover, although biodiversity loss occurs at the local level (e.g., subsistence farmers clearing forest for new agricultural fields, timber companies logging new areas of forests, or hunters trapping wild game for sale), the forces that drive people to behave in these ways often come from pressures and demands at a wider geographic scale (e.g., national and international). The links between socio-economic structures and biodiversity loss, however, are not well understood (Wood et al. 2000). Therefore, knowing what forces drive environmental change, both internal and external to the particular site being studied, is a key step to understanding why various stakeholders use forest resources as they do under the socio-economic contexts they find themselves in. This is a key step to finding more effective conservation solutions and in forging more sustainable behaviour.

Frameworks to analyse changes in forest ecosystems have been developed in both the natural and social sciences. There are many studies linking individual socio-economic factors and environmental changes, for example, population growth and economic policies (Barber 1995; Barbier et al. 1994b; McNeely et al. 1990; WRI et al. 1992), but there are only a few examples of analyses that cut across all types of factors. Of these, few provide empirical cases of biodiversity loss that show how these factors have caused declines in biodiversity (Geist & Lambin 2002; Wood et al. 2000). For example, in the humid tropics, where the rainforest accounts for about 50% of all tropical forest and the biodiversity levels are extremely high (Collins et al. 1992), two major factors – poverty and increasing human population – were identified as threats to natural ecosystems. Given that around two-thirds of

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<sup>48</sup> The Living Planet Index (WWF 1999) is an aggregation of key indicators relating to the state of the world's environment (e.g., forests, freshwater and marine) to produce an index of how fast elements of nature is disappearing from the Earth.

all terrestrial species occur in tropical forests, their conversion or loss has serious implications for global biodiversity (Fisher et al. 2005; McNeely & Scherr 2001). This also suggests that these areas warrant greater attention as a positive change here would create a better response for the planetary system.

Early inter-disciplinary approaches were developed to understand human-induced environmental problems. For example, in the 1980s Vayda (1983) developed the progressive contextualisation approach for UNESCO's Man and the Biosphere programme, Blaikie & Brookfield (1987) promoted the political ecology approach, and Robinson's (1991) model broadly divides drivers of environmental change into two categories: physical and socio-economic. The physical factors include population growth and consumption and extraction of resources, while the socio-economic factors consist of political power, markets, organisations and attitudes (Robinson 1991). The former are linked to the latter through the process of decision-making about resource use. While the physical factors can be measured quantitatively, many socio-economic factors are inherently unquantifiable and yet are essential to describing human behaviour (Wood et al. 2000). Furthermore, while knowledge of biodiversity is valuable for ensuring the well-being of humans and ecosystems, cultural diversity represents differing solutions to survival in differing contexts (WRI/IUCN/UNEP 1992). In other words, human cultural characteristics (e.g., knowledge, values, and social organisation) also play important roles in enhancing the capabilities of culture to flourish, and this constitutes a kind of 'insurance policy' for human species (Barbier et al. 1994b; Colfer et al. 2001b).

These approaches have some similarities in terms of main interests and the multiple scales of analysis applied. Studies using these approaches examine how communities and the environment are being transformed through market integration and how they link with each other in both spatial and temporal scales (Fisher et al. 2005). In this multiple scale analysis, the political and economic power of different stakeholders is made explicit and the plurality of perceptions of ecological change is recognised. The approaches, therefore, help provide historical depth to understanding processes of environmental degradation, and clarify how power relationships and processes work (e.g., who gets what and who controls resources) in particular resource contexts (Fisher et al. 2005; Peluso 1992, 1993).

Using this inter-disciplinary approach a study usually starts with an environmental problem of interest to the researcher in a local context, then moves up to the subsequent contexts. In this way, the chain of interrelationship between local users and external actors can be explained. These linkages serve as tools for understanding local responses to external factors operating beyond the local scale. The core premise of this approach is that a fuller understanding of problems can be gained only if they are seen as part of an intricate interacting causes and effects (Vayda 1983: 266). In other words, to understand an environmental problem, such as biodiversity loss, the limits and possibilities that affect local resource use must be understood (Perrings 1995). Wood et al. (2000) also underlined that biodiversity loss is not predetermined by socio-economic conditions because resource users also make decisions within their particular circumstances and their decisions affect the environment. Thus, global and national systems can present both constraints and opportunities for local socio-economic systems, and local conditions will in turn affect the regional or global situations; the chains of explanation can be in both directions.

To demonstrate how social and biophysical factors drive biodiversity loss, Wood et al. (2000) applied an inter-disciplinary framework (Figure 3.1). The framework is based on a wide

literature accounting for demographic change; poverty and inequality; public policies, markets and politics; and social change (see Box 3.2) that determine local resource exploitation (Barber 1995; Barbier et al. 1994b; Forester & Machlis 1996; McNeely et al. 1990; Perrings 1995; Perrings et al. 1992; Robinson 1991; WRI et al. 1992).

Moreover, these drivers tend to interact and amplify each other, forming feedback loops and producing impacts that are often non-linear and still largely unknown. For example, global warming, acid rain and tropical deforestation, which were not explicitly known before the 1972 Stockholm meeting, are now a major global environmental problem. In a world of considerable scientific uncertainty – where human activities are continually imposing burdens – there are environmental processes at work with the capacity to generate significant problems and surprises (Myers 1995). These impending problems are grouped into two types: environmental discontinuities and synergism (ibid). The former occurs when ecosystems absorb stresses over long periods with little outward sign of damage, until the disruption threshold is reached, then the cumulative effects appear in critical proportion. Similar types of stresses can also occur in the socio-economic realm. An example is the widespread problem of landlessness in many developing countries (where land provides the livelihood of 60% of the population and where most fertile and accessible land has already been claimed). The increasing human population exacerbates landlessness and places stronger pressure for forests. An additional stress occurs when the forest serves as a source of fuel wood as the main source of energy for rural populations. In this instance, as long as the collection of fuel wood does not exceed the rate of regrowth of the tree stock, people can exploit the resources sustainably. But when the rate of cutting is higher, the resource base declines and the speed of change become more rapid and non-linear. As soon as sustainable yield is exceeded, the problem of resource depletion becomes graver.

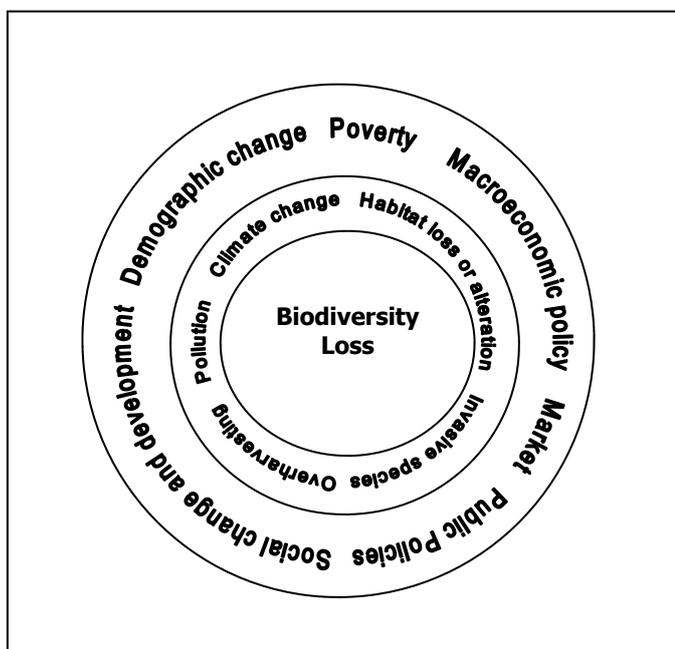


Figure 3.1 Biodiversity loss: proximate and underlying root causes (Wood et al. 2000).

**Table 3.6 Scales for analysing socio-economic factors that affect local resource use**

Temporal	Geographical	Political	Economic
Today	Farm	Agreements among neighbours	Subsistence
Agricultural cycle	Wildlife reserve	Local council	Local market
Political term	Eco-region	State government	State development funds
Timber cycle	Nation	National government	National policies
Generation	Continent	International intervention	International markets

Source: Wood et al. (2000).

**Box 3.2 The main criteria to analyse the root causes of biodiversity loss**

<p><b>Demographic change</b> The link between population growth and resource degradation is through the increase of resource consumption and waste generation. Generally, this increase is associated with expansion and intensification of land use, exploitation of marginal lands, and the breakdown of traditional resource management systems (Barbier et al. 1994b; Dasgupta 1992; Ehrlich &amp; Daily 1993).</p> <p>In addition to the absolute numbers of population, the specific location of growth is equally important in explaining biodiversity loss. Both rate of growth and absolute numbers can directly affect the use of resources and often drives habitat conversion in areas important for biodiversity conservation.</p> <p>Despite its rarity, cases have been found where forest cover and diversity have actually increased in some areas as population increases (Blaikie &amp; Brookfield 1987; Colchester &amp; Lohmann 1993; Fisher et al. 2005; Sayer 1995) because people have more incentives to use resources more efficiently.</p> <p>Finally, population increase in developed countries has had significant impact due to their greater level of consumption; an individual in a rich country can consume forty to sixty times more of the world's resources than a person in a poor country (UNEP 2006).</p> <p><b>Poverty and inequality</b> There are many definitions of poverty, which include economic (material deprivation), political, historical, and psychological aspects (e.g., social exclusion and powerlessness) (Fisher et al. 2005). Economists often use notions of 'absolute poverty' and 'the poverty line.'</p>	<p>The poverty line is the level of per capita consumption that allows the individual to satisfy basic nutritional requirements. The notional poverty line of US\$2 per day is a figure currently used to reflect a person's ability to afford a diet sufficient to meet minimal nutritional needs. Absolute poverty is defined as existing where income falls below this poverty line (World Bank 2001).</p> <p>Despite various technical difficulties in measuring poverty in these terms, and questions arise about what such measurements do not and cannot tell about the underlying causes of poverty, the poverty line is a useful indicator and is by far the most quoted in the study of poverty (Fisher et al. 2005). According to the World Bank (2001) there are three dimensions of poverty: (1) lack of assets (e.g., natural, human, financial, physical and social capitals), (2) powerlessness (caused by social differences, inadequate access to resources, unresponsive public administration, corruption), and (3) inequitable legal systems and vulnerability to risks (e.g., economic and social crises and natural disasters).</p> <p>The link between poverty and poor management of resources has been identified by many authors, and evidence has illustrated the vicious cycle of poverty and resource degradation (Dasgupta 1992; Koziell &amp; McNeill 2004). From the consumption perspective, wealth and its associated high levels of consumption are closely linked with short-term management of resources that lead to its degradation (Tacconi 2000b).</p> <p>While debates about the role of poverty and wealth in affecting forest sustainability continues, the poor are also considered a threat to forest ecosystems, both because of their direct and indirect impacts on resource use patterns, migration, and frontier expansion (Wood et al. 2000).</p>
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### Box 3.2 The main criteria to analyse the root causes of biodiversity loss (continued)

#### **Policy and markets structure**

The close relationship between markets, politics, and public policies is widely recognised as a powerful influence in resource use and central in explaining human-induced biodiversity loss (Myers 2002; Wood et al. 2000). Laws, regulations, and public institutions governing resource use are products of political, social, and economic interactions. Therefore, policy and market 'failure', often blamed as a main force driving biodiversity loss, is rarely accidental, as 'they are established and maintained because they benefit, or are intended to benefit, some sector or class of the economy or society' (Contreras-Hermosilla 2000; Wood et al. 2000).

Such policies often provide incentives for unsound resource management; hence, it is often referred to as *perverse* government policies (Myers 2002). Another form of policy failure is government's inability to incorporate the full(er) values of biodiversity into decision-making concerning resource use (Barbier et al. 1994b; Barr 2001; McNeely 1988; McNeely 1995a, 1996; Repetto & Gillis 1988; Resosudarmo 2005; Swanson 1995). Both failures have been common to achieve traditional economic development goals, such as industrial expansion, and intensification of agriculture to increase food production and export of cash crops.

Wood et al. (2000) also argue that the state of biodiversity is influenced by the structure and behaviour of national and global markets, which have enormous power in shaping decision-making concerning local resource-use patterns. For example, national governments in the past had somewhat more control over trade, capital flow, and national markets. However, the current shift towards market liberalisation has led to an increased role for the international market, bringing large-scale changes in production and resource-use.

There are two main theoretical models to explain the role of macro-economics in driving biodiversity loss. Traditional neo-classical economic theory posits that improvements in government macro-economic policy, such as trade regulation, will improve resource-use pattern. The political economy theory postulates that changes in macro-economic policy, without changes in the underlying power and market structures, may worsen resource-use patterns. Empirical evidence shows that both have some truth (Wood et al. 2000).

#### **Social change and development biases**

Related to public policy and political structure as underlying causes of environmental change is the pattern of economic development. Commonly, development has been understood as increases in consumption and the transformation of natural resources. This understanding is deeply embedded in many economic and political systems, which lead to cultural and social preference for this kind of development (Wood et al. 2000). The linkages between culture and resource-use patterns are clearly demonstrated by economic activities, settlement patterns, and political structure affecting biodiversity.

Another common pattern of resource exploitation and consumption is exemplified by the expansion of Western culture, which has induced social change around the world. Many developing countries have a bias toward urban development over rural areas, and through this process traditional cultures that are often less destructive of natural resources are being lost or compromised or pushed towards unsustainable practices (Colchester 1997). The shift towards a more 'modern' society is likely to introduce traditional people to rising consumption levels and lead to the loss of traditional knowledge about sustainability. Consequently, traditional resource management institutions are also likely to be disrupted or lost (Colchester 1997).

Synergies arise when two or more environmental processes interact in such a way that the outcome is not the sum total of the processes but can be multiplicative (Myers 1995). For example, in the interactions between global warming and agro-biodiversity, some genes of agricultural crops may be expanded to adjust to changes in temperature and rain fall or to increase their resistance to too much or too little water. However, the gene reservoirs of many crops are being depleted more rapidly because plant breeding has focused on genetic uniformity that reduces germ-plasm variability. Little is known about the consequences of such combinations of problems and the potential impacts are still largely unknown (Myers 1995: 360).

While decision-makers often have incomplete information (including the largely unknown impacts of the various drivers noted above) and face competing interests when they are

making resource-use decisions, understanding the importance of biodiversity conservation for sustaining the flow of goods and services is instrumental for encouraging a change of behaviour toward more sustainable management of biodiversity. This understanding and the realisation of existing and potential human-induced threats are fundamental to avoid or reduce environmental crises. As the type of threats can vary from one place to another, and they operate at various scales within different time-frames, it is important to clarify the extent to which local stakeholders understand what kind of threats are operating at the local scale and the part other external drivers play in changing local biodiversity. This issue frames the third objective of this study. In order to generate and analyse the socio-economic factors that affect forest resource use at a provincial scale (Gorontalo), I use the progressive contextualisation approach developed by Vayda (1983) to analyse both the direct and underlying causes of loss of forest biodiversity (see Chapters 6 and 8).

The above-mentioned drivers of resource-use were used as a basic conceptual model to guide the collection of data on the root causes of biodiversity loss (Figure 3.1). However, the comprehensive criteria used by Wood et al. (2000) were adopted only partially for two reasons. First, the analysis primarily focused on locally perceived direct drivers (see Figure 8.2). Most of the market and policy failures were identified in my study by only a few stakeholders at the national level. The factors operating at national and international scales are not the main focus of this study and they are addressed mainly through the available literature. The perceived local root causes resonated with poverty, demographic change, and public policy factors. An important social factor was also identified, the poor awareness of the fuller benefits of protected forest. Second, time and funding constraints led to a more circumscribed study.

### **3.4 Chapter Summary**

This chapter reviewed the current scientific knowledge of biodiversity, including key concepts of its essential role for supporting the survival and maintenance of human welfare and the planet Earth itself. The chapter outlined the history of biodiversity conservation and critically reviewed the strength and weaknesses of conservation paradigms and practices in achieving its goals. The role of values and perceptions in implementing conservation actions was also discussed. The chapter explained the conceptual framework or ‘lenses’ of political ecology as a tool for analysing the direct and underlying factors that influence stakeholders’ decisions on the use of forest resources. The key concepts and framework have contributed to the development of the research design, approaches, and tools (see Chapter 5) to answer the research questions raised in Chapter 1.

## CHAPTER 4 A REVIEW OF THE RESEARCH SITE

Gorontalo lies in the middle of the Minahasa Peninsula (the northern arm) of Sulawesi, the fifth largest island of the Indonesian archipelago (Figure 2.1). The island occupies the centre of Wallacea, the biogeographical transition zone between the Asian and Australasian fauna (see Section 2.2). Its isolation from the two major biogeographical realms led to its unique natural evolution, reflected in its flora and fauna. This chapter provides background information on the roles of natural forests and the biodiversity within them for the socio-economic development of Gorontalo. It describes three protected areas that served as the focal sites for the study and reviews the key activities in addressing major threats they face to date.

### 4.1 Biogeography

Straddling the Minahasa Peninsula 500 km east to west, Gorontalo is bounded by the parallel coastlines of the Sulawesi Sea in the north and Tomini Bay in the south. The province has rugged mountains (22 in total), the highest peak Mt. Tabongo (2,100 m) and the lowest one Mt. Huwata (at 923 m) running across the land from the east to the western borders of North and Central Sulawesi provinces, respectively. Their forests thus play a critical role in protecting the watersheds, where a geological fault cuts through the southern mountains, allowing the main rivers, Paguat, Randangan, Paguyaman, Milango, Bone, and their tributaries to drain into the vast Tomini Bay (Allen 2006). These rivers are important sources of freshwater for most of the population, for both their agricultural and domestic needs. In the valley among these mountains lies Lake Limboto (3,000 ha) – one of the largest lake in Sulawesi for freshwater and fishery resources.

Gorontalo's natural vegetation is typical of Sulawesi's, yet it is dramatically different to the neighbouring islands of Sumatra and Kalimantan. The number of species endemic to Sulawesi is much lower than its neighbours, and only 7 plant genera are known to be endemic compared to Sumatra (17) and Kalimantan (59) (Kinnaird 1995). Sulawesi's vegetation is also much less known than that of Sumatra and Kalimantan. According to a forest cover map presented by Whitten et al. (1987), the vegetation of the island is classified as lowland and hill forests with scattered areas of distinct forest types growing on ultrabasic and volcanic soils; limited tracts of montane vegetation occur at high elevations.

Owing to a long history of human disturbance, many areas are now dominated by second-growth vegetation or alang-alang (*Imperata cylindrica*) grassland. Dry areas are characterised by open scrub dominated by drought tolerant species, cactus and grasslands, including the invasive *I. cylindrica* (Whitten et al. 1987). The lowland forests are characterised by enormous strangling figs, a high diversity of fan palms, and the economically valuable native timber species of Rao (*Dracontomelon dao*) and Nantu (*Palaquium amboinense*). However, a World Bank review of Indonesia's forest cover in the late 1990s and another conducted by the Global Forest Watch in 2001 concluded that Sulawesi has now lost its lowland forest (FWI/WRI/GFW. 2001; Holmes 2000).

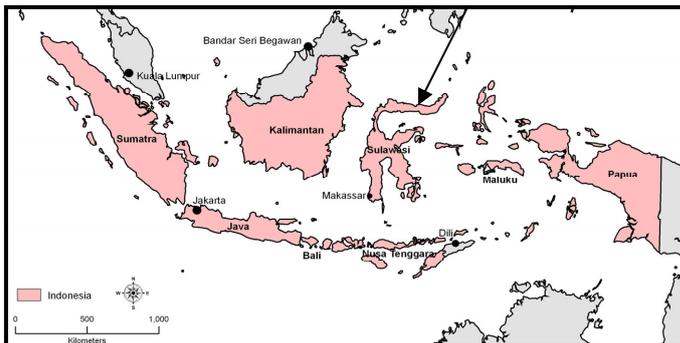
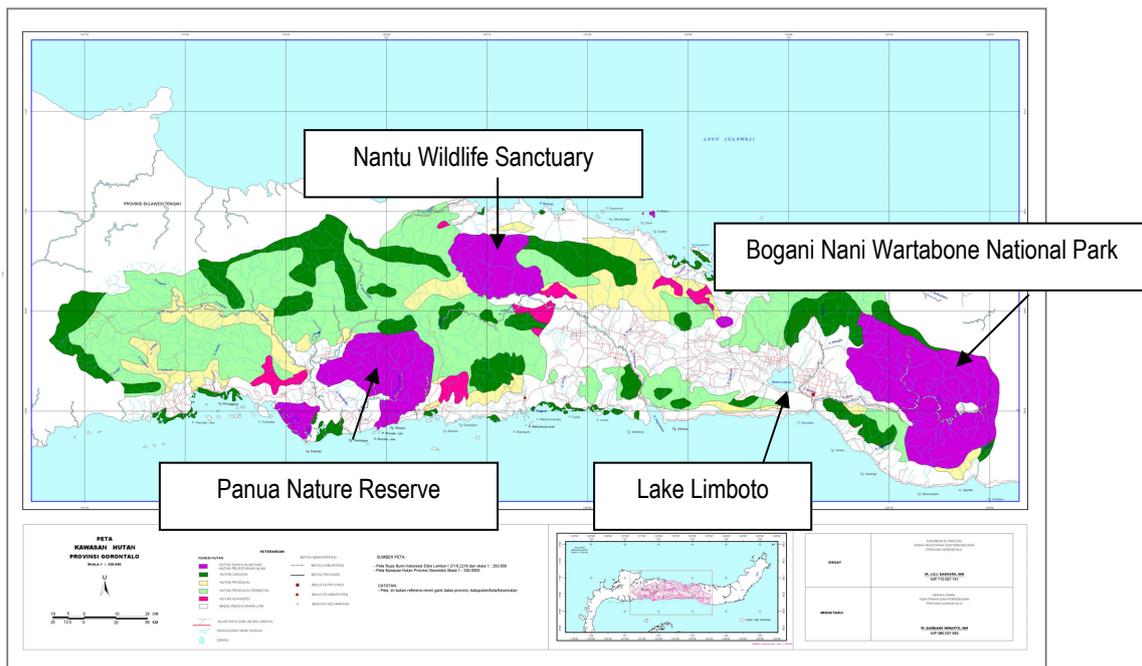


Figure 4.1 Location of Gorontalo and the focus study sites.



In spite of the rich vegetation, soils of the lowland forest are in fact nutrient poor and most of the nutrients are stored in living plants or decomposing leaves. Consequently, when the forest is logged and converted into agriculture the nutrients are quickly lost within a few planting seasons (Whitmore 1984). Owing to the poor quality soils (Kinnaird 1995; Whitten et al. 1987) and other socio-economic reasons (e.g., Dove 1983, 1985, 1987), an extensive farming system known as shifting agriculture is commonly practised (see Chapter 8).

As most of the lowland forest has either been logged or converted into cultivated land, the forests in the hills and mountains are home for many distinctive fauna found in Indonesia: 79% of its 127 indigenous mammal species are endemic (a percentage which rises to 98% if bats are excluded) (Lee & Rais 2001; Whitten et al. 1987). Examples of the endemic mammals are the wild pig *babi rusa* (*Babyrousa babyrussa*), dwarf buffalo or *anoa* (*Bubalus* sp.), crested black macaques (*Macaca nigra*), the nocturnal dwarf cuscus (*Strigocuscus celebensis*), and the smallest primate, the spectral tarsier (*Tarsier spectrum*). Sulawesi in general has a total of 328 species of bird, 88 of which are endemic; the two most notable species in Gorontalo are the incubator bird, *maleo* (*Macrocephalon maleo*), and the red-knobbed hornbill (*Aceros cassidix*).

The climate in Gorontalo is markedly seasonal. Rainfall is highly variable owing to the steep mountains and prevailing winds, resulting in localised ‘rain shadows’. In general, the northern coast receives the greatest annual rainfall; in most areas monthly rainfall averages about 150 mm. The region experiences a dry season from June through mid- to late October, although this varies depending on local topography. During the rainy season (October to December) the monthly rainfall ranges 221-231 mm, but it drops to as low as 17-20 mm during the dry season (BPS 2003, 2006). The temperature ranges from 23 °C to 34 °C and the level of humidity ranges from 71% to 84% throughout the year.

## 4.2 People and Recent Change in Local Politics

Gorontalo’s population is dominated by the native Gorontaloese, who are predominantly Muslims (97%), although *animism*, the belief that non-living objects have spirits, is still practised by small communities in remote areas. Other ethnic groups include the Minahasan (native residents of North Sulawesi province), who are mostly Christian due to the strong influence of Dutch colonisation and their education system, the Buginese (the well-known traders and seafarers of Sulawesi’s coastal areas), and the more recent transmigrants from Java and Bali. The latter arrived in Gorontalo in the late 1970s through a government-sponsored transmigration programme. The primary aim of this programme was to reduce the population density in the islands of Java and Bali and to encourage socio-economic development in the Outer Islands (i.e., Sumatra, Kalimantan, Sulawesi, and Western Papua). Through this programme, each of the participating households (of mostly landless farmers) was allocated 2 ha of free land for housing and cultivation of crops (in formerly forested areas), for which they have a legal right of ownership to the land (see Chapter 6).

The former Gorontalo District and Gorontalo Municipality, which for five decades (1952-2000) were part of the North Sulawesi Province, on 16 February 2001 became the 30<sup>th</sup> province of Indonesia under Law No 38 of 2000. The separation was motivated by a sense of self-determination,<sup>49</sup> against perceived political and economic marginalisation<sup>50</sup> from Manado and the desire to return to the autonomous ‘Great Tomini Province’.<sup>51</sup> Several years of lobbying and the national atmosphere of *reformasi* after the fall of Suharto in 1998<sup>52</sup> also provided the right momentum for the move. Gorontalo’s unique birth went peacefully and almost unnoticed nationally. Initially the new province comprised two districts (Boalemo and

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<sup>49</sup> Inspired by Nani Wartabone’s leadership, who declared Gorontalo’s independence from the brief Japanese occupation in 1942. However, his prominent role in the fight for independence was overshadowed by other Minahasan leaders, such as Sam Ratulangi, and Gorontalo was the underdog region, under North Sulawesi Province, during the independent era until 2000 (Sabar 2004).

<sup>50</sup> Religious tension is never mentioned as one of the reasons for separation in any official record as any action taken by individuals or groups on the basis of race, ethnicity, and religion – known by its acronym SARA (*Sukuisme, Agama, Rasisme dan Antargolongan*) – was strongly suppressed by the Suharto regime in the effort to maintain national unity against these threats. However, the stark ethnic and religious difference between the northern (predominantly Christian Minahasan) and southern (predominantly Muslim Gorontaloese) was commonly known and many respondents of this research openly acknowledged these as an important reason. See Chapter 6 and Li (2007) for an example of the religious tension in the neighbouring Central Sulawesi province.

<sup>51</sup> It covered a region formerly under the federated kingdoms of north and central Sulawesi before the Dutch took control over Sulawesi in the mid-18<sup>th</sup> century.

<sup>52</sup> Former president B.J. Habibie’s presidency, who himself is Gorontaloese, was also another factor for the leaders to push for an independent province.

Gorontalo) and a municipality (Kota Gorontalo). By the end of 2006 the two districts were further divided into four: Boalemo, Pohuwato, Gorontalo,<sup>53</sup> and Bone Bolango. Under the newly adopted Regional Autonomy Law (henceforth, RAL No. 22/1999) the elected head of the regency or municipality is a key decision-maker with regard to natural resource management in their jurisdictions.

According to the province's Regional Agency for Planning and Development the province covers an area of 12,215.45 km<sup>2</sup> and is unevenly populated, ranging from 24 people/km<sup>2</sup> in remote rural areas to 2,414 people/km<sup>2</sup> in the capital city of Gorontalo (0.5% of land area). The total population has increased 11% from 835,720 in 2000 to 909,083 in 2005, with an average annual rate of growth of 1.5% in the 1990s and 1.83% in the first half of the first decade of the 2000s. The highest rate of growth occurred between 2000 and 2003 (at 2.16%) as a result of in-migration. The high growth rate was driven by perceived employment through investment opportunities in the new province (BPS Gorontalo 2006). Between 2000 and 2005 the average proportion of young people (under 15 years of age), adults (between 15 and 64 years), and the aged over 65 were 33%, 65%, and 2% respectively. Most of the former mountain dwellers and traditional farmers now live in scattered villages along the plain or coastal areas, particularly in the district of Gorontalo (28.1% of total area).

Gorontalo's economy (Section 4.3) and other general indicators of its residents' well-being are best understood by comparing the situations prior to and after its creation as an independent province. In 1999 the Human Development Index (HDI)<sup>54</sup> for Gorontalo district was 63.3; the HDI for the North Sulawesi province was 67.8. Nationally, the North Sulawesi province ranked in the top six, but Gorontalo district ranked 175<sup>th</sup>, compared to North Sulawesi's capital city of Manado, which ranked 5<sup>th</sup> (of the 294 districts countrywide). In 2002 the HDI for Gorontalo province was 64.1, representing very little change in life expectancy (64.2 years) or adult literacy (95.2%), although the mean years of schooling had improved slightly (from 6 to 6.5 years). Moreover, the latest available data on the Human Poverty Index (HPI) in 2002 indicated that 62% of the total population has no access to clean water, 32.7% lacks access to health facilities, and as many as 42% of children under five are under-nourished.<sup>55</sup>

### **4.3 Economy**

Agriculture has been the backbone of Gorontalo's economy, where cultivation of rice-fields, dry-land farming for the production of maize and other grains, and coconut planting has been carried out for generations. During the period from 2000 to 2005 the agricultural sector absorbed 56% of the workforce and contributed to 35% of the regional GDP. Included in this sector are food and cash crops, forestry, and fisheries (BPS Gorontalo 2003/2006).

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<sup>53</sup> At the end of 2007 the Gorontalo regency was further divided and another new regency, Gorontalo Utara, was created.

<sup>54</sup> Human Development Index (HDI): a composite index based on three indicators: longevity, as measured by life expectancy at birth; educational attainment, as measured by a combination of adult literacy and mean years of schooling; and standard of living, as measured by annual per capita expenditure (in Rupiah). The index value is between 0 and 100; 0 being the lowest and 100 the highest. Human poverty index (HPI): a composite index that measures deprivations in three dimensions: longevity, knowledge, and standard of living.

<sup>55</sup> Gorontalo's HPI was almost half that of North Sulawesi province, for which the percentages of the same indicators were 35.7%, 18.4%, and 21.9% for access to clean water, health facilities, and under-nourished children, respectively.

In 2000 Gorontalo's GDP was Rp 918,616 million (measured in terms of production) and the average annual per capita income at constant prices was Rp 1,128,840. With half of the total villages (129) categorised as disadvantaged (*Desa Tertinggal*) and about 70% of its population living below the poverty line (World Bank's definition of income of \$1/day), Gorontalo was by far the poorest province in Sulawesi. For example, the daily income per household was about Rp 12,000 or less than US\$1.50. Its proportion of Sulawesi's GDP was only 3.5%, compared to the 52.3% contribution from the South Sulawesi province. Nationally, Gorontalo ranked the second lowest, after North Maluku province, in terms of its regional GDP (Sabar 2004). For the subsequent five years the economy grew steadily with an annual growth of 4.9% in 2000 to 7% in 2005. Both the GDP and per capita income almost doubled to Rp 2,025,321 million and Rp 2,226,474 respectively, ranking the province 24 out of the 30 provinces in the country (BPS Gorontalo 2003, 2006).

Official records roughly group land-use types into agricultural land (24% of total, which includes rice-fields, dry-lands, and plantations) and forest land (67% of total). From the total rice-fields of 27,593 ha, 40% is under regular irrigation and the rest are rain-fed or semi-irrigated. In 2003 for example, production of food crops contributed 14.2% of the agricultural sector, primarily from rice and maize, with an average output of rice and maize grain of 4.4 tons/ha and 3.7 tons/ha respectively. The provincial government has made maize production one of its main priority development programmes – locally known as 'agropolitan' (see Chapter 8) – that has more than doubled the area under maize production from 45,718 ha in 2002 to 107,753 ha in 2005 (BPS Gorontalo 2003, 2006).

In the same year, the contribution from other sectors included small-scale plantations (coconut, palm sugar, candle nut, cloves, and to a lesser degree cacao), accounting for 8.3%; fisheries (4.2%), mainly from the coastal areas, Lake Limboto, and from some of the major rivers (Sabar 2004). The official contribution of the forestry sector was only 5.6% of the regional GDP (primarily from timber), but the collection of rattan, wild fruits, and wild meat provides an important contribution to subsistence livelihoods for rural households, as has peasant gold mining in protected areas. However, the illicit nature of these activities means that its economic contribution to the local economy is never officially recorded, and neither are its environmental costs (BPS Gorontalo 2003, 2006).

Public transportation in the province is very limited. Infrequent buses are the main means of reaching major towns in the neighbouring provinces of south-east and north Sulawesi via the narrow and winding trans-Sulawesi road. Ox-carts and horse buggies are commonly used for pulling heavy loads. Recently the relatively easy access to motorcycles (mostly purchased on credit) has encouraged Gorontalo's own invention of the *bentor* (a short form of *becak-motor* or a sawn-off motorcycle that pushes the shaded passenger compartment – see Figure 4.2). The prolific growth of *bentors* has changed people's mobility, created a new type of livelihood in the more urban parts of the province, and provided an important source of revenue (from licence fees) to local government. Motorcycles are the main means of transport to rural areas, mostly on dirt roads, while limited motorised long-boats are still the only transportation in many riparian villages.



Figure 4.2 *Bentor*, the prolific motorbike-driven inexpensive public transportation in Gorontalo.

#### 4.4 Natural forest and its management

The natural forest of Gorontalo is rich in flora and fauna of high global conservation value. About 67% (826,370 ha)<sup>56</sup> of the total land area falls under various categories of forest.<sup>57</sup> These forests are officially claimed by the central government, managed by different directorates of the Ministry of Forestry (MoF). However, for various reasons (see Chapter 8) the claim is not simple or uncontested. Out of this total, 56% (470,384 ha) was leased to nine logging companies until 2002 for timber production. The recorded annual production of logs was 12 m<sup>3</sup>/ha<sup>58</sup> between 1996 and 2001, which was far below the average national production of 30 m<sup>3</sup>/ha (Dephut 2002 in Kartodihardjo 2003). The difference in log production (150%) went unrecorded, causing loss of government revenue (from tax and logging fees and royalties) of about Rp 50.7 billion annually<sup>59</sup> (Kartodihardjo 2003). The resulting degradation in the production forests<sup>60</sup> ranges from 40% to 70%, due to the lack of replanting the logged forest. Timber ceased being exported out of North Sulawesi in 1981 (Whitten et al. 1987), and in 2002 legal logging was officially stopped in Gorontalo province (Provincial office of Forestry and Plantation 2005). As in other parts of Indonesia, however, illegal logging continued or even became more rampant when, under the RAL, the local government was allowed to issue small-scale logging permits (Dudley 2002; Obidzinski 2005; Smith et al.

<sup>56</sup> Based on the Decree of Ministry of Forestry and Estate Crops (Surat Keputusan Menteri Kehutanan dan Perkebunan No. 452/Kpts-II/1999 – quoted in the Provincial Forest Resources Account of 2005).

<sup>57</sup> It is based on the Forest Land-Use Consensus (*Tata Guna Hutan Kesepakatan*), agreed upon by the central and local government agencies in 1984 (SK Menteri Pertanian No 680/1981). This policy was established in response to the booming forest utilisation, and is known to be mostly deskwork, and lacking reality checks (Nawir et al. 2007).

<sup>58</sup> The figure is based on total area of forest for log production divided by the total period of lease (35 years). The annual allocation for logging is factored by a national average of 0.7. So in the Gorontalo case the annual allowable area to be logged is  $(407,383 \times 0.7)/35 = 9,400$  ha. According to MoF (2002) the recorded average annual log production was 113,500 m<sup>3</sup>, with an output of 12 m<sup>3</sup>/ha.

<sup>59</sup> Assuming that the logged forest amounted to 9,400 ha/yr, the unrecorded logs amount to  $9,400 \times 18 = 169,200$  m<sup>3</sup>. With the average official royalty and fee payable to government at Rp 300,000/m<sup>3</sup> of log harvested, the loss of government revenue was estimated at Rp 50.7 billion.

<sup>60</sup> Included in this category is Production Forest (100,684.45 ha), Limited Production Forest (342,449.55 ha) and Conversion Forest (20,168.60 ha) (Provincial Office of Forestry and Plantation Gorontalo 2005).

2003; Suryadi et al. 2006; Tacconi et al. 2004b) for supplying local needs. Most timber from Gorontalo is exported to other regions or overseas as timber-processing factories do not exist, although many small-scale saw-mills are in operation for local construction needs (interview with Bukar, a legislator in Gorontalo, 14/9/2005).

The other 44% of forest is officially protected: 24% (197,586.85 ha) for the conservation of Sulawesi's rich and unique but threatened biodiversity (Clayton 2003; Lee & Rais 2001; Whitten et al. 1987) and 20% (165,488.67 ha) for watershed protection purposes. For the former, six protected areas (PAs) of various sizes and categories were gazetted between 1992 and 1999 by the MoF (Wiratno et al. 2004) (Table 4.1). Extraction of forest resources is prohibited in these PAs and in the protection forest, but the forests are degraded. For example, only 47% of conservation forests remain as primary forest, 44% have degraded into secondary forest, and 9% are no longer forested. The level of degradation in protection forest (*Hutan Lindung*) is much worse, with only 34% remaining as primary forest, 51% as secondary forest, and 14% with no forest cover (Provincial Forestry and Plantation Office 2005).

As the focus of this research is on stakeholders' perceptions of biodiversity conservation in the whole province, no given PA was particularly chosen as a focus study site. However, because most participants of this research referred to Nantu Wildlife Sanctuary (*Suaka Margasatwa Nantu*, hereafter Nantu) and Bogani Nani Wartabone National Park (hereafter BWNP), and occasionally Panua Nature Reserve (hereafter Panua), key facts about these PAs are provided in Box 4.1. Officially, the management of these forests is under different government agencies. The PAs, with the exception of BWNP, are managed by the Gorontalo branch of the Natural Resources Conservation Bureau (henceforth BKSDA: *Balai Konservasi Sumber Daya Alam*) of Sulawesi, headquartered in Manado. The BWNP has its own management unit, the National Park Bureau (BTN: *Balai Taman Nasional*), with its head office in Kotamobagu. Moreover, prior to RAL, the management of protection forest (*Hutan Lindung*) was under the regional office of the Directorate of Land and Forest Rehabilitation of the MoF but it is now under the District Forestry Office (*Dinas Kehutanan Kabupaten*). In reality, however, these distinct land classifications are commonly perceived as the same. Most participants in this research, including some government officials, referred to them all as protection forest (*Hutan Lindung*).

**Table 4.1 Protected areas in Gorontalo Province**

Name and category of PA	Total area (ha)
Panua Nature Reserve (PNR)	45,575
Mas Popaya Raja Nature Reserve (MPNR)	160
Tangale Nature Reserve (TNR)	112
Tanjung Panjang Nature Reserve (TPNR)	3,000
Nantu Wildlife Sanctuary (NWR)	31,215
Bogani Nani Wartabone National Park (BWNP)	110,000*

Source: Provincial office of Forestry and Plantations, Gorontalo (2005).

\* This figure represents a slightly less than half of the size of the park, with the other 117,000 ha being in the jurisdiction of North Sulawesi province.

## 4.5 Biodiversity and its importance

The most recent biodiversity survey in Sulawesi (WCS 2001) suggested that the BWNP has almost all of the island's endemic species. It has 24 species of mammal, 195 species of bird,

11 species of reptile, 2 species of amphibian, 38 species of butterfly, 200 species of beetle and 19 species of fish (Lee & Rais 2001). Most animals living here are endemic to Sulawesi, like the black-crested macaque (*Macaca nigra nigra*), Tomini black-crested macaque (*M. nigrescens*), eastern tarsier (*Tarsius spectrum spectrum*), Sulawesi palm civet (*Macrogalidia musschenbroekii musschenbroekii*), lowland anoa (*Bubalus depressicornis*), mountain anoa (*B. quarlesi*), *babi rusa* (*Babyrousa babyrussa celebensis*), and various bird species. The flagship here is the *maleo* (*Macrocephalon maleo*); another endemic is the Bone bat (*Bonea bidens*). Several endangered plant species include the matayangan palm (*Pholidocarpus ihur*), black wood (*Diospyros celebica*), iron wood (*Intsia* spp.), yellow wood (*Arcangelisia flava*), and carrion flower (*Amorphophallus companulatus*). The most commonly found species are *Piper aduncum*, *Trema orientalis*, *Macaranga* sp., *Agathis* and other softer timber species known as *cempaka*, *kenanga*, and various species of orchid and ornamental plants (Balai Taman Nasional BW 2001).

Nantu, and to a lesser extent Panua, share most of these rich flora and fauna. Nantu's rich faunal diversity makes it an important site of global conservation value, specifically as the last stronghold on earth of the *babi rusa*, whose wild population numbers less than 5000 in all of Sulawesi (Clayton et al. 2007). Other unique animals include the *anoa*, locally endemic Heck's macaque, the spectral tarsier, Sulawesi wild pig (*Sus celebensis*), and more than 90 species of birds (35 endemic) (Clayton 2003). The forest is rich in commercially valuable natural stands of mature *Eucalyptus deglupta*, *Dracontomelum dao* and *D. mangiferum*, *Pangium edule*, and *Palaquium* (locally known as Nantu), and a high diversity of figs and palms, such as rich stands of rattan.

Much drier by far than the other two protected areas, Panua was historically known to host the largest population of *maleo* birds in Sulawesi in the mid-1900s, but four decades later less than a quarter of the breeding population remained (Wiriosoepartho 1980 in Whitten et al. 1987). Overexploitation of the eggs and predation from pigs and monitor lizards, in Panua and BWNP, were the main causes of the dramatic decline in its population (Lee & Rais 2001; Lee et al. 2005).

As well as being important for global biodiversity conservation, the PAs provide an enormous range of economic and ecological benefits for about one million people (in 114 villages in 17 sub-districts) in the nearby districts of Gorontalo and the southern part of North Sulawesi provinces (Lee & Rais 2001). The establishment of BWNP, for example, was supported by the World Bank because of its protected watershed for irrigating 11,000 ha of rice-fields in the Dumoga Valley (Whitten & Whitten 1992) and also for supplying water for the domestic needs of the local population. The forest also supports local communities who practice traditional farming and rely heavily on forest products to meet their subsistence needs. As for Nantu, the forested watershed supports 30,000 households for their domestic and agricultural needs of freshwater (BPS Gorontalo 2003).

#### **4.6 Threats to PAs**

All three PAs face problems common to most protected forests in Indonesia. For instance, studies of wildlife in northern Sulawesi showed that the establishment of PAs has had little impact on biodiversity conservation against ongoing threats (Clayton 2003; Clayton et al. 2007b; Lee & Rais 2001). The studies identified some main pressures on these PAs, which included wildlife hunting, illegal logging and gold mining, and shifting cultivation for subsistence. The rapid decline in wildlife species is well documented (Lee et al. 2005). The

large mammals, including *babi rusa*, *anoa*, and macaques are hunted for the meat market in the predominantly Christian province of North Sulawesi. The increased wealth of the province has meant an increased demand for wild meat over the past 15 years (Clayton & Milner-Gulland 2000).

#### Box 4.1 Key facts on the focus study sites

##### **Bogani Nani Wartabone National Park**

The 287,115 ha park was officially established in 1991 as one of 30 terrestrial parks created in the 1990s to demonstrate Indonesia's commitment to biodiversity conservation after the Third World National Congress in Bali in 1982. In 1992 it was renamed Bogani Nani Wartabone National Park (BWNP) in honour of Bogani (a knight of Bolaang Mongondow) and Nani Wartabone, a local resistance fighter who drove the Japanese from Gorontalo during World War II.

BWNP is the largest and most important terrestrial protected area in eastern Indonesia (Lee & Rais 2001), located within the jurisdiction of Gorontalo (110,000 ha or 37.7%) and North Sulawesi (117,115 ha or 62.3%) provinces. The park is situated 260 km south of Manado and its southern part is about 30 km from Gorontalo city.

Among all the PAs in Gorontalo, BWNP is the only one that allows limited human activities in its utilisation zone (about 8% of the total area), such as eco-tourism in Lombongo, and bird- or other wildlife watching in its forests. The park has been a popular destination for both domestic and international researchers (Whitten & Whitten 1992; Lee & Rais 2001).

##### **Nantu Wildlife Sanctuary**

The NWS (31,215 ha) lies at the upper reaches of Gorontalo's second longest river, the Paguyaman (99.9 km), 140 kilometres to the west of Gorontalo city. The forests were formerly allocated to logging concessions. However, as a result of long-term research on the ecology of Sulawesi's charismatic pig-deer or curly-tusked pig, *babi rusa* (Clayton 1996), the area was recommended as a reserve. With a strong support from the local government, in 1999 the Minister of Forestry and Estate Crops cancelled the concession right, and gazetted the forest as a Wildlife Sanctuary (*Suaka Margasatwa*) (based on *SK Menteri Kehutanan dan Perkebunan No. 573/Kpts-III/1999*) (Clayton 2003).

Today, Nantu is one of Sulawesi's few intact pristine forest ecosystems. It is extraordinary, and perhaps

unique, in that the forest contains a large natural salt-lick, called Adudu, where endemic wildlife congregate to consume the mineral-rich soil and waters (Clayton et al. 2007). While it can only be reached by days of walking or a half-day longboat ride from the nearest village of Mohyolo, the otherwise rare large mammals can be observed with relative ease. This makes it a great candidate for wildlife-based tourism.

The SBKSDA Gorontalo has received long-term assistance from the UK-based Darwin Initiative for the Survival of the Species through the Nantu Forest Conservation Programme (NFCP) to manage this reserve (Clayton 2003).

In partnership with the local government and SBKSDA Gorontalo, in 2004 local legislation by Gorontalo district was implemented by which the NWS was expanded into a watershed conservation programme of 52,000 ha, called the Nantu Boliyohuto conservation forest. The additional 20,000 ha came from 11,000 of protection forest and 10,000 ha of production forest. A further step to strengthen Nantu was made in early 2005, when the NFCP and the provincial government of Gorontalo proposed this enlarged conservation forest as a national park.

##### **Panua Nature Reserve**

Administratively it falls within the Pohuwato District in the western part of the province. The formerly 5,000 ha reserve, established by the Dutch colonial government in 1938 for its potential gold deposits and watershed protection, was enlarged to 45,557 ha by the MoF in 1992 (Ministry of Forestry Decree (*SK. Menhut No. 472/Kpts-II/1992*)). The reserve covers a range of ecosystems, from sea level to hill and mountain forest.

Despite having the strictest legal status among other categories of PAs, it received the least management support. For example, only three rangers are charged with its care and the long-term senior ranger died recently having worked for almost 50 years.

The intensity and scale of these activities differ among the PAs. For example, illegal gold mining is more prevalent in BWNP and Panua, while illegal logging and poaching are more intensive in Nantu (Clayton 2003; Clayton et al. 1997; Clayton & Milner-Gulland 2000). Further, local large-scale physical infrastructure projects have been threatening Nantu (see Chapter 8). The main reasons identified were lack of staff capacity and financial resources, lack of a clear and implemented management plan, and ambiguous or contested PA boundaries. The latter has led to strenuous and bitter relations with neighbouring communities, who rely heavily on forest resources for their subsistence needs.

Moreover, efforts toward strengthening management of BWNP was seen by communities as yet another strong-arm tactic by the central government to marginalise them (Lee & Rais 2001; Whitten & Whitten 1992). In addition, policies aimed at increasing agricultural productivity in the neighbouring districts have encouraged land clearing in and around PAs. Consequently, the park has become one of 41 national ‘paper parks’<sup>61</sup> in the country (Lee & Rais 2001).

Sulawesi also has one of the highest rates of lowland rainforest loss in the world (Holmes 2000). The deforestation in the Paguyaman watershed (i.e., Nantu) since the late 1980s has been dramatic, largely due to illegal logging, forest conversion, and agricultural encroachment. Both sides of the branches of Paguyaman River upriver from Potangga used to be completely covered by undisturbed primary rain forest. In 1991, for example, a large sugar cane factory owned by the Barito Pacific Timber Company (who also held 40,000 ha of forest concession rights or *Hak Pengusahaan Hutan* – HPH) was established at Lakea and this was a contributing factor to the movement of settlers upriver. The same company also logged the western branch of the Paguyaman River during 1994-1998. Groups of settlers followed along the logging road and further settlement of this area occurred when a transmigration settlement (200 families) was established in 2005, on the southern boundary of the NWS. Long-term observations (1989-2007) indicated that about 50% of the original primary forest in this watershed has now been destroyed. Consequently, large iconic mammals such as *babi rusa* and *anoa* have now virtually disappeared from most north and south-east Sulawesi forests, while macaque and bear cuscus populations are small and isolated (Clayton et al. 2007a).

#### **4.7 Key activities of the PAs**

Small operational budgets in these PAs have meant that the focus is on patrolling against the noted illegal activities. Other activities that engage local communities, particularly to increase local participation in park management, include awareness-raising through the provision of livelihood assistance and agro-forestry development in buffer zone villages. At the BWNP, training for locals to be tour guides in the park was also conducted. In all of these the BWNP

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<sup>61</sup> The term was defined in a 1999 report, Conversion of Papers Parks to Effective Management: Developing a Target, as: “A legally established protected area where experts believe current protection activities are insufficient to halt degradation”. The main point of the report is that paper parks occur when there is ineffective management. The report is available online <http://www.iucn.org/themes/forests/protectedareas/ThreatstoForestProtectedAreas.pdf>.

works closely with local community development NGOs. In the late 1980s it started to work with an international conservation NGO (Wildlife Conservation Society) to improve the population of *maleo* birds in several inland nesting sites (Whitten et al. 1987).

The continuous existence of Nantu is largely a result of intensive forest law-enforcement efforts there over the last fifteen years (Clayton et al. 2007a). The enforcement team involves local police personnel (POLRI) and local assistants. They are based in the remote Nantu field station at all times and patrol NWS's south-east boundary daily. Before their deployment, ten rafts of illegal timber per day (40 m<sup>3</sup>) were being extracted from the Nantu watershed (measured by daily records of rafts passing the Nantu field station/guard post). The presence of these patrols has overall been sufficient to deter illegal loggers from operating within the NWS. Outside the reserve, however, on the left branch of the Paguyaman, joint patrols with BKSDA and the police force in a few days in 1998 detained 70 m<sup>3</sup> of timber cut. Moreover, despite intense pressure the regular patrol has also prevented the destruction of NWS by forest clearance for shifting agriculture. Since the early 1990s a sustained wave of this clearance moved up the Paguyaman River. Along the Nantu River, for example, 1000 ha of primary floodplain forest were burned by settlers during the four month-long drought in 1997 (this was a serious El Nino year and many areas of Indonesia were affected). The enforcement team also prevented the destruction of the Adudu salt-lick and Nantu's wildlife population, though two other salt-licks outside this reserve, on the left branch of the Paguyaman, have been destroyed by shifting agriculture (Clayton et al. 2007).

Given the poverty level of the villages bordering the Nantu Forest: Sari Tani village (with today's population of about 300 families) and Pangahu village (150 families), a key feature of the NFCP has also been a local education programme in these villages (see Chapter 9).

## **4.8 Chapter Summary**

Owing to its unique natural evolution, Gorontalo's biodiversity has a high global conservation value. The forests and resident wildlife at the same time are important for sustaining economic activities of local communities. The long history of human disturbance to the forest, largely from extensive subsistence agriculture but more recently large-scale logging and wildlife hunting, has led to the loss of most of its lowland forest. This made the wildlife and valuable plant populations restricted to the remaining protected forests of Nantu, BWNP, and Panua that were established over the past two decades. Despite their legal status, these forests face increased threats from the same sources. The intensity of these threats is discussed in detail in Chapter 8.

## **CHAPTER 5**

### **RESEARCH STRATEGY AND TOOLS**

The arguments for requiring the involvement of other stakeholders in the management of biodiversity have been highlighted in Chapter 3. While scientific knowledge about biodiversity is more available and the natural scientists' contributions are essential for sound management of forest resources, socio-economic systems are commonly more dominant in decision-making about resource use. There has also been increased recognition of the limitations of current science-driven conservation approaches and the fact that other stakeholders, in addition to scientists, have different, and often conflicting, interests in or objectives for the same resources. This study used a combination of qualitative and quantitative approaches to identify these relevant stakeholders and to know their interests.

The first two sections in this chapter explain the qualitative research approach and the use of a case study as the strategy of inquiry for this study. The third section outlines the procedures (methods) for generating data, which included purposive and snowball sampling techniques to select research participants. The main tools for generating data are qualitative semi-structured interviews and a ranking exercise to assess perceptions of values of forest biodiversity. The processes of analysing and interpreting the data are described in the final section.

#### **5.1 The Qualitative Research Approach**

Social science research problems are approached and solved on the basis of two paradigms or philosophical stances: 'positivism' and 'post-positivism'. Positivism seeks facts and causes of social phenomena, apart from the subjective state of the individual, and assumes that inquiry is value-free. It tends to rely on hypothesis testing or prediction and control. The most common strategy for data collection involves questionnaires, surveys, and structured observations. Conversely, post-positivism, or interpretivism, strives to examine and understand social phenomena from the research participant's own perspective. Thus, the inquiry is described as value-laden (Babbie 1999; Denzin & Lincoln 2000; Patton 2002). Post-positivism has yielded 'social constructivism' in recent years (Creswell 2003; Lincoln & Guba 2000; Neuman 2000), emphasising that individuals develop subjective meanings of their experiences of the world. These meanings can be expressed in various ways, such as through symbols and language systems, and are often negotiated socially and historically, depending on the purpose sought (Denzin & Lincoln 2000). Therefore, meanings are not simply imprinted on and in individuals, but are formed through interactions with others. Common strategies for data collection include ethnography, Q-Methodology, and participatory policy analysis methods such as scenario workshops, decision conferencing, and citizen panels (Durning 1999).

The qualitative research approach recognises a socially constructed reality. It represents a shift away from the dominant positivist paradigms towards post-positivism (Denzin & Lincoln 2000). Instead of using a predetermined set of answers to a question about a particular phenomenon from the researcher's point of view, qualitative research seeks participants' opinions about a phenomenon in which the researcher is interested (Locke et al. 2000). In other words, the qualitative approach is largely an investigative process where the

researcher gradually builds understanding of a phenomenon by compiling and comparing participants' opinions; classification happens thereafter (Miles & Huberman 1994).

The qualitative technique is developed on the principle that the researcher can accurately know about social life only through his or her immersion in the lives of the people being studied (Loftland & Loftland 1995). These authors argue that understanding of participants' perspectives on a phenomenon can only be gained and analytically articulated through direct interaction with them (Marshall & Rossman 1999). On the basis of the inherent characteristics in the research design and associated methodology, social scientists distinguish the qualitative approach from a quantitative by some characteristics (see Table 5.1).

As the aim of this study was to understand how key stakeholders perceive biodiversity conservation, studying the human dimensions associated with biodiversity management (knowledge, values, perceptions or attitudes) can never be a precise and objective process. This is because subjectivity influences how people (including researchers) see an objective reality (e.g., the biophysical environment, its elements and functions).

Furthermore, values and beliefs, life experiences, education, and the way in which the biophysical environment has been used by different societies (Spellerberg & Hards 1992) influence the interpretation of its meaning. Thus, it can be said that biodiversity conservation is a socially constructed reality. As described in Chapter 2, many conservationists recognise that the predominantly western- and biological-science driven conservation actions have shown limited success, particularly in developing countries. Because the biophysical environment is so diverse, complex, and dynamic, as are the socio-economic factors that influence how people see it, their perceptions cannot be understood with the objectivity and certainty of a positivist approach, or supposedly 'value-free' inquiry. For these reasons, this study adopted the post-positivist or interpretive paradigm, by applying participant observations and ethnographic fieldwork.

Some of the strengths of the qualitative approach include data richness and a more holistic representation of reality. By being the primary instrument in data collection (Lincoln & Guba 1985), as the researcher, I strove to be a participant in, and a witness to, the lives of others (Loftland & Loftland 1995). My primary role as a witness is to recount the information presented to me in a way that is as representative as possible. Since each research participant in this study was free to express his or her perspectives on the social reality of biodiversity conservation, this study generated rich data. The use of qualitative techniques enabled me to listen to their thoughts, feelings, and interpretation of biodiversity conservation, which are treated as significant realities. These perceptions are more varied than the selected variables generally applied in quantitative research (Minichiello et al. 1990).

However, the qualitative approach has its limitations. While criteria for assessing research quality in quantitative research are well established, involving validity, generalisability, reliability, and objectivity (Lincoln & Guba 1985), these same criteria are inappropriate to assess qualitative work. One of the reasons for this is that qualitative research is, by nature, specific to a time and place (Read 2005). Consequently, they cannot be precisely replicated, unlike laboratory experiments in the positivist tradition. It is also argued that pure objectivity in analyzing the data simply does not exist (Popay et al. 1998 cited in Read 2005: 65).

**Table 5.1 Inherent attributes of qualitative and quantitative research approaches**

Characteristic	Qualitative approach	Quantitative approach
Physical setting	Natural settings of the participants, where human behaviour and events occur (e.g., home, office)	Natural setting or laboratories
Theory and hypothesis building	Emerge in a more 'organic' way, as data collection and analysis are pursued	Established ahead of time
Primary instrument in data collection	The researcher him/herself	Other mechanisms, tests, and instruments
Methods used in data collection	Multiple and interactive (observations, interviews, document analysis in the form of text and images data)	Mainly structured questionnaires, surveys, and observations.
Biases, values, and interests	Explicitly acknowledged	Regarded as objective or value-neutral
Characteristic assumptions	Assumes dynamic and reciprocal interaction between actors: social reality is made by people and may be changed by people Subjective Close to data or the 'insider's perspective' Values are explained Biases are explained – recognising that they exist in all research	Assumes more stable/static relationships (correlations, fixed parameters) between variables Objective Measurable Removed from data or the 'outsider's perspective' Value-free or controlled Biases not explained – 'numbers explain all'
Types of reasoning	Multi-faceted, iterative, and simultaneous. Reasoning is largely inductive, but also involves deductive processes in an iterative manner	Mostly deductive
Research orientation	More complete or holistic understanding is sought through the lens of the respondents' point of view or interpretation	Selected, particularistic, and narrow variables are studied through researcher's point of view or interpretation
Research purpose and interpretation of data	Understanding, description, and interpretation of participants' perception and experiences, multiple realities, more holistic, idiographic (attention to the particulars)	Prediction and control, cause and effect
Outcomes	Focus on collecting rich and <i>thick</i> data, meanings are negotiated, reality presented by the participants is summarised or integrated by the researcher	Focus on replicable but thin data
Source of knowledge	Intuitive and felt knowledge, data are not always numerically quantifiable	Data are generally numerically quantifiable
Data	Valid: real, rich, deep data Less generalisable, often drawn from single case studies Personal and people driven Context specific Based on understandings of changing perceptions and values	Reliable: hard and replicable data More generalisable, because the 'N' is larger with multiple case studies Impersonal Number driven Based on stable/static, quantifiable 'facts'
Objectivity and truthfulness	Judged based on coherence, insight, and trustworthiness	Judged based on validity and reliability measures

Sources: Creswell (2003); Denzin & Lincoln (2000); Lincoln & Guba (1985); Lofland & Lofland (1995).

Because good research is normally judged by its objectivity and trustworthiness in representing reality, these two criteria are often the basis of criticisms made of qualitative research. The lack of objectivity stems from both the research participants and the researcher. In the effort to understand a phenomenon, personal bias can colour participants' opinions. Likewise, the researcher can inadvertently impose his or her own biases upon the participants in interpreting the participants' views, making the true situation obscure. This kind of subjectivity can occur in both the design and the evaluation of the project. So it is necessary to explicitly state the measures taken to improve the rigour of this research, both in generating and evaluating the data.

A wide range of principles for assessing qualitative research is suggested in the literature, as detailed in a review provided by Baxter and Eyles (1997). Instead of using rigid rules for assessing qualitative work, these authors argued that a set of criteria, which include credibility, transferability, dependability, and confirmability (Lincoln & Guba 1985), should be adopted. While they applied these criteria from a positivist stance, Popay et al. (1998) provide similar principles from an interpretive point of view. The main purpose for applying these criteria is to provide a reliable representation of the 'reality' of participants' life experiences, and at the same time to enlighten the subjective opinions and actions in the context of the people being researched.

Some criteria for enhancing rigour are suggested by Lincoln and Guba (1985 cited in Baxter & Eyles 1997), who define 'credibility' as 'the degree to which description of human experience is such that those having the experience would recognise it immediately and those outside the experience can understand it' (Baxter & Eyles *ibid* p. 512). Some strategies to achieve a high degree of credibility include clear reporting on how research participants were selected and the provision of multiple sources of evidence (triangulation). Another common strategy is 'member checking' to ensure that research participants have the opportunity to check that their views were adequately reported.

Another criterion to improve objectivity in qualitative research is 'confirmability'. According to Lincoln and Guba (1985), confirmability means 'the degree to which findings are determined by the respondents and conditions of the inquiry and not by the biases, motivations, interests or perspectives of the enquirer' (cited in Baxter & Eyles 1997 p. 517). In this study, the principles of credibility and confirmability were applied. I attempted to recognise and reduce my own biases (e.g., gender and professional background in forest conservation) as much as possible throughout the course of data collection and analysis. Some audit trails (e.g., audio files and interviews transcripts, recorded observation in field notes) were reproduced in this thesis to reduce biases in representing participants' opinions.

In addition to being an approach to understanding a phenomenon, qualitative research can serve as a vehicle for theory building. This is achieved by developing concepts and clearly stating their relationships, which form an integrative framework to explain or predict a phenomenon (Strauss & Corbin 1988). For this purpose, qualitative research can be particularistic and applied or generalisable. Particularistic research aims to provide information about a particular place and time; for example, a deep description of the life history of individuals or a group of people. Generally, these are presented as narratives; the common strategies of inquiry are narrative, phenomenological, and ethnographic research (Clandinin & Connelly 2000; Moustakas 1994; Wolcott 1999). The purpose of applied research is to build generalisations from samples representative of the variation in a population; the common strategy of inquiry includes grounded theory (Taylor & Bogdan

1998) and case studies (Stake 1995, 2000; Yin 2003). This research adopts the latter, with the main reasons explained in the section that follows.

According to Glasser and Strauss (1967) grounded theory is a general procedure for developing theory based on data that is systematically gathered and analysed. Grounded theory does not begin with prior assumptions about a hypothesis. Instead, the research questions or insights gained from reviewing the literature become the foundation for exploring the topic being studied (Glasser & Strauss 1967). A case study, according to Yin (2003), shares the main tenet of grounded theory as a strategy of inquiry, but it focuses on a contemporary phenomenon within its real-life context.

In both grounded theory and case study strategies, guidelines and procedures are provided for inductive research and the theoretical framework is built from data, as opposed to testing theory with facts. The data originate from interviews, field observations, and from different types of secondary documents; they serve as the basis for developing themes and concepts. Further, interpretation of data is based on the perspectives and voices gained from the research participants, which in turn are compared with other studies. However, researchers often assume further responsibility of interpreting what is observed, heard, or read (Strauss & Corbin 1994) in line with the context of the research. Finally, themes, ideas, and concepts are confirmed, discarded, refined, or elaborated. The central feature of this approach is its openness, which provides an opportunity to discover important features of a phenomenon in a given site, as knowledge is linked closely with time and place. The procedure carefully and specifically builds conditions into theories, thus representing realistic versions of knowledge, which are open for further development of a theory (Strauss & Corbin 1994). Both grounded theory and case studies determine what a phenomenon being studied means under specific conditions and how it is manifested, by whom, when, where, how, and with what consequences.

The main point of difference between grounded theory and case studies as a strategy of inquiry lies in the role of theory development prior to data collection (Lincoln & Guba 1985; Strauss & Corbin 1998). While grounded theory deliberately avoids specifying any theoretical propositions at the outset of an inquiry, case studies often construct a preliminary theory related to the topic of study. In many cases, theoretical propositions may be generated from existing literature (Yin 2003), which is then linked to the available data. For this reason, case studies can be a rich source of data to generate working hypotheses (Patton 2002).

The ecology of Sulawesi (see Whitten et al. 1987) and the the conservation biology of certain plants and wildlife, and the interactions between local communities and these forest resources have been studied in the central part of Sulawesi and the neighbouring islands (Alvard 2000a, b; Armitage 2002, 2003; Henley 2002, 2005; Li 1991; Li 1999, 2007; Lowe 2000, 2004, 2006; Siebert 1989, 2004, 2005). However, apart from biological studies in the Gorontalo region (Clayton 1996, 2003; Clayton et al. 2007b; Clayton et al. 1997; Clayton & Milner-Gulland 2000, 2002; Dunggio 2005; Kinnaird 1995; Lee & Rais 2001; Lee 2000; Lee et al. 2005), little was known about local perceptions of biodiversity conservation in this province. For this reason, this current study adopted a strong element of grounded theory for data generation because hypotheses pertaining to local perceptions could not be stated before the research began (see Sections 5.3 and 5.4). However, some theories, concepts, and themes relating to perceptions of biodiversity conservation were reviewed in the literature prior to data collection. Therefore, some of the themes were conceived, and as recommended by Yin (2003), some guidelines or theoretical propositions were developed during the research

design and the first stage of the field work. Moreover, as my primary interest is not just a particular group, but to understand the interests of many groups who have a stake in the way biodiversity is managed at the research site, the case study was an appropriate strategy for capturing their diverse perceptions.

## 5.2 Case Studies as the Research Strategy

The choice of a research strategy depends on the purpose of the study and the nature of the research questions (Marshall & Rossman 1999; Yin 2003). The research questions raised in this study are broad, focusing on perceptions of a general phenomenon (i.e., biodiversity conservation) at a particular place (Gorontalo province). Methodologically, therefore, it is important to narrow the research focus to a group of people. My intention in using a case study strategy was to gain an understanding of the ‘big picture’ of how biodiversity is managed at a provincial level, that is from the point of view of selected key stakeholders (Section 5.3.3), rather than only of those of a specific community around a particular protected area.

Lofland and Lofland (1995) defined a case study as ‘a holistic investigation of some space- and time-rooted phenomenon’ (p. 21). Yin (2003) emphasised that the selection of research strategy also depends on the amount of control the researcher has over behavioural events in the case being studied, and whether the research is contemporary or historical. Further, unlike an experiment that purposively disengages context from the inquiry, a case study includes the context as an important part of the study, despite the complexities that this brings. By this definition, case studies are contextually specific, based on the desire to understand complex social phenomena, by allowing investigators to retain the diverse but meaningful characteristics of real-life events. In this study, as the researcher, I had no control over the participants’ behaviour or events (unlike in a controlled experiment), and the research focus was contemporary, not historical.

Moreover, the choice of research strategy is influenced by the purposes for studying cases. Stake (2000) differentiated these into three. First, a case study is undertaken because the researcher has an *intrinsic* interest in the case; the researcher wants a better understanding of a particular case, not because the case represents other cases. Second, an *instrumental* case study is undertaken because the particular case is expected to provide insight into an issue, or refinement of a theory. In this situation, the case helps to understand something else. Third, and with less interest in a particular case, *collective case studies* are applied to investigate a phenomenon, population, or general condition. So the collective case study is the study of a series of cases simultaneously and could be described as instrumental case studies extended to several cases. My primary purpose in this research is to understand why conservation of biodiversity in Gorontalo has not worked well. In this sense, I have an intrinsic interest in the case. However, some of the reasons I found in the case of Gorontalo may provide insights for other areas in Indonesia and elsewhere, or challenge the current theory of root causes of biodiversity loss (see Section 3.3). As this study involved several stakeholder groups, it is important therefore, to ensure that their perceptions are fully explored, described, and explained, but within the limit of available resources. To achieve this, the number of cases was limited for each group (see Section 5.3). However, each participant was interviewed independently and asked similar questions to ensure consistency across the groups. In this way, limited generalisations were expected to emerge throughout the research, based on similarities and differences between individuals.

An important aspect of a case study is its link with theory. A case study does not represent a broader reality (Stake 2000). Instead, it represents the case. Thus, it is used to improve understanding of a single case, rather than to generalise from that case. However, a number of generalisations can be suggested based on logic and evidence gathered through secondary data. In a case study, the researcher sees the case as a 'bounded' system and strives to understand the complexities that exist within that single case. However, when 'collective case studies' are used to build a theory or framework, then cases must be carefully selected to ensure that replication of the case can test the generalities that emerge (Stake 2000). Silverman (1985 cited in Read 2005: 57) argued that cases are selected because the analyst believes that they demonstrate some general theoretical principle, and that the characteristics of a case are representative of a general principle.

A trade-off can occur between the 'intrinsic' case study, where description is deep but generalisation is rarely possible, and the 'collective' case study approach where a large number of cases are studied to allow some generalisations to be made, but in the process the deep insight of individual cases is likely to be sacrificed (Stake 2000). However, Yin (2003: 40-41) argued that case studies can be used as a way to generalise from a previously developed theory or proposition. He based his argument on the contrast between *statistical generalisation* and *analytical generalisation*. The former is applied to ensure generalisation from empirical data collected about a sample, from which an inference is made about a whole population. This is a common way of generalising in surveys or archival data analysis because researchers have access to quantitative formulae to determine the confidence with which the generalisations can be made. This generalisation depends mostly on the size and internal variation within the sample, usually assuming the variation is random.

Conversely, *analytical generalisations* in case studies are applied to compare empirical results with a previously developed theory (Yin 2003: 32-33). Single case studies are used in situations where the case is unique or extreme, or it has not been investigated before, or a case is being examined to test a 'well-formed theory'. Multiple-case designs, however, have distinct advantages because the evidence they generate is often considered more compelling to confirm or challenge a theory; hence, it is regarded as more robust (Harriot & Firestone 1983 cited in Yin 2003: 46). However, more time and resources are needed to conduct multiple-case studies, and this is often beyond the means of a single researcher.

Experts on grounded theory warn, however, that any researcher using this approach should not be so enclosed in the literature that his or her creative efforts become impeded or constrained. Generally, research was executed with a clearly defined purpose, but also with the realisation that this purpose may be modified or even radically altered during the research process (Strauss & Corbin 1998). In qualitative research, questions are formulated during and after the literature review, as well as during the generation of data. In this research, the development of substantive theories was based on data collected using a combination of grounded theory and case studies strategy. However, new theories that emerged were developed during the whole process of the research: before, during, and after the field work was conducted. The tools used in generating the data to answer the four research questions are described in the next section.

### **5.3 Methods for Generating Data**

Strauss and Corbin (1998: 3) defined data collection methods as ‘... a set of procedures and techniques for gathering data’. Mason (1996), however, suggested that in qualitative research what counts as ‘data’ are not in the form of ready facts waiting for collection. Rather, they exist potentially, but need to be generated and independently interpreted. This activity requires interaction among the researcher, the social world, and the research participants. This implies that the ‘method’ of generating data is ‘more than merely technical or mechanical as it involves intellectual, analytical and interpretive activities through which the researcher and research participants together generate data and construct knowledge about certain aspects of the social world being studied’ (Mason 1996:36). Following Mason’s (ibid) suggestions and the qualitative nature of this study, ‘data generation’ is the preferred term used in this thesis, instead of ‘data collection’.

The purpose of generating empirical materials, from semi-structured interviews, participant observation, and a number of relevant documents, is to provide the richest possible data (Lofland & Lofland 1995) from multiple sources of evidence (Yin 2003). In this current study, these materials became the basis for understanding the context and issues relevant to the research questions. The activities involved at this stage include locating the research site, choosing individual research participants, gaining access, and purposely sampling the participants. A brief description of each of these steps follows.

#### **5.3.1 Selecting the site**

The province of Gorontalo was selected as a study site because its forest is rich in biodiversity of high global conservation value (see Chapter 4). More than half of the forest is under legal protection for biodiversity and watershed purposes, but the province is poor in other natural resources. So the forest plays an important role in supporting local socio-economic development. Consequently, there is an ongoing tension between efforts to keep the forest standing and to cut or convert it for other economic uses. So, my other reason for choosing the site was to have a better understanding of a particular case (Gorontalo), not because the case represents other cases (other provinces or districts in Indonesia) (Stake 1995, 2000).

As the focus of this study was the perceptions of key local stakeholders, the selected individuals were the unit of analysis. However, given that historical and current conservation practice has been implemented on the basis of policies and decisions made by the central government (see Chapter 2), selected central government officials were included so that their perspectives could be included in the analysis, especially on the perceived threats to forest biodiversity. Their inclusion also helped to approach the issue at multiple geographic scales (see Chapter 8).

#### **5.3.2 Gaining access and creating rapport**

Some administrative arrangements were made prior to the commencement of the field work. First, ethical aspects of the field work were discussed in detail with the research supervisors to ensure that the work was ethically executed. These included applying the principle of anonymity, confidentiality of the sources of information, and the security of data during and after the interviews. Further, the principles of ethical research involving human subjects were followed, using Lincoln University’s Human-Ethics Committee (HEC) process as a guide. Formal approval from the HEC was not required because participants were interviewed in their professional capacities.

Second, permission to undertake the research was sought from the Government of Indonesia.<sup>62</sup> The Center for International Forestry Research (CIFOR), in Bogor, Indonesia, provided formal support by being a host institution. The Nantu Forest Conservation Project<sup>63</sup> director, Dr Lynn Clayton, provided initial contacts with relevant professionals in Gorontalo.

Third, a consent form was prepared (Appendix 5.1), containing a brief explanation of the purpose of the study and the reasons for selecting the participants. This consent form ensured that research participants understood their rights and had consented to the interviews. It also included their right to withdraw from giving information and participating in the research. A careful effort was made to ensure that any potential harm to research participants was minimised. This included confidentiality, making participants comfortable and relaxed, ensuring questions were clear and culturally acceptable, and being sensitive to the participants and the organisation for which they worked.

Contact with potential research participants was made by short-messages-service (SMS) via cell phones. As well as being relatively inexpensive, the use of SMS was culturally acceptable, even for communicating with senior government officials. A generic template message was created, containing a personal introduction, the research topic and objectives and a request for an interview. In most cases, potential research participants responded either by sending back an SMS or telephoning. For people without access to cell phones, a phone call or an introductory visit was made first to make an appointment, although most people in this category agreed to be interviewed on the spot.

A minor problem was encountered in gaining access to research participants. Five local timber companies were approached; one representative refused totally on the grounds of his limited knowledge (or suspicion of my intention), another agreed but relegated the interview to a lower-ranked staff member from whom only limited information could be obtained; the other three accepted the requests for an interview.

During the course of the field work, I carefully learned and observed Gorontaloese cultural norms. In this predominantly conservative Muslim society, I paid particular care with respect to dress. Most women wear a head-scarf, trousers, and long-sleeved tunic. Although a non-Muslim, I conformed to this dress code, except for the head scarf, as it is commonly worn as an indication of adherence to Islamic teachings. I also considered my conduct during my stay with a local family in a local neighbourhood. I paid special attention to minimise any potential harm to myself and the University by keeping all collected and recorded data secure. A summary of the research findings was presented orally to relevant organisations involved in the research to ensure the accuracy of the information in November 2007.

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<sup>62</sup> The government of Indonesia, through the Directorate of National Unity of the Ministry of Internal Affairs, requires both domestic and foreign researchers to obtain this research permit as some kind of 'visa' to ensure the legitimacy of the research project and as a means to track that the research results are reported and fed back to the research sites.

<sup>63</sup> The Darwin Initiative for the Survival of the Species (DISS), a UK-based research institution focusing on conservation biodiversity of global value, has been assisting the Indonesian government in fulfilling its obligations under the CBD by protecting the endemic and threatened pig-deer, *babirusa*, and their last remaining lowland forest habitat in the northern part of Sulawesi. DISS provided financial support for the first field work of this research in Gorontalo.

### 5.3.3 Sampling techniques

The identification of research participants who may offer rich and interesting data is a key aspect of social research such as this. This is particularly necessary as forest management is typically characterised by diverse interest groups, users, and organisations. The qualitative approach does not demand that sampling be random. Rather, it recognises that purposive sampling can add richness to the data (Mason 1996; Neuman 2000) as it focuses on a sample or small collection of cases that can provide or deepen the understanding sought in the study. Thus, purposive and snowball sampling techniques were applied in the identification of key stakeholders (Patton 2002). In these techniques, groups or individuals are selected on the basis of their relevance to the research questions and the analysis being developed from the data. It was the relevance of these people to the research topic, rather than their representativeness, that determined their selection (Mason 1996).

As this research sought to develop a current general understanding of the concept of biodiversity conservation and its implementation in Gorontalo, the nature of this inquiry is to develop a substantive theory on this topic. The aim is to represent the case, not the wider population. A rich description of how key stakeholders, with their diverse ways of thinking, view biodiversity management allows for the development of better understanding of biodiversity management issues. This understanding in turn will help to address these issues more appropriately.

To ensure that selected participants represent the most relevant stakeholders for the management of biodiversity, a set of criteria based on the ‘who counts’ method developed by Colfer et al. (1999) was applied to each research participant. These criteria included proximity to a protected area, dependency on forest resources, pre-existing rights to these resources, knowledge of forest management (including indigenous knowledge), links between forest and local culture, the level of poverty of each participant, and their legal rights. The definition of each criterion and its application to the stakeholder groups of this research is provided in Appendix 5.2.

The selected participants included those from government (e.g., planners, law-makers, resource managers) and non-governmental organisations (e.g., nature conservation, community development, traditional/religious leaders, academics/teachers/ researchers), commercial users of biological resources (e.g., collectors and traders of timber and non-timber forest products), and private companies (e.g., mining, agriculture, forestry, and industry people). In this research, these people are referred to as ‘key local stakeholders’. Each group of stakeholders was given ‘scores’ based on the seven categories. Colfer et al. (1999) originally used a scale of one to three, but Purnomo et al. (2005) preferred a scale of one to five (1=high, 2=relatively high, 3=medium, 4=relatively low, 5=low), which was applied in this study. The scores for each stakeholder were calculated, and the mean score of the seven criteria was used to determine whether a stakeholder was included as a participant (Purnomo et al. 2005). The cut-off value for inclusion was the final score of 3 or less, which was determined based on field experience in many countries where criteria and indicators for sustainable forest management were developed (Colfer et al. 1999; Purnomo et al. 2005). This method provided a simple means for ranking stakeholders according to their relationship to forest biodiversity. It also ensured that important stakeholders were not excluded when only a subset could be analysed as in this study (Colfer et al. 1999).

Miles and Huberman (1994) also suggested that the best strategy for selecting research participants is to initially target those cases that are most likely to yield the richest data,

leaving more peripheral cases until later. These latter cases, however, are still important because they may yield negative or exceptional cases, for example, those contradicting the initial case findings.

The number of interviews to conduct depends on the point at which little ‘new information’ is gained. With in-depth interviewing, time and other resources are usually limited for all research, and the researcher does not know, prior to speaking with research participants, how many interviews would be useful (Minichiello et al. 1990). Some researchers have conducted over 100 interviews, although most studies are based on approximately 30-50 interviews (Lofland & Lofland 1995). These authors suggest that this range is a reasonable number, and the researcher is legitimately sacrificing breadth for depth. Strauss and Corbin (1998) suggested that the more interviews, observations, and documents obtained by a researcher, the more variations will be found from multiple sources of evidence, resulting in a greater data density. Therefore, it is important for the researcher to look for events or conditions that are indicative of the phenomena being researched, rather than the number of individuals or sites. This is why a snowball technique was applied in this study.

Snowball sampling is a referral technique by which participants are asked to recommend other individuals for participating in the study, and it is considered an effective way of identifying research participants from different stakeholder groups (Babbie 2001). Each of the identified participants completed the ranking exercise noted earlier. In this study, the selection process began by contacting a few people from each of the relevant stakeholder groups. For example, at the central government level, the initial interviewees were selected on the basis of their role in setting national government policy for, and strategy on, biodiversity conservation. This included officials from the Department of Forestry, the National Development Planning Agency (BAPPENAS), and the Indonesian Institute of Sciences (LIPI). Their suggestions became the basis for identifying subsequent interviewees, from either similar or totally different interest groups, who might wish to take part in this research. This ensured that a wide variety of views was included. A similar process was applied at the provincial and district levels.

In the current study, the number of key informants interviewed was decided on the basis of their potential knowledge and availability, apparent involvement in the management of biodiversity, and the time and cost required to visit them. In total I interviewed 108 individuals, representing local (83) and national (25) key stakeholders. An overview of the key characteristics of research participants and their roles in biodiversity management is provided in Section 5.5.

#### 5.3.4 Generating data

The field work for this research was conducted from August to December 2005. However, during the month of Ramadan (the Islamic fasting month which started in the first week of October 2005) no interviews were undertaken because daily activities were greatly reduced, and it was considered a less productive time to be in the field. This was foreseen and the cost and other logistical implications of the field work had been discussed with, and approved by, the research supervisors and the research sponsor (DISS) before the field work commenced. The field work resumed in early November and continued until the end of December 2005. Another visit was made in early November 2007, with the main purpose of sharing and reporting the research findings with the research participants.

As mentioned in the introduction to this chapter, this research aimed to understand how key stakeholders perceive the conservation of biodiversity. In order to find out this ‘local voice’, the primary tool for generating data was semi-structured in-depth interviews (Creswell 1998; Denzin & Lincoln 2000; Mason 1996; Patton 2002). This tool was applied to selected ‘key’ informants (Section 5.3.3), who could articulate their views on the issues being researched. In addition, quantitative ranking exercises, commonly known as a Pebble Distribution Method (PDM) (Colfer et al. 1999), were used as a supporting tool (see Table 5.2 for the specific tools and their application to each of the research questions).

**Table 5.2 Specific tools applied to generate data for each of the research questions**

Research question	Specific tool
1. Understanding of the concept of biodiversity	Semi-structured interviews
2. The value of the natural forest as an element of biodiversity	Murray’s typology of values and MDM exercises to assess participants’ perception of the value of the natural forest
3. Perceptions on the underlying forces of decline in forest biodiversity	Semi-structured interviews to generate the forces of unsustainable resource use, based on a conceptual model developed by Wood et al (2000)
4. Attitudes toward biodiversity conservation	Murray’s typology of reasons to protect the natural forest Semi-structured interviews to generate participants’ views

*Semi-structured interviews*

Qualitative interviewing is referred to as a conversation between the researcher and the research participant, with the specific aim of obtaining information pertinent to the research questions (Minichiello et al. 1990). In this conversation, the researcher focuses on the participant’s perception of self, life, and experience, as expressed in his or her own words. Through this process the researcher gains access to, and subsequently understands, the private interpretations that individuals hold. It is assumed that this perception is knowable and can be made explicit (Patton 2000).

A continuum of interview types exists, from structured interviews at one end to in-depth interviews at the other (Babbie 1999; Patton 2002; Taylor & Bogdan 1998). Other forms of interviews lie somewhere between these two extremes (Minichiello et al. 1990). The structured interview is predominantly used in surveys or opinion polls. Each research participant is asked exactly the same question to ensure comparability with other studies and to minimise differences or biases between interviews. In this type of interview, the closed-ended questions are prepared by the researcher prior to the interviews and are asked in exactly the same order, although some open-ended questions may be included as well (Minichiello et al. 1990). Conversely, unstructured or semi-structured (or focused) interviews represent a more open approach than the interrogative process used in structured interviews. The goal of focused interviews is to seek information about the participant’s world by understanding his or her perspective, in a language that is natural to him or her, rather than focusing on the researcher’s perspective as the valid view (Minichiello et al. 1990). It allows the participant to introduce ideas and place emphasis on topics he or she sees as important.

The face-to-face in-depth interview was the primary tool for generating data in this research. It started with an informal conversational interview that provided an opportunity for me to

study issues in depth, without constraints on questions. It also enabled me to gain insights, through first-hand assessments and interpretation, of relationships, roles, and actions in a real-life situation. However, as the interviews involved many individuals across a diverse group of stakeholders, a simple interview guide was prepared. It contains a range of questions or themes to be explored, covering topics such as stakeholders' understanding of the concept of biodiversity; their perceptions of the value of biodiversity; and their attitude toward existing conservation measures and the forces that drive patterns of biodiversity use (see Appendix 5.3). This guide was meant to direct the conversation and to ensure consistency in the information being sought across the groups as the interviews progressed in a relatively informal style.

Prior to the field work, trial interviews to pre-test the interview guides were conducted with two Indonesian post-graduate students in Canterbury, New Zealand. These interviewees were selected because they represented one of the key stakeholder groups to be interviewed during the course of the research. The questions were slightly modified as a result of these interviews.

Focused interviews offer some degree of flexibility and openness in the process of data gathering. They allow the researcher flexibility in obtaining information and encourage research participants to share the information they possess openly. However, this technique has some limitations. Openness, which was encouraged during the discussion, can result in data containing expression of feelings and sentiments about issues unrelated to the research that make data collection, management, and analysis very time-consuming and highly demanding and laborious (Lofland & Lofland 1995; Minichiello et al. 1990). Consequently, the information can lack coherence and comparability across a range of interviews. Moreover, when research participants are interviewed at short notice, as was the case in this study, it is inevitable that their answers are more likely to represent current issues and information (i.e., salient items), rather than from past historical events.

In this study, all interviews began with an explanation of the purpose of the research and the presentation of the consent form. Research participants were assured of the confidentiality of the information they provided and of their right to withdraw comments or even refuse to give information at any stage before or during the interview. Most people who agreed to be interviewed were happy to sign the form. The interview guide was offered to each participant to view, but only a few of them looked at the list before the interview began; the rest were relaxed and willing to talk in a natural conversational manner. Many participants asked me why I was interested in Gorontalo, and this kind of exchange proved helpful in 'breaking the ice' and laying the groundwork for the interviews.

Each interview lasted between one and two hours. The sequence of questions I asked depended on what I considered most relevant to the participant, and the order was not necessarily as listed in the interview guide. This was helpful as an entry point as respondents were happy to talk about something that they were familiar with. Later in the interview, I directed the flow of conversation to the topics pertinent to the research questions and used probing techniques (Minichiello et al. 1990) to elicit more information following an introductory topic, without putting pressure on the participants. I listened to what they said, so the data generated reflect issues that are important to their professional lives.

Most interviews were conducted with individuals, except in three situations, where a group interview occurred because the interviewees were more comfortable talking in the presence

of others. These took place with a community of peasant gold miners, who represented some of the commercial users of forest resources, and with two local societies of university students whose main activity focused on exploring nature.

All interviews were recorded using a digital voice recorder. Before each interview began, I asked permission from each participant to record it; the thumb-sized device helped to ease the conversation as it was inconspicuous and less intimidating than a portable tape recorder. The technique was very useful because some interviews were long, making simultaneous note-taking difficult. Recording allowed greater attention to be given to what the research participants were saying. However, this method has a drawback; an hour of interview can take between three to five hours to transcribe (see Section 5.4). After a few interviews, I summarised the contents, in order to document difficulties encountered, which in turn helped me to improve the content and style of later interviews. These summaries also helped me to categorise themes and concepts that emerged during each interview while they were ‘fresh’. These notes and the transcripts of the recorded verbal interviews served as the primary data for this study.

#### *The ranking exercise*

Given that most of the targeted interviewees were not biologists, the PDM (Colfer et al. 1999) was applied to assess the research participants’ views on the benefits of natural forests. For convenience, however, matchsticks were used in this study, instead of pebbles. Later, the matchsticks were replaced by paper clips as these are slightly heavier and did not get blown away easily (nor were they used to light cigarettes!). Henceforth, the method is referred to here as the Matchstick Distribution Method (MDM).

In this method, each participant was asked to express his or her opinion about the importance of the natural forest, using statements printed on 20 cards. These statements were an elaboration of six categories of benefits: biological uniqueness, economic activity, aesthetic values, research and education, socio-ethical values and the regulation of the physical environment (Murray 1990) (see Section 3.1.2). Each card was identified by a number and contained a statement about a specific, beneficial function of the natural forest. These six themes were also used to rank their reasons for protecting natural forests.



**Figure 5.1** Examples of respondents performing the MDM to rank the benefits of natural forests and their reasons for protecting the forest.

Although Gorontalo has its own local language, the statements were translated into Indonesian, as all participants spoke the national language. The 20 statements used in this research were adapted from the 21 arguments to justify forest protection used in a global survey of individuals and organisations with an interest in tropical forest conservation (Murray 1990). In this current study, a slight modification to the original list was made to accommodate the local context; the natural forest was used as a proxy for examining participants' perceptions of the value of biodiversity since it hosts most of the remaining biodiversity in the research site. The full list of statements is provided in Chapter 7.

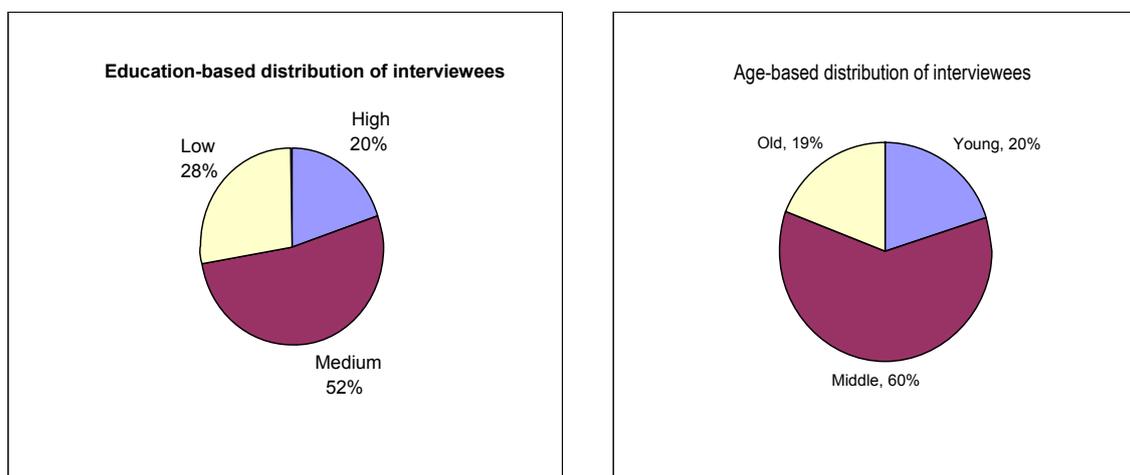
Ideally, each research participant should have been interviewed and should have performed the ranking exercise. Unfortunately, in some situations this was not possible. For example, one of the senior government officials was interviewed in between meetings. The interview took place in a moving car in traffic congestion, so it was not possible to spread the twenty cards and do the ranking. Four interviews took place in restaurants, chosen by interviewees, and it was either too noisy or had the potential for attracting unwanted attention to do the ranking activity. Two other people did not have time to complete the exercise and promised to send their answer in the mail, but never did. In total, I do not have the MDM ranking from six research participants (4% of total respondents). Each participant conducted the MDM ranking on his or her own, following the interview because I did not want to influence their response to the interview question about the benefits of natural forests. However, on a few occasions the person being interviewed had colleagues who also wanted to participate in this activity. In this case, one person was interviewed and others were asked to do the MDM ranking individually. In total, 146 individuals performed the MDM, including the 83 interviewees.

During this exercise, cards were randomly spread in front of each participant to reduce bias in conducting the ranking. For example, on card number 8 the statement read *Natural forest areas can be managed to encourage tourism, providing employment and local income*. To demonstrate how a participant valued each stated benefit, s/he was given 100 matchsticks to distribute among the 20 statements. The higher the number of matchsticks allocated to a given statement, the higher the perceived importance of the stated benefit to the participant. Technically, the score for any one statement can range from 0 to 100, or an average of 5 matchsticks for each statement. Most research participants positively responded to the use of this research tool as it was new to all of them, and hence, more fun to do than filling in survey forms. As for me, the MDM was helpful for consistently gauging how respondents valued the natural forests.

After the MDM was completed, the results were tallied and entered into an Excel spreadsheet for analysis. Selected demographic data, such as gender, occupation, and type of organisation (government or non-government), age group, and education, were collected during the scoring exercise. These demographic data were used as variables for comparing perceptions at the analysis stage. Data were analysed using mean scores for each statement of the 20 specific benefits of the forest.

Details of the field research programme are provided in Appendix 8.1, the summary of which is shown in Table 5.3. These include the date of each interview, the names of research participants (coded) and the stakeholder group they represented, and the location of interviews. There are three categories of participation: those who did both interviews and the ranking exercises (A), those who did the ranking exercise only (B), and those who were interviewed only (C). A summary of these is provided in Table 5.4.

Out of the total 83 interviewees, 43 individuals (52%) were government officials and 40 (48%) work outside the governmental sector. In terms of educational levels, they consisted of individuals who have post-graduate degrees ('High'; n = 17), under-graduate degrees ('Medium'; n = 44), and those who completed primary and secondary schools ('Low'; n = 23). The majority of these respondents (n = 51) were from the middle age-group (between 31 and 50 years old), while the young group (under 30 years old) and older group (50 years and above) consisted of 17 and 16 individuals, respectively (see Figures 5.2 and 5.3).

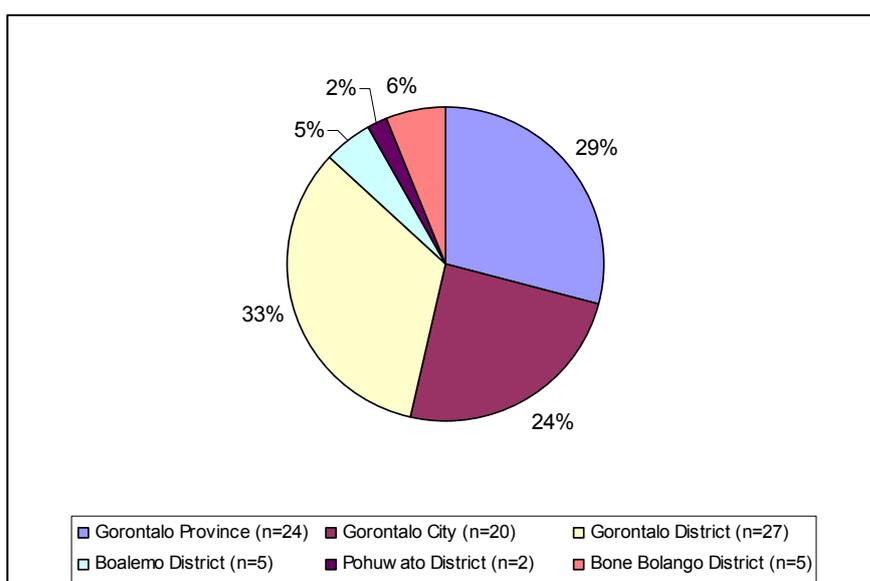


**Figure 5.2** The distribution of interviewees, based on education (left) and age (right).

Respondents were selected also on the basis of area (e.g., province, districts, and village) where they work: Gorontalo Province (n = 24), Gorontalo municipality (n = 20), Gorontalo District (n = 27), Boalemo District (n = 5), Pohuwato (n = 2), and Bone Bolango District (n = 5). The first three districts are bordering the NWS, the Pohuwato district is the westernmost part of the province where Panua Nature Reserve is located, and the Bone Bolango district is in the eastern border of the province where half of the BWNP is located (see Figures 4.1 and 5.3).

**Table 5.3** A summary of the field research programme and the number of interviews conducted from July to December 2005.

Period	Research samples	No. of interviews	Location
End of July	Indonesian post-graduate students	2	Christchurch, NZ
4 to 29 August	Stakeholders at national level	23	Bogor, Jakarta, Yogyakarta
3 September to 13 October	Stakeholders at provincial and district level	56	Gorontalo province and Districts of Gorontalo Boalemo, and Pohuwato
10 November to 16 December	Stakeholders at provincial and district level	27	Gorontalo Municipality, Bone Bolango District, and Pangahu Village



**Figure 5.3** The distribution of interviewees, based on geographic location.

**Table 5.4** A summary of research participants, their primary roles and the type of participation in the current study

Group of stakeholders	Male	Female	Total	A	B	C
<b>Educators</b> Educating primary, secondary, and tertiary students	8	12	20	9	11	0
<b>Resource managers</b> Implementing agricultural, environmental, forestry, watershed management, and mining policies	38	10	48	28	17	3
<b>Legislators and enforcers</b> Drafting regulations related to natural resources management and enforcing them	14	5	19	10	8	1
<b>Community leaders</b> Faith- and tradition-based community education	7	3	10	8	2	0
<b>Activists of local NGOs</b> Grass root activities and community empowerment	23	13	36	13	22	1
<b>Commercial users of biodiversity</b> Users of forest products for their livelihoods	15	5	20	8	10	2
<b>Total</b>	<b>105</b>	<b>48</b>	<b>153</b>	<b>76</b>	<b>70</b>	<b>7</b>

During the first phase of the field work in Gorontalo (September-October 2005), I was based in Limboto, the capital town of Gorontalo District. The interviewees in the Gorontalo District and Municipality were located within 15 minutes to a half-hour drive or longer on mini-buses. However, the number of respondents from the Boalemo, Pohuwato, and Bone Bolango

Districts was fewer because of the distance (approximately 150-200 km from my base) and also due to limited access to public transportation. It took me at least four hours drive in a private car or about six hours in a mini-bus one-way to reach the prospective respondents in the nearest town of these districts. I was fortunate to be loaned the NFCP's vehicle for a few days to visit the respondents who were available during the three-day visits on each site. The long journeys provided me with opportunities to see the various types of land use and the state of the three PAs. The villagers from Pangahu were interviewed because of their close proximity to the NWS and also their knowledge about innovative conservation activities being implemented there. This remote village was reached in about four hours drive from Limboto (half of the drive was on dirt roads), followed by another hour on a long-boat towards the upper reaches of the Paguyaman River.

One, and occasionally two, field staff members of the NFCP assisted me in locating the prospective respondents because they were very familiar with the research sites. I conducted all interviews myself, but these assistants sometime helped with tallying the results of the MDM ranking, especially when there was more than one individual undertaking the MDM (see Figure 5.1)

## **5.4 Data Analysis**

The purpose of data analysis is to reduce the large amount of material, such as recorded interviews, photos, field notes, and published documents collected during the field work, into a coherent story, constructed on the basis of themes discovered. These themes and the meaning given to them, within the context of this research, allowed me to answer my research questions. This section explains the steps taken during this stage, which included managing the collected information, transcribing the recorded interviews, and coding or classifying data.

In contrast to the quantitative approach, where the lines between data collection and analysis of data are more linear and fixed, analysis of qualitative data is more fluid and emergent. The distinction between data collection and analysis is far less clear, and the two processes can occur concurrently (Patton 2002). Qualitative analysis began during the field work, but it continued throughout the course of the research as new sources of information became available. Ideas and themes may emerge at the start of the field work, giving direction to a more focused data generation. These initial insights are helpful, but they should be treated carefully because too many of them can interfere with the openness of an inquiry. Likewise, too few themes may mean losing them forever or removing the opportunity to deepen data generation and analysis (Patton 2002: 436). As a strategy, Patton (ibid) recommended the use of these early insights to identify gaps and for narrowing the interview questions, so that alternative explanations and patterns can be sought, which would either confirm or disconfirm the early insights that appeared. This data treatment was very helpful in the current study.

### **5.4.1 Managing the collected information**

In addition to recorded interviews and the hardcopy of the ranking exercise results noted in Section 2.4.5, a large number of printed documents and field notes were also collected. Because of the time constraints, as can be seen in the research programme summary (Table 5.3), there was little opportunity to review the recorded interviews in the field. However, a summary of notes was made at the end of each day and all of the audio files were stored in a computer, with back-up files kept in a flash/pen disk. Data from the ranking exercise was

entered into an Excel spread-sheet shortly after collection every few days. The tally-sheet of the MDM exercise was filed together with the signed consent forms in a safe place. After these different forms of materials were carefully checked for completeness, they were stored in my office where only I had access to them. A back-up for the hardcopy of the ranking exercises was also made and kept in another secure place.

It is important to protect the valuable information, both in digital and printed forms, because the primary data from the interviews and the ranking exercises are unique and precious. These can never be recaptured in precisely the same way, even if the opportunity is available again (Patton 2002). Moreover, the researcher has an ethical obligation to protect the confidentiality of information given by the research participants (Mason 1996; Patton 2002).

After sorting and storing the collected materials, the next step was more focused data analysis. As noted earlier, the process of analysis had informally begun during the data generation phase when insights and ideas emerged and were noted. However, the detailed analysis, and the steps involved, took place after the field work was completed (see Table 5.5).

**Table 5.5 Steps taken in conducting data analysis**

Steps of analysis	Types of materials produced
Interviewing	Recorded conversation
Transcribing the recorded interviews Coding of the printed text	Text Annotated text for interesting concepts, themes, and ideas
Classifying and integrating themes	Classified/integrated themes
'Analytic induction'	Interaction between data and the wider literature

Given the sheer amount of material collected, organisation was essential to management. In addition to checking the overall completeness of each form of information, e.g., details of location and date of the interview, and participants' main profile (i.e., age, gender, education level, and occupation), this process was very useful for identifying gaps in the collected information. Thus, this process assisted me in getting familiar with the information as a whole.

#### 5.4.2 Transcribing

Transcribing<sup>64</sup> the recorded interviews offers another point of transition between data generation and analysis. While in the field, I transcribed the first ten interviews myself, as

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<sup>64</sup> Transcribing is a process of translating spoken (recorded) language into a written text. For this research a verbatim transcription was applied, punctuation was added when appropriate, but forms of interjection were not typed.

recommended by Patton (2002), and I gained two primary benefits. The systematic listening and transcribing helped me to get an overall sense of an interview's content. Transcribing also provided an opportunity to generate categories or themes, through careful listening, typing the information given by the research participants, and reading the transcripts (Mason 1996).

Moreover, transcribing helped me to be more aware of other aspects of interviewing behaviour, such as being more patient in listening, courageous in probing, and swift at 'thinking while listening' to ask follow-up questions. It also helped me to resist the temptation to comment and explain when perceptions about some scientific concepts or principles differed from my own. Thus, this initial analysis served as a self-critique (Read 2005).

Translating spoken language into a typed form constituted a different level of analysis. The 'depth' of listening required to transcribe a recorded interview reveals indications of participants' attitudes that may not have been noticed at the time when the interview was conducted (Read 2005). Transcribing is also a means to reduce materials in the conversation into data because I decided which parts of the content of the recorded conversation needed to be typed, according to their relevance to the research questions, and which were to be left out. Some examples of the latter included information on personal or family matters, and the non-verbal aspect of the conversation. Thus, an explicit and systematic reduction of materials took place in this process. Mason (1996) gave some principles to guide this selection procedure. Included in these are deciding which parts of the recorded conversations to consider as 'data'. In this research, what constituted the primary data are the literal words uttered by the interviewees, the written records of the ranking exercises, and the printed form of secondary data (e.g., official documents and photos). This principle helped ensure rigour and avoided misrepresentation of the research participants' perspectives. It also influenced the extent to which the data will be 'read' (i.e., literally, interpretively, or reflexively). A more detailed explanation about the types of data reading is given in the next section.

Once interview transcripts are created and printed, they do not automatically become data. Mason (1996) warns about the danger of overestimating such transcripts. She asserts that transcripts are only a partial record as they do not include the non-verbal aspects of the interviews. Moreover, during the typing I had to decide which verbal utterances would be included in the transcript. Consequently, I had to question my own assumptions as I typed and coded the texts. Mason (ibid) also asserted that there is simply no complete written translation of verbal conversation. However, while transcripts are not complete objective records of the interviews, when combined with contextual interpretation and observation they become a sound foundation for data analysis.

Owing to the demands of handling the data generated by the 108 interviews, three local senior students in Gorontalo were hired to ease my load of transcribing most of the audio files.<sup>65</sup> All interviews, except two conducted with foreigners, were in the Indonesian

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<sup>65</sup> Due to time constraints, it was more important to use my resources to increase the diversity of stakeholders for the interviews.

language. This made the verbatim transcribing work relatively easier for the assistants. They also knew better how to transcribe the local terms uttered by some participants during the interviews. This minimised the language barrier.

For each assistant, a random check of their completed transcripts was carried out to check for consistency in their quality. In cases where deficient transcripts were found, a more thorough review and remedial work were conducted. While the remedial typing of some interviews took place, I checked the completed transcripts by listening to each interview. Then each transcript was printed, ready for further analysis (coding). Each printed transcript was given a number, which served as the main means of identification of the interviewees.

### 5.4.3 Coding

Coding is a formal and systematic process of data sorting and analysis. It is the first step in data abstraction, which involves organising data into categories relevant to the research questions. Its main purpose is to make sense of the overall materials. This means that each text of the interview transcript was read in its entirety. Certain phrases, ideas, and concepts that emerge naturally from the data and provide insights into the research questions were selected as codes. These codes serve as the basis for developing the themes for analysis and for constructing a coherent and interesting narrative. Coding is done iteratively (LeCompte & Schensul 1999), and while listening to the interviews enabled some rapid analysis at a general level, the review of transcripts facilitated a more detailed level of analysis at a slower pace (Creswell 1998; Mason 1996).

Mason (1996) identifies three ways of coding: literal, interpretive and reflexive. Literal coding is generally applied at the start of data analysis, which then serves as the basis for an interpretive reading of the data. These two kinds of data reading are commonly used in qualitative research, while reflexive coding is increasingly used in participatory action research where the analyst is an integral part of the data s/he generated.

In qualitative research, the codes generally originate from two main sources: from other researchers (e.g., those generated during the literature review stage) and from the research participants. For example, in this study, the six categories of assigned values of biodiversity were borrowed, and extracted, from Kellert (1993, 1996), Murray (1990), and Rolston (1994) (see Chapter 3). The categories were used as criteria for coding the data that came from the research participants. However, as this research was designed to understand the perceptions of local stakeholders, the grounded manner of data generation was also applied in the way the content of the interviews was coded. Thus, the codes were created based on a combination of (1) the literal words or phrases appearing in the interviews, (2) issues referred to by the research participants, and (3) some themes in the relevant literature (Patton 2002).

Coding can be done either manually or using computer software such as the NUDIST and NVivo programmes. The coding for this research was done manually for the first ten transcripts. While generation of codes started during the field work, it became more intensive during the coding process itself. The literally-generated codes formed the majority of data for this research. The later development of codes (by expanding or reducing them) took place as familiarity with data improved, maintaining close engagement with the research questions at the same time. Themes and ideas which emerged during this stage of analysis were manually tallied on a spread-sheet, and then entered in the Excel format where a final list of categories was constructed. This final list (i.e., free codes) was used as a guide to apply categories to the rest of the interviews. Eventually, this list served as the basis of interpretive reading, which

involved constructing and documenting a version of what the data might mean, what could be inferred from sections of the text, or what they implied. This interpretation of data involved my judgement, but this is done within the context of the topic of investigation. For interpretation purposes, these two types of reading of the data, literal and interpretive, were applied in this research. Given the large number of interviews involved, the rest of the coding was done by using the NVivo programme, described in the following section.

#### 5.4.4 Using NVivo for coding and data analysis

While manual analysis was conducted on an ongoing basis through the transcribing process, the data as a whole was reviewed through reading, coding, and analysing hundreds of pages of colour-coded printed pages. Keeping track of who uttered which themes across the massive amount of notes generated through this process was very slow. To assist this process, I used NVivo programme version 2, which was available to analyse both visual and textual data, primarily because of its capacity to store, code, compare, and sort all transcript data from a large number of interviews. Although most of the data for this research was in text form, the software has greater flexibility to link text with pictures as well as with other types of text, such as field notes and notes from the Endnote bibliography software.

Coding with NVivo is essentially the same as in manual coding, by thoroughly reading, marking, and annotating the important parts of the texts. Highlights of different colours for different categories can be used for both manual and electronic coding. When using this software, the interview transcripts can be saved in Word format. For coding purposes, the same text is converted into Rich text format (rtf), which can be logged into the NVivo programme without any impact on the original materials. In this format, pieces of text – in the form of words, phrases, or paragraphs – that represent similar ideas or themes, are selected and stored. The creation of nodes<sup>66</sup> can be done separately, based on the earlier manual coding, or every time a new theme appeared in a text while coding. Texts containing concepts or ideas can also be coded more than once according to their relevance to the themes identified. Through this programme, the coded texts were stored together in the form of free nodes (a list of loose themes) that could be retrieved quickly, efficiently, and thoroughly across texts of different interviews (see example of a node containing some coded paragraphs in Appendix 5.4).

These multi-coded texts were stored in separate files together with other text with similar themes. However, NVivo does not do the analysis, such as deciding what constitutes a theme, what to name it, and what meanings to extract from case studies (Patton 2002). To complete the analysis, further thought and building connections with other primary and secondary data were required. Whether coding was done manually or with a computer programme, the process included making decisions about what counts as ‘data’, systematically applying the codes to the transcripts, and storing the coded texts to make retrieval for further analysis easier, faster, and more thorough. To maintain consistency in the

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<sup>66</sup> Nodes are ‘containers for ideas’ made up of references to text from documents being coded. The text corresponding to such a reference is called a coding passage, and collectively is called the node's coding. A node is said to contain references to, or to code, several passages from several documents (NVivo tutorial).

coding process NVivo stores the themes generated (e.g., under free and tree nodes) and I kept the hardcopy of the list of themes used in the analysis (Appendix 5.5)

#### 5.4.5 Classifying and integrating themes

Once the transcripts had been coded and sorted into free nodes, the next step was to analyse the coded text. In this process, only the most relevant data that represent a variety of respondents' responses to the research questions were chosen for further analysis. This long list of themes at this stage was refined, merged, or integrated into tree nodes. For example, 'lack of local employment opportunity', 'encroachment into reserves', 'illegal logging' and 'collection of non-timber forest products' were among many factors that threaten natural forests in Gorontalo. These themes were later coded into a more refined node (i.e., a tree node) called 'threats to protected areas'. The resulting entire tree nodes were used to describe inter-relationships between free nodes contained in each tree node (Appendix 5.5).

#### 5.4.6 Data interpretation

All of the data abstraction steps described above represents the first-stage analysis. At the transcription stage, the material contained in the recorded conversation was substantially reduced. Further data reduction occurred at the coding stage, when relevant themes were selected, and interesting representatives of the data were reproduced in the form of quotations. The next stage of analysis was to interpret the data, which allows the researcher to tell the 'story' and answer the research questions (LeCompte & Schensul 1999).

The epistemological basis of using the semi-structured interviews is that the researcher and the research participants are engaged in the mutual construction of knowledge (Kitchin & Tate 2000). As most interviews were conducted in Indonesian, ideally the selected texts used as quotations would be presented in that language so as to reduce the potential for inaccurate translation. However, since the narrative is presented in English in this thesis, the flow of the narrative would be cumbersome if the quotations in Indonesian were presented in full. Consequently, a translation of the meaning of the quoted phrases, not the literal uttered words, was adopted in this thesis.<sup>67</sup> The English-language quotations reproduced in Chapters 6 to 9 of this thesis are taken from the transcripts and represent the clearly articulated expression of respondents' thoughts that I considered illustrative of a general pattern within the data. Each quotation is accompanied by a pseudonym of the participant so that his or her confidentiality is protected.

The reflexive nature of reading the data came into play during the later stage of coding and analysis. This is stressed by Morse (1997: 445 in Read 2005) in which she describes the 'fluid' and 'organic' nature of coding:

Initially, coding decisions may be quite superficial, e.g., by topic, but later coding decisions are made with the knowledge of, and in consideration of, information gained from the previously analysed interviews. Such coding schemes are not superficial and, in light of the knowledge gained, small data may have monumental significance. The process is not necessarily superficially objective: It is

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<sup>67</sup> I am a native speaker of Indonesian with many years' experience of translating into English, so I am confident of the accuracy of my translations. However, to reduce bias in translating the data, examples of translated paragraphs were checked for better accuracy (see Appendix 5.7).

conducted in the light of comprehensive understanding of the significance of each piece of text. The coding process is highly interpretative.

This description mirrors the process of coding I experienced in this research. I gained more confidence in making coding judgements as I progressed with this task. The coding results ultimately became the foundation for defending the interpretations and analysis offered in the result chapters.

#### **5.4.7 Ensuring rigour and validity**

Given the inherent limitations of qualitative research (Section 5.1) and the use of transcripts as the main source of data (Mason 1996), strategies to ensure credibility, transferability, reliability, and confirmability of this research were applied throughout the research process. Purposeful sampling, triangulation (of data sources), and member checking were used to ensure credibility through using multiple sources of evidence as suggested by Yin (1989), King (1994), Creswell (1998), and Neumann (1998). The mechanically recorded data and audit trail products presented in Appendix 5.6 were used to ensure dependability. Variability and idiosyncrasies found in interpretation can be tracked through these tools (Lincoln and Guba 1985).

### **5.5 Chapter Summary**

This chapter outlined two primary requirements of this research project: the rationale for selecting a combination of qualitative and quantitative approaches and the tools applied in the project execution. The qualitative approach in the investigation is more appropriate and consistent with the insights of post-positivism and the quantitative ranking (MDM) served a complementary to capture wider perspectives from respondents. The case study was used as the strategy of inquiry because the main purpose of this research is to represent the case, the local voices on issues related to biodiversity management. A qualitative semi-structured interview was the main tool for generating data, with the MDM ranking exercises as a complementary tool to capture local perceptions of the benefits of natural forest quantitatively. Secondary data were also collected as part of the multiple sources of evidence. The unit of analysis of this study was key stakeholders in the Gorontalo province. They were selected through purposive and snowball sampling techniques in order to maximise richness of information. Finally, the chapter explained the procedures of data analysis and interpretation, which serve as the basis for detailed discussion in the next four chapters.

## CHAPTER 6

### LOCAL PERCEPTIONS OF BIODIVERSITY

What is biodiversity? Erm ... how should I put it? I am not entirely sure - animals, plants, lakes and swamps, or other ecosystems - as I only heard about it on the radio recently. The important thing is, I think, that all of these are living things (Roni, a member of local conservation club in Gorontalo).

Having described the natural and socio-economic systems that govern the management of biodiversity, and explained the procedure of carrying out this current research in the previous three chapters, this chapter is the first of the four chapters that articulate the substantive results of investigating the perceptions of key local stakeholders on biodiversity conservation in Gorontalo. The chapters are structured so as to build a comprehensive understanding of the complexities in managing biodiversity at the research site. This chapter presents the research participants' views on what biodiversity means to them, their reasons for stating its essential roles, and their knowledge about and awareness of changes in local biodiversity. The findings presented in this chapter are systematically generated from the themes or ideas that emerged from the interview data.

#### 6.1 The Meanings of Biodiversity

The scientific term 'biodiversity' is translated from English to Indonesian as *biodiversitas*, *biodiversiti*, and *keanekaragaman hayati* or its shorter version *keragaman hayati*. The brevity and closeness of the first two transliterations to the English word have made them popular among academics and conservation activists in the western part of Indonesia. Literally, the Malay-rooted word *keragaman* means 'various' or 'variation' and the (originally Arabic) word *hayati* means 'life-related' (Echols & Shadily 2002). The official use of the term *keanekaragaman hayati* first appeared in Law No. 5 of 1994 on the Ratification of the United Nations Convention on Biological Diversity (*Undang-Undang No. 5/1994 tentang Ratifikasi Konvensi PBB mengenai Keanekaragaman Hayati*) although the same idea of biodiversity, written as 'biological resources (*sumber daya hayati*) and their ecosystems', was officially used earlier in Law No. 5 of 1990 on the Conservation of Biological Resources and Their Ecosystems (*Undang-Undang No. 5/1990 tentang Konservasi Sumber Daya alam Hayati dan Ekosistemnya*). None of the three translations of 'biodiversity' noted in this research is commonly used in everyday conversation. However, I chose, and consistently used, *keanekaragaman hayati* in the interviews because it is used in official documents. In fact, I was quite surprised to find out that none of the interviewees, except a few represented national stakeholders, used either *biodiversiti* or *biodiversitas* in the interviews for this research.

The quotation in the beginning of this chapter is typical of how local stakeholders (see Section 5.3 for details of their primary roles in the management of biodiversity) defined biodiversity. For the purpose of consistency and comparison, this thesis adopted the definition stated in the Convention on Biological Diversity (CBD) (see Chapter 3). Given that 61 (76%) of the total of 83 interviewees did not have a natural science background, it is not surprising that they provided varied interpretations of this technical term. Respondents'

definitions are examined here on the basis of their closeness to, or alignment with, the CBD definition.

Despite my attempts to conduct each interview in an informal and conversational manner, I found that, in general, respondents were hesitant or afraid of giving an incorrect answer; they did not feel confident talking about biodiversity. Consequently, they tended to provide short answers and rarely volunteered information beyond what they were asked. Only a few of the respondents provided definitions with a close alignment to the common, internationally used term 'biodiversity'. Further, these data suggest that familiarity with this scientific concept was influenced by respondents' professions. Among the six stakeholder groups, about half of the responses to this question came from resource managers; the commercial users group did not offer any definitions. Two of these managers, Jola (a waste manager) and Zaid (a forest ranger), said 'I don't know much about it'. While Jola did not offer any reason for his ignorance, Zaid humbly said he did not have enough education to answer this technical question. Another interviewee who responded this way was Arman (a law enforcer), who explained that the topic was outside his professional field.

I also learnt during the early interviews that asking a respondent to define 'biodiversity' was not a good way to start a conversation. So, in most of the interviews I started the conversation with a topic likely to be more familiar to the interviewee, such as local issues related to forest and the environment. Besides providing data in its own right, discussing a familiar topic served as a good way to build trust with the respondents. In many cases, some respondents themselves introduced the term *keanekaragaman hayati* while talking about other topics, and I used this as an opportunity to ask them to define what they meant by it. However, some interviewees were too busy or too excited talking about the complexity of managing the local forests, and avoided answering a more technical question, such as defining 'biodiversity'. This might explain why less than half (35 of 83) answered this question.

Respondents explained the meaning of 'biodiversity' in fairly general terms, by stating its elements: all living things, or all forms of life. When asked specifically about the elements that may be contained in these collective terms, 19 interviewees confidently stated plants and animals or flora and fauna and only one (Araf, a resource manager) included single-celled plants and animals (micro-organisms). A few answered with less confidence, such as Roni, quoted earlier, although their statements were fairly accurate. Others attempted to answer the question by dissecting the words and giving an example of the elements included in the definition, as illustrated below:

Yes, I have heard about biodiversity, but what does it mean? Maybe it means something alive; all that exists in nature, which can move. But it could also mean plants, as they are part of natural richness. Actually, worms are very useful too because they help to keep the soil structure; bacteria are also useful for research and doing some experiments in a laboratory. Is that what it means? (Joice, a community development activist).

Several respondents added a more specific element to this general understanding. For example, Wina (a city planner) included worms and insects; she explained their essential roles in sustaining the planet Earth. Like Roni, other respondents included habitats and ecosystems, both terrestrial and aquatic (e.g., forests, waterfalls, lakes, dry-land, rice fields, rivers, and coral reefs) in their definitions. Some also emphasised that diversity occurs at the species level [of plants and animals] *that are part of an ecosystem*, such as forests. Only one respondent, Rusdi (a researcher), provided a description that resembles the CBD's definition,

by including elements of biodiversity and the levels of biological organisation where diversity can be found. He stated:

Biodiversity exists at genetic, individual species, and population or community levels. It is more difficult to see diversity at the genetic level. So what we generally see is diversity at the species or population levels.

No one else mentioned the genetic diversity. Most respondents referred to biodiversity at species and ecosystem levels, as is very common in the biological science literature (e.g., Belden et al. 1996, 2002; Bright & Stinchfield 2005; Gaston 1996). In a study of the public's perceptions in a biodiversity hotspot in the USA, Hunter & Brehm (2003) found that by dissecting the term, their respondents were able to get a general meaning of biodiversity, but spoke only about species diversity; few included ecosystem and genetic diversity.

However, when respondents in this research gave examples of biodiversity, they referred only to attributes of species and not those of ecosystems. For example, Serau (a law enforcer) mentioned size (*big and small*). Others emphasised the limited distribution (*endemic*) where biodiversity may be found. He listed some endemic species, such as the dwarf buffalo (*anoa*), the *maleo* bird, and the black macaque that can only be found in Sulawesi. Further, Samat (a resource manager) defined biodiversity as *protected species*. Further evidence of the interviewees' focus on species and ecosystems diversity is discussed in Section 6.3 where respondents shared their knowledge about local biodiversity.

Moreover, some respondents talked about biodiversity in terms of its origin or natural condition. For instance, for Zaid (a ranger), it means *native species [flora and fauna] that naturally occur in a given place*; while Barto (a ranger) understood biodiversity as *plants and animals in the forest* and underlined that they are *safe or protected*. Muti and Samat added the attribute *rarity*. For these interviewees, undisturbed ecosystems (e.g., natural forest in its original structure and composition) and rare and native species are synonymous with biodiversity. Their narrow definitions of biodiversity reflect their regular interaction with forest ecosystems as part of their jobs. Their answers, and their propensity to associate biodiversity with its specific origin (*native*), distribution (*endemic*), and conservation status (*rare*), implied that biodiversity and conservation are closely related. Their emphasis on protected species and ecosystems may imply that life forms that are not protected, or are located outside protected areas, are not parts of biodiversity.

In this present study, 90% of interviewees (32 out of 35) who attempted to discuss the meaning of 'biodiversity' had a tertiary education. The other three had completed secondary education. Respondents with higher formal education levels were more willing and able to discuss this scientific term. Respondents' familiarity with the term was, however, limited to an understanding of the diverse *elements* of biodiversity and much less in terms of *interactions* or *connections* between these elements, as well as with the physical environment that determine the functions of biodiversity. Similarly, studies that examined the American public's understanding of this scientific concept found that the public also had difficulties defining the term, let alone understanding its meaning (Hunter & Brehm 2003; Watson et al. 2004); biodiversity was not a familiar term to most people even in this western, English-speaking context. In the examples of case studies noted in Section 6.1 the umbrella concept of biodiversity, enshrined in the CBD, is understood narrowly at species level only.

## 6.2 The Essential Roles of Biodiversity

Among those who defined biodiversity, and hence demonstrated a fair degree of familiarity with its elements, less than half (14) were able to explain their *interactions* or *functions*. Respondents associated the roles of biodiversity for aesthetic, utilitarian, interdependence, and survival reasons. An explanation of each of these themes is provided below.

In general, the aesthetic view was more prevalent among respondents whose livelihoods did not directly rely on the harvesting of forest products. Others underlined that people's appreciation of biodiversity depends on the types of benefit they get from it (see Chapter 7). Examples of respondents' comments were:

As humans, we appreciate variation in nature. Life would be very boring if we only had one kind of something, but in a large quantity. It is like having many clothes but of the same model and same colour. Diversity or variation is much better (Wanti, a legislator).

Natural forests have a high diversity of plants. For people in the timber trade business, it would be better if the diverse plants in it are changed to a teak plantation. But for people who work in forest [conservation], a single species of plant is not good. We may think other kinds of plant species are not useful for humans, but they are useful for forest animals. Teak trees have no fruits, so birds will have nothing to eat. Even if these trees have fruits, neither humans nor mammals such as the *babi rusa* will eat them (Barto, a ranger).

As briefly described in Chapter 4, Gorontalo's rich biodiversity is of global conservation value. However, long-term research on its wildlife (Clayton et al. 1997; Clayton & Milner-Gulland 2000; Lee 2000; O'Brien & Kinnaird 2000) and respondents' observations reported in this research (see Section 6.4) showed that many of its unique wildlife have suffered degradation and/or some species might have been lost. The following respondents suggested the inter-relationship among elements of biodiversity as essential for the functioning of ecosystems:

Diversity is important because each of its elements has a role in supporting the others (Beruga, a planner).

There are many forms of life inside the forest communities: plants, animals, river and other ecosystems which are *interdependent* and when one element is missing or destroyed, others will be affected (Asla, a teacher).

Within an ecosystem there are various cycles [water, air, nutrients], and each is performed by animals and plants, which are interdependence with each other, and with the environment where they exist (Kamis, a forest ranger).

Many of the respondents who explained this concept of interdependence were those with higher levels of formal education. The three respondents above, for example, have completed tertiary education. While they had a good grasp of this theoretical concept, specifically about the forest ecosystem, they did not explain any specific mechanism by which the concept works in everyday life. Only a few articulated the link between deforestation in the upland areas and the disturbed balance in other ecosystems. They said:

As the existence of one element [of biodiversity] affects another, when one element disappears [trees of commercial value], the diversity [in plant communities in the forest] will be reduced and the natural balance disturbed [less roots to hold the forest soil and retain rain water]. Sadly we have a poor understanding of the fact that our environment is a living system (Lade, a legislator).

There was an incident of insect attack on some maize crops a few years ago in Gorontalo; explosion of an insect population turned them into pests that damaged the crop and brought economic loss to the affected farmers (Herry, a planner).

When the bat population is declining because of hunting, then certain fruits that need bats to pollinate will not be able to bear fruit because an important part of biodiversity is missing. Consequently, the ecological function of the natural forest [where the bat population occurs] is reduced (Muti, a community development activist).

The loss of forest cover has a very clear biological impact, by reducing the quantity of organisms, which in turn affect their own survival. This, in turn, is affecting the survival of both human and non-human communities. I am very concerned that most people in Gorontalo do not see the wider implication of this loss; they only think about the economic benefits they can get from biodiversity (Aton, an educator).

Other respondents also observed the decline of many of the animal species known as important pollinators of fruit trees (such as bats and certain birds) and wild pigs as seed dispersal agents. For example, Suha (a city planner), who recently returned to Gorontalo to work after being away for over three decades, noted the loss of the ‘blackbird’ population because people considered them pests, eating the pawpaw fruits. He lamented this ignorance because this bird actually helped the dispersal of seeds for certain fruit trees. Wanti (a legislator) also underlined the importance of this concept of interdependence in the local government’s efforts in developing food security programmes. In her view, maintaining the diversity of plants is important to support the diversity of local food sources (e.g., maize and taro) because most rice – a critical staple in the diet – for its population has been imported from other regions or islands. Others also believed in the link between biodiversity and their culture, especially for educational purposes, as the following respondents demonstrated.

The diversity of flora and fauna within conservation areas is declining over time and some of the plants and animals have even become extinct. We need to maintain the diversity of habitat and rare species so that we can learn about their potential benefits and have access to them in the future (Samat, a resource manager).

We need to protect our local biodiversity because *it is our cultural asset* and source of pride. For example, the *babi rusa* in Nantu Forest can now be found only in Gorontalo. We need to protect it so that our younger generation can learn about and see it alive, not just from pictures (Asrul, a journalist).

While the respondents’ opinions illustrated above focus on the interdependence among elements of biodiversity, particularly of animals and plants, Jufar (a forest ranger) recognised that the diversity [of plants] is often undervalued. Evidence of his observation is shown in the presentation of respondents’ knowledge about local biodiversity in the next section.

### **6.3 Knowledge of Local Biodiversity**

In contrast to the hesitant response on the previous two research questions, respondents (25) were generally much more enthusiastic when they shared their knowledge about local biodiversity. A few of them acknowledged their limited knowledge about biodiversity. However, when asked to give an example of unique animals of Sulawesi, they immediately talked about the *anoa* and the *maleo* bird and emphasised that both used to be abundant.

A summary of the interviewees’ knowledge of local animals and plants, grouped into broad categories, is provided in Figure 6.1. The findings were generated from the interview data, by tallying the commonly cited plants and animals and the frequency with which each interviewee mentioned them. It was revealed that respondents were more knowledgeable

about animals than about plants (with a frequency of 102 and 20, respectively). Moreover, knowledge of plants was limited to those with direct utilitarian value for consumption (e.g., wild fruits and palm trees), housing construction (e.g., timber from the pine and *Agathis* species), and for ceremonial purposes (e.g., yellow bamboo).<sup>68</sup> Figure 6.1 shows that the *anoa* and the *babi rusa* were among the best known fauna (see also Gorontalo's iconic wildlife after the title page of this thesis). Many respondents stated that they used to eat the meat of both species, and also deer meat, when their populations were abundant; they had been main sources of protein throughout Sulawesi. Knowledge about the local avifauna ranks second, with the *maleo* being the most frequently cited. By contrast, reptiles, amphibians, insects, and other invertebrates, such as worms, were the least mentioned taxa.

Like the responses reported in Section 6.2, most local knowledge of biodiversity came from individuals who had tertiary education (16) and nine who completed primary and secondary education. More than half of these respondents (15) were of the middle age-group and the same number of respondents (4) represented each of the young and older age-groups (see definition of the groups in Section 5.4). The young respondents said that they gained their knowledge from their parents or grandparents; several respondents across the age groups were quite embarrassed to state their ignorance about local biodiversity. Some said they knew only very little, have heard about it from others, or have never personally seen, even the most famous species, such as the *maleo* bird. Examples of these responses follow:

I heard from stories that we have tarsiers, *anoa*, and *maleo* here, but I have never seen them myself (Roni, a member of a local conservation club).

Yes, I have seen the *yaki* monkey [black macaque] and the *babi rusa* in the forest but I have never seen a deer. I heard that these animals can only be found at the Nantu forest now (Midas, a trader of forest products).

Although the older group was only represented by four individuals, their life experiences as long term residents of Gorontalo provided rich data from their decades of observations. For example, Beruga, a native Gorontaloese who had worked for many years in another region and had only recently returned to Gorontalo, lamented the limited distribution of local wildlife that once was widespread in Sulawesi. She attributed this to the loss of much of the natural forests in her homeland. From her observation, she concluded that Nantu forest is now the only stronghold for Gorontalo's wildlife. By contrast, others, like Fiona (a community development activist), believed that diverse wildlife still exists in Gorontalo, although they are limited to the forest. She said:

We have this species of monkey that looks like *orangutan* but smaller, with black or greyish fur, and also some snakes. Unique animals, such as the *maleo* bird, the *babi rusa*, and the black monkey still exist in the forest. It was great to take my children to see the monkeys in the wild when they were young.

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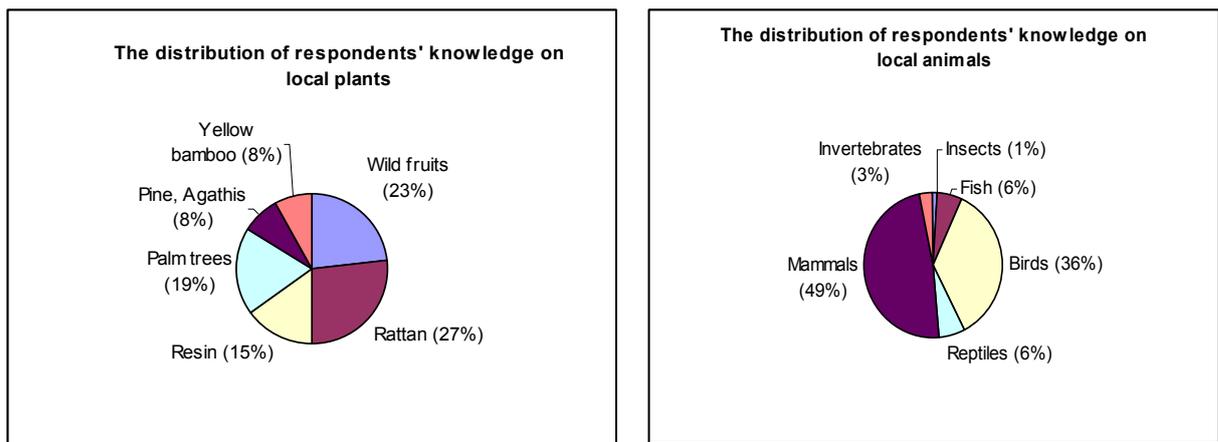
<sup>68</sup> This species is a very important decorative element in Gorontaloese traditional ceremonies (i.e., birth, initiation to adulthood, weddings, and funerals) and also for marking the boundary between traditional leaders and commoners in those ceremonies. The high level of use and lack of replanting or cultivation has led to a decline in its population. Because it is difficult or expensive to get it now, people use ordinary bamboo [the green variety] or paint it yellow instead (interview with Ibra, a traditional leader, 25/11/2005).

Unfortunately, the government has not been able to provide an educational facility, like a zoo, so it is hard for the general public to see them. We also have many species of beautiful birds in the lake [Limboto].

As examples of respondents' knowledge about biodiversity show, wild animals were mostly referred to (81% of responses) than plant diversity (19%). For example, a few respondents acknowledged that they only know certain plants that are useful for people, such as *Agathis*, that produces valuable resins and other valuable timber, such as nantu, rao, and teak (see Chapter 4). Others also observed that only recently did local people learn to cultivate cacao and cloves; some noticed the decline in the population of wild fruit trees as a result of unsustainable methods of harvesting. Respondents' limited knowledge about plant diversity is best explained by respondents below:

Our knowledge about plant diversity is limited to what we can eat! Although the diversity of plants here is high, for example in cash crops like coconut, we only know one or two species out of so many that are locally available - the yellow variety, the green one for treating some kind of illness. But most people do not know them; we do not lack plants as food sources, but we lack knowledge and underutilise what is available due to lack of studies (Rusdi, a researcher).

The *langsat* fruit used to be abundant in the forest in the 1990s. Strangely, instead of picking the fruits, people just cut the whole trees. Those trees behind the research station in Nantu are perhaps the only ones left now (Araz, a resource manager).

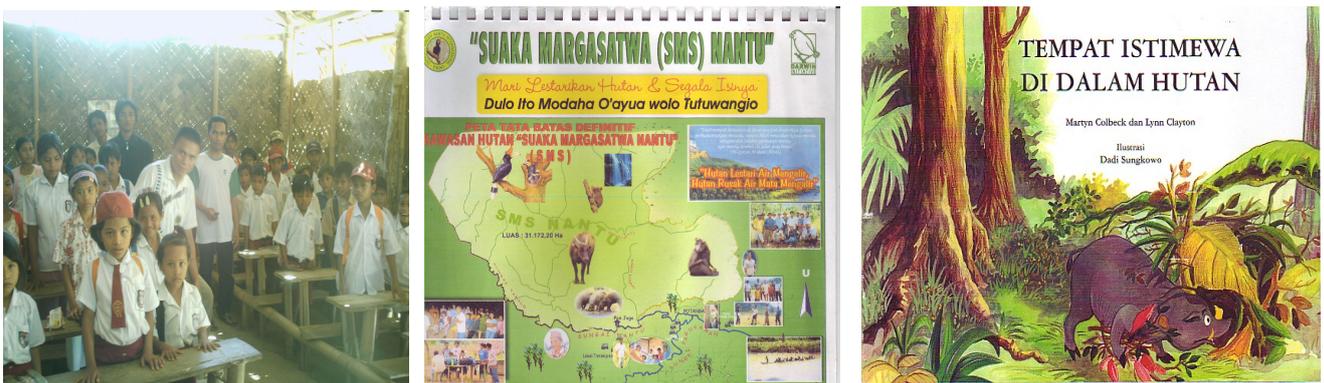


**Figure 6.1 Respondents' knowledge of local biodiversity, distributed by taxa and the relative percentage of their occurrence in the interviews.**

Wild pigs were the second most frequently cited mammal species in the interviews. According to Whitten & Whitten (1996), Sulawesi has two endemic species of wild pig: the wild pig or *babi hutan* (*Sus celebensis*) and the *babi rusa* (*Babyrousa babyrussa*). Both live in the forest but have very different behaviour; the wild boar usually lives in forest edges close to human settlements; they are known as pests as they often raid food crops during harvest times. By contrast, the elusive and nocturnal *babi rusa* prefers the dense natural forest for its habitat (a detailed description of its ecology is available in Clayton 1996). Legally, the *babi rusa* is a protected species, but the *babi hutan* is not. Culturally, as all species of pigs are regarded as unclean animals under Islamic teachings, the predominantly Muslim Gorontaloese are prohibited from consuming their meat. However, both species have been subject to wildlife hunting for the sale of the meat (Clayton et al. 1997; Clayton & Milner-Gulland 2000; Lee 2000; Lee et al. 2005). Consequently, the once widespread *babi rusa* is

now only found in some remaining natural forests of the northern parts of Sulawesi, such as Nantu and BWNP forests (Kinnaird 1995; Whitten & Whitten 1996). An estimated 1500 *babi hutan* and 750 *babi rusa* were trapped in one year in 1997/98 from the head of the Dumoga valley, now part of BWNP (Clayton et al. 2007).

Many respondents confused the two very different wild pig species; only four individuals said they have seen the *babi rusa* in the wild; the others only heard about it from stories told by the older generation. Indeed, respondents' frequent references to the *babi rusa* were closely associated with Nantu forest and the long-term conservation work of NCFP (see Chapter 4). This long-term project, which primarily aimed at protecting the last habitat of this endemic pig, conducted a long-term law-enforcement programme to combat illegal logging and awareness raising activities through film-making, publication in the local print media and field visits for local decision-makers. Many respondents acknowledged the major contribution that this project had in raising awareness about the fate of the *babi rusa* and its survival that depends on the integrity of the Nantu forest. A well distributed NCFP's publication was a coloured picture book for primary school children entitled, *Tempat Istimewa di Dalam Hutan* (A Special Place in the Forest), depicting the community of wildlife in the Nantu Forest. Sponsored by the NCFP, during the field work for this research, I took four teachers and a dozen senior primary school children from the nearest villages for a three-day visit to this forest. For most of the children (and the adults), this was their first encounter with the wilderness in their 'backyard'.



**Figure 6.2** Primary school children of Pangahu village, Gorontalo and the limited available conservation education materials to equip them to be future decision makers (with permission from C.M. Clayton).

Two other mammal species, rats and owls, were mentioned in relation to farming. Respondents told me that rat attacks are a common problem during harvest times. Farmers usually keep cats to deal with them, but they think that the presence of wild 'grey owls' helps to reduce the rat population (interview with Mahar 6/9/2005). The *maleo* bird was the most frequently cited avifauna. Respondents have detailed knowledge about the biology of *maleo*, including its shrinking population and distribution, and the kind of threats to their populations and habitats in the region, as illustrated below.

The Panua reserve was known to have the largest *maleo* population in its 40,000 hectare forest, but people questioned the legitimacy of this protected area. If the *maleo* bird population, the reason for protecting this forest, is no longer viable or is extinct, why do we need to keep the forest protected? (Lade, a legislator).

I heard that we have *maleo* bird but I have never seen it myself. When I was a child my father was given a beautiful *maleo* bird in the Pinogu village [within the BWNP], but I heard that now even the eggs are very difficult to see, and I have never seen it again since then (Mario, a trader of forest products).

The unique *maleo* bird is a small bird, but they have huge eggs. I have seen it, and eaten the eggs, because in the Sumalata area [BWNP], many people still sell the eggs. People think that it is okay to sell the eggs but not the bird, but now it is more difficult to get them because I heard that the bird has become rare (Sole, a planner).

The *maleo* bird population is in decline here, but there are more in its original distribution in Central Sulawesi. There was an artificial breeding effort in Bolaang Mongondow [BWNP] but the level of damage [to the eggs] has been very high. This bird incubates its eggs under the ground in sandy beaches (Timu, a resource manager).

The *maleo* eggs were sold, in a small number, but only from the mountain area that is now the BWNP. They were used as one of the items in the offering for a traditional ceremony (Ibra, a traditional leader).

As noted in Section 6.1, some respondents included certain ecosystems in their definition of biodiversity. In general, however, most equated biodiversity with wild animals; none included domesticated species as part of biodiversity, nor did they discuss ecosystem diversity. As for local knowledge about protected areas in Gorontalo, respondents believed that most members of communities who live in the vicinity of PAs did not know the difference between a protected area (*kawasan lindung* or *kawasan konservasi*) and protected forest (*hutan lindung*). For example, Muti (a community development activist) stated that:

We did a survey in 2003 in two villages near the WBNP. The results showed that most people did not know the forest's legal status as a national park, but they knew that it is a protected forest. They also know about the boundaries of this forest and the wildlife within the forest, but they don't know that it is a national park.

As explained in Chapters 2 and 3, there are various categories of PAs, with different levels of strictness with regards to human activities permitted within them. However, in respondents' views, including many government officials', the three different categories (wildlife sanctuary, strict nature reserve, and national park) were understood as the same *hutan lindung* or protected forest for watershed protection purposes. In other words, the primary role of PAs for biodiversity conservation was not commonly understood. Some of the socio-political reasons for this are explained in Chapter 8.

While respondents showed a high degree of familiarity with some local wildlife, particularly of the 'iconic' species such as *maleo* and *anoa*, their sources of knowledge appeared to come mostly from listening to stories from the older generation and much less from direct personal interactions. Respondents attributed this poor knowledge to lack of facilities and up-to-date information about local biodiversity. This was also confirmed by a long-term study of wildlife and plants in the region (Clayton 2003; Lee et al. 2005). While sharing their knowledge about the notable mammal and bird species, respondents showed a deep concern about the downward changes in the population and distribution of the species, and the reduction in their natural habitats.

#### **6.4 Awareness of Changes in Local Biodiversity**

The focus in this section is respondents' awareness about the impact of decline in forests cover on local biodiversity. Several respondents recalled that 65% of Gorontalo's land was covered by forest and not much of it was cultivated. But in the last decade, the forests have

been logged and cultivated for cash and food crops (interview with Wanti, a legislator, 27/09/2005).

The 37 interviewees who provided the data identified the main causes of the decline in the forest ecosystem and its biodiversity to come from both physical activities (e.g., changes in land use patterns, extraction of forest resources, pollution) and cultural factors. A detailed presentation of the perceived direct and underlying causes of this decline is provided in Chapter 8; this section specifically addresses the perceived impacts on wildlife population and distribution. Some examples to illustrate these changes are as follows:

When I was a child, the forest in the Bongo Paguyaman [now known as Wonosari subdistrict of the Gorontalo District] was so dense then; there were many big snakes around. I saw wild pigs, jungle fowls, hornbills, black tailless monkeys, and the *babi rusa*. There were also white birds along the river, but I do not know their name. Now, you cannot see these wild animals any more; unless you go into the forest (Midas, a trader of forest products who came to Gorontalo through a government-sponsored transmigration programme in the early 1980s).

When I came to work here [Gorontalo District] in 1989, most of the village [Mohyolo – the closest neighbour of the Nantu Wildlife Sanctuary] was still covered with forest. The size of the forest has not only shrunk, but the big trees are gone (Araz, a traditional leader).

In Puhubala [Paguyaman] the increased forest agricultural encroachment since 1985 has affected our local wildlife. To see hornbills, tarsiers, and deer people have to go further into the forest. Deer were particularly easy to see then, as they often visited the river banks near our village. It was easy to see and catch them then; their population had declined; some perhaps even went extinct or moved to a safer place. I am not sure about this as there is no research on this matter. The same thing happened in Paguyaman Pante (a subdistrict of Boalemo). I used to pass along the road with my parents. We often saw deer crossing the road, and occasionally bought dried deer meat to take home because the deer population was abundant. In the dry season it was even easier to see them (Jusa, a local government official).

Large-scale logging operations were highest from 1980 to the end of 1990; they drove certain species, such as the *maleo* bird, hornbill, *anoa*, *babi rusa* and the green parrots, to disappear (Farid, a traditional leader).

Some respondents observed that illegal peasant gold mining in some forest areas, particularly in the Panua Reserve have affected the forest ecosystem as well as other ecosystems far away from it, like the coastal ecosystem in the southern and northern parts of Boalemo District. Others also commented that the disappearance of the *maleo* and other birds is closely linked to the erosion of traditional or *adat*<sup>69</sup> laws and people's ignorance about them. As a result, the *maleo* population has shrunk and so has its distribution. They explained:

The use of cyanide for illegal mining killed the fish in the river and mangrove areas. Now we have less fish in them, and even if we still can catch them, they are much smaller in size. The silting of coastal areas also kills the reefs and their fish community. Fishers used to catch fish along the nearby coastlines, but now they have to go further for a smaller catch.

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<sup>69</sup> *Hukum adat* is generally defined as a set of traditional rules and norms that govern the social life of a group of people and often apply to specific geographic areas. These laws were the primary tools for governing access to natural resources and were commonly applied among the diverse groups of people throughout Indonesia before the Dutch occupation. Since then these have been confounded with other nationally-determined laws, such as the Basic Forestry Law (of 1969). The groups of indigenous peoples who adhere to these rules are referred to as *masyarakat adat*.

Unlike the Javanese, who have a strong culture of keeping birds in cages, the Gorontaloese generally do not have this tradition or the tradition of keeping or selling wildlife as pets. We just eat them! (Lisda, a community development activist).

In the past the traditional leaders had the power to ban the killing or hunting of certain animals and damage to their natural habitats. But now, we do not even have those 'blackbirds' any more because the farmers are wary of them eating the maize crop. This bird has been hunted for a long time; I have seen a Chinese merchant transporting a sackful of black crows on the back of his bike. It is a shame because the crows eat the caterpillars that damage young maize, and thus act as a biological control over agricultural pests. The same thing happened with the *maleo* birds that dig a big hole in a sandy beach to incubate their large eggs. People collected them - either for consumption or sale - although it was prohibited under *adat* law. No one listened to this prohibition, then or now, because when they found these eggs, they could sell them for a lot of money (Ibra, a traditional leader).

Rahmat (a retired government official turned traditional leader) told me that it was easy to see *maleo* within 30 km from Tilamuta (now the capital town of Boalemo District), or at least to hear their calls. He explained that during Alfred Wallace's expedition (in early 19<sup>th</sup> century) this species was reported to be common along the road from Boalemo to the Luwuk areas of the easternmost parts of the northern arm of Sulawesi Island. He found it ironic that in 2002, when there was a contest for creating a logo for the newly established Boalemo District, many people proposed the *maleo* bird, which he believed has already gone and now people can only see this unique bird from photos. A few respondents mentioned that snakes, jungle fowl, white herons, and hornbills used to be common in the forest edges; these are no longer evident.

Respondents' knowledge about local plants was also limited to a few species that have economic utility to them. Only five respondents offered information on this topic. For example, Rusdi and Araz noticed the decline in the once abundant wild fruit trees that were consumed by local communities in the vicinity of Nantu forest. Beruga also commented on the decline in the population of yellow bamboo (see Section 6.3). Others observed a change in plant diversity, particularly of the economically valuable rattan that grows in the natural forests (see Chapter 8).

Specifically, Barto (a ranger) noticed the change in the sizes of rattan cane that people collect from the forest; earlier it was common to see rattan canes that reached 100 m in lengths, so they had to be cut and dragged into the river in order to get them out of the forest. Jola (a local government official) was awe-struck by the rich diversity of plants when he went on a field-trip to the Nantu forest as part of the NFCP's conservation awareness raising programme. He said:

I did not know much about the local forest and its biodiversity, but I learned a lot in this trip to the Nantu forest. I saw many big trees and rattan palms all over them. There was no path to go into the forest. I was wondering how to keep from getting lost. One ranger told me that opening the forest to create pathways would mean cutting trees, and this forest is preserved in its natural condition as much as possible.

Many respondents also linked forest loss with the degradation of aquatic ecosystems and their associated flora and fauna, such as in the major rivers, Lake Limboto, and some mangroves and coral reefs. Examples of their observations are provided below:

In the mid-1980s, during the dry season the river [Paguyaman] along our village still had much flowing water, but now even in the first month of the dry season, the same river has much less water and in some parts is even dry. This, I think, is because the forest in the upper land has been greatly reduced and some of the upper reaches now have villages in them (Midas, a trader of forest products).

In 1984, people could use the Johnson motorboat (40HP) to reach Nantu. Now, even our long shaft *katinting* [3-4 m long wooden canoe-like boat with a single motor attached on one end] often have difficulty going up [mid-way on the river trip the boat has to be pushed to a deeper part] because there is less water in the river. This, I think is due to the destruction of the forest upriver (Araz, a traditional leader).

People are not aware of the environmental degradation in Gorontalo, for example, in Boalemo the main rivers have much less water and are more turbid. In 1980, I came here as part of a scout jamboree and we swam in one of the big rivers here. The water was very clear. Ten years later, I came to work here, but the same river has become much shallower and less clear (Dote, a planner).

In the 1950s I used to swim in the Bone and Bolango Rivers; the water there was deep and clear. But since then, the forests uphill were cut, and almost all of the forest is now gone. And now, if you see it from the air, only the edges still have trees; the middle is barren (Rasid, a traditional leader).

Some respondents commented that the various changes in the main river ecosystems have led to the loss of biodiversity in them. For example, Barto (a ranger) and Tuti (an educator) recalled the once abundant populations of fish and fresh water shrimp in the Paguyaman River and others observed a similar change in the Bone River, both of which used to be main sources of protein for the local people. Suha (a senior government official) commented:

The once very common and abundant fish *nike* [whitebait] is disappearing in many rivers. As children, we used to be able to collect them once every month from the river banks.

Suha also believed that another unique fish species, the *payangga*, which was once also abundant in the upper reaches of the Bone and Bolango Rivers (both feed water into Lake Limboto) had a similar fate to the *nike*. He said that it is very difficult to find this fish in the lake due to the sedimentation problem. He added that some experiments were conducted to cultivate it in the Bolaang Mongondow area (of North Sulawesi Province); the fish grew bigger, but were tasteless. Another element of river biodiversity that Suha considered to have disappeared from Gorontalo was porpoises. He reasoned that this was due to overexploitation, mostly by people outside Gorontalo, as Muslims are prohibited to consume their meat.

Over half of the total interviewees (18 out of 35) who shared their observations on the changes in the river systems also noted the associated effects on the dire state of Lake Limboto and its biodiversity. The lake (5,600 ha) was once renowned for its rich bird and fish population and surrounding natural beauty. It was also a source of cultural pride for the Gorontaloese. Respondents attributed the lake's degradation to ecological and socio-economic problems. About the former, Rasid (a traditional leader) stressed the impact of a long history of deforestation in the upland areas, both by subsistence farmers and by large scale companies, particularly since the early 1970s (see Chapter 7) on the biophysical lake environment. Many respondents were very familiar with some of the official statistics of this change (Anonymous 2007), as illustrated below:

I heard that there were 20 rivers and tributaries throughout the year and seasons. But now, only one or two of these rivers exists. The sedimentation level was very high, and the process occurred very fast so that it has been predicted the lake will disappear in five years time (Fatom, a member of a local conservation club).

The silting problem has reduced the lake's capacity to hold water; its depth has shrunk from about 30 m in 1970 to about 3-4 m at present. The run off water through existing rivers causes floods during the wet seasons, but water scarcity is common in the dry seasons (Dani, an activist of a local conservation NGO).

Within a decade [from the 1970s to the 1980s], 11,000 ha of the lake area was lost due to silting and subsequent drainage for dry-land agriculture. People planted the lake's shore with food crops and then claimed it as theirs and then many conflicts related to the land claims have occurred around the lake (Asrul, a local journalist).

The earliest record shows that in 1932 the lake area was around 7,000 ha, with an average depth of 30 metres. By the early 1960s, its area had shrunk to 4,250 ha, and the most recent record shows that by the early 1990s less than half of the lake surface remained (2,700 ha). The current depth ranges between 2 and 3 metres (Anonymous 2007; BPS Gorontalo 2006). Furthermore, the three major rivers (Limbotu, Bone, and Bolango) that feed water into the lake used to have about 20 tributaries in the 1990s. Currently, only four of them have water throughout the year (interview with Aton, an educator 3/9/2006). The reduced water volume in the lake has had a negative effect on the population and diversity of fish and birds (see further details in Anonymous 2007). This and the use of traditional fish cultivation methods<sup>70</sup> (Figure 6.3) exacerbate the sedimentation and pollution problems, as well as creating socio-economic problems associated with claims to accretion of the shore.

Second, respondents attributed the change in the lake's biodiversity to the poor management of the lake and some economic activities around it, such as fisheries, dry-land agriculture, and increased illegal settlement. Several respondents talked about various traditional fishing methods used in the lake with little or no effort to replenish fish resources. Coupled with the growing local population and its associated increase in consumption, this means that the frequency of fishing and the volume of fish extracted increased while the fish population was declining. Long-term monitoring of the economic activities at the lake, by a local NGO (*Jaringan Pengelolaan Sumber Daya Alam – Japesda*) found that in the mid-1990s some fishers also started to introduce aquaculture technologies by constructing more 'controlled' fishing areas, where they use sedentary nets tied on rows of bamboo or wooden poles (see Figure 6.3) or floating cages (*keramba*). In them, they reared commercially valued fish species. Meanwhile, many others used more sophisticated tools, such as fish poisons, electric shock, and bombs, to cover larger fishing areas and speed up the fishing for larger catches. While sedentary nets increase the sedimentation due to the use of certain types of grass to create 'ponds' within the lake, the latter methods indiscriminately kill or debilitate a large

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<sup>70</sup> Examples of these include the use of floating cages or 'islands', locally called *olate*, *bibilo*, or *tiopo* (see Figure 6.3). These are constructed by using bamboo poles as rafts and fences, with various types of vegetation, including coconut leaves and the invasive water hyacinth, which act as a platform. Once constructed, they are dragged into the deeper part of the lake, hence creating small 'islands' where fish such as carp are cultivated underneath it.

number of fish. Respondents regarded all these methods as destructive, leading to the depletion of the fish populations and exacerbating the silting problem (Anonymous 2007).



**Figure 6.3** Examples of traditional methods of fish cultivation. From the top left, clockwise: bamboo poles are made into a raft as a platform; a bamboo fence is hooked on to the lake bottom and erected around the platform to stop the cultivated fish from escaping; water hyacinth is used as shade on top of the platform; several floating ‘islands’ in the lake. Source: Japesda 2005.

Lake Limboto was once the main source of livelihoods for local subsistence fishers and the main source of protein for the local human and wildlife populations. However, as this resource has shrunk as a result of the processes explained above, some of the important ecological services that the lake ecosystems previously provided have declined. For example, the water flowing out of this lake has been crucial in irrigating rice-fields (see Chapter 4) in the surrounding lowland and coastal communities. In terms of fish production, in 1985 the fish harvest declined to a fifth of the level harvested in the 1970s (Anonymous 2007). With little development of aquaculture, the remaining fish populations are under increasing pressure from over-fishing (interview with Asrul, a local journalist, 6/10/200%).

Several sources stated that there has been no effective control in place. Recently this resource management problem triggered social conflicts over ownership of land – resulting from accretion along the shore – among members of fishing communities around the lake. On the one hand, this accretion reduced the lake’s water level that supports agricultural activities as there is very little or no irrigation scheme and the farmers just drill wells for all domestic water supplies. On the other hand, the new land gives the previously landless fishers a new

opportunity to cultivate food crops, such as maize, ground-nuts, and chilli peppers, for local consumption and sale. The ‘temporarily dry-land’ has also been the target for the expansion and intensification of maize production under the local governments’ ‘agropolitan’ programme. Several respondents doubted whether land suitability assessment was ever conducted for this programme, but it was indeed an attractive one for the majority of local people who are either landless or have no legal rights to land around the lake (see Chapter 8).

No biological studies have been conducted about the impacts of all these changes (e.g., declining size and fish populations) on the lake’s biodiversity. However, as earlier respondents indicated, there has been a decline in some endemic fish species, such as the *payangga* and the *hulu* have disappeared (e.g., interview with Beruga 24/11/2005). Others highlighted the change in the population of birds, but no record about the bird diversity in the lake was available. Some respondents, such as Dani (an activist from a local community development NGO), who witnessed the decline due to hunting for food testified:

In the 1990s people trapped the birds by mixing some kind of poisonous substance with rice bran. When these birds were ‘sedated’, it was easier to catch them. The practice was reported to a relevant government agency and this has ceased now, but the present bird population is much smaller and mainly seasonal migrant species only. There are resident species also but there is less diversity due to hunting.

Respondents underlined that this complex problem of access and control over the lake resources and the economic activities around it have made the remaining area of the lake more prone to water pollution. Moreover, in the absence of a long-term management programme for the lake, the invasive species, water hyacinth (*Eichhornia crassipes*, locally known as *eceng gondok*) now covers almost the entire surface of the lake.

Given the seriousness of the problems in the lake and their ecological, economic, and social implications, several respondents were exasperated with the latest provincial government programme to expand maize production while the lake is actually dying from lack of care and maintenance and the conflicts over its use remain unsolved. They emphasised the need to address the land use problem in upland areas, by preventing further decline in forest cover and improving the management of the remaining forests, in order to find satisfactory solutions for the problems with the lake. A task force, consisting of non-governmental and governmental agencies, was formed to save Lake Limboto (Anonymous 2007). However, to date little progress has been made in the formulation of local government regulations for the management of the lake (interview with Rusdi, a senior researcher, 27/11/2007).

Finally, to some extent the loss of forests in upland areas and the main rivers has led to increased silting in the mangrove and coastal ecosystems along the southern and northern coasts of Gorontalo. Many respondents considered this as endangering the coastal fishery; one of the main sources of income and livelihood for coastal communities around the Tomini Gulf in the southern part of Gorontalo. Moreover, the eco-tourism and recreation potential of its beaches, for both local and external markets (e.g., diving, snorkelling), will also be threatened. Because fishing has been an important part of the lives of the Gorontaloese, both for the livelihoods and as a form of cheap recreation, their quality of life has been and will be affected by the ecological problems. Only three respondents noted this connection, but their voice is warranted to illustrate the overall change that has transformed the ecosystems in this province.

Because soil erosion is pervasive much of the mangroves were destroyed and the sedimentation levels higher in coastal areas. Consequently, fishers lost their livelihood. The government has put priority in replanting the coastal areas with cash crops, such as coconut, cacao, and candle nuts. This is good! It

will help reduce the pressure on coastal habitats and at the same time bring improvement to the largely poor coastal communities (Ibra, a traditional leader).

The mangroves along the north and south coasts of Gorontalo have undergone similar reduction in size, diversity, and ecological function. As urban areas expand, mangroves have been converted into harbour, fish pond (*tambak*) for shrimp and fish production and the native fish population now is less diverse and much smaller than it was 10-20 years ago (Dote, a planner).

In respondents' views, the decline in forest cover has had negative impacts on some of its unique wildlife species as well as on other ecosystems. These, in turn, will mean real and potential losses in economic, social, and ecological terms. Attempts to address the direct and underlying causes of the decline are discussed in Chapter 9.

## **6.5 Chapter Summary**

Most respondents understood biodiversity in terms of its *elements*, but fewer were able to describe the *interactional* attribute. Respondents mainly associated biodiversity with animal species, although a few included ecosystems in their definition. In respondents' opinions, biodiversity is important for economic survival reasons, both for the human and non-human communities. Their knowledge of local biodiversity is largely limited to 'iconic' animal species, and there was a big gap in their knowledge of local plants. They were well aware of the changes in local biodiversity; they were able to make a clear link between the degradation of the forest ecosystem and how and why it affects other major ecosystems and the species within them. The perceived benefits of forest biodiversity to local stakeholders are the subject of the next chapter.

## CHAPTER 7

### PERCEIVED BENEFITS OF NATURAL FORESTS

The forest is a gift from God to humanity. It's invaluable. It provides all kinds of resources to meet humans' needs, such as timber, rattan, resin, and holding water underground. When the forest is gone, all of these resources will disappear also, and nothing else can hold the water, from which we get our drinking water. The forest also provides an opportunity to learn about God, the Creator (Ibra, a traditional leader in Gorontalo).

As briefly described in Chapter 4, this case study of Gorontalo is about a predominantly agricultural society that relies heavily on natural resources for its socio-economic development. The previous chapter provided a detailed discussion of respondents' knowledge about local biodiversity and their awareness of the impacts of forest loss on it. The findings highlighted that their knowledge was dominated by the elements of biodiversity that have direct utility value to them. This chapter discusses in greater detail the perceived benefits of natural forests to local stakeholders.

The findings presented here were generated systematically from two sources of data: interviews (83 participants) and the MDM ranking exercise (performed by 146 participants, including most of the interviewees; see Chapter 5). The themes or ideas that emerged from the interview data are grouped into six aggregate categories relating to the benefits of natural forests, as developed by Murray (1990). These include: (1) biological uniqueness; (2) economic activities; (3) aesthetic value; (4) opportunities for research and education; (5) cultural value; and (6) regulation of the physical environment or ecological services (see Appendix 7.1 for the definition of each category). The perceived relative strength of each category is indicated by the total number of individuals (shown in parentheses) who spoke about it in the interview. As some respondents discussed more than one issue, the number of responses can exceed the total number of interviewees.

Overall, the findings from the interview data show that the natural forest was most valued for the provision of diverse economic activities (75), followed by its role in providing ecological services (58). The natural forest's biological uniqueness, aesthetic attributes, and provision of opportunities for research and education were deemed of equal importance (22 for each category). By contrast, the cultural significance of natural forests (17 respondents) for local people was the least appreciated (see Appendix 7.1 for the narrow definition of 'cultural attributes of biodiversity').

Using the same six categories of benefit, the MDM gauged the perceived relative strength of each type of benefit by calculating the average score that respondents placed on it. This was done by dividing the total score given by all participants divided by the number of participants (146). No statistical test was conducted on the significance of the differences in the respondents' score. The overall MDM yielded different overall results to those of the interviews, with ecological services being the most valued (mean score 6.6; Figure 7.1) and economic activities only ranked fifth in importance (mean score 4.7). Specifically, respondents placed the highest value (mean score of 7.4) on the forest's role in regulating

freshwater (benefit no. 19; Figure 7.2 and Appendix 7.1) and they scored the lowest for the forest’s spiritual value (benefit no.16, mean score 1.3).

In the sections that follow, the level of detail of respondents’ perceptions is determined by data availability and richness. First, their perceptions of each type of benefit are described ethnographically, according to the order of its relative importance (noted above). Then, a description of the related MDM results at the aggregate level follows. Bearing in mind that each category of benefit comprises two or more specific benefits (see Appendix 7.1), the discussion highlights specific benefit(s) that stand out in comparison to the other(s). Respondents’ perspectives were compared, on the basis of selected demographics (i.e., type of stakeholder, gender, age, and level of education), to see which variable(s) appeared to influence their perceptions.

### 7.1 Economic Activities

On the basis of the interview data, most interviewees (90% of 83) valued the natural forest because of the multiple economic activities that can be generated from it. They attributed the direct value of forest to the timber that can be harvested (71 respondents); indeed logging was regarded as a major driver of forest loss (Chapter 8). Other economic benefits were from extraction of non-timber forest products (NTFPs; 41 respondents) and indirect economic opportunities, such as the supporting role of forests for subsistence agriculture and fisheries and potential employment from tourism (11 respondents). However, a few respondents found no economic benefit, particularly from forests legally protected for biodiversity conservation purposes. In order to highlight respondents’ perspectives on these various economic benefits, their detailed observations are presented as follows.

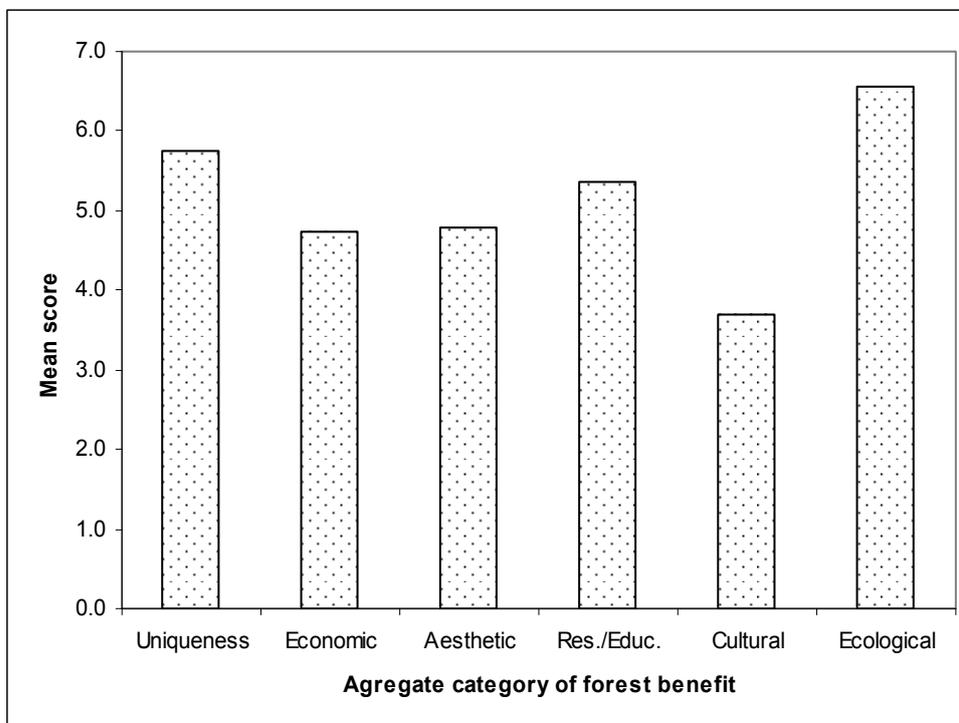
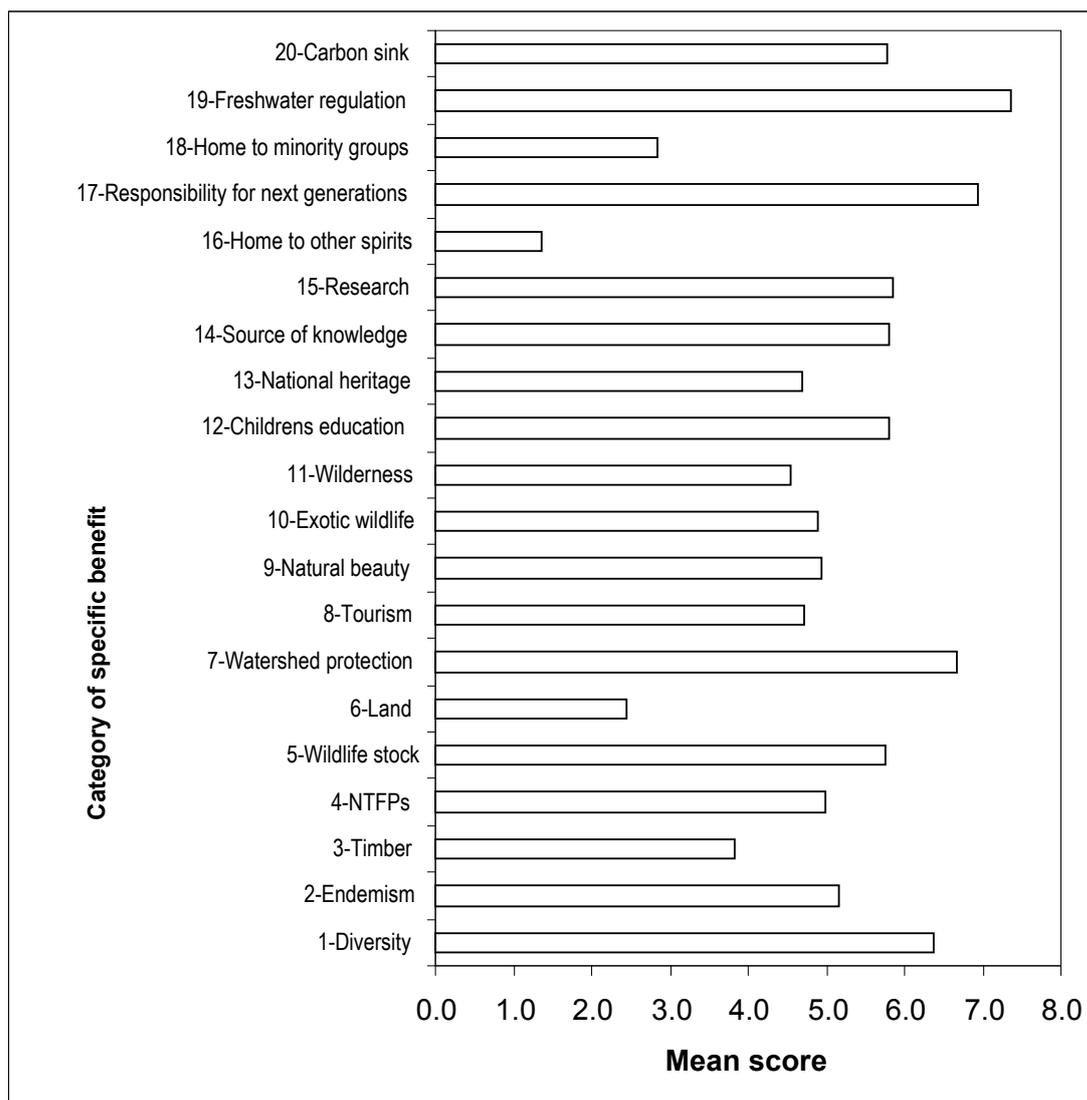


Figure 7.1 The relative importance of natural forests to local stakeholders at the aggregate level (see details of specific types of benefits within the broad six categories in Appendix 7.1).



**Figure 7.2** The perceived relative importance of natural forests to local stakeholders at the specific level, based on the MDM results (see definitions of each type of benefit in Appendix 7.1).

Predictably, the commercial users of forest resources viewed the forest primarily as a source of timber. This view was also common among other stakeholders, such as resource managers and local elected leaders. About half of the respondents deemed the extraction of rattan canes an important source of cash income, while gathering of wild fruits and wildlife hunting have also been part of the subsistence economy (interviews with Rais, a trader of forest products 26/11/2005; Jafar, a resource manager, 12/09/2005) of many communities living around the boundaries of PAs (see a detailed discussion in Chapter 8). Examples of their specific observations were:

Timber from the forest in Gorontalo is a valuable resource. It is economically important for both the government and many local communities who have lived around the forest for a long time and rely heavily on forest products for their livelihood. However, most people are not aware of other benefits that the forest provides, so they just exploit it for the maximum economic benefit and they do not care about the damaging impacts (Rudi, a religious leader).

Our government officials, decision-makers, and members of the local legislature see the forest as an economic asset to be exploited as a source of cash for the local government. Its social and ecological values are largely neglected and the economic benefit is not shared equitably. Likewise, local communities who are hungry for land to meet their subsistence needs use the forest to expand their land for planting food crops (Bani, a local government official).

The people who live around these forests only see the forest as a source of timber, biodiversity is beyond them. There is limited public education to increase awareness of the forest and its functions. People do not care so much as long as they can harvest something from the forests (Hamsah, a resource manager).

*Anoa*, wild pigs, and *maleo* have been hunted for food in the Paguyaman forest [Nantu]. *Anoa* meat is commonly eaten in the Pinogu area (BWNP), while the *babi rusa* is hunted and sold to Manado [capital of North Sulawesi Province, the northern neighbour of Gorontalo]. Even though it is a local icon, *anoa* populations have shrunk although forest rangers work in this national park. The forests of Nantu and BWNP have been the main target for wildlife hunting because the game population there was abundant (Kupu, a member of a local conservation club).

As well as being consumed and traded as meat, respondents believed that the forest's special wildlife has potential economic benefits due to its attractiveness as a tourism object. This is particularly so because of the scenic beauty of the surrounding forests of NWS and BWNP. The development of ecotourism may economically benefit local communities, as several respondents illustrated below:

The forest and its wildlife can attract foreign visitors and there is an opportunity for tourism development. This means that local people who operate small boats [*katinting*] can keep their livelihood (Serau, a law enforcer).

The wildlife in the forest can attract people to come and see or study. Sadly, there are not many interest groups studying wildlife here. I hear that in other countries, elephants and butterflies can be a tourism attraction, which means there are people who work and have a livelihood related to these animals. They will try very hard to stop people cutting the forest because when the forest is gone, the animals will die and they will lose their job (Bobi, resource manager).

Nantu forest offers a great opportunity for ecotourism, which can be a source of local government revenue if it is managed properly. Unfortunately, the forest is always up for grabs. Local communities feel that they have the right to use it (Bani, a local government official).

However, several others argued that this potential would be of greater interest to foreigners and to people outside Gorontalo. Locals did not consider outdoor recreation to be their primary need. They also underlined social, infrastructural, and managerial limitations to ecotourism development by stating that:

The people who visit the Park think that the entrance fee is too expensive because their income is very low. Tourism development is hampered by the lack of skills of local people, who also have very little interest in developing tourism (Jafar, a resource manager).

There is a great need to tell people that timber is not the only benefit we get from the forest. Local government, for example, can generate income from the management of Lombongo [part of BWNP that is open for visitors] as an ecotourism object. But government officials said that it is not easy to do that. It is true, but at least we should be more open-minded in calculating the cost and benefits of such a venture and how to share them equally (Arin, a community development activist).

The way this protected area [Nantu] is managed at present gives little [economic] benefit to local people. If it is managed as a national park, local people can benefit from it by selling food and handicrafts from Gorontalo to visitors, but it is so difficult to do this here. I think the government should help with building road access to enter the forest right up to the boundary [so visitors can have easier access to Nantu]. I think this can be done, and it's up to the government to deal with the encroachment problem. If the enforcers are strict, there is no problem, but as long as their stomachs are empty, this has a lot of influence on the way they do their job (Araz, a community leader).

The quotes above also imply a high reliance on timber as a source of revenue (see Chapter 8). More importantly, in the absence of other economically valuable natural resources, the forest is perceived as the easiest and quickest natural asset for generating income, both on an individual basis (e.g., members of communities adjacent to forests) and through collective enterprises (e.g., logging companies and local forestry agencies). For the latter, the economic necessity of local timber extraction actually reflects the situation at the national level (see Chapter 2). While agreeing with the economic imperative of timber extraction, a few respondents asserted that the scale of the local communities' harvest of timber was very small, and it was only done for their subsistence needs. However, they recognised that this has changed more recently as many local communities have become increasingly involved as paid labourers in logging (see Chapter 8). Others underscored the inequitable distribution of benefits of harvesting timber for the whole society in Gorontalo. Their specific statements were:

Because of the timber exploitation in the past, the forests in Gorontalo have been denuded and we are facing soil erosion as one of the consequences. So the net benefit of forest for the social economic development of Gorontalo is very small and the illegal logging problem has been very difficult to solve. Sadly, the largest portion of the benefits from exploiting the timber has been enjoyed by people in the timber business, while the local communities having received very little of it (Abdul, a journalist).

In the past local communities did not do any harm to the natural forest. They took something from it, such as timber for constructing houses and fuel wood, but they did not need very much. Other forest products, such as rattan canes and wild fruits, such as *langsat*, *durian*, and *rambutan*, had an economic value because they could be consumed locally and sometimes for sale too. But they did not cut big trees and sell the timber because they did not know where or how to sell it, because Gorontalo was a landlocked area anyway; nor did they know how to process it because they did not have the tools to do it. So in terms of the benefits [of forests] to individuals, it was only limited to those small-scale uses. But then things changed when the central government, not the local, issued large-scale licences to log the forests. Timber became an important source of foreign exchange (Rasid, a traditional leader).

As the legal source of timber has become exhausted, pressures on the remaining natural forest (i.e., those under legal protection) have also increased. These pressures have come from loggers and also from local government agencies, who tried different strategies to exploit the resources or convert them to other uses. An example of these attempts was a government proposal to build a dam inside a protected area, for which a government official reasoned that:

The cumulative benefit of the natural forest is much bigger than from the timber alone. We proposed to dam the main rivers that flow out of the BWNP forest, because the dam would be very useful to generate electricity, develop a freshwater fishery, and as a tourism destination. Sadly, many people here do not see these opportunities; they strongly protested this plan. I believe that if the surrounding communities and the public can enjoy the many benefits of the forest, they will not destroy it. You can imagine how difficult it is for the local communities to see the forest before them - full of valuable resources - and yet they have no access to the benefits from it because of the current management of this park (Suha, a senior planner).

In addition to the direct and indirect economic benefits outlined above, several respondents underlined the importance of natural forest as a source of fertile land for shifting agriculture (see Chapter 8). It is also a place where valuable minerals, particularly gold, can be exploited. Indeed, several respondents pointed out that gold mining has been a traditional livelihood for a small portion of communities around Panua, and BWNP (see Chapter 8). Finally, respondents linked the changing condition of natural forests and the quality of other subsistence economic activities. Their specific observations illustrate these various perceived benefits, as follows:

Virtually all the forest has been used in an irresponsible manner by the practice of shifting agriculture, such as in Sumalata and Atinggola (Toni, a religious leader).

The small-scale mining of gold [*Penambangan Emas Tanpa Ijin* or PETI] has provided an opportunity to improve the local economy [around the Panua reserve]. Some of the people here became wealthy in a very short time, but the environmental destruction is very difficult to deal with. We tried to introduce more environmentally friendly technology, but the peasant miners do not comply with it (Sole, a planner).

When the forest was in a much better condition in the 1980s, fisheries and agricultural productivity were much better (Asrul, a local journalist).

Conversely, there were others who felt that natural forests, specifically those inside protected areas, gave no economic benefit to local communities. Others argued that despite the restriction on access to resources within PAs forests, villagers can still enjoy real but indirect benefits from the forests, such as cleaner and fresher air that is important for their health. The following is an example of respondents' views:

We need the palm leaves [*woka*] for the roofs of our huts, but we are not allowed to take them. We would be arrested if we are caught doing it. We are also prohibited from collecting rattan and timber for our needs, so all of these economic benefits of the forest are no longer available to us. But at least the air around this village is much cleaner than in the city. Also, during the rainy season we do not have landslides because the trees in the forest are well protected, the wildlife has a safe home because nobody can enter this protected forest without permission. So hopefully, my children and grandchildren will have an opportunity to enjoy the forest personally, not just from a story. We are so lucky to have this protected forest around us (Adpo, a teacher).

To sum up, the direct economic benefits from timber and NTFPs featured prominently in respondents' views. By contrast, the long-term and potential values of forests, such as employment opportunities from tourism and the health benefits from clean water and air, which are not directly relevant to their economic survival, were less apparent to them. However, when assessed through the MDM ranking, the relative importance of economic activities was far below that of ecological value (mean score 4.7 vs 6.6, respectively) and ranked fifth out of the six categories (Figure 7.1) at the aggregate level (Table 7.1, column B).

Moreover, a comparison of views among the six stakeholder groups (see definition in Section 5.3.3) revealed that, predictably, the economic benefit of forests was the most important for commercial users. Despite their comparatively small sample population (12% of the total),

their mean score was the highest (5.5). Conversely, for the salaried groups<sup>71</sup> this economic benefit was considerably less important (their values ranged from 4.3 to 4.8). It is plausible that certainty in income among salaried government officials means less dependence on forest products as their source of income. Respondents' education,<sup>72</sup> age, and gender provided another explanation for the difference in their perceptions, reflected in the average scores they placed on economic benefits. The difference of scores, based on each of the three demographic variables, was only slight (see Table 7.1, column B). However, those with low education (42% of the total), from the oldest age-groups, (17% of the total), and male (62%) placed a slightly higher value on the forests' economic utility. Therefore, at the aggregate level, respondents who are non-salaried stakeholders, of lower education, from the oldest age-group, and male showed a slightly higher appreciation for forest's economic utility.

A further comparison among the six specific economic activities (type of benefits 3 to 7 in Appendix 7.1) revealed that, contrary to the findings from the interview data (where timber extraction was valued as the highest), the MDM score for forest as a source of timber was the second lowest (mean score 3.8). The relative strength of the other four specific benefits, indicated by the mean score in descending order, was protection of watershed (7.2); wildlife stock (5.5); extraction of NTFPs (5.0); and potential employment from tourism (4.7). Like the findings from the interview data, natural forests were valued the least as a source of agricultural land (mean score 2.5).

A further comparison based on each demographics (Table 7.2), revealed the following patterns. All stakeholder groups, except the commercial users, placed their highest value on the indirect<sup>73</sup> economic benefit of forested watersheds. Of these groups, resource managers placed the highest score for it (mean score 7.2), while the lowest mean score came from commercial users (5.8). The same pattern also occurred for the forest as a host of wildlife stock, with salaried stakeholders placing a considerably higher value on this long-term benefit than non-salaried respondents. This indicates that those whose economic survival is less dependent on the extraction of forest products are able to appreciate the longer-term benefits of the forests.

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<sup>71</sup> As differences among all six categories of stakeholders were only slight, they are broadly grouped as 'salaried stakeholders' (i.e., educators, resource managers, and legislators/law enforcers) because they typically receive a regular salary from their professional occupations. Conversely, the other three (i.e., community leaders, grass-roots activists, and commercial users/traders of forest products) do not have regular salary. I use the broad categories to explore any link between regularity of income and forest-related activities.

<sup>72</sup> Respondents' educational levels are defined as: those who have post-graduate degrees ('High'; n = 17), under-graduate degrees ('Medium'; n = 44), and those who completed primary and secondary schools ('Low'; n = 23). The categories of respondents' ages were young (under 30 years old; n = 17), middle age-group (between 31 and 50 years old; n = 51), and oldest (50 years and above; n = 16) age-groups.

<sup>73</sup> In this thesis, the indirect economic benefits are those related to benefit of protected forest for supplying freshwater for agricultural and domestic needs, potential employment from forest-related tourism, and for the preservation of wildlife stock to ensure continuity of resources for future (see Appendix 7.1). Direct economic benefits refer to those forest resources which can be readily consumed or sold. It could be argued that for a fisher, watershed protection is directly relevant to fish supply. Since this research is based on forest biodiversity, the category of watershed protection is treated as indirect benefit to land-based economic activities.

**Table 7.1 The perceived relative importance of natural forests, based on the MDM results**

Demographic variable	N= (%)	Biological (A)	Economic (B)	Aesthetic (C)	Education (D)	Cultural (E)	Ecological (F)
		<b>Mean aggregate score</b>					
<b>Overall</b>	146 (100%)	5.8	4.7	4.8	5.4	3.7	6.6
<b>Gender</b>							
Male	97 (66%)	5.9	4.8	4.7	5.4	3.7	6.4
Female	49 (34%)	5.5	4.7	5.0	5.3	3.6	6.8
<b>Stakeholders group</b>							
Educators	20 (14%)	5.2	4.3	4.7	6.0	3.9	7.2
Resource managers	45 (31%)	5.8	4.8	4.8	5.2	3.7	6.8
Legislators/Law enforcers	19 (13%)	5.8	4.6	4.6	5.4	3.9	6.6
Community leaders	10 (7%)	5.7	4.8	5.3	5.5	3.7	5.6
Grass-roots activists	34 (23%)	6.1	4.7	4.9	5.4	3.4	6.7
Commercial users	18 (12%)	5.4	5.5	4.6	5.0	3.8	5.6
<b>Education level</b>							
Low	62 (42%)	5.8	4.8	5.0	5.2	3.7	6.2
Medium	64 (44%)	6.6	4.7	4.6	5.4	3.7	6.8
High	20 (14%)	4.8	4.6	4.9	5.7	3.8	6.9
<b>Age group</b>							
Young	43 (29%)	6.0	4.7	5.0	5.4	3.2	6.6
Middle	78 (53%)	5.8	4.6	4.7	5.5	3.8	6.6
Old	25 (17%)	5.3	5.1	4.6	4.8	4.3	6.5

Note: A = biological uniqueness, B= economic activities, C= aesthetic value, D =opportunities for research and education, E= cultural value, and F= ecological services.

By contrast, the direct tangible benefits of forest (i.e., timber, NTFPs, and as source of agricultural land) and the potential employment opportunity from ecotourism, were the most important for the commercial users of forest products (i.e., traders and collectors of rattan and timber). This group, which represented the smallest sampled population (12% of the total), placed the highest scores for all of the four types of benefits. At the aggregate level, stakeholders whose incomes rely mostly on the extraction of timber and cultivation of forest land tended to place a much higher value on the direct economic benefits of the forest.

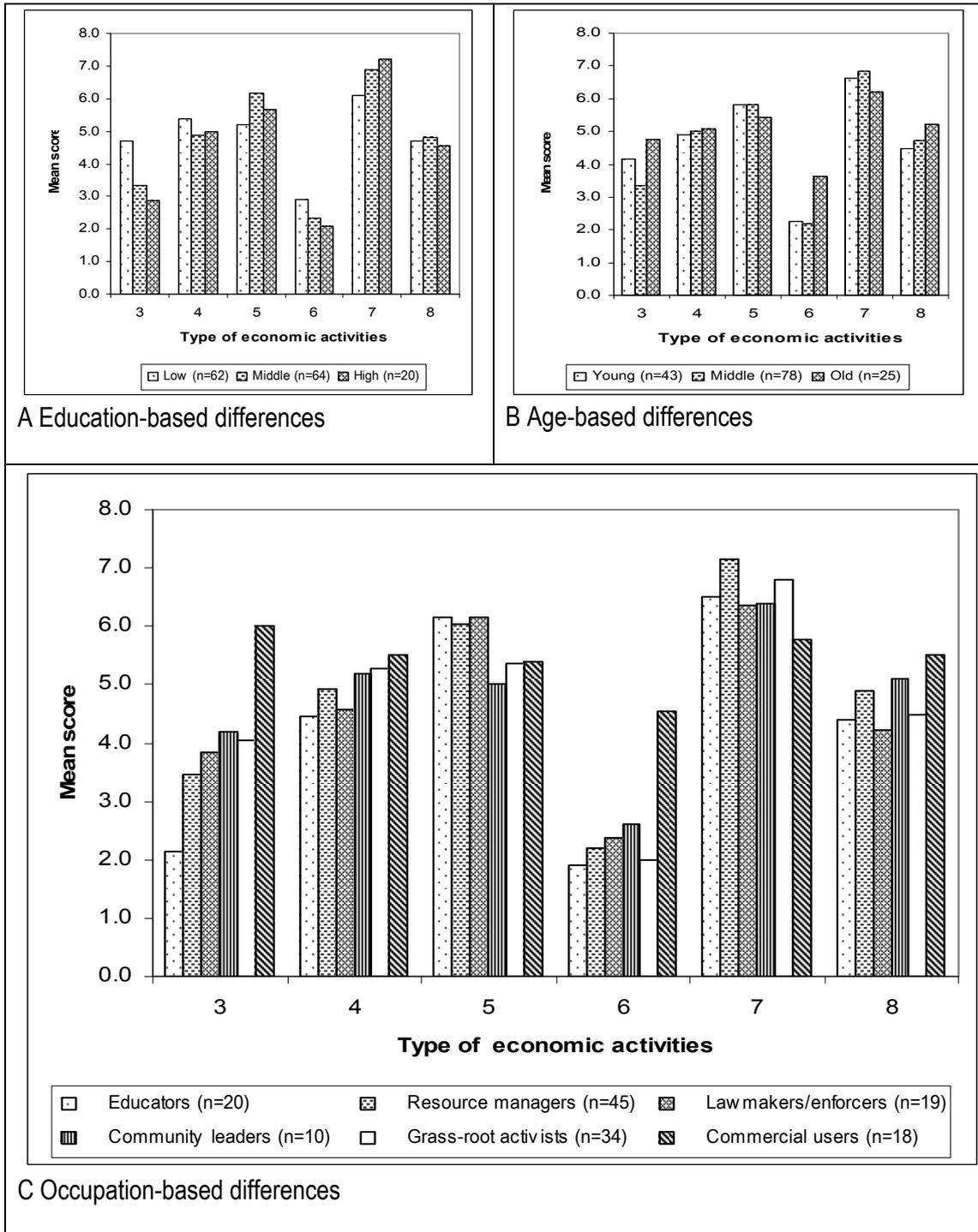
From the perspective of respondents' education, those of low educational level (42% of the total) placed a considerably higher value on direct economic benefits (i.e., timber, NTFPs, and land) (Figure 7.3a). Those from the higher education groups showed considerably higher scores for the indirect benefits (watershed protection and wildlife stock). There is an inverse correlation between education level and perceptions of value of the economic benefit of forests. The findings suggest that their formal qualifications and skills provide them with more options for their employments. Thus, they are typically less dependent on the extraction of forest products as their livelihoods. Further, they are more exposed to and able to understand media coverage, both printed and audio-visual, of the wider benefits of forests.

**Table 7.2 Perceived specific economic benefits derived from the natural forest**

Demographic variable	N= (%)	Mean aggregate score	Mean specific score					
			Timber (3)	NTFPs (4)	Wildlife stock (5)	Land (6)	Watershed protection (7)	Tourism (8)
<b>Type of specific benefit</b>								
<b>Overall</b>	146 (100%)	4.7	3.8	5.0	5.8	2.5	<b>6.7</b>	4.7
<b>Gender</b>								
Male	97 (66%)	4.8	3.7	4.9	6.0	2.3	<b>6.9</b>	4.8
Female	49 (34%)	4.7	4.2	5.2	5.3	2.7	6.1	4.6
<b>Stakeholders group</b>								
Educators	20 (14%)	4.3	2.2	4.5	6.2	1.9	6.5	4.4
Resource manager	45 (31%)	4.8	3.5	4.9	6.0	2.2	<b>7.2</b>	4.9
Legislators/Law enforcers	19 (13%)	4.6	3.8	4.6	6.2	2.4	6.4	4.2
Community leader	10 (7%)	4.8	4.2	5.2	5.0	2.6	6.4	5.1
Grass-root activists	34 (23%)	4.7	4.0	5.3	5.4	2.0	6.8	4.5
Commercial users	18 (12%)	<b>5.5</b>	<b>6.0</b>	<b>5.5</b>	5.4	<b>4.6</b>	<b>5.8</b>	5.5
<b>Education level</b>								
Low	62 (42%)	<b>4.8</b>	4.7	5.4	5.2	2.9	6.1	4.7
Medium	64 (44%)	4.7	3.4	4.5	<b>6.2</b>	2.1	7.0	<b>4.8</b>
High	20 (14%)	4.6	2.7	5.1	5.9	2.1	<b>7.3</b>	4.5
<b>Age group</b>								
Young	43 (29%)	4.7	4.2	4.9	5.8	2.3	6.6	4.5
Middle	78 (53%)	4.6	3.3	5.0	5.8	2.2	6.8	4.7
Old	25 (17%)	<b>5.1</b>	4.8	5.1	5.4	3.6	6.2	5.2

Note: Keywords and numbers for the type of specific economic activities refer to definitions in Appendix 7.1 (3= timber, 4= Non-timber forest products [NTFPs], 5= stock of plants and animals, 6= a source of land; 7= a source of water; and 8= potential for ecotourism).

The age-based analysis revealed that the oldest age-group placed a considerably higher value for timber, land, and tourism, whereas the narrow range of scores for the NTFPs indicates similarities in respondents' views of this benefit (Figure 7.3b). By contrast, the younger age-groups showed a moderately higher appreciation of the indirect benefits of wildlife stock and forested watershed. The findings support their observations (see Chapter 8) that, historically, the natural forest has been an important source of land for shifting agriculture; timber and NTFPs were, and still are, important sources of cash income. Further, the oldest age-group experienced these direct benefits in their own lives as their economy was traditionally based on harvesting forest products and shifting agriculture. To a lesser extent this is still true today, especially in rural areas, because almost all of the arable land has been intensively cultivated and also because of increased human population. In contrast, the younger groups tend to have a better chance of finding employment in more urbanised areas; such opportunities are still very limited locally. They also have a greater awareness of the negative impacts of forest product extraction on the environment and biodiversity (see Chapter 6), so they tend to question the reliance on timber extraction and shifting agriculture as a source of income and livelihoods.



Note: Numbers for the type of specific economic activities Appendix 7.1, only the keywords are noted here: 3= timber, 4= NTFPs, 5= stock of plants and animals, 6= a source of land; 7= a source of water; and 8= potential for ecotourism.

**Figure 7.3 Perceived relative importance of economic activities derived from natural forests, based on respondents' education level (A), age (B), and type of occupations (C).**

From the perspective of gender, differences in respondents' perceptions were most apparent in the indirect economic values of the natural forests. Male respondents placed considerably higher scores for the protection of watershed and the wildlife stock. For female respondents,

the direct economic benefits (e.g., timber, NTFPs, and land) were slightly more important (Table 7.2).

The detailed descriptions of findings above show that each of the respondents' demographic variables influenced their perceptions of forest-related benefits differently. In a nutshell, while the scores are not very far apart, the non-salaried and female stakeholders, those with a low formal education, and from the older age-groups appeared to place a much higher value on the direct economic benefits of natural forests than on the potential or future benefits that might be generated from it (e.g., forested watershed and wildlife stock). Some possible explanations are that as in many islands outside Java (see Section 2.2), timber is primarily exploited from natural forests that fall within the category of production forests. Typically, these are managed by large-scale logging companies (HPHs). When Gorontalo became a new province in 2002, the existing HPH concessions in its jurisdiction were not renewed, nor were any new licences issued. According to forestry officials, this policy was aimed at keeping the revenue from timber locally, because previously a large proportion of the revenue was taken to Jakarta and Manado (the capital of North Sulawesi province) and only a small portion was retained to fund local development activities (see Section 2.3).

However, soon after the RAL 22/1999 was issued in 1999, district governments began to issue small-scale logging permits (such as IPKTM), which quickly replaced the large-scale logging by HPHs. The IPKTM was intended for logging on private and community lands, primarily for meeting local needs for timber and from it district government generates its own revenue (*Pendapatan Asli Daerah, PAD*) through taxes and levies. However, many respondents reported that logs are continuously taken out of Gorontalo to other regions or countries, such as Malaysia and China (an interview with a log trader, 11 November 2007). More importantly, as timber stock from production forests is increasingly becoming degraded, depleted, or even exhausted, largely due to a lack of replanting or natural regeneration, many respondents observed that protected forests have become easy targets for illegal logging. Partly, this is because of valuable timber species within them and the poor enforcement of conservation laws (see Chapter 8).

Other forest-based economic activities (e.g., extraction of rattan, wildlife, and wild plants) represent an important source of livelihood for many communities that live in the forest peripheries. Quantitative population data on the status of rattan and wildlife are extremely limited and old, and records on the level of their extraction are equally scanty. However, many respondents were concerned about the ecological and economic sustainability of these activities. While rattan collection used to be an important local livelihood, only one out of the eight rattan processing companies operating in Gorontalo since early 1990s now survives. Processed rattan are exported to west and east Java (interview with Mario, 4/10/2006), primarily for rattan furniture industries. Mario stated that one of the primary reasons for this decline was the difficulty in supplying the raw materials (see Chapter 8), because of the decline in the natural stock due to a lack of regeneration. Like timber, the remaining rattan and wildlife populations are scattered around the remaining natural forests inside protected areas. Unlike in many parts of Kalimantan where community and private rattan gardens have been developed to improve its economic and ecological sustainability (Belcher et al. 2004), such ventures do not exist in Gorontalo. Earlier attempts, involving some private companies and local forestry agencies, to develop rattan plantations did not succeed. Respondents reasoned that this was due to lack of technical and financial support and unclear use rights of forest and ownership of the plants.

Taken together, the diminishing timber and NTFP resources and the more restricted access to them have led several respondents to consider the potential benefits of forest- or wildlife-based tourism development. While the remaining natural forests do indeed have potential for this venture, many respondents quoted in this section voiced various major constraints to realising these potentials. Furthermore, a tourist operator interviewed for this research said that poor transport infrastructure (via air, land, and sea) has been a major hindrance for attracting tourists to the otherwise exotic and spectacular eco-tourism destinations in Gorontalo. Further, the current management style of protected areas, which predominantly discourages human interaction with the forest for recreational purposes, was another limiting factor. For example, the proposal to enlarge the NWS, which was submitted to the central conservation authority in 2003 to enable ecotourism activities by changing its legal status into a national park, still has no outcome to date.

There was a marked contrast of perceptions of economic benefits between the commercial users and other salaried stakeholders, with regard to both the aggregate and the specific benefits. The evidence outlined above explains that for the commercial users, extraction of forest products typically represents a primary (or often the only) source of income. In contrast, salaried government officials, who typically have higher education, generally also have more reliable and multiple sources of income. Thus, they are less reliant on extraction of forest products for their incomes. It is not uncommon, however, for some government officials to also receive financial rewards for their involvement in (illegal) logging (see Chapter 8). The pattern demonstrates that those with a less reliable source of income and higher uncertainty of employment tend to place a higher value on the short-term and direct economic benefits of the harvesting forest resources, which are often unsustainable, than the careful harvesting that preserve the long-term benefits of wildlife.

Further, as explained in Chapter 4, shifting agriculture has been, and still is, an important traditional livelihood of many rural communities in forested parts of Indonesia (see Chapter 8 for the Gorontalo case). Since this land-use practice typically begins with clearing a patch of forest,<sup>74</sup> it is not surprising that this type of benefit was very important for the shifting agriculturalists. A long-term observation around Nantu indicated that forest clearance for traditional agriculture, followed by human settlement, has been one of the main drivers of forest loss there (Clayton et al. 2007). Interestingly, while performing the MDM ranking many respondents commented that clearance of forestland to make way for *ladang* was very common, and they did not consider it an illegal activity. They thought that the statement in the MDM card was designed to trick them into confirming their involvement in shifting cultivation! They said that they know the same activity has been prohibited since the conservation areas, such as Panua, Nantu and BWNP, were established. Inevitably, this frontier activity has led to the establishment of human settlements, which leads to deforestation of pristine forest, such as was the case of Pangahu and Tangga villages near Nantu (ibid).

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<sup>74</sup> in many regions where shifting cultivation is practiced, farmers prefer to clear secondary and not primary forest areas because it is easier. Clearing secondary forest would likely have different consequences from clearing primary forest. The cases reported by respondents in this research included both clearance of secondary forests (formerly logged forests managed by HPHs) and primary forests (within or on the periphery of protected areas).

The female respondents also tended to place a higher value on the tangible benefits. Women might have been very involved in the gathering of medicinal and food plants and their direct involvement in NTFP collection would be a stronger reason for higher valuations of their benefits. However, there are no studies available on this in Gorontalo and the most obvious forest-related activities are performed by men. Culturally, logging and hunting are typically a male occupation, because it involves long and arduous walk in the forest for days and often weeks, where they might encounter dangerous wildlife, such as snakes. Indeed, large pythons have been known to attack loggers and forest rangers. In a small-scale logging operation, tree felling and log transporting requires physical strength; logs are generally carried manually from the forest to the collection points where they will be transported further, such as to river banks where they are rafted down the river. Although it is the men who do this hard work, women value this benefit more highly than men because it is commonly the responsibility of women to manage the family's needs. Moreover, because there are few alternative livelihoods for women in rural areas, the cash income from forest products that men bring home is very important.

Of the six specific benefits, the perception of forested watershed as the most prominent has been clearly demonstrated in this section. In particular, the highest appreciation came from respondents who have high education and more secure income. As respondents' quotes indicated, supported by the MDM results described earlier, forested watershed is highly valued due to its supporting role for agriculture and fishery activities. However, as this group includes government officials, then their rent-seeking activities that lead to forest destruction are contradictory to their expressed values. The ways by which the forest provides ecological services for the general well-being of the Gorontaloese are the subject of discussion in the next section.

## **7.2 Ecological Services**

As Figure 7.1 and Table 7.1 show, the forests' role in providing ecological services<sup>75</sup> was very important to the local stakeholders. This is indicated by the high percentage of interviewees who discussed it (71% of the total of 83 interviewees) and also by the fact that they gave it the highest MDM score. Most respondents (90%) attributed the environmental benefit to the forest's role in regulating freshwater; others (10%) linked its function in stabilising the local climate and providing habitats for the wildlife. To illustrate these findings, details of respondents' views are presented below.

As noted in Chapter 4, the narrow lowland of Gorontalo is surrounded by steep hills and mountains. For many reasons, respondents emphasised the important roles of forest cover for the socio-economic well-being of the people by (1) protecting the physical environment against landslides, floods, and soil erosion; (2) regulating the freshwater flow for domestic and subsistence farming needs in rural areas; and (3) supplying water for the urban areas. More specifically, several respondents observed that the quality and availability of water in or

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<sup>75</sup> As defined in Appendix 7.1, environmental services refer to the role of natural forests to regulate the physical environment (i.e., water, land, and air), whereas ecological services include both the physical and biological roles (e.g., pollination, provision of habitat for wildlife) that respondents of this research referred to. Throughout this chapter, the more inclusive 'ecological services' is used.

near forested areas are much better than in places where the forest has been lost or degraded. Their specific statements were:

The shape of Gorontalo's land is like a bowl. Its narrow lowland, as the primary agricultural area along the coastline, needs the support of the forests in Boliohuto [Nantu] and the BWNP. The rivers that flow out of them supply the freshwater for irrigation and household needs of the rural populations around these protected areas<sup>76</sup> (Rizal, a legislator).

The forest [BWNP] regulates the water flow of the two main rivers that flow into the whole catchment, so it is very important for protecting the city of Gorontalo from being flooded, because the lake [Limbotu] can only hold a certain amount of water due to its high sedimentation. People know the effect of forest loss on sedimentation of the lake, even as far as the harbour! (Muti, a community development activist).

I became more aware of the fuller benefits of natural forest after I experienced a serious flood that reached about one metre deep in this part of this city because of the deforestation of the upland. This had never happened before. It made me realise the effect of forest loss (Tina, a teacher).

Respondents clearly understood the effects of forest loss on the flow of freshwater. Despite the many essential environmental services illustrated above, they acknowledged that these 'free' services, including those of Panua and BWNP forests, are threatened by continuous timber exploitation or are disappearing due to conversion to other uses. Respondents who witnessed the fast disappearance of both the lowland and hill forests in the Boalemo District, to which Panua falls within its jurisdiction prior to 2002, gave specific examples:

There is always a conflict of interest in the management of forests. Some HPHs are still operating in this district and they generate revenues for the local government. However, the continuous logging of the forests could mean that we will not be able to secure the supply of water and maintain the balance of the environment. Many rice-fields rely on the forest to provide water; they will dry up. While I agree that the *agropolitan* programme is good, relying on a single commodity makes us economically and ecologically vulnerable (Dote, a planner in Boalemo District).

To some extent, economic necessity is a valid reason for exploiting timber, but some respondents underlined the unequal distribution of benefits from timber extraction and the costs for maintaining the forests. For example, Sole (a resource manager) illustrated the specific tensions in managing the valuable freshwater resource from BWNP. As Bone Bolango District (BBD) is newly-formed, he explained, more than half of its jurisdiction is covered by the BWNP. Under the decentralisation policy, the BBD is required to generate its own revenue (PAD; see Chapter 2) to fund local development activities. However, unlike other districts, it cannot do so by logging the timber from the BWNP. He explained further that:

Our local revenue is only Rp 1.4 billion [approximately US\$ 164,705] annually, which is roughly enough to pay the salary of our local government [District] officials for three months only. Although the municipal water company uses river water to supply drinking water to the city dwellers, we get nothing from them to contribute to our revenue. Worse still, this company now has a Rp 6 billion [almost four times the district's revenue] debt from unpaid bills by the city dwellers. I found it so ironic that they asked our local government to share the obligation to pay that debt! Moreover, we are only burdened by the responsibility of protecting the forest, there is no budget allocated for protecting it. There should be

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<sup>76</sup> For example, the Nantu forest is very important to support traditional farmers who mostly practise dry-land agriculture along the Paguyaman River (with a population of about 30,000 households, BPS Gorontalo 2006).

compensation for our effort not to cut the forest. Moreover, a large part of the watershed that falls within BBD is considered critical land. Logically, the provincial and municipal governments should help us because the degradation of the forest will have an important impact on urban areas. However, we get much smaller funding allocation from the National Tree Planting programme than the Gorontalo municipality, although the forest is located in our area. We know there are many kinds of benefit that the natural forest offers, and they are invaluable. When it is gone, we will have a big problem with water shortages and other services that the forests provide for us.

Additionally, water use and the various costs of dealing with water-related disasters are shared unequally between different sectors of society, as illustrated by respondents' observations below:

The source of city water is from the forest in Bone Bolango, but we never pay the people in the villages up there for not cutting the trees. When we have floods, which unfortunately have become more frequent as a result of loss of forest cover, we easily blame them for cutting the forest. When things are fine, we ignore those in the uplands where the forests are. Sadly, government officials are too busy to looking for development projects that give them money! They only talk about helping farmers in the rural uplands but there is no real action (Abdul, a journalist in Gorontalo city).

When we have floods and droughts farmers bear most of the brunt. Fishers have fewer fish to catch because of the silting of the lake, and many physical infrastructures get damaged. The local government also loses a potential income while the limited funding, mostly allocated by the central government, are spent on rehabilitating the resulting damage of forest degradation (Herry, a planner in the Gorontalo District).

Respondents also expressed their appreciation of some environmental benefits of the natural forest. The most frequently cited reasons were prevention of soil erosion and silting of coastal ecosystems, which they believed could threaten their pursuit of long-term socio-economic development and a pleasant local climate in rural areas. They also underlined the role of forests in maintaining a pleasant climate, absorbing carbon dioxide, and filtering air pollutants, all of which contribute positively to their health. Examples of their comments were:

The direct benefit of the forest to local people is very limited in terms of income that can be generated from it, but the trees in the forests help reduce the soil erosion problem. The loss of forest in the upland has affected poor fishers in coastal areas because the silting in coastal water reduced the fish population that provides a source of livelihood for them (Fayab, a traditional leader in Boalemo).

The role that plants play to make the air clean is never considered as a benefit. Just think that when we have breathing problems, we have to go to a hospital and pay Rp 500,000 [approximately US\$60] a day for the use of the oxygen machine! Our understanding of the human-plants relationship is very limited. We would die without plants, but without humans, the plants would continue to grow (Bobi, a resource manager).

When the forest remains standing it can absorb carbon dioxide; the trees change it into oxygen that we need to stay healthy. We can also trade this service with other rich nations. Ironically, while there is a strong movement to make the city green by planting trees, the trees we already have in the forest are being cut so fast. Sadly, the forest condition has changed much with the decentralisation policy and in general the forest is facing greater pressures (Mupol, a law enforcer).

Respondents appreciated the natural forests for their role in providing habitats for local wildlife, which also offers certain economic benefits through their various biological roles (see Chapter 6). While agreeing with this view, others believed that at present only a small number of people shared this sentiment. Respondents' reasons are as follows:

When the forest is destroyed or gone, then there is no home for wild animals to live (Kupu, a member of a conservation club).

The presence of special animals, especially the *babi rusa* in the wild, can be a source of revenue to local government, if we take care of the forest now. Not only the *babi rusa* will benefit, but other wildlife will also be safe. I really appreciate this project in ensuring that the Nantu forest remains standing, giving the unique wildlife an opportunity to survive in our land (Rizal, a legislator).

Some butterflies are useful to help pollinate certain plants, without them we have no fruit because these plants need help from animals to reproduce (Adpo, a teacher).

Some people complain that the forests are protected more for the benefit of monkeys, because these monkeys are beautiful, while poor people remain poor [and have no access to valuable forest resources]. I think the functions of protected forests here are still not optimal for wildlife conservation purpose, because people only treat the forests well as long as they have direct economic value (Rusdi, a researcher).

The findings clearly showed respondents' appreciation of the forest's ecological services, especially because they see strong links between these services and their economic survival. Findings from the MDM ranking reinforce this perception, as indicated by the highest mean aggregate score (6.6) for this ecological benefit (Table 7.1, column F). When respondents' perceptions were compared on the basis of selected demographic variables, the results revealed that this benefit was the least important for the commercial users of forest products and community leaders (mean score 5.6). Again, the salaried stakeholders, along with the grass-roots activists, placed a much higher value on it (Table 7.3); each of them scored higher than 6.6. In addition, the resource managers, who are officially tasked with ensuring the protection of natural forests, scored the second highest (6.8). Overall, differences of perceptions on the basis of gender and age were only slight, but respondents' views differed substantially based on their education; those with higher education placed a much higher value on the forest's ecological services (6.9 vs 6.2).

However, a comparison of respondents' views of the two specific benefits that comprise the ecological benefit revealed that their appreciation of the forest's function in regulating water resources was far higher than for absorbing carbon (7.4 vs 5.8). For both types of benefit, salaried stakeholders placed a substantially higher value than the non-salaried stakeholders did (see Table 7.3 and Figure 7.4b).

On the basis of respondents' education there appeared a contrasting influence on their views of the two specific benefits. Those from the lower education groups placed a considerably higher value than those of the high education group (7.3 and 7.8 vs 6.3) on the water-regulating function. By contrast, the high education group showed a much higher appreciation of the forest's function as carbon sink (7.6 vs 5.2 and 5.8; Figure 7.4) than those of lower education groups.

Taken together, it was evident from the interview data and MDM ranking that the role of the forest in regulating water flow was the most prominent and best understood by all stakeholder groups. Naturally, respondents' knowledge about this function is more pragmatic and experiential in nature. Given that less than 20% of agricultural land is irrigated (BPS Gorontalo 2003/2006), most farmers rely on rain and river water for their dry-land farms.

**Table 7.3 Respondents' views of the ecological benefits derived from the natural forest.**

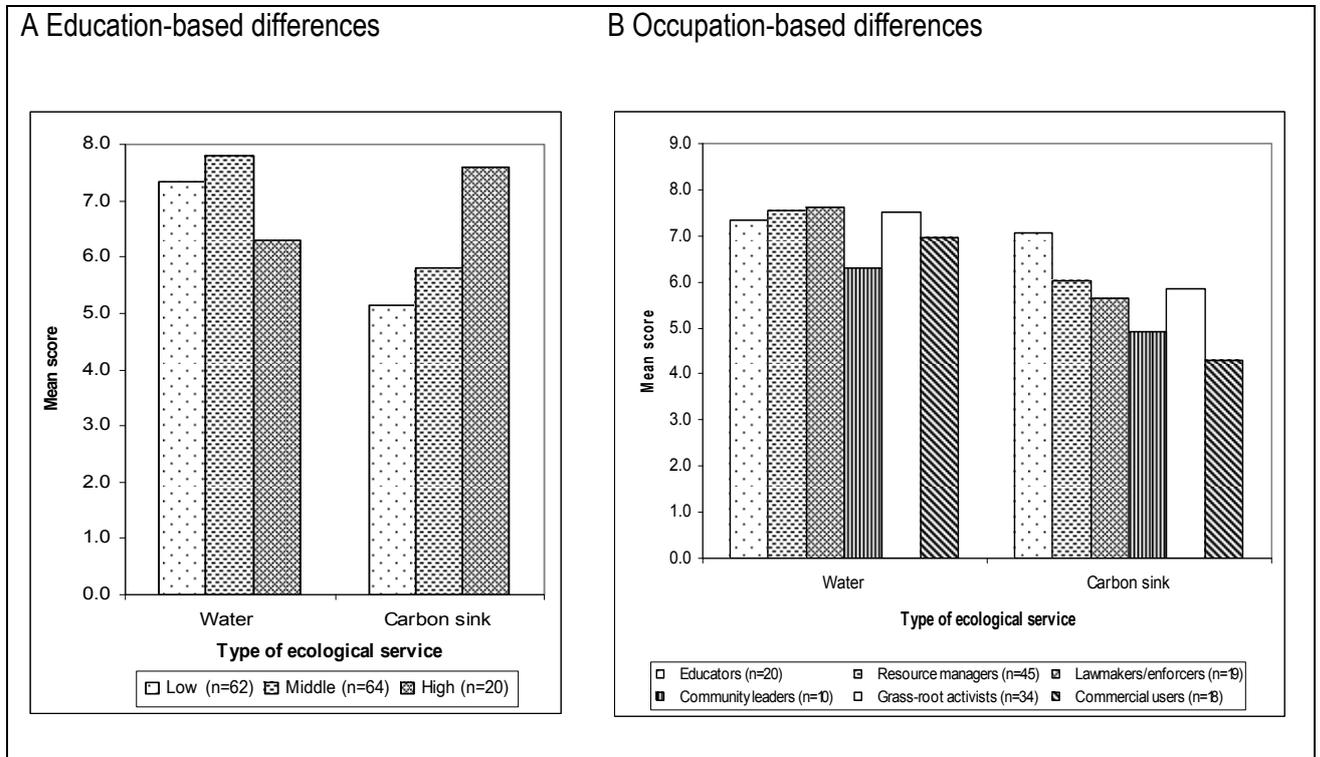
Demographic variable	N=	Mean aggregate score	Mean specific score	
Type of specific benefit			Water regulation (19)	Carbon sink (20)
Overall	146 (100%)	6.6	7.4	5.8
<b>Gender</b>				
Male	97 (66%)	6.4	7.3	5.6
Female	49 (34%)	6.8	7.6	6.1
<b>Stakeholders group</b>				
Educators	20 (14%)	7.2	7.4	7.1
Resource manager	45 (31%)	6.8	7.5	6.0
Legislators/Law enforcers	19 (13%)	6.6	7.6	5.6
Community leader	10 (7%)	5.6	6.3	4.9
Grass-root activists	34 (23%)	6.7	7.5	5.9
Commercial users	18 (12%)	5.6	6.9	4.3
<b>Education level</b>				
Low	62 (42%)	6.2	7.3	5.2
Medium	64 (44%)	6.8	7.8	5.8
High	20 (14%)	6.9	<b>6.3</b>	<b>7.6</b>
<b>Age group</b>				
Young	43 (29%)	6.6	7.3	5.8
Middle	78 (53%)	6.6	7.3	5.9
Old	25 (17%)	6.5	<b>7.7</b>	<b>5.4</b>

Note: Keywords and numbers for the type of specific ecological services refer to definitions in Appendix 7.1. 19= regulation of freshwater resources and 20= natural forests contribute to carbon storage.

Since farmers don't typically irrigate their ladang, respondents' high appreciation of the forest's role in regulating the freshwater flow maybe key in this perception. Moreover, as rural populations rely heavily on river water for their domestic needs, the cleanliness of the water has also a key factor. This perception is also linked to the well-being of the urban population. As Chapter 4 indicated, less than 30% of Gorontalo's populace have access to clean water, and the local water company (PDAM) relies on river water to supply about 75 thousand households (less than 10% of the total population) (ibid). Thus, irregularity of water supply could cause many problems. Water shortages mean more expensive water treatment as well as interruption of water supply to consumers.

Moreover, as respondents' comments indicated in this section, the loss of forests has had severe negative impacts on the state of Lake Limboto, the second largest lake in Sulawesi (Whitten et al. 1987). The lake is ecologically important as a habitat for freshwater fish, birds, and aquatic plants (Chapter 6). Economically, it is also an important freshwater fishery and agricultural resources for about 50,000 households in the five sub-districts of Gorontalo district and municipality (BPS Gorontalo 2003/2006). The land, resulting from accretion of the lake's shore has also been converted to 'illegal' settlements and for planting food crops (interview with Asrul, a local journalist, 6/11/2005). Since most of the population around the

lake has no access to piped water, they use wells to get water for their domestic needs. Many interviewees reported the steady decline in the water table around the lake. Consequently, their wells have to be dug deeper and more frequently because the wells dry up quickly (e.g., interview with Rusdi, a researcher, 26/9/2005).



**Figure 7.4** Perceived relative importance of natural forests in providing ecological services, based on respondents' education (A) and type of occupations (B).

The freshwater supply, both from rivers and the lake, has been taken as 'free' and while respondents recognised the water supply problem outlined above, they underlined that the solutions have mainly been approached through engineering work; paying little attention to the land use problems upstream. During the last field visit, a few provincial government officials shared the progress in formulating a more comprehensive policy for the management of the lake.

While respondents appeared to understand fairly well the link between the forest and soil erosion, the responsibility for dealing with erosion lies mainly with the forestry offices and the watershed management agency. As some officials of these agencies explained there has only been a demonstration project, not a long-term programme for soil conservation measures (e.g., interview with Araf, 8/9/2005). Moreover, land cultivation in erosion-prone areas tends to be conducted by farmers who do not have legal right to the land; hence the lack of incentive to invest, in both labour and materials, to prevent soil erosion on their land. Neither are there financial incentives for environmentally friendly farming practices, nor sanctions for poor farm land management (see Chapter 8 for further details of the *agropolitan* programme). Recently, the provincial government reported that 90% of the land under maize cultivation is steep (more than 75% slope) (Anonymous 2007). Added to this is a lack of co-ordination among relevant government agencies, which was considered a serious hindrance to addressing the problems of land and water management in a more integrated manner (Anonymous 2007).

As noted in Chapter 4, to date Gorontalo has lost more than 40% of its original forested areas due to logging and land conversion to other uses (maize-based agriculture, transmigration, and increasingly plantations). Meanwhile, a large portion of its population practices shifting agriculture, with the main tree-based agriculture limited to growing coconuts, and to a much lesser extent cacao and fruit trees, particularly in lowland areas. Therefore, it is understandable that respondents highly valued the forest's role in regulating water because of its direct link to their economic survival.

By contrast, fewer than 10% of the interviewees understood the carbon sink function. Several respondents pointed out that the loss of forest cover has made Gorontalo hotter. However, because of a lack of up-to-date information about the state of the forests, only people who realise that the forest is increasingly shrinking and those who know about the role of forests as carbon sinks can understand the impact of forest loss on the local and global climate. Evidence from the MDM results also revealed that respondents' education clearly influences the understanding of the forest's role in absorbing carbon. Respondents in the high-education group (only 14% of the 146 participants of the MDM ranking) placed the highest value on it. This indicates that the forest's function as carbon sinks is less commonly understood. As knowledge about it is also relatively new; it is gained through absorbing new information about the links between forest and climate change. More importantly, this benefit is less directly relevant to the respondents' economic survival. Therefore, it was less apparent and much less appreciated by the majority of respondents, especially those with lower education levels.

Indeed, this understanding and awareness of the potential revenue that can be generated from this ecological service has led several district government officials to seek compensation for 'keeping the forest standing' from the wider beneficiaries of this service. For example, several districts in West and East Kalimantan provinces have declared themselves forest conservation districts (*kabupaten konservasi*).<sup>77</sup> Furthermore, as human-induced emissions of greenhouse gases is widely accepted as a major global problem (for which deforestation contributes 20% of the total global emissions), the role of forests as a carbon sink has received increasing political support worldwide (MEA 2005, IPCC 2007), for example through the Kyoto Protocol. The United Nations Convention on Climate Change meeting in Bali in 2007 further discussed the post-Kyoto adaptation and mitigation plans, of which carbon trading is one of the widely discussed options. Under this scenario, many forested tropical countries are seeking financial and technological compensation, through the Reduced Emissions from Deforestation and Forest Degradation (REDD) scheme, for keeping the forest standing. This market-based approach to putting a monetary value on forest as a carbon sink is being experimented with worldwide. The mechanisms by which forested countries can access the financial compensation for conserving the forest as a carbon sink are still being discussed.

As indicated in the interview data, the role of forest as habitat for wildlife (both plants and animals) was considered important by an even smaller number of respondents. This reflects

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<sup>77</sup> [www.cifor.cgiar.org/conservation/\\_ref/publications/seminar.htm](http://www.cifor.cgiar.org/conservation/_ref/publications/seminar.htm)

respondents' anthropocentric views, with wildlife being valued for its economic utility (see Section 7.1) and not seen as having an inherent right to exist. Although no records of wildlife population in Gorontalo over the years are available, many older respondents recalled the abundant mammal and bird populations in the past. Now that the human population has increased at least three times compared to the early 1960s, wildlife populations have been impoverished by both the loss of habitat and hunting for both subsistence needs and sale of wildlife (see Chapter 8). For example, the *babi rusa* population used to be widespread throughout Sulawesi and its satellite islands (Anonymous 2007), but now there are only about 500 individuals in Nantu, and a smaller population in Togian Island to the south of Sulawesi (Clayton 1996). The fate of the *maleo* bird and the *anoa* are similar. Together, as well as affecting their population size and distribution, these factors reduce the animals' ability to reproduce. The lack of information about local wildlife (Lee et al. 2005, see also Chapters 6 and 9) is another reason which respondents considered responsible for the serious decline of wildlife. The knowledge of the role of wildlife in agricultural production (as a biological control) was also very limited.

In summary, respondents' high appreciation of the forest's ecological services is dominated by its direct link to their economic survival. This is consistent with the findings for the economic benefit. Like the benefit of natural forest as a carbon sink, the other four categories of benefits (biological uniqueness, research and education, aesthetic value, and cultural significance) presented in the subsequent sections are less directly linked to economic well-being. Analysis of the respondents' responses in the interviews shows that the first three were deemed to be of equal importance. However, findings from the MDM ranking yielded a very different result, as reflected by the mean score of each category of benefit (in descending order): biological uniqueness (5.8), research and education (5.4), and aesthetic value (4.8). The findings are presented following this order of perceived importance.

### **7.3 Biological Uniqueness**

More than half of the interviewees who responded to this topic came from government officials. Most of them attributed the forest's biological uniqueness to plant and animal species that live in it and the fact that many of them are found in Gorontalo only. They believed that the survival of these life forms depends on the health of the local forest and that they are not substitutable.

About 90% of respondents who recognised the forest ecosystem and its wildlife as unique were government officials. This is not surprising because, by virtue of their education and professional experience, they have a more globally sophisticated knowledge base, while local people know a lot about forest ecosystems and wildlife locally. Paying attention to those unique animals was also an important part of their jobs. Moreover, compared to other stakeholder groups, their livelihoods are also less dependent upon the extraction of forest resources. On the other hand, if all the wildlife is lost or the forest is cut down, they will lose their regular salaries. Their reasons for valuing the forest's uniqueness were:

In Islamic teaching, we are told that God was not ashamed when He created ants and mosquitoes, for each of these has its unique role to play within an ecosystem (Tony, a religious leader).

Once I went to the Nantu forest with my colleagues to see it. They were so amazed when they saw certain trees, birds, and other animals that are no longer common in other places. Nantu is like the last home of these rare plants and animals from which we can see what Gorontalo was like in the past (Bani, a local government official).

When the forest is converted into a plantation of a single crop, the biodiversity will change as only one desired crop is cultivated (Serau, a law enforcer).

It's true that people need timber from the forest. Whereas timber can be substituted with other materials for construction purposes, many of the forest functions cannot be replaced. Even conversion from forest to plantation would change the ecosystems, and some of the forest's unique functions would be lost (Araf, a resource manager).

When assessed through the MDM ranking, however, the dominance of government officials was almost the same to that of the NGO activists (Table 7.4). Furthermore, the salaried stakeholders, especially the educators, showed a considerably lower appreciation of this benefit than the grass-roots activists (5.2 vs 6.1). It was more surprising that the educators' score was even lower than that of the commercial users (5.4). Analysis based on respondents' education revealed that those with high education appreciated this benefit considerably less (4.9) than the others (5.8 and 6.0). The difference of perceptions based on age appeared to be similar, with the oldest age-group placing the least value on this benefit (5.3) compared to the younger age-groups (6.0 and 5.8). This was also the case for both the specific attributes of this biological uniqueness, described in greater detail below.

**Table 7.4 Respondents' views of the biological uniqueness of natural forests**

Demographic variable	N=	Mean aggregate score	Mean specific score	
			Diversity (1)	Endemism (2)
<b>Type of specific benefit</b>			Diversity (1)	Endemism (2)
<b>Overall</b>	146 (100%)	5.8	6.4	5.2
<b>Gender</b>				
Male	97 (66%)	5.9	6.4	5.4
Female	49 (34%)	5.5	6.4	4.6
<b>Stakeholders group</b>				
Educators	20 (14%)	5.2	5.8	4.6
Resource managers	45 (31%)	5.8	6.3	5.4
Legislators/Law enforcers	19 (13%)	5.8	6.4	5.3
Community leader	10 (7%)	5.7	6.0	5.4
Grass-root activists	34 (23%)	6.1	7.2	5.0
Commercial users	18 (12%)	5.4	5.8	5.1
<b>Education level</b>				
Low	62 (42%)	5.8	6.6	5.0
Medium	64 (44%)	6.0	6.4	5.6
High	20 (14%)	4.9	5.5	4.2
<b>Age group</b>				
Young	43 (29%)	6.0	6.6	5.5
Middle	78 (53%)	5.8	6.4	5.1
Old	25 (17%)	5.3	5.8	4.8

Note: Keywords and numbers for the specific benefits of natural forests as biologically unique refer to definitions in Appendix 7.1. 1= diversity of plants and animals, 2= endemic species of plants and animals.

As Table 7.4 shows, the diversity of life forms was valued considerably more highly than their endemic status (6.4 vs 5.2). The range of values for 'diversity' was also wider (5.8 to 7.2) than for 'endemism' (4.6 to 5.1), which illustrated a greater variety of views in the

former. It is understandable that the commercial users placed the lowest value on ‘diversity’ within the natural forest because the high diversity of plants, for example, does not necessarily give economic advantages to them. Indeed, tropical forests typically have a high level of diversity, but the species density in a given area is generally low (e.g., see Siebert 2004, 2005 for rattan).

Resource managers considered the endemic and rare plants and animals of high importance because preserving them is an important part of their job. They were much less valuable to commercial users, although some rare animals (such as *babi rusa* and *anoa*) may yield higher monetary value to them. Surprisingly, the educators’ appreciation of the unique endemic wildlife was much lower than that of commercial users (4.6 vs 5.1). These findings could be explained (see Sections 7.1) by respondents’ observations and experiences that the unique animals and plants are generally viewed in terms of their economic utility.

This was also the case of the oldest age-group, who placed considerably lower scores than the younger age-groups, for both diversity and endemic attributes of the forests. The latter showed a higher appreciation of these attributes because they have a greater awareness of the actual state of the forest and its wildlife. Furthermore, as several respondents indicated (Chapter 6 and Section 7.5), the lack of educational facilities (such as a natural history museum or botanical gardens) to demonstrate this value may also influence their perceptions. Moreover, from their life experiences, the oldest group knew how much of the riches of the local forest have disappeared. Conversely, the younger age-groups had a higher appreciation because they know that many of Gorontalo’s unique animals are threatened; they are no longer part of their lives and they only know about them from stories. This result raises the question whether when they put their matchsticks down, they were thinking about a conceptual value in their minds (e.g., how much do I love this X?) or a more concrete economic valuation (e.g., how much external value exists in this X, such as money?).

The low appreciation of endemic animals among local stakeholders indicated a disconnection between global (or national) conservation policies and perceptions of local needs by the meso-level of stakeholders. Some of the main protected areas in Gorontalo were established on the basis of the existence of endemic animals (e.g., Nantu for the *babi rusa* and *anoa*, Panua and BWNP for the *maleo* bird) because of their importance to global biodiversity conservation (see Box 4.1). However, their importance to the local communities was limited to being a source of meat. Under the preservationist approach of managing the PAs this local subsistence need is not accommodated. Meanwhile the capacity of the conservation agency to conserve wildlife is very limited, allowing illegal hunting to continue that resulted in the fast decline of their population (Clayton et al. 2007; Lee 2000; Lee et al. 2005).

No gender-based differences appeared in respondents’ views of the diversity attribute, but male respondents scored much higher than the females (5.4 vs 4.6) for the endemic issue. This illustrates further the findings from the interviews (this section), which suggests that male respondents, by virtue of their education and occupations, were generally more knowledgeable about the specific status of Gorontalo’s flora and fauna.

## **7.4 Research and Education**

Despite respondents’ limited knowledge about and awareness of the multiple functions of natural forests (noted in Chapter 6), about 26% of the total interviewees (22 out of 83) thought that the forest provides limitless opportunities for research and education. In fact, these

activities are among the few that are allowed in the legally protected forests (see Chapter 2). However, respondents underlined the reality of declining wildlife, which might mean that the object of research and thus the opportunities to do it may disappear. Others also observed the limited local interest in research activities in and about the natural forest. Their specific comments about this benefit were:

The natural forests offer a great natural laboratory and source of knowledge, it is important for our learning. For example, some of the plants that we do not know now might have some medicinal properties or be useful as biological controls (Adri, a government official).

The Lombongo area of the park provides an opportunity for our university students to learn about plants. It is quite easy to access, although it is more difficult for younger children because of the distance they have to walk (Lisda, a local NGO activist).

Research that focuses on forest or forestry issues is very limited here, even within the government research agencies, such as the *Balitbang* [local research and development agency]. There is no research programme on this topic, and everything is focused on maize production, which is only good for supporting the government programme but not the public at large (Rudi, a religious leader).

The special animals of Gorontalo have attracted foreigners to spend time studying them. The study of *babi rusa*, specifically, has led to the protection of the Nantu forest where it lives. Why is it that a foreigner is more concerned than us about the state of our forest and works hard to protect it? (Abdul, a journalist)

According to respondents, there are social and logistical barriers (see Section 7.5), which many of them believed are the result of lack of environmental education throughout all stages in the formal education system. The following were their specific remarks:

Our formal education system puts so much emphasis on theoretical knowledge with very little direct interaction with nature. This is very different to other countries that give children much more exposure to knowledge about the environment (Tuti, an educator).

Our culture encourages aversion to certain animals, such as worms. Most children are afraid of these creatures because their parents do not allow them to touch the worms. This kills children's natural curiosity. Sadly, it is very common that children will step on them, instead of taking the opportunity to learn about animals, and their behaviour, which are created by God. Learning about plants and animals is an important part of developing children's confidence and motivation. I know that taking children outdoors is one of the good ways children can learn about plants, their diversity, and how they grow. These children would be more exposed and not just learn from theory. Most children probably only know about grasses and they are no use except to be cut and thrown away. Unfortunately it is difficult to find a place for our children to know their natural heritage. Therefore, we need to make a special effort to introduce children to something that they don't know in their everyday life (Fiona, a community development activist).

Our current school curriculum does not have enough components about the environment. As a result, our children [in Gorontalo] know very little about their cultural and natural environments (Rudi, a religious leader).

As Rudi indicated earlier, local interest in forestry research was almost non-existent because of the local government's focus on increasing agricultural production. In particular, respondents noted an important gap in exposing children to the local forests. The MDM results revealed further that the value of natural forests for educating children ranked third out of the four specific benefits. Further details of the MDM results are presented below.

Table 7.5 shows that at the aggregate level, the educators predictably valued this benefit the highest (6.0) and the commercial users the lowest (5.0). Furthermore, the range of values among the other four stakeholder groups was small, indicating that their views varied only slightly. Again, the difference of views on the basis of education and age was small.

A deeper analysis of the four specific benefits of forests as (1) a source of knowledge; (2) a natural laboratory for research; (3) a focus for educating children about the environment; and (4) a national heritage, revealed that the first two were considered as equally the most important (each with a mean score of 5.8) but the role of forest as part of a national heritage was the least appreciated (mean score 4.7).

As expected, the educators showed the highest score for the other three benefits, whereas the opportunities for research were the least important for commercial users (Table 7.5). Again, this reflects the relevance of these benefits to respondents' livelihoods. This is supported by the fact that the highest mean score (6.7) that the educators gave was for the forest's utility for children's education, compared to other stakeholders whose scores ranged from 4.6 to 5.2 for this benefit. This also applies to the forest's role in providing opportunities for research and as a source of knowledge, although the difference of views of the latter (scores ranged from 5.5 to 5.9) was less apparent among the other five stakeholders. Interestingly, grass-roots activists also placed a high value (6.1) on research opportunities. This again reflects its relevance for their livelihoods or their choice of livelihoods strategy based on what they value (e.g., personal interests and commitment to development).<sup>78</sup>

The interview findings (Chapter 6) and an official report (Anonymous 2007) indicated that environmental problems, specifically as related to forest exploitation, are becoming more complex and there is a serious lack of environmental expertise within the government sector. In response to this, about twenty local NGOs, working especially for rural community development, were formed in the last decade as part of the local network of NGOs to empower communities in the management of local natural resources<sup>79</sup> in Gorontalo. Typically, their staffs are young people who are hired by local governments in implementing small-scale projects with various communities.

Although the range of scores for the heritage attributes of the forest was very small, indicating that all the groups placed a similarly low value on it, community leaders placed the highest value, perhaps because it is part of their leadership role to preserve their natural wealth. Respondents' predisposition toward the economic utility of forest resources (Section 7.1) and the low cultural significance (in narrow terms) of forests (Section 7.6) provide another explanation for the low appreciation of the heritage value of forests.

Analysing respondents' responses by education yielded similar patterns to those found in the other categories discussed earlier. Figure 7.5a shows the strong influence of education on

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<sup>78</sup> Where swidden agriculture is part of a livelihoods strategy, for instance, there are also likely other cultural elements (such as gender roles, sacred forest areas, kinship and reciprocity aspects, animist religious beliefs) that may be shorthand as livelihoods, but actually affect much more than that (C.Colfer, pers. comm. 2008).

<sup>79</sup> *Jaringan Advokasi Pengelolaan Sumber Daya Alam* (Japesda).

their appreciation of forest's utility for children's education. Those with higher education gave a substantially higher score for this specific benefit (6.7 vs 5.2). To a much lesser extent this applies to the benefit of forests for research (6.1 vs 5.7). Conversely, the value of natural forests as a national heritage was much more appreciated by those with low education (5.7 vs 5.0).

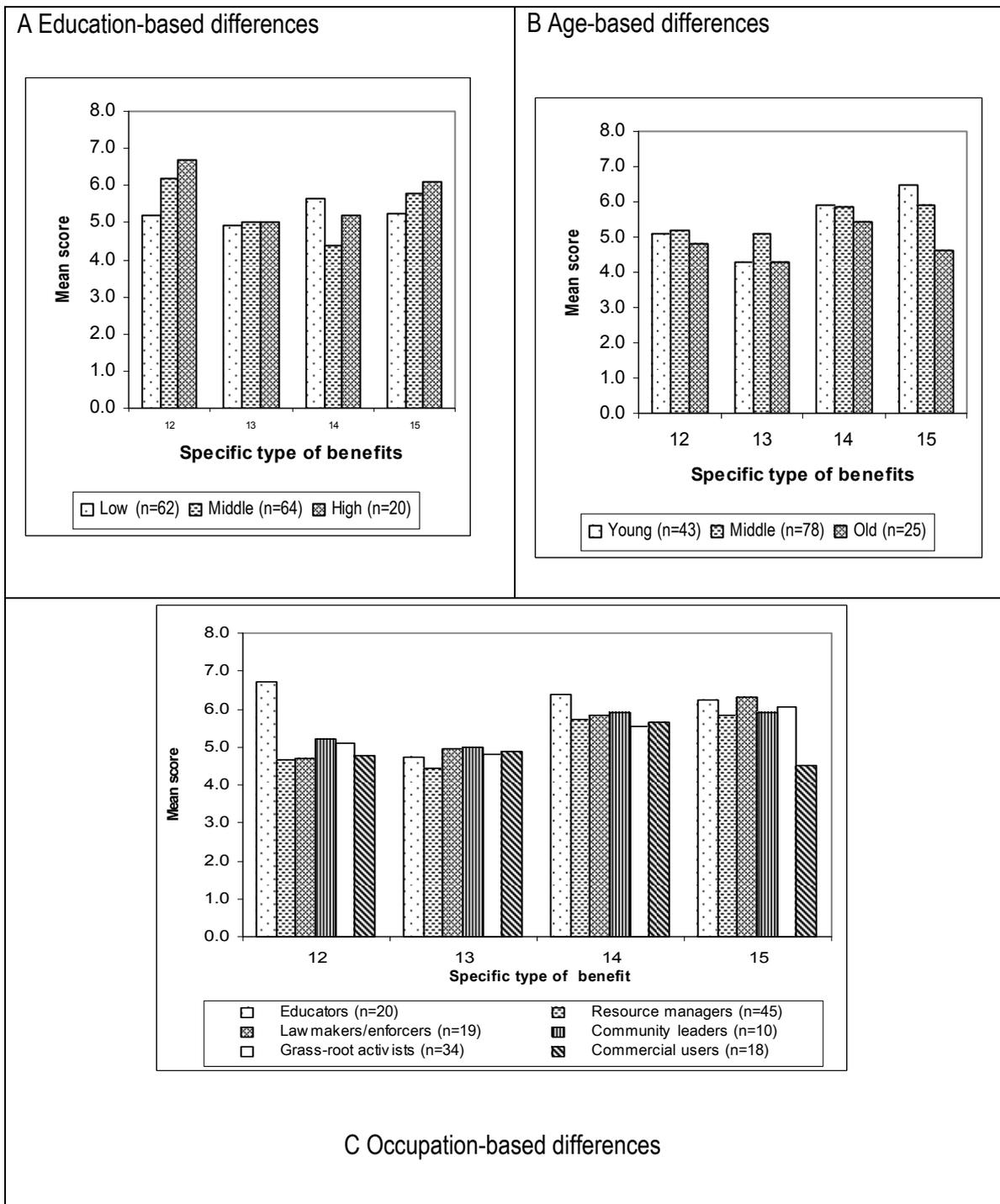
**Table 7.5 Perceived value of natural forests for research and education opportunities**

Demographic variable	N=	Mean aggregate score	Mean Specific Score			
			Children's education (12)	National heritage (13)	Source of knowledge (14)	Research (15)
Type of specific benefit						
Overall	146 (100%)	5.4	5.1	4.7	5.8	5.8
<b>Gender</b>						
Male	97 (66%)	5.4	5.0	4.7	5.8	6.1
Female	49 (34%)	5.3	5.3	4.8	5.8	5.4
<b>Stakeholders group</b>						
Educators	20 (14%)	6.0	6.7	4.8	6.4	6.3
Resource managers	45 (31%)	5.2	4.6	4.4	5.7	5.8
Legislators/Law enforcers	19 (13%)	5.4	4.7	4.9	5.8	6.3
Community leaders	10 (7%)	5.5	5.2	5.0	5.9	5.9
Grass-root activists	34 (23%)	5.4	5.1	4.8	5.5	6.1
Commercial users	18 (12%)	5.0	4.8	4.9	5.7	4.5
<b>Education level</b>						
Low	62 (42%)	5.3	5.2	5.7	4.9	5.7
Medium	64 (44%)	5.4	6.2	5.0	4.4	5.8
High	20 (14%)	5.8	6.7	5.0	5.2	6.1
<b>Age group</b>						
Young	43 (29%)	5.4	5.1	4.3	5.9	6.5
Middle	78 (53%)	5.5	5.2	5.1	5.8	5.9
Old	25 (17%)	4.8	4.8	4.3	5.4	4.6

Note: Keywords and numbers for the type of specific research and education opportunities refer to definitions in Appendix 7.1. (12= children education, 13= national heritage, and 14=source of knowledge, and 15= basic and applied researches).

As noted earlier, the lack of environmental expertise can be explained further by the fact that most of those holding senior management posts do not have an educational background in this topic. Respondents expressed concerns that major government agencies are led by managers who are lacking in relevant technical expertise. For example, several heads of district forestry offices are led by officials who have no previous forestry training. Furthermore, according to respondents (e.g., interview with Aton, 3/8/2005) it is not uncommon for their appointments to be based on their familial relationship to the district heads (Collins 2007). This lack of expertise also exists within the formal higher education institutions, where economics and business studies are very popular because they are perceived as providing greater job opportunities after graduation. For example, in the two universities in Gorontalo, forest management as a subject of study is a minor part of the agriculture division. However, this is changing as more of their junior lecturers have recently

embarked on post-graduate studies in environmental management in several universities outside Gorontalo (interviews with Isdu and Bani, 15/9/2005).



Note: Keywords and numbers for the type of specific research and education opportunities refer to definitions in Appendix 7.1. (12= children education, 13= national heritage, and 14=source of knowledge, and 15= basic and applied research).

**Figure 7.5 Perceived relative importance of natural forests in providing education and research opportunities, based on respondents' education (A), age (B), and type of occupation (C).**

Similarly, as Rudi indicated earlier in this section, most graduates of the Institute of Islamic Studies (IAIN), the oldest higher education system in Gorontalo, work as religious

teachers/leaders particularly in rural areas. Yet, the study of the environment receives little attention in the IAIN's curricula. This gap of environmental expertise among these leaders is unfortunate because they generally have more interaction with local communities, are respected, and could be instrumental in filling the gap in the formal education systems.

Moreover, studies and research in forest-related topics were perceived as less relevant to everyday life. Partly, this was due to a cultural disposition. Interest in research about plants and animals is generally low and limited only to those of immediate utility value, such as timber, food, and medicines (Clayton et al. 1997; Clayton & Milner-Gulland 2000, 2002; Lee & Rais 2001; Lee 2000; Lee et al. 2005), this is relatively common among Asian nations (Ng 2000) and societies in the tropics (Diamond 1997). However, as forest resources are declining due to continuous exploitation (see Chapter 8) a large number of species that are not yet known and might potentially be of value to humans in various ways have disappeared. Finally, as indicated in Section 7.2, information such as the forest's role as a carbon sink is relatively new and not well disseminated locally.

My field experience during this research illustrates this. In 2005, when most of the interviews were conducted, only 2 out of 83 interviewees talked about it. In July 2007, prior to the UNFCCC conference in Bali, the NFCP facilitated a field study and workshop (Figure 7.6) for local leaders to improve their understanding of the importance of forests as a carbon sink and how this might benefit them financially through the REDD scheme. Indeed, there was a genuine hunger for this kind of new knowledge among the participants (Lynn Clayton, pers. comm. 2007). Overall, the lack of research, and hence lack of up-to-date information related to forests and their biodiversity in Gorontalo, has been one of the major issues hampering steps towards achieving more sustainable and equitable use of forest resources.

Figure 7.5b shows that the influence of age seems to be most apparent for the opportunities for research, with the young age-group showing a considerably higher value (6.5 vs 4.6) than the oldest group, whereas differences between the scores for the other three benefits were only slight. This suggests that, for the young age-group, greater opportunities related to forest are now more available (see section 7.2) than it was for the oldest age-group. For the latter, forest-related employment was more about extraction of forest resources (Section 6.2). Overall, gender-based differences did not exist, except regarding the provision of research opportunities in or about the forest, for which male respondents gave a much higher score (6.1 vs 5.4). By contrast, female respondents held a slightly stronger value for natural forests due to their utility in children's education and as a symbol of national heritage. These findings suggest the relationship between respondents' occupation and typical social roles. In the latter, women generally assume a larger role in children's education and passing on social values because most of them have more interaction with children. As noted in Section 7.1, forest-related work is dominated by males and very little of it is available, especially since the private sector operations (e.g., large-scale logging) recently declined in Gorontalo.

## **7.5 Aesthetic Value**

Since Section 7.1 covered the potential economic benefits of wildlife tourism, this section focuses on the natural beauty and scenery of the forest that can be developed for ecotourism. More than 25% of the total interviewees discussed this type of benefit, and they based their comments on personal and pleasant experiences, specifically about Nantu and BWNP. Most of the respondents (18 out of 22 interviewees) who appreciated aesthetic attributes of the forests work with government organisations; none came from the commercial users. This

appreciation arises from the respondents' direct interactions with the forest, as the quotes above illustrated, either through their work or recreation. However, others argued that most people in Gorontalo have the opposite sentiment towards the forests due to some cultural and logistical barriers to access them. Given the remoteness of the forests and the limited public transportation facilities, the aesthetic value of forests is more accessible to people who have access to private vehicles or live nearby. For example, on public holidays the Lombongo gate of the BWNP is full of chartered minibuses and motorbikes (personal observation). Most visitors, particularly young people, come by motorbike. A large number of visitors spend their time around the park entrance, either for a picnic, or for a swim in the cool streams that flow out of the waterfalls or in the recently built swimming pool. However, only a small number of visitors, particularly young people, venture further up and into the forests for a long hike along a rugged path on steep hills (Figure 7.7).



**Figure 7.6** Improving local stakeholders' understanding of the ecological benefits of protecting the local forests. From the top left, clockwise: The field research station, run by the Nantu Forest Conservation Programme where various workshops for local leaders and hands-on experiment in measuring the forest's carbon stock have been conducted (with permission from C.M. Clayton).

This walk among the dense vegetation takes from 1.5 to 2 hours and requires a certain amount of physical fitness to reach the tallest waterfall (about 100 m). This walk has become more popular among nature-lover clubs, who occasionally help the BWNP to clean up the plastic litter that visitors leave along the path. Respondents' contrasting views are presented below:

I grew up in the city and had very little contact with a forest, so I never thought of it as an interesting place. But after I visited Nantu forest, I was pleasantly surprised by how beautiful that forest is compared to the city environment (Tina, a teacher in Gorontalo city).

The diverse plants and animals in the forest are good for the eyes to see. For example, the beautiful butterflies could inspire children to learn about nature. They have also inspired people to write songs and poems (Adpo, a teacher in Pangahu village).

The Lombongo area [southwestern part of BWNP] has majestic waterfalls and there is a traditional village of Pinogu [inside the BWNP]. These are of a great potential for recreation and development of cultural tourism. Recently some cottages were built near the park's entrance, but I think they do not add to the attraction because people go there to see nature, not to stay in those cottages (Lisda, a community development activist).

Most people see the forest as a scary place. So to make it more interesting and less scary, people think it is okay to get rid of the scary animals, such as snakes, because they have no benefit to humans. We need to develop a tourism programme that makes visiting forests interesting (Rusdi, a researcher).

We want to use the forest not just as a source of timber but also as a recreational area where people can enjoy nature and breathe fresh air. Many people do not see forests as a beautiful place. But for me, going into the forest helps me to reduce stress, because of the green environment and the clean air. Unfortunately, there are very few opportunities for our young children to experience being in a forest and enjoying the pleasant surrounding. It is great that there is a research station at Nantu, but it is too far away for most people to go there (Fiona, a community development activist).

Another perceived barrier to outdoor recreational activities was limited information about the PAs (Chapter 9). For example, the visitor information kiosk inside the BWNP has very little conservation information regarding the park; it looks tatty with graffiti and offers very little educational material (Figure 7.7).

The aggregate MDM score was almost as high as that of economic benefits (4.8 vs 4.7). The range of scores at the aggregate level was small (4.6 to 5.3) within the six stakeholder groups, indicating a similarity among respondents' views of this type of benefit. However, the community leaders showed the highest appreciation for this benefit, although it does not provide income to them. Two eco-tourism operators who were interviewed in this research expressed their concerns about the effect of forest degradation on the health of coral reefs, an attractive tourist destination especially for foreigners. Unfortunately, due to logistical reasons, they did not perform the MDM. Differences in respondents' perceptions on the basis of gender, education, and age were only slight at the aggregate level.

However, when respondents' views of the three specific benefits (i.e., natural beauty, exotic wildlife, and wilderness) were compared, the wilderness attribute of the forest was the least appreciated. This was possibly due to the logistical and economic barriers noted earlier. As for the other two benefits, they were considered of equal importance (Table 7.7). However, a deeper look at each of them found that the views of natural beauty were less varied (scores ranged from 4.4 to 5.9), indicating that all stakeholders, except the law enforcers, showed a high appreciation of this attribute. Understandably, it is relatively easier for people to enjoy the natural beauty of the forest. By contrast, views about exotic wildlife were more varied (3.8 to 5.8) because it is much harder to appreciate exotic wildlife which, in the Gorontalo context, is very hard to see in the forest. Indeed, as explained in Chapter 6, most respondents said that they have never personally seen even the iconic fauna, such as *anoa*, *babi rusa*, or *maleo* bird alive. This is largely due to their small and scattered remaining populations and also to difficult access to the forests.

**Table 7.6 Perceived relative importance of aesthetic benefits of the natural forests**

Demographic variable	N=	Mean aggregate score	Mean Specific Score		
			Natural beauty (9)	Exotic wildlife (10)	Wilderness (11)
<b>Type of specific benefit</b>					
Overall	146 (100%)	4.8	4.9	4.9	4.5
<b>Gender</b>					
Male	97 (66%)	4.7	4.8	4.7	4.5
Female	49 (34%)	5.0	5.2	5.1	4.7
<b>Stakeholders group</b>					
Educators	20 (14%)	4.7	5.1	4.5	4.5
Resource managers	45 (31%)	4.8	5.1	5.1	4.2
Legislators/Law enforcers	19 (13%)	4.6	4.4	4.5	<b>5.1</b>
Community leaders	10 (7%)	5.3	<b>5.9</b>	<b>5.8</b>	4.1
Grass-root activists	34 (23%)	4.9	4.5	5.4	4.8
Commercial users	18 (12%)	4.6	5.4	3.8	4.6
<b>Education level</b>					
Low	62 (42%)	5.0	5.1	4.8	5.1
Medium	64 (44%)	4.6	4.9	4.6	4.2
High	20 (14%)	4.9	4.8	<b>6.0</b>	4.1
<b>Age group</b>					
Young	43 (29%)	5.0	5.2	5.0	5.0
Middle	78 (53%)	4.7	4.7	4.9	4.5
Old	25 (17%)	4.6	<b>5.5</b>	4.5	3.9

Note: Keywords for the type of specific aesthetic values refer to definitions in Appendix 7.1. 9= natural beauty, 10= exotic wildlife, and 11=wilderness.

Respondents' education seemed to have a strong influence on their views of the exotic wildlife; those with high education placed the highest value on it (6.0). Conversely, those with low education showed a slightly higher appreciation of the natural beauty and wilderness attributes. This indicates that knowledge about the local wildlife being extraordinary, rather than simply as an economic commodity, is obtained through formally learning about them. In the case of Gorontalo's wildlife, and also in other parts of Indonesia, knowledge about wildlife has primarily been generated through studies by foreigners (see references cited in Chapter 1). Most of this information used to be inaccessible in the Indonesian language, but recently this has improved, for example, through the publication of *The Ecology of Indonesia* and the *Field Guides of Flora and Fauna of Indonesia* series (see Chapter 2) Moreover, those with high education tend to have more secure livelihoods and income, and thus they can afford to value wildlife more as an aesthetic object than as an economic resource.

Age-based analysis of the MDM results revealed that, except for the natural beauty attribute, the youngest group placed the highest value on the wilderness and exotic wildlife attributes. Although outdoor activity is not popular among the locals in Gorontalo, younger people generally have more physical energy and natural curiosity for exploring and enjoying direct



**Figure 7.7** The forest of Bogani Nani Wartabone National Park offers ecotourism opportunities. The two-hours hike to the Lombongo waterfall (top row). A make-shift changing room and a dysfunctional information centre inside the park (bottom row).

interaction with the wilderness. Conversely, for the oldest age-group, these two attributes were much less important because they have seen degradation of the forest and the decline in local wildlife populations over a long period of time (see Chapter 6). The natural beauty of the forest, however, was highly valuable to them and they are likely to show leadership in maintaining this treasure.

Overall, in light of the discussion of the interview data about the locals' reliance on forest resources for their subsistence needs (Sections 7.1 and 7.2), the forest's aesthetic attributes is of low priority to them. In fact, these only appeal to people who can afford it, as several interviewees indicated in this section. However, the MDM score for this benefit was as high as economic ones (see Chapter 10 for explanations of different results from the interviews and MDM ranking). Moreover, nature- or forest-based recreational activities are not (yet) a primary need for most people because of various barriers noted earlier (e.g., finance,

transport facilities, and accessibility). Gorontalo's location at the equator also means that the local climate could also be a factor; the outdoor temperature is too hot (30-35 °C) during the day for people to go for a walk. Those who go to the forest, such as loggers, hunters, and rattan collectors, do so because of economic necessity. Typically, they are of low socio-economic status. Findings about the cultural significance of the natural forest, discussed in the final section, provide a further support for this lower appreciation of the forest's aesthetic values.

## 7.6 Cultural Significance

As shown in Figure 7.1, the socio-cultural significance of the natural forests was the least valued. This was indicated by the smallest number of responses (17 out of the total 83 interviewees) and the lowest aggregate score (3.7; Table 7.2) among the six categories of benefits. When respondents talked about this type of benefit, many associated it with their religious beliefs, as illustrated in Ibra's words at the beginning of this chapter. Others linked it with their sense of responsibility to future generations, as illustrated below:

The biodiversity that exists in our environment is a natural heritage (something that we found, not made). It gives us a unique cultural identity, and is very valuable, although the way we value it is often limited to its monetary value, which of course is much lower because there are other values as well, such as its beauty that we can see (Bani, a local government official).

The forest is just a loan to us. It is not only the present generation that needs it and its services. That's why we have a common responsibility to look after our forest and to keep replanting more than the trees we cut so as to ensure its continuity (Mupol, a law enforcer).

The forest needs to be protected because it is our cultural asset and source of pride, such as the *babi rusa* in Nantu Forest that can only be found in Gorontalo. We need to protect such species so that our children can learn about and see them alive, not just from pictures (Asrul, a local journalist).

Respondents also observed that they used to pass these cultural values to the younger generations through certain rituals in the Gorontaloese culture. However, they remarked that these symbols and the traditional wisdom that are part of their customs are eroding quickly or have been lost; others commented on the disconnections between *adat* and religious principles and the everyday management of forest resources. Their examples are given below:

From a religious or cultural point of view the natural forest is seen as an object for development but at the same time as something that needs to be protected. The core of the problem is that they [teachers of Islamic religion] don't really know what the teachings are, while teachings about environmental care are embedded in *adat* tradition [influenced by animistic beliefs]. Sadly, the role of *adat* leaders has changed from that of advisory and corrective function to becoming government mouthpieces; so there are fewer people with authority watching the government's behaviour. I think it would be very difficult to reverse this now, because these leaders receive payment from the local government. So I will say that the traditional philosophy still exists, but its implementation is far from those ideals (Rudi, a religious leader).

We used various plants in both religious and traditional ceremonies. The initiation rites of children into adulthood, for example, are full of symbols of appreciation of nature that shape the morals of Gorontaloese. For example, during the *be'at* ceremony, a teenage girl has to cross a bridge made of the boughs of banana plants. This teaches the girl the importance of being industrious as a banana plant will not die before producing fruits. Likewise, the taste of a sugar cane is sweeter the older they are; this emphasises the importance of gaining wisdom as this young girl grows into adulthood. Meanwhile, I must say that Islamic teachings provide little support for the appreciation of nature. The role of Muslims as *khalifah* or leader and as *khalifatullah* [manager of creation] should provide the religious context for

us to manage the environment, especially because it is our motto that our development is based on *adat* and Islamic teaching. But I have seen very little of these principles operating here (Toni, a community leader).

Others added these disconnections to other limitations, including a lack of political will on the part of local government to improve the protection of conservation areas. Despite the small number of responses to this category of benefit, respondents showed a strong sense of inter-generational obligation to maintain the forest's various services. Examples of their statements are quoted as follows:

It is very difficult to convince Gorontaloese about the multiple benefits of natural forests. If we have a sense of responsibility to the future generation, we would put effort into protecting them. But we live as if meeting the current generation's needs is all that matters and yet our creativity and imagination to find a better solution to the forest problems is lost due to a lack of vision. Meanwhile, those who destroyed the forest without proper licences have remained free (Abdul, a local journalist).

The exploitation of the Nantu forest means that our grandchildren will not have the opportunity to enjoy the forest and its many benefits. We need to help in any way we can in order to ensure that the forest here is kept standing (Araz, a community leader).

The small range of scores among all stakeholder groups (3.4 to 3.9) pointed to the similarity of their views. Moreover, analysis of other demographic variables showed only a slight variation of views, except in the case of age. In this case, the oldest group predictably held a much stronger appreciation of this cultural benefit. However, the aggregate MDM score masked the relative strength of the three specific benefits that comprise this cultural significance: (1) as a home of other spiritual beings;<sup>80</sup> (2) as a heritage for future generations; and (3) as a home for other minority groups. As Table 7.8 shows, an analysis at the specific level revealed a striking contrast between these benefits. Specifically, all stakeholders placed a far higher value (6.9) on forests as heritage for future generations. However, the forest as a home for other spiritual beings was the least appreciated (1.3) and views of this varied only slightly. Analysis of demographic variables showed the following patterns.

First, the findings showed that the heritage attribute was the most important for resource managers and community leaders. Indeed, community leaders were the most vocal in expressing their views about this responsibility (see quotes in this section and also their observations on the impacts of forest degradation in Chapter 6). By contrast, educators scored the lowest (6.5). As the earlier quotes from Toni and Rudi illustrated, this finding supports respondents' observation that the role of educators in teaching the cultural values of the forest is very limited. They also believed that this is largely due to the focus on universal subjects in the national school curriculum and the limited attention to the local environment and its cultural significance.

The consistently low appreciation of this attribute can be explained by respondents' comments while they were performing the MDM ranking. Some acknowledged the existence

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<sup>80</sup> The actual statement used in the data collection was 'natural forests are home to many spirits' (see Appendix 7.1), which was designed to gauge the spiritual significance of the forest for the Asian communities being studied that have elements of polytheistic beliefs. In such societies, for example in Lao (with a predominantly Buddhist tradition) and for the Balinese, such as a few respondents in this research, this 'spiritual' aspect of the forest was considered very important.

of other spirits in this world, but they do not worship them, like the pantheists do. But others said that because they are Muslims, they do not believe (or were told not to believe) in the existence of other spirits. Therefore they considered this forest attribute unimportant to them. Interestingly, the commercial users showed the highest appreciation of the forests' spiritual attribute. Their closer and more direct interaction with the forest possibly made them more respectful of other spirits that are believed to inhabit the forests.

**Table 7.7 Perceived cultural values of natural forests**

Demographic variable	N=	Mean aggregate score	Mean Specific Score		
			Home to other spirits (16)	Heritage for next generations (17)	Home to minority groups (18)
<b>Overall</b>	146 (100%)	3.7	1.3	6.9	2.8
<b>Gender</b>					
Male	97 (66%)	3.7	1.4	7.1	2.7
Female	49 (34%)	3.6	1.2	6.6	3.2
<b>Stakeholders group</b>					
Educators	20 (14%)	3.9	1.5	6.5	3.7
Resource managers	45 (31%)	3.7	1.3	7.5	2.3
Legislators/Law enforcers	19 (13%)	3.9	1.6	6.6	3.5
Community leaders	10 (7%)	3.7	1.2	7.2	2.7
Grass-root activists	34 (23%)	3.4	1.1	6.6	2.6
Commercial users	18 (12%)	3.8	1.6	7.1	2.8
<b>Education level</b>					
Low	62 (42%)	3.7	1.5	6.7	2.9
Medium	64 (44%)	3.7	1.4	7.0	2.7
High	20 (14%)	3.8	0.8	7.5	3.2
<b>Age group</b>					
Young	43 (29%)	3.2	1.2	6.1	2.5
Middle	78 (53%)	3.8	1.4	7.1	2.9
Old	25 (17%)	4.3	1.6	8.0	3.4

Note: Keywords and numbers for the type of specific cultural values refer to definitions in Appendix 7.1. 16= as a home for many spirit, 17= religious obligation and social obligation to main the forests for future generations, and 18= as a home for ethnic minorities.

Moreover, a traditional leader (Farida) explained to me that many of the practices that embody respect for other elements of nature that are believed to have spiritual power (e.g., certain trees or rocks) have been eradicated and replaced by Islam in Gorontalo. However, she said Islamic teachings do not include mechanisms for, or the requirement of, appeasing spirits or seeking their blessings when people begin to clear forest. She added the lack of materials costs (e.g., in providing items as offerings to the spirits) incurred; instead, people simply say 'in the Name of Allah' before they cut the trees to get timber or acquire new land. The social controls for resource management practice, in the forms of traditional laws (see Chapter 8), have been quickly eroding. As Rudi and Toni underscored earlier, religious leaders lack the political power to influence the ways decisions are made. Meanwhile, the modern laws and implementing regulations that govern the management of natural resources are often lacking; when they do exist, they are poorly enforced. More importantly, respondents observed the growing materialism in the pursuit of economic growth among Gorontaloese society. The vacuum (of ethical management of resources) that this transition has

created is considered one of the primary causes for environmental degradation; examples of this abound in many parts of Indonesia (Whitten et al. 1997; Monk et al. 1998).

Being aware of these gaps, in 2005 the Nantu Forest Conservation Programme (NFCP) began to forge collaborations with local community and Islamic leaders to expand the conservation constituency. A three-day workshop for these leaders was held, specifically to discuss conservation sciences and Islamic approaches to forest conservation. For most participants, this was a wake-up call. At the end of the workshop the head of the agency of religious affairs showed much appreciation of this initiative. He acknowledged his agency's limitations in introducing the Islamic perspective in the care of the environment. A task force was formed immediately after the workshop, and one of the planned follow-up programmes was to prepare teaching materials for the *imams* to use for their Friday sermons. However, I was not aware of any concrete action that had happened since the time of my last field visit at the end of 2007. One of the main reasons was a lack of human resources and funding. More importantly, those who were keen at the workshop basically had other more immediate tasks to attend to. For example, one of the initiators for this was busy administering the creation of (yet another) new district; he then became the head of its local planning body.

Second, as Table 7.7 shows, education also appeared to strongly influence respondents' views of the heritage attribute and their respect for ethnic minority groups. By contrast, the forest's function as a home for other spiritual beings markedly decreased with increasing levels of education. This indicates the influence of respondents' formal education, with less emphasis on spirituality, and their attitude to taboo. For respondents with low formal education, particularly in many traditional communities, fear of other spiritual beings typically forms an important part of their culture and is embodied in their relationship with the forest. In Indonesia, examples of these include the Kubu people or Orang Rimba in Jambi (Zikri, pers. comm.), the Badui people in West Java (Whitten et al. 1996), the Iban Dayaks in West Kalimantan (Colfer et al. 2001c) and many communities in the Moluccas (Monk et al. 1997)

Third, the forest's importance as a home for ethnic minority groups was most highly valued by the educators and legislators. Most respondents know about the existence of the forest people (*Polahi*) inside the BWNP, although their population and distribution are not known. One senior respondent explained to me that these people are descendants of a small community of people who rejected the Dutch rules that governed Gorontaloese society, beginning about four centuries ago. The *Polahi* fled to live in the forest and continue to live in their traditional ways. Respondents said that they respect the *Polahi's* lifestyle, and they tend to have a romantic view of their environmentally friendly resource use system and their detailed knowledge of plants. The latter was particularly useful for some rattan collectors, who, according to some respondents, often seek their help in locating valuable rattan. Indeed, the MDM score shows that the commercial users placed an intermediate value on this attribute (2.8, on a range of value between 2.3 and 3.7). By contrast, resource managers and grass-roots activists had the lowest score for this. They considered the *Polahi* as 'backward' and in need of being educated and integrated into a more 'modern' lifestyle. This reflects the official attitude towards isolated ethnic groups. Its main agenda is to resettle the *Polahi* into 'civilisation' like the rest of society (Li 2003). Some respondents argued that past attempts to relocate them outside the forest had failed; some of them returned to the forest and many died of diseases resulting from their contact with other humans.

Finally, respondents' appreciation of all three benefits also grew with increasing age, most prominently for the social and religious heritage attribute. Indeed, the mean score for this specific benefit was the highest (8.0) of all the twenty types of benefit. The findings reflect the reality that, having witnessed the transformation of Gorontalo forest and the resulting degradation to date, the older groups are more concerned about the future state of the forest and whether their grandchildren can enjoy the forest services from which they have benefited.

## **7.7 Chapter Summary**

Key stakeholders in Gorontalo most valued the natural forest as a source of diverse economic activities and the ecological functions that support them; they valued the forest's cultural significance the least. While the economic benefit of the forest was, by far, the most frequently cited in the interviews, it ranked the second lowest among the six categories of forest benefits. Differences in results from the interview and MDM data were less striking for the other types of benefit.

The findings revealed the respondents with low education, of older age-group, and who were in the non-salaried group tended to have a higher appreciation for the forest economic utility. As for the forest's ecological functions, respondents valued its function in regulating freshwater flow higher than its role in absorbing carbon. Partly, the former benefits have more obvious links to their economic survival. Respondents' education and occupations, and hence the relevance to their livelihoods, seemed to influence their perceptions, with those with high education, and to a lesser extent the youngest age-group, placing a higher value on forests as carbon sinks.

Of the other categories of benefit, the importance of the forest for its unique flora and fauna stood out in comparison to its utility for education, aesthetic, and cultural attributes. Specifically, respondents placed a higher value on the diversity of life forms than on their endemic status. This view was apparent among those with low education and the younger age-groups. Rarity of biodiversity is much less important to local stakeholders, whose priority is economic survival. The findings showed a disconnection between global conservation policies, and its key strategy in establishing PAs, and the subsistence needs of the locals. The research and education opportunities in or about the forest were appreciated more by those with high education and of the younger age-groups. Respondents' occupations also influenced their perceptions, with commercial users showing the least appreciation of this educational benefit.

These general patterns also appeared in respondents' views of the aesthetic attributes of the forest; its natural beauty and exotic wildlife were perceived as more important than its wilderness value. Specifically, community leaders, the youngest age-group, and those with high education valued exotic wildlife more highly than the rest of the respondents. Finally, despite the overall low appreciation of the cultural significance of the forest, respondents highly valued the forest because of its role as a provider of cultural heritage for future generations. Their appreciation of it was overwhelmingly higher than their respect for it as a home for other spiritual beings and ethnic minority groups. This was prominent among the community leaders and the oldest age-group, from whom leadership in cultural matters is generally expected.

Overall, respondents demonstrated their appreciation of the wide range of benefits that the natural forest provides for them. The findings show how life experience, education, age, and

occupation influence their perceptions. Besides analysing the level of knowledge of respondents about biodiversity and the benefits of natural forests, it is very useful to point out examples of 'incorrect' knowledge and perceptions that can be one source of behaviour that either does not conserve nature or in fact actually destroys it. Perceptions on the types of threat to the natural forest, and the flow of these various benefits from it are elaborated in Chapter 8.

## CHAPTER 8

### PERCEIVED CAUSES OF FOREST BIODIVERSITY LOSS

There has been so much encroachment into the protected areas. The forest ecosystems have been disappearing fast, except the Nantu Forest, which remains intact to date because of the continuing work of the Nantu Forest Conservation Programme. Other protected areas are heavily threatened, and, perhaps exist on paper only (Warno, a law enforcer).

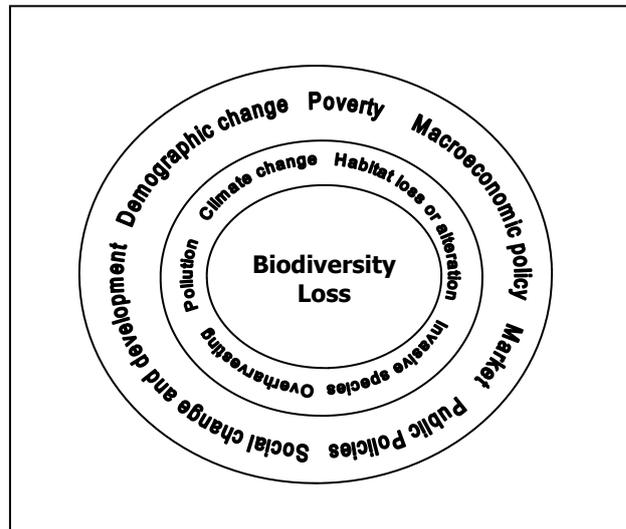
Respondents' appreciation of the multiple values of local natural forests was elaborated in Chapter 7. On the basis of long-term changes in local biodiversity (Chapter 6) the respondents believed that the forest is under increasing human-induced threats. As a scientifically little known region, quantitative data on Gorontalo's biodiversity is scant, but studies on its wildlife have indicated biodiversity's fast decline (Clayton 2003; Clayton et al. 1997; Clayton & Milner-Gulland 2000, 2002; Lee 2000; Lee et al. 2005; O'Brien & Kinnaird 2000). The analytical framework (see Section 3.3 and Figure 8.1) is applied in this chapter to explore local stakeholders' perceptions of the direct and underlying causes of this loss.

The findings presented here are based on a systematic analysis of data from 83 interviews (Appendix 8.1), applying the progressive contextualisation approach (Vayda 1983) (see Section 3.3.3). The key step in this approach is to examine the types of *local* activity that represent threats to biodiversity, how they are manifested, by whom, when, and with what real or potential consequences. The scope of this analysis is extended to the linkages between local activities and their primary root causes at the local level. Whenever relevant, external factors (e.g., at national and international levels) are included in the presentation. Data for the latter were generated from interviews with a select few national stakeholders (see Sections 8.2.5 and 8.2.6). The case study of Gorontalo helps explain how the combined internal and external factors drive the loss of local forest biodiversity.

The temporal scale of the local activities can range from decades to just a few years, as illustrated later in this chapter. Several senior respondents provided rich historical insights from the early period of Indonesia's independence. However, since the focus of analysis was the contemporary period of the early 2000s, when decentralised forest management came into force (see Chapter 4), this temporal scale is given a priority. It is also useful to bear in mind the influence of this political change on the state of the local forest. Specifically, by this time large-scale forest concession rights were stopped, primarily because most of the production forest, within which timber extraction is legal, had been logged. This implies that the economically valuable timber has become restricted to within the boundary of protected areas (PAs) of Nantu Wildlife Sanctuary, Bogani Nani Wartabone National Park, and Panua Nature Reserve, the focus sites of this study (see Box 4.1). As these forests host a wide range of economically valuable resources, it is assumed that human activities that pose threats to these PAs might lead to the degradation or loss of biodiversity within them.

The drivers of biodiversity loss identified by the study respondents resonate with those found in the literature. The five main perceived threats, from the strongest to the weakest, as indicated by the number of interviewees who discussed a given activity, were logging (55), shifting agriculture (54), local physical infrastructure projects (46), extraction of rattan and wildlife hunting (41), and peasant gold mining (22). These are presented in the first section of

this chapter. Respondents attributed the decline in species and populations to the first and fourth activities and the rest were perceived as contributing to the degradation of forest ecosystems. A small number of respondents (14) also mentioned pollution, particularly in relation to peasant gold mining and its disposal of chemicals in the water bodies; two stated the problem of invasive alien species, but no interviewees mentioned climate change as a threat.



**Figure 8.1** A basic conceptual framework to analyse direct and underlying root causes of biodiversity loss (after Wood et al. 2000).

The second section explains key socio-economic conditions that underpin the persistence of those activities. These were policy and institutional failures (86), poverty in rural areas (38), poor awareness about the full value of protected areas (29), and population growth (21) (see Figure 8.2). Some respondents discussed more than one activity, so the total number of responses exceeds the total number of interviews (83).

Analytically, the local and external underlying factors can be separated, but in reality they work together in various combinations to drive any of the identified local activities. To describe the links between a given activity and its underlying factors the first section of this chapter ethnographically presents the perceived direct drivers. The perceived root causes are presented in the second section. The depth of discussion of each direct and root causes is determined by the amount and richness of interview data, as summarised in Figure 8.2.

## **8.1 Direct drivers of loss of forest biodiversity**

### **8.1.1 Illegal Logging**

Many respondents acknowledged that logging (both legal and illegal) in Gorontalo, which peaked in the late 1990s, has caused forest loss and degradation. While large-scale legal logging declined in the 2000s, due to the depleted availability of economically valuable timber from natural production forest (interview with Herry, 14/9/2005) (see Chapter 4), others commented that illegal logging, which is not a new phenomenon (see definitions in Box 8.1), has recently intensified. Respondents' accounts of historical and current examples are as follows:

Local people reported that, in the Sumalata area [now part of the BWNP], the Japanese [1942-1945] cut timber illegally [by cutting undersized timber] and then took it away, for example to Ambon [in the Moluccas, off the northeast of Sulawesi], where there was a processing mill. In doing this, they built a tunnel [discovered in a survey in the 1960s] through which timber was transported by trucks to the other end (Rasid, a traditional leader).

In the 1960s, many members of the communist party cut the forest to make way for agriculture and to get timber for cash. This was then officially 'controlled' in the 1970s and the loss was much reduced during the 1980s, not because the enforcement was successful but because the distance to get timber was greater. Then, in the 1980s, large-scale forest concession companies [Hak Pengusahaan Hutan – HPH] started operating in Gorontalo, and the competition between them and small-scale loggers for the same forest areas increased. Under the lease agreement, there was a requirement to sell 20% of the cut timber to the local market. However, only timber of inferior quality was sold locally and the rest was exported. Consequently, local people cut timber of better quality from illegal sources. This continued until 2002, when officially there was no HPH operating in Gorontalo. Some HPHs stopped operating because there was not much timber left and since then I believe most timber in Gorontalo has come from illegal sources. The central government addressed this issue by creating a 'middle ground' whereby local district governments were allowed to issue permits, called the IPKTM [*Ijin Pemanfaatan Kayu dari Tanah Milik* – wood utilisation permit from certified land]. But this became a new 'toy' between *penguasa* [those who are politically powerful] and *pengusaha* [those who are economically powerful] (Bukar, a retired army officer turned legislator).

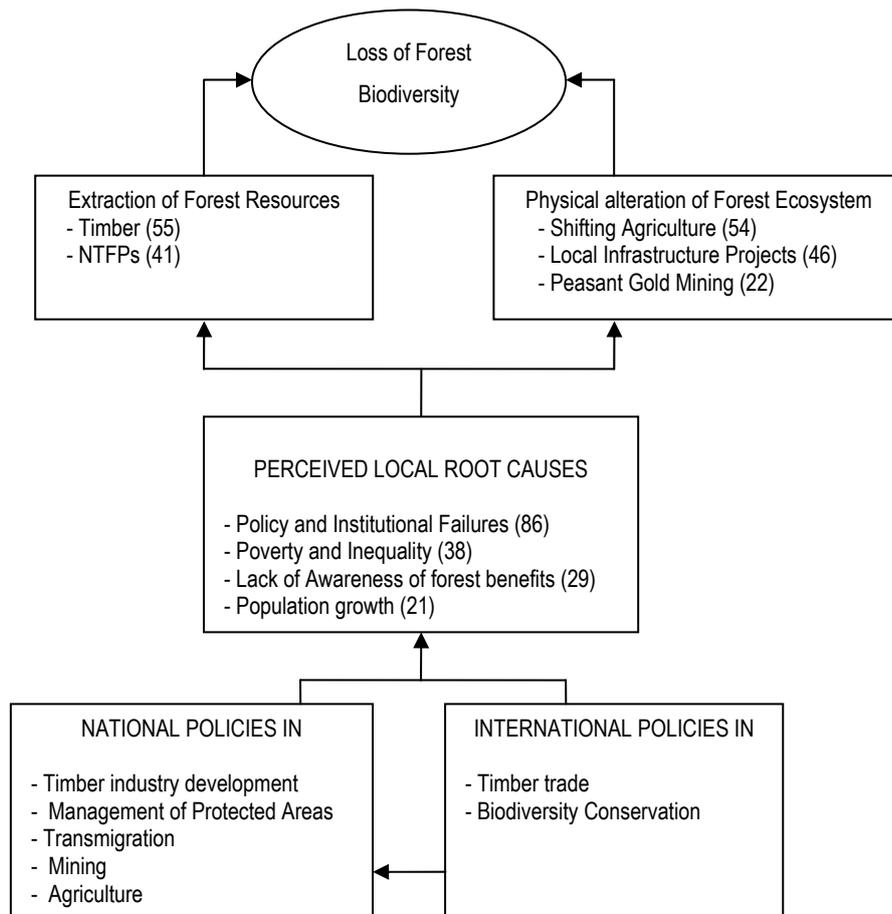
Moreover, Bobi (a resource manager) noted an important change in the Gorontaloese attitude towards timber exploitation during Gorontalo's political transition in 2002. He gave the following reasons:

I would say that forest degradation in Gorontalo started in the past. Ironically, while we were still part of North Sulawesi province, every local government sector tried very hard not to degrade the forest further because the revenue from logging would have been taken away from us. But now, illegal logging is so rampant and people think that this is the only cause of forest degradation, although there are other causes of forest loss, such as forest clearance to increase maize production. Sadly most of this is done without the application of either appropriate technologies or [soil] conservation measures and the government turns a blind eye to this.

Bobi also stressed that since the [district] administrative expansion began in 2002, people have cut forests to meet the demand for local physical development. As Bukar noted earlier, local government facilitated this by issuing the IPKTM permits, but their capacity for monitoring logging practices is very limited (see Section 8.3.1). Behind this 'mask' of local needs, Bobi added that local timber is transported to Poso (the capital of the neighbouring province of Central Sulawesi). He believed that the volume of timber for local needs is only about 5% of the total extracted.

Specifically, many respondents observed that the lack of legal sources of timber has made protected forest (*hutan lindung*) and PAs the main targets for illegal logging (interview with Barat, 29/11/2005). They witnessed logs being transported down the Paguyaman River and by land from the rural areas to the nearest ports or towns. Rasid (a traditional leader who lives in the city of Gorontalo) testified that:

I often see police cars guarding the front and rear of the trucks full of logs when I go for a walk after prayer time at dawn. People are generally afraid to report this kind of incident to the police.



**Figure 8.2** The perceived driving forces of biodiversity loss in Gorontalo and their underlying socio-economic conditions, based on interview data of this research.

### Box 8.1 What is Illegal logging?

Illegal logging, or *penebangan liar* (which literally means 'wild logging') covers a wide range of illegal activities associated with timber extraction in infringement of national laws and regulations. It includes violation of regulations in the harvesting, transporting, and processing of timber, and in the financial reporting of these activities (Tacconi 2003). However, most literature in illegal logging refer to the illegal harvesting of timber as statistics for that are more readily available for analysis.

In Indonesia the primary regulation for harvesting timber is the Selective Cutting and Replanting System (*Tebang Pilih Tanam Indonesia -TPTI*). It is designed to prevent the overexploitation of forest resources and to promote sustainable forest management. Under the TPTI, illegal logging includes logging in protected areas or outside the concession boundaries, harvesting of protected species, logging, extraction of more than the allowable harvest, removal of oversized and

undersized trees, and extraction of timber in prohibited areas, such as water catchments, steep slopes, and river banks (Callister 1992 in Casson & Obedzinski 2002).

The meaning of illegal logging has expanded under the recent decentralisation policy, which gives authority to local governments to issue small-scale logging permits to meet local needs for timber. Some authors consider the implementation of this policy to have added to the vibrancy, resilience, and adaptability of illegal logging. They argue that by issuing these permits in areas overlapping with existing legal concession areas, without considering the sustainability of the forest resource, local governments officially legitimise timber extraction. (Dudley 2002; Smith et al. 2003; Tacconi et al. 2004b). The legality of logging under the two types of concession is blurred further due to lack of mapping and boundary marking in the overlapping areas of logging operations (Obedzinski 2005).

Those currently involved in illegal logging include individual loggers who live in the vicinity of PAs and small-scale logging operators. According to respondents the former are primarily landless shifting cultivators (see Section 8.3.1) who subsist on dry-land farming. These farmers may log individually, but generally they are part of a team of paid labourers (McCarthy 2000; Box 8.2); they are the willing partners of the wealthy and politically well-connected local entrepreneurs, popularly termed *cukong*. The latter are mainly transmigrants who hold IPKTM permits (see Chapters 2 and 4) for their small forest blocks, but allegedly also log timber outside them. Bukar observed that abuse of permits like this is very common. He said:

When law enforcers check their permits, they can show their land certificate, but there is no way the enforcers can tell where the timber originated. In fact, it is easier for a timber businessman to acquire timber from holders of IPKTM than to get a logging licence himself.

### Box 8.2 *Cukong*: the invisible actors of illegal logging

Typically from the Indonesian-Chinese ethnic group, *cukong* play a very important role in the logging network in Indonesia. They primarily act as the 'mediator' between the suppliers and buyers of logs. They also organise local loggers to work with more skilled labourers from outside the villages who operate the chainsaws. They often manage the transportation and sale of the timber, and sometimes operate sawmills as well.

To enable these loggers to work, a *cukong* usually lends them money and equipment and they are expected to pay back the loan with the money from the sale of the extracted timber. Through this deal, the same *cukong* normally buys the timber at the price he determines.

Owing to the favours afforded by the *cukong*, loggers often end up serving the *cukong*, taking the high risk of confiscation of the timber and the subsequent imprisonment themselves if they get caught.

For the smooth running of all of these works, a *cukong* needs the support of 'certain local officials' (*oknum*) from the military and police force. In return for extra-legal favours, these *oknum* offer protection to the *cukong's* operations. Furthermore, various government officials (*aparats*) at the village, subdistrict, and district levels are involved in facilitating the long process of obtaining logging permits (Casson & Obidzinski 2002). A lump sum or regular payment is often given to these officials in return for their 'services'.

Source: McCarthy (2000).

The following quotes are examples of respondents' views about illegal loggers. They also noted the shift of players and forms or guises under which illegal logging has operated. Respondents noted the pre-decentralisation domination of HPH, especially the fact that the permits often prescribed unrealistic cutting quotas due to a lack of information regarding the actual stock of timber. Throughout Indonesia it was not uncommon that the quotas were higher than what was technically considered sustainable, giving opportunities for logging companies to engage in illegal practices (Box 8.1) in order to maximise profits (interview with Timu, a resource manager, 9/9/2005). Most respondents blamed illegal logging practices by HPH as the main reason for the exhaustion of the local timber supply, particularly because of the poor enforcement of timber harvesting regulations, as the quotes below show:

Timber business people did not comply with the TPTI regulation; they never replanted and just left the logged forest, mostly in a degraded condition, prone to erosion and flooding. With the large-scale legal logging, the rotation regulation was not enforced, and clear cutting was very common. Consequently, the natural regeneration produces smaller trees of less economic value (Iksan, a resource manager).

The two HPH operators [name suppressed] were working locally around the Nantu forest. Whereas local people transported the logs by buffalo carts, HPH operators used trucks and cleared forest for the logging road. So you can see the scale of damage of this logging road on the forest and for transporting the logs. Since the 1990s, besides taking timber from around Nantu the HPHs also converted forest to sugar-cane plantations. If local people only are harvesting the timber, I think we would have enough timber supply from there (Rais, a trader of forest products).

In the early 1970s, the central government, not local governments, played a key role mainly through the granting of large-scale logging licences to large-scale logging companies. As well as cutting undersized timber, they cleverly deceived us by leaving the forest edges unlogged, but the inside of the forest was void of timber. Whereas before the decentralisation era (2000s) timber tycoons were located in Jakarta, now we have many local little timber kings! The reform era has brought a new wind of change whereby local people and NGOs watch these local timber kings working. Unfortunately, enforcement agencies and some of their officials became protectors of the offenders (Rasid, a traditional leader).

Local loggers are generally backed up by people with money and chainsaws. They are only workers for some *cukong*, who are generally successful because they are very well-organised. They gave advance payments and guaranteed markets for their logs (Barjo, a ranger).

Yes, I borrowed some money to buy chainsaws and took timber from the forest but I was never caught. Nobody patrolled this forest [Nantu] then [mid-1980s]. When this forest was established as a protected area [the NWS, in 1997], I quickly sold the chainsaws. Then I worked on the land I had cleared, rearing some goats as well. As a protected forest, the southern borders of Nantu are continuously under patrol. Some members of the village became involved in illegal logging; others from outside the village also came to take timber and collect rattan (Mahar, a forest product trader).

Respondents also noted the increased dependence of loggers upon the *cukong*. One of the frequently cited reasons was that the cash income the former get from the sale of timber, even after repaying the advance payment, is generally more attractive than the occasional sale of their farming surplus (interview with Barjo, 5/9/2005). As Rasid indicated earlier, there is also a problem of collusion between *cukong* and some government officials (*oknum*), making the illegal activities 'protected' from legal detection and prosecution (interview with Barat, 29/09/2005 and Lade 22/11/2005). Respondents' specific comments were:

The *cukongs* are better organised than the law enforcers. Some of the latter occasionally played a part as *cukong* or acted as the 'hands and eyes' of the former (Herry, a planner).

Illegal logging activity is very well protected by powerful players, in terms of provision of equipment, advance payments, security in transporting logs, as well as selling them. When the government apparatus increases its strictness in enforcing the law, local communities resent this, which means more problems for government to deal with (Bukar, a legislator).

As a trader of forest products, Rais explained that he gets his timber supply, for example *Agathis*, from the natural forest. He said that its sale price is now about Rp 1.5 million per cubic metre compared to Rp 80,000 per cubic metre in the 1980s, when the natural supply was more abundant and the cost of transport cheaper. He added that intense competition for the dwindling timber supply has increased log prices, leading to the smuggling of logs to bordering countries, such as Malaysia and the Philippines.

Respondents believed that this increase in log prices, outdated official data on forested land as Timu indicated above, and the IPKTM system have together made the PAs particularly more vulnerable to illegal logging (see Section 8.3.2). Consequently, several PAs were rendered 'paper parks' and another form of illegal logging, called 'timber laundering', emerged. Respondents' views concerning these are provided below:

Money laundering, as recently practised by some national timber tycoons, is not happening here, but timber laundering is. As part of the district assembly (DPRD) team I once dealt with a timber laundering case. There was a shipment of timber from Maluku with the destination of Aceh and Riau (in Sumatra). We suspected the timber would be taken to Malaysia, but strangely it landed in the Anggrek harbour in Gorontalo. Apparently, to mask the actual origin of the timber the shipping manifest was changed [*diputihkan* or literally 'whitewashed'], as if it originated from Gorontalo. An investigation revealed that those responsible for the shipment had paid the district government the amount of Rp 1 billion to have the timber treated this way. This kind of income is very large for a local government [whose annual budget is less than Rp 4 billion or around US\$ 470,000]. Timber was transported out of Gorontalo based on the IPKTM document, although it is clearly meant for supplying local demand only. This is what I meant by the game played by business and government people. They play on the documentation; at the logging site the loggers used the IPTKM permit, but during storage and shipment they use the HPH permit [which is actually not operating] - to get the timber out of the province. This is a vicious circle. The IPKTM permit is indeed valid, but with the lack of ground surveillance, it is difficult to ascertain the origin of the timber [Bukar, legislator].

Towards the Kwandang area, the Tangale Nature Reserve only has about 20% of its original forest - the parts that are visible from the roadside. The rest is gone despite its legal status! The forest has been destroyed since the 1970s; the reforestation project has failed. The forest looks good from the outside when you approach it from Isimu, but after you go 500 metres into the forest, most of it is degraded. The condition in Panua and WBNP is the same; the forest looks green from above and the periphery, but the inside is hollow (Mutaf, a resource manager).

Another type of abuse was of small-scale logging permits issued to newly formed village co-operatives (*Koperasi Unit Desa-KUD*) – which at that time were non-existent – to manage a type of 'community forest'. The scheme was introduced during President Habibie's brief rule (1998-1999), with the main objective to give rights to local villagers to manage forests on a community basis. However, since many KUDs had no land in order to qualify for accessing the credit, this scheme led many villagers to clear (state) land which they then claimed as theirs. Again, this programme was not based on actual land availability; it provided opportunities for abuse of permit that heightened pressures on forest land (interview with Jafar, a forest ranger, 12/9/2005).

Respondents were deeply concerned about the rampant illegal logging, largely because of its perceived environmental, social and economic costs (see Chapter 6), mostly borne by the general public. Examples of these costs are provided below.

Tilamuta [the capital town of Boalemo District] had no history of flooding, but now every rainy season the water level reaches houses there. The economic costs for repairing damaged agricultural and other infrastructure is very high, and disaster assistance often does not reach the people who need it most (Farid, a traditional leader).

Illegal logging has depleted the wildlife population that used to be abundant here, such as the *maleo* bird, hornbill, *anoa*, and *babi rusa*. The use of cyanide for illegal mining killed the fish in the river and mangrove areas. Now we have fewer fish in them, and if we still can catch them, they are much smaller in size. So the loss of forest affects other ecosystems far away from it. The silting of coastal areas also kills the reefs and their fish community. Fishers used to catch fish near the coast, but now they have to go further away for less catch. (Dote, a resource manager).

As the most important gate to economic activity of this province, the harbour is suffering from the impacts of illegal logging. Cargo ships used to be able to load within a day, now it takes longer and is more expensive because of the sedimentation problems. If government agencies act in an integrated manner, high environmental and economic costs such as this can be dealt with. In the end, it is the public who pays for this expense (Mutaf, a resource manager).

The multiple players involved in illegal logging and their intricate network of operation implies that there are reasons for its persistence in Gorontalo. The perceived reasons are presented in Section 8.3. Rattan extraction and wildlife hunting, described in the next section, are local activities that were perceived as a driver of biodiversity decline.



**Figure 8.3** Floods in Tilamuta due to increasing loss of forest cover in the Boalemo district (Source: Japesda).

### 8.1.2 Extraction of NTFPs

According to respondents, extraction of NTFPs (see Box. 8.3), most importantly rattan and wildlife hunting, has been an important source of cash income for communities around Nantu and BWNP since before they were established as PAs.

#### *Extraction of rattan*

Extraction of rattan is mainly a male occupation, because the long period of searching, arduous work during extraction and manual transportation require physical fitness (see Box 8.4). The processing of rattan, however, mostly involves female workers; for example, two surviving processing companies (of the 8 in the 1990s) in Gorontalo employ about 700 women.

Data on the extent of rattan extraction from these PAs is not available. However, a detailed study in Lore Lindu National Park (Central Sulawesi) showed that 18% of the park area had been subjected to intensive rattan collection (Siebert 2004, 2005). There are three main reasons for this. First, collectors in general believe that as rattan grows in the wild, they are free to collect it, regardless of its location in a state-owned forest (interview with Araz, a community leader, 10/9/2005). Tina (a teacher) illustrated the economic importance of rattan extraction to local communities around Nantu, as follows:

The wives of rattan collectors told me that their husbands can earn money worth 2 to 3 months' wages from collecting and selling rattan as a secondary job. They are aware of the danger their husbands face, especially when they are caught by forest rangers, but the share of cash income that their husbands receives is much less than that of the middlemen.

### Box 8.3 NTFPs: their development and conservation values

Non-timber forest products (NTFPs), also known as minor forest products, are broadly defined as any kind of forest product other than timber. They include fruits and vegetables, resins, leaves, medicinal plants, and wild animals collected from the wild (de Foresta et al. 2000).

Typically, NTFPs are extracted in small quantities from forested areas by smallholders with little or no capital investment. The rights to access NTFPs vary among forest communities, from commonly owned (e.g., ownership of honey trees among the Dayak in Kalimantan (C. Colfer, pers. com 2008) to 'open access' (de Foresta et al. 2000). Moreover, owing to the ecological nature of its production, especially the soil, climate, and seasonal patterns that influence their production, NTFPs have seasonal fluctuations that make the transaction cost high while the bargaining power of the producers is low (de Jong et al. 2003).

The history of trade in NTFPs between Indonesia and other countries is well documented (Peluso 1983 cited in de Jong et al. 2003; Boomgaard 2007). The trade was centrally controlled until 1995, when a movement towards returning the legally recognised rights of local communities to harvest NTFPs for subsistence and sale received greater support in line with the decentralisation policy in the early 2000s (Belcher 1998).

Extraction of NTFPs is a very common traditional source of secondary income for people living in and around forests in the tropics. For example, the global usage of rattan alone is estimated to be worth US\$ 2.5

billion, involving 0.7 billion of the world's population in its use or trade (de Jong et al. 2003). World-wide, the extraction and trade of NTFPs received more attention as the loss of forests increased in scale and rate towards the late 1970s and the destructive effects of logging on forest ecosystems and their biodiversity were better understood.

Ecologists consider the harvesting of NTFPs a better alternative to logging practices and therefore it is strategic to achieve the goals of both development and conservation (Sunderland & Dransfield 2002). The perceived value that local people put on the natural forest can increase their incentives to reduce destructive practices in resource extraction, and thus improve maintenance of forest ecosystems (de Jong et al. 2003).

Development specialists also regard it as a potential contributor for improving national income in countries endowed with rich forests, or at least for their rural population living in and adjacent to forests (ibid). For example, studies in the Amazonian reserves suggested that the long-term economic benefits derived from NTFP collection have the potential to exceed those from logging (Arnold & Perez 2001). However, some authors were cautious due to mixed of success (Moegenburg & Levey 2002). For example, a review of seventy studies that quantified the ecological effects of harvesting of NTFPs concluded that NTFP harvesting can affect ecological processes from the individual and population, to community and ecosystem scale (Wollenberg 1998).

Second, unlike in East Kalimantan (see Box 8.4) where there is a long history of communal ownership and management of rattan gardens, such an arrangement does not exist in Gorontalo. Facing the declining natural supply of rattan, due to lack of regeneration, and its potential economic implications for the growing rattan processing industry, in the mid-1990s the Gorontalo chapter of ASMINDO (the Association for Indonesia Furniture and Handicraft Industry or *Asosiasi Industri Permebelan and Kerajinan Indonesia*) proposed to the Regional Forestry Office (*Kanwil Kehutanan Sulawesi Utara*) the development of a rattan plantation in the Paguyaman and Kabila sub-districts (interviews with Mario, 4/10/2005 and Araf, 8/9/2005). However, this plan did not materialise, because of the high investment that would be needed for building a rattan nursery and replanting, even though the seeds may be collected from the nearby natural forests. There was also a problem with non-existent legal provision for managing the proposed plantation (interview with Rizal, a legislator 13/9/2005). Third, respondents commented that after BWNP and NWS were established as PAs, the forest rangers often enforced the conservation regulations inconsistently.

Many rattan collectors supply directly to local processing companies but others sell the canes in the traditional market in Tapa, Bone Bolango (interview with Dani, 8/9/2005). Despite anecdotal evidence of long-term and widespread rattan extraction, some respondents (e.g., government officials) said that the rattan population in Gorontalo is still abundant. However, others contended that the natural stock is rapidly declining and jeopardising the local rattan-related businesses, which in the late 1990s employed about 4,000 people in the Paguyaman Watershed alone (Clayton & Milner-Gulland 2000). The latter respondents alleged the former's view about the abundance of rattan was mere political propaganda to boost the image of the new province, not based on factual information. Their contradictory statements are as follows:

In the past we used to ship rattan every month but now once every three months is more common. Each shipment is about 3-4 containers [each of about 4-5 tons]. We must keep this business on because of the amount of local labour we employ. All supply of rattan is from natural stock that will soon be exhausted. How we maintain the stock of commercially valuable rattan in the future I am not sure. It is increasingly difficult to meet the demand and increased price competition has become stronger because of an increasing number of small 'unofficial' processing companies. Collectors told me that they have to go further into the forest. It used to be 2-3 days, but now it can take 2-3 weeks before they can find the rattan; on average rattan collection can take a whole month. They say that the stock of rattan in the forest is still abundant but they cannot get it out because of the difficulty in transporting, especially in the hilly parts of the forest. On average they now have to drag canes about 2-3 kilometres from the forest to the nearest river, and then raft them down the river. When the HPHs were still operating, their logging roads provided access into the forest for rattan collectors (Mario, a trader of forest resources).

Around 70% of the national supply of rattan comes from Sulawesi and it has been harvested sustainably. When rattan canes are not harvested for 3-4 years, they die. We need to empower around 300,000 rattan farmers in Sulawesi, most of them are collectors. There are 81 rattan-processing factories in Sulawesi; four of them are in Gorontalo. We have an abundant supply of rattan in the wild and rattan can be cultivated, but many people do not understand this. It is a matter of regulating the harvests (Fahrul, a senior government official).

Rattan extraction has been more pervasive than illegal logging in the BWNP. (interview with Kamis, a forest ranger, 29/11/2005). As for Nantu, Serau (a law enforcer) indicated that while illegal logging has declined as a result of continuous surveillance, rattan collection has not. He explained that:

Collectors have good knowledge about rattan distribution in the forest. They often work in groups and spread themselves, taking turn to watch out for rangers. Some only collect rattan along the park's borders but others go into the forest for about 3 hours' walking distance. They generally transport the canes by carrying them manually or rafting them down the river.

According to respondents, in addition to depleting the wild population, rattan extraction can have negative impacts on the forest ecosystem and its biodiversity due to destructive harvesting techniques. It is very common that rattan collectors cut the host trees as well as the canes, damaging other vegetation. Moreover, during the dry season they use fire to get rid of the thorny canes, which often catches other vegetation and spreads elsewhere (interview with Jafar, a ranger, 12/9/2005).



**Figure 8.4 Rattan can potentially be a sustainable forest product to support the livelihoods of forest communities. From the top left, clockwise: harvesting spiky and clingy rattan plant (Lopez & Shanley 2004); drying and processing of rattan canes for the furniture industry.**

In respondents' views rattan extraction clearly represents an important economic activity for forest communities. However, due to the difficulties in enforcing regulations on rattan extraction, no rattan collectors seemed to care about the sustainability of the resource base, as the following respondents explained:

The [district] forestry office is required to generate revenue for local government [PAD] from forest. They issue licences to rattan collectors to achieve this goal. Officially there is no production forest and rattan can only be found in natural forest, which is within national park boundaries. They should only issue permits after consultation with the national park authority, but they determine the specific locations in the licence themselves and collectors just go to the national park area regardless. By doing so, the government legitimises the prohibited rattan collection from within the park [BWNP] (Jafar, a senior ranger).

#### Box 8.4 Rattan and its economic importance for Indonesia

Rattan, a group of spiky climbing plants belonging to the palm family (Palmae or Arecaceae), grows mostly in tropical forests in a wide range of altitudes, soil, and climatic conditions, from lowland to mountain forests (Dransfield & Manokaran 1994). Each plant can have a single or multiple (clump) stems that can grow to 100 m long. Its leaves, whip-like branches, and stems are covered with thorns, spines, hairs, and bristles which enable them to anchor on and climb all over nearby trees. This makes harvesting of rattan an arduous job, which involves cutting the cane at ground level and disentangling the canes from other climbing plants off the host tree(s) (Figure 8.4). Once the long canes are cleaned and cut into transportable and saleable lengths, they are bundled together and dragged or rafted out of the forest.

Throughout Asia and Africa, rattan is an essential part of everyday life for both rural and urban people. The lexicon of local uses of rattan is very well documented from the 16th century though the development of the rattan-based furniture industry began only in the 1920s (Heyne 1926, Burkill 1935, Brown 1941-43, and Corner in Dransfield 1979). Because of its strength, elasticity, and lightness rattan stems (canes) are used in whole round form for furniture, while rattan splits, peels, and cores are used for making a wide range of products, from binding materials in house or boat constructions to a wide variety of household tools. Moreover, in rural areas rattan leaves are used for thatching, the young ones can be consumed as a vegetable, and fruits of certain species can also be consumed or used as medicine, dye, or varnish (Clayton & Milner-Gulland 2002).

Rattan has been extracted from Sulawesi for export since the 1920s, between 10,000 and 21,000 tons

annually (Dransfield & Manokaran 1994; Sunderland & Dransfield 2002). Indeed, van de Koppel (1928 cited in Whitten et al. 1987) voiced a concern about the rapid exploitation of rattan canes in almost all of the island's forest.

The collection and processing of rattan provide a source of income for forest communities (Dransfield & Manokaran 1994) and the manufacturing and trade of rattan furniture provide employment for thousands of people in the cities (Belcher et al. 2000). Most of rattan supply (85%) comes from natural forests of Sumatra, Kalimantan and Sulawesi (DeBeer & McDermott 1989) and only a small portion (15%) comes from rattan gardens in South Kalimantan. The latter was developed in the 1970s, and provides an important source of income for many villages in the region (Belcher et al. 2000).

As the main supplier of raw materials for the rattan industry Indonesia earned US\$15 million annually in the 1970s. Hong Kong's export value, which further processed the rattan from Indonesia in 1977 was US\$68 million (Sastry 2002; Silitonga 2002). By 1985 the value of Indonesia's rattan export had increased 250-fold (Manokaran 1990). In 1989, the Indonesian government banned the export of unprocessed rattan to stimulate the domestic rattan-processing industry. The export of rattan products was heavily regulated by a cartel, led by one of Indonesia's politically well-connected timber tycoons, Bob Hassan, through ASMINDO. It did so by applying a quota system, imposing export restrictions, and extracting export fees for exporters. This devastated the local processing industry and encouraged smuggling. Consequently, in 1991 the export of rattan carpet (*lampit*), for example, dropped to approximately 10% of the amount exported in 1990 (de Jong et al. 2003).

Respondents were very concerned about the economic and ecological sustainability of rattan extraction. Detailed studies in Central Sulawesi and East Kalimantan are provided, among others in Dransfield and Manokaran (1994) and Belcher et al. (1989, 1993, 2004, 2005). Siebert (2004) claimed that rattan can potentially be a sustainable form of extractive activity as long as collectors pull the thorny canes, leaving the stump intact to regenerate and it is collected on a small scale. He emphasised that rattan is available all year around. This has several advantages, both ecologically and in socio-economic terms. Some economically valuable rattan species produce many canes that are capable of vegetative reproduction. Further, since rattan is often collected by the poorest, who lack access to other economic resources, they can gain income when labour demands in other agricultural activities are low. A study of rattan in the Paguyaman watershed in the early 2000s found that the area is a major source of rattan in northern Sulawesi (Clayton & Milner-Gulland 2002) and that the species diversity in rattan populations was high, especially in the less exploited parts of the

forests. However, limited biological information (e.g., species diversity, distribution, and abundance) on rattan made it difficult to determine the sustainability of rattan harvesting. The study also found that in the mid-1980s, the rattan industry here experienced rapid growth, with an annual production of 15,000 tons (BPS North Sulawesi, in Clayton & Milner-Gulland 2002). It represented the largest and most developed industry based on natural forest in this province. However, since the post-1997 crisis rattan extraction has decreased; many of the collectors turned to gold mining due to the increase in the price of gold (ibid) (see Section 8.2.5).

### *Wildlife hunting*

Gorontalo's wildlife has been subjected to long-term intensive harvesting. As reviewed in Chapter 2, almost all the mammal species of Sulawesi are limited in their distribution to this biogeographic region. Their populations were once abundant, as their forest habitats were less disturbed. The human population in the region (i.e., their level of consumption) was also much lower while access (e.g., roads and other means of transporting or selling the hunted animals) was more limited (Clayton & Milner-Gulland 2000; Lee 2000; Robinson & Bennett 2000). However, hunting pressures for both subsistence and sale, specifically on the iconic species *babi rusa* and *anoa* as sources of meat, and *maleo* bird for their eggs, have resulted in a marked decline or endangered their populations (see Chapter 6). Long-term studies found other species of mammals, such as wild pigs (*babi hutan*), deer, macaques, bats, civets, cuscuses, rats, squirrels, tarsiers and many species of birds have suffered a similar fate (Lee et al. 2005).

Twenty-two respondents who identified hunting as a threat to forest diversity acknowledged that it was, and still is, common throughout Sulawesi. As in the case of rattan noted earlier, the local people felt they had a traditional right to the wildlife, which was considered their own as a source of meat. Respondents stated that in addition to hunting, the decline in local wildlife populations was caused by the reduction or conversion of the forest ecosystems where most of them are found. Consequently, their distribution is now limited to PAs, where extractive activities are supposedly restricted. Examples of respondents' observations below illustrate the long-term change in local wildlife.

When I was a child growing up in Paguyaman Pante [a subdistrict of Boalemo], I used to see deer crossing the road. My parents often bought dried deer meat to take home because the deer population was abundant. In the dry season it was even easier to see them, but this does not happen any more. It is the same with other wildlife, which was easier to see near the villages there, but it is increasingly more difficult to see them because their population has declined, some perhaps have even become extinct or have moved to a safer place. As the rate of forest degradation increased since 1985, in my view, this must have affected the wildlife as well. But I am not sure about this as there is no research on this matter (Jusa, a government official).

The *alang-alang* grasslands in the Kwandang area are where wild pigs and deer used to be found. They have been hunted for years and now that people burn these grasslands, build working huts, and farm the land with ground-nuts, these animals have gone further into the forest because they cannot find food any more (Warno, a law enforcer).

In addition, respondents commented on cultural factors that influence the hunting of local wildlife. For example, in some ceremonies *maleo* eggs used to be one of the wedding gifts from the groom to his bride (interview with Ibra 25/11/2005, and Kamis 29/11/2005) particularly in Kotamobagu (the north-eastern side of BWNP). It appeared also that their choice of hunted species, for subsistence or sale, was also determined by Islamic religious constraints, as respondents commented below:

Unlike the Javanese, who have a strong culture of keeping birds in cages, we do not have this tradition of keeping or selling wildlife as pets. We just eat the meat of *anoa*! (Lisda, a community development activist).

In Sumalata [BWNP] area, many people still sell *maleo* eggs. I know that the bird species is legally protected but people felt that it is okay to sell the eggs. I have eaten this huge egg in the past; it can feed five people. But now it is more difficult to get them because I heard that the bird is declining quickly (Sole, a planner).

People do not use guns for hunting, instead they use traps for wild pigs and *anoa*. While *anoa* meat is for people's own consumption, the meat of *babi rusa* and wild pigs is usually for sale, mainly to Manado (Kepes, a community leader in a village near Nantu).

As these respondents indicated, the primary players in wildlife hunting used to be local communities, who trapped or snared wild pigs or *anoa*. Being a predominantly Muslim society, only species whose consumption is not constrained by the Islamic belief system were hunted. This made other species (e.g., wild pigs and the *babi rusa*) which under Islamic teachings are prohibited for consumption, safer from hunting. More recently, however, increased demands for wild meat and the buying power of the Christian Minahasan people (see Chapter 4), have put pressure on these species as well, as the following respondent pointed out:

Shifting cultivators have also been involved in reducing the population of wildlife here. They work with hunters/poachers and wildlife traders, who generally come in a large group of 20 people from Minahasa [North Sulawesi]. The traders are very well organised. They come regularly with pickup trucks, take the meat and sell it as roasted meat to North Sulawesi. Hunters usually work with local people, who helped in setting traps and snares in the forest to catch wild pigs and the *babi rusa*. Because the locals in general are Muslims, they do not want to take money in return for the pigs they catch. For people who seriously adhere to Islamic teaching, they just give the trapped pigs to traders. Others, however, are happy to trade the pigs for anything on offer, such as agricultural tools or foodstuffs. Swidden farmers also trap wild pigs because they raid the food crops (Warno, a law enforcer).

This observation was confirmed by long-term studies in northern Sulawesi, which found that monkeys, bats, and rodents were more abundant in the forests in the southern part of Sulawesi due to less pressure from hunting (Clayton & Milner-Gulland 2000; Lee 2000; O'Brien & Kinnaird 2000). By contrast, in the North Sulawesi province, where there is no religious constraint on wild meat consumption, wildlife hunting was extensive. This led to over-exploitation and extirpation of some mammal species, such as *anoa* and *babi rusa* from the once most well-known productive hunting sites in the Tangkoko Duasudara Nature Reserve (Lee et al. 2005). Consequently, wild meat started to be supplied from the neighbouring regions, including Gorontalo, and the range of species hunted there widened. Indeed, a study of the wildlife trade showed that 64% of traded wildlife in six main markets in Manado originated from Gorontalo. The trade in wildlife also increased significantly after the construction of the Trans-Sulawesi highway was completed in the early 1980s (Milner-Gulland & Clayton 2002; O'Brien & Kinnaird 2000) with large bats (66%) and wild pigs (29%) as the most frequently traded species; the rest included *babi rusa*, macaques, cuscuses, and civets (Lee et al. 2005).

These findings have led Sulawesi's wildlife experts to believe that wildlife hunting in the region is unsustainable on the grounds of biophysical and socio-cultural factors. Although several respondents noted the reduction in the use of wildlife, such as *maleo* eggs, in traditional ceremonies, the increased demands for wild meat for the North Sulawesi markets is much greater and will continue to increase. Currently, wild pigs are not protected, but

uncontrolled hunting will affect their population in the wild, which in the long term will affect forest dynamics due to their role in seed dispersal (Clayton & Milner-Gulland 2000). As respondents noted, rural communities' greater involvement with wider economic systems has increased the range of species hunted for trade. Moreover, advancements in technology (e.g., better roads and access to previously remote parts of forest through motor boats or motorbikes) have intensified the hunting pressures locally. In particular, the increasing human population throughout Sulawesi, and indeed in Gorontalo, means that demands for wild meat will increase while the supply of meat from livestock remains limited (BPS Gorontalo 2003, 2006; Clayton et al. 2007).

While the extraction of timber and rattan, and the hunting of wildlife described above were perceived as reducing their population, the three activities discussed in the next sections were considered a threat because they physically alter the forest ecosystem, through reduction, fragmentation, or complete conversion to other uses.

### 8.1.3 Shifting agriculture

Respondents who discussed this land cultivation system (see Box 8.5) acknowledged it as a traditional and legitimate way for rural people to acquire new land on the forest periphery for subsistence. As noted in Chapter 4, when large-scale logging and the government-sponsored transmigration programme began in Gorontalo in the 1970s, the traditional farming system was officially regarded as unsustainable. This was partly due to rising population densities, eroding traditional regulations because the farmers were in closer contact with the outside world (Geertz 1963; Whitten 1987), and the commonly negative reaction by government officials to shifting agriculture (Dove 1983, 1985).

Moreover, in the late 1980s, when large areas of natural forest were declared PAs for biodiversity conservation purposes, local communities' legal access to these forests and their resources was essentially removed. The formerly legitimate system was officially labelled as encroachment (*perambahan hutan*) (Wrangham 2002), or illegal occupation of state forested land (*okupasi lahan*). Indeed, most respondents used these terms and 'shifting agriculture' (*peladangan berpindah*) to denote land use which is environmentally unsustainable and a threat to forest ecosystems. Since no empirical evidence of sustainable swidden agriculture (see Box 8.5) is found in Gorontalo, this thesis uses the term 'shifting agriculture' to translate the activities described by the respondents. In fact, Whitten et al. (1987) believed that swidden agriculture in its true meaning has virtually disappeared from Sulawesi. For example, only a very small percentage of its population is still involved in one isolated area, such as the Lauje people in the slopes of Mt. Ogoamas, Donggala in Central Sulawesi (Li 1999).

Gorontalo's narrow lowland is under intensive cultivation (see Chapter 4). According to Rasid (a traditional leader) this land use system is generally maize-based (*ladang milu*), planted in combination with food and cash crops, such as coconuts and cloves. More recently cacao and cloves have been planted as well. Respondents' concerns about this system were largely due to its perceived impacts on the forest ecosystems and local biodiversity (*italicised for emphasis*), as illustrated below:

The problem we have here is that people clear forest on *steep land* that is prone to soil erosion because they do not have land to work on. Generally, the cultivation is viable for only 3-4 harvests *but the nearby rivers suffer high sedimentation*. At the same time the population is growing while the available land is very limited; what is left is increasingly being reduced as a result of encroachment. As a ranger I have to understand this situation, it is not that we don't allow these people to work on this land, but we have to

implement the regulations. But when the encroachment area is large, like a whole village, it is difficult to deal with as we don't have an effective method to help them and I know that they do what they do because they have to eat (Kamis, a ranger).

When clearing land, a few people usually make a plot of 2-3 ha [dry-land or *ladang*]. They burn the vegetation because it is the cheapest and quickest way to clear a patch of forest and also because they have no means of transporting logs to sell them. While small trees and bushes are easier to burn, they simply pour kerosene under the big trees then leave them to die, as they have no means of using tools like chainsaws to cut them. Once the land is cleared, they typically plant maize and chilli peppers mainly for their own consumption though the latter is usually for sale because they fetch a good price and generate income. These short-season crops are more rewarding for swidden farmers because they bring harvest and cash income in a shorter time than, say, cacao trees (Jusa, a government official).

Once the part of the cultivated *ladang* is harvested it is usually left to regenerate naturally, grow wild, or become scrub or secondary forest with some timber trees of poor(er) quality, only useful as fuel wood. Despite the poor soil quality, plants grow very quickly and are very difficult to control. This regeneration can take place over a period of 5 to 6 years and when farmers return to this original plot, the soil has become fertile again. Whenever this is possible farmers will return and dry-land rice usually grows well, maybe for 5-6 harvests. Some of the steep slopes are also good for planting dry-land rice (Midas, a former transmigrant who is now in the forest product trade business).



**Figure 8.5** Burning as the main method of forest clearance to grow food crops in Gorontalo (left) and maize cultivation on a steep sloping land (right).

Respondents reasoned that encroachment into PAs occurs because they contain economically valuable timber and wildlife. For example, in Tambo village near the BWNP, the scale of encroachment in a particular year involved 21 people who burned 51 ha of forest to make way for cultivation (interview with Barat, a retired resource manager, 29/11/2005).

According to Samsu (a journalist) the Panua Reserve is particularly vulnerable to encroachment because the Trans-Sulawesi road cuts through its southern part, which is densely populated. He said that encroachers enter it from any direction, reaching as far as 500 m from the main road. Timu (a forestry official) also commented that despite Gorontalo's relatively small population, the level of land occupation is very high. He estimated that 70% to 80% of the problems associated with the management of Gorontalo's PAs and protected forest (*hutan lindung*), are due to encroachment, as illustrated below:

The forest in Dulupi village [in Boalemo] is under watershed protection, but some of it has been cultivated illegally by local communities (Iban, a government official).

In the Bone Pante area [in Bone Bolango District to the east of Gorontalo city] some farmers live in a lowland area but they work on land further up where they build working huts. Then, when they think the productivity of the land they are working on is declining, they abandon the land and move on elsewhere. We found a lot of these during a base-line survey I was involved in (Jusa, a government official).

### Box 8.5 Shifting agriculture: a friend or foe for biodiversity conservation?

The term 'shifting cultivation' or 'shifting agriculture' – a traditional agricultural system that occurs in or around tropical forest – is often used collectively to represent a continuum of farming systems, from sustainable 'swidden farming' (involving rotation of cultivated plots of land and long-term fallow to allow forest regeneration) to 'slash-and-burn agriculture' (often practised without social and cultural restraints with little regard to long-term sustainability of the forests) (Robinson & Bennett 2000).

In the early 1980s about 300 million people practised this land use on about half of the land in the tropics (Angelsen 1995; Dove 1983; Dove 1985; Dove 1987; MacKinnon et al. 1996; Monk et al. 1997; Whitten et al. 1984; Whitten et al. 1987; Whitten et al. 1996). It is still a common practice in most of the outer islands of Indonesia. All systems within this continuum, except swidden agriculture in its purest sense, cause varying degrees of damage to the environment (Whitten et al. 1987). The economic and ecological sustainability of this system was much debated in the 1980s, when it tended to be denigrated as a wasteful and destructive use of forests. However, Dove (1983) refuted the widely accepted myths surrounding this system. He convincingly argued, based on long-term studies of several swidden communities in Indonesia, that this system is sustainable in both economic and ecological terms. It can support an average of 25 people per square kilometre (Dove 1983). Moreover, contrary to common belief, subsistence swidden farmers are not isolated from the wider economy; they are engaged in and well integrated with the outside world through the production of cash crops as well.

Other studies also showed that they are rational and sophisticated users of their natural environment (Dove 1985; Padoch 1988 in MacKinnon et al. 1996). However, the sustainability depends on the type of crops they cultivate (subsistence vs. cash crops), the effectiveness of cultural restraints (Geertz 1963; Kartawinata et al. 1984 in MacKinnon et al. 1996), and low human population density (Dove 1985). It is ecologically sustainable due to the high species diversity of cultivated plants, varied vegetation cover

on the land, and the fact trees can research and education-establish and soil nutrition be replenished because the cultivated part of the plot is small (Dove 1985).

Despite these findings, misconceptions about this system prevail (Dove 1983). Government officials and those of national and international NGOs regarded it as a destructive and wasteful use of forest land and resources (Whitten et al. 1987) and it is deemed (as this research shows) a major cause of deforestation. However, the figures that show the size of forest cleared varies widely (ranging from less than 300,000 ha to 1.3 million ha per year) with a high uncertainty about its impact on the forest environment. For example, in its 1990 report, the World Bank identified shifting cultivators as contributing 50% of deforestation in the 1980s. However, a detailed critique to this report resulted in a more acceptable estimate of 21% with the rest from large-scale government-sponsored development programmes (e.g., commercial logging, mining, and transmigration settlements) (Sunderlin & Resosudarmo 1996).

Recognising a significant overlap between officially designated forest land (in all categories) and the existence of local communities, some of which have occupied the same land since well before the establishment of the current Ministry of Forestry, the position of international development organisations has shifted significantly. The 1994 World Bank report explicitly acknowledged the uncertainties surrounding the number of shifting cultivators and their role in increasing the rate of deforestation and affirmed that many of their communities have developed highly sophisticated and quite sustainable management systems, which actually help to protect biological diversity (World Bank 1994).

Nevertheless, prevailing misconceptions have led to government policy that encourages a transition from shifting to sedentary agriculture. So far many forestry and agricultural analysts believe that most of these attempts have not been very successful (Atal 1984 in Angelsen 1995, Hayes 1997). The reasons for this failure include an inadequate understanding of the logic of shifting cultivation and factors influencing farmers' decision making (Angelsen 1995).

Finally, evidence of forest clearance can be seen in some hamlets along the Boalemo side of the Paguyaman River towards the Nantu forest (Figure 8.5). The clearing of mangrove forests is also common to make way for establishing commercial fish or shrimp ponds along the coastal road of Boalemo District; fallen trees and big trunks are left to rot along the mangrove areas (field notes, 7/9/2005).

Respondents' remarks above implied that poor landless villagers bordering PAs are the main players in shifting agriculture. However, others pointed out the involvement of land speculators, who work behind the encroachers. The former typically obtain land by lending capital to the latter and marketing their agricultural products and timber. Once the land is cleared, they buy the land cheaply. Respondents also believed that the local forestry offices themselves are part of this system, through issuing community logging permits (see Section 8.2.1). They showed the multiple players in this activity have made it very difficult to deal with:

The government has tried to solve the encroachment problem, for example through local transmigration projects. But it is not uncommon that before the year's end, the transmigrants moved out and searched for new land again, cutting more forest to plant more crops. They get good crops for the first few years, but because they plant maize the soil nutrients get exhausted very quickly (Ibra, traditional leader).

Shifting cultivators move around because the land will produce less over time, and if they stay in the same plot, they cannot produce their food crops. Sometimes this practice opens up an opportunity for people who get benefits from getting the timber (Abdul, a radio journalist).

I came to Gorontalo as a transmigrant in the early 1980s. I started clearing the periphery of Nantu forest [now Pangahu village] to expand my allocated plot to grow maize. I worked very hard on the land but also built a good network with local traders. They lent me some capital to establish myself. Now I own about 50 ha of land and I rear goats and cows as well (Mahar, a trader in forest products).

Because of the method for forest clearing, all 32 of the 54 respondents who discussed this topic regarded shifting agriculture as unsustainable for many reasons. Economically, the yields are generally low. It was perceived as inefficient and ecologically destructive, primarily due to the cultivators' lack of awareness about land suitability (interview with Beruga, a planner, 24/11/2005). Further, because shifting cultivators move around they increase the area of critical land, aggravate the soil erosion problem, and increase the hazard of escaping fires. The changes in vegetation structure due to the removal of timber also alter the habitat of wildlife or reduce their populations. The following quotes illustrate respondents' views (*italicised for emphasis*):

How much longer can this type of land use be sustained, because the farmers keep on moving? The forest is shrinking because *those who cleared the forest never replant it!* My colleagues at a local community development NGO have been working with two pilot projects in Toidito. They encourage more sedentary agriculture so that they can look after the soil better (Lisda, a community development activist).

Shifting agriculture is destructive *because farmers cultivate steep sloping land (20%-40% gradient) without terracing to access new land relatively richer in nutrients; then they move after the second or third harvest, leaving their hut behind* (Dani, an activist from a local community development NGO).

Based on the critical land data there has been an increase in encroachment activities in the upland of the [Bone Bolango] catchments. This has increased soil erosion and caused more frequent floods *because the loss of vegetation cover in catchment areas, from logging and shifting agriculture, makes them less able to retain rainwater* (Samat, a resource manager).

Shifting agriculture caused *soil erosion and silting damage to mangroves* and nearby coral reefs in southern and northern coasts of Boalemo (Dote, a planner).

Only three respondents argued that the system is economically productive; farmers are knowledgeable about their farming practice, and the diversity of crops they grow gives them the highest economic return (see Box 8.5). They also underlined its less destructive impact on the forest environment than large-scale logging. However, they recognised that local demographic changes and lack of application of appropriate technologies have made it less sustainable. They said:

The farmers know about soil fertility for cultivation of food crops. They also plant other cash crops, such as coconut, clove or nutmeg trees. This means that the forest environment is given an opportunity to recover through the trees. They move around for a good reason, they know that it is not economically profitable to stay on the same plot as the soil fertility declines over time (Rasid, a traditional leader).

Swidden agriculture is actually sustainable because farmers allow forest regeneration to take place; they will return in later years to the same cleared plot. The scale of degradation is much smaller than that created by decision-makers, such as converting forest to large-scale plantations. The forestry agency has set a bench mark that when 20% of the forested area is destroyed, it is regarded as critical land, but when you look at the scale of damage caused by shifting agriculture, it is much smaller (Aton, an educator).

In the past shifting agriculture was not a problem but now as the population increases, there is very little improvement to this traditional method of land cultivation, making it less sustainable (Hamsah, a senior resource manager).

Abandoned land resulting from shifting cultivation in Gorontalo can potentially regenerate, if sufficient time is given, through tree-based agroforestry systems. However, among other socio-political problems that will be discussed in Section 8.3, the uncertainty of rights to land and resources was seen as one of the major hindrance for tree-based farming systems.

#### 8.1.4 Local Development Projects

All local development activities that respondents discussed under this topic were conducted in line with the political changes that took place in Gorontalo through the implementation of the RAL in the early 2000s (see Chapter 2). This section focuses on agricultural intensification, locally known as *agropolitan*, and physical infrastructure projects that were perceived as threatening the PAs and other major ecosystems.

##### *The agropolitan programme*

As noted in Chapter 4, Gorontalo's economy is primarily based on dry-land farming for the production of maize and other grains; it is supported by small-scale coconut plantations and the coastal fishery. The *agropolitan* is one of the province's three priority programmes (the other two being development of human resources and of the fishery industry). Many respondents believed that it brought about dramatic shifts in maize production, from extensive multiple varieties for local consumption to an intensive production of a single high-yielding variety and from small- to large-scale production for export purposes.

To achieve its objectives, the provincial government works with a giant agricultural company to provide some of the agricultural inputs (interview with Roni, a local journalist, 5/9/2005). Jusa (a resource manager) provided the following examples to illustrate these changes:

Traditionally, farmers grow the local maize variety in six long rows: two for their own consumption, two for sharing with their neighbours, and the other two for sale or for trading for spices and other basic food stuffs. They also harvest the crops while they are young, as they like to cook it with the cob (*milu tongkol*) in a porridge-like dish. There were also farmers who specialised in growing the variety of which the stalks and leaves were sold for feeding horses that draw carts - the main means of transportation in rural areas. There were many such 'restaurants for horses' [laughs]. The yield from local maize varieties is indeed much lower than the newly introduced kind. So you can understand that outsiders see it as a suboptimal use of the land. Recently, when the oil price increased, the need for horse feed also increased. The production of maize, particularly for export, was considered a quick way to improve farmers' well-being but I heard rumours that one of our leaders has a large share in a livestock feed factory outside Gorontalo. So, perhaps increased production from here is to secure the supply of its raw materials.

Several government officials explained the rationale for making the *agropolitan* a priority programme for socio-economic and ecological reasons. The programme was aggressively promoted to increase the level of maize production (from 2-3 tons/ha/year under the traditional method, to about 7-9 tons/ha/year under *agropolitan*). In 2005, the provincial government set a maize production target of 1 million tons, which means that with the present average maize production of 2-3 tons per hectare, an additional 300,000 ha of land was needed to achieve this goal (interview with Toro, a resource planner, 9/11/2005).

According to Rusdi (an agricultural researcher), as well as boosting the maize production, the *agropolitan* was intended to address the increasing problem of degraded land that was not under cultivation, locally known as 'sleeping land' (*lahan tidur*)<sup>81</sup>, which amounted to 242,000 ha or 24% of the total land area. To this end, the government provides assistance to farmers to grow maize on land currently not cultivated or on critical lands. He argued that targeting this land will have little impact on the forest. He claimed that at present approximately 4,000 ha of critical land have been turned into productive use. Senior government officials justified this programme by explaining that:

This programme is done in stages. The first one, for 2002-2003, is to build traditional farmers' hope of a better life and trust because they have lost trust in the government. We told them to grow crops but we left them alone to market their produce. Through this programme, in 2004 we started to improve the farming system by encouraging them to intensify their crop production. We help them by giving chemical fertilisers and seeds; they are now used to it. But when they see that the steep-sloping land is also good for maize growing, it is very difficult to stop them moving up like that (Gani).

The *agropolitan* programme has many advantages. First, the hybrid variety grows faster and the yield is higher; 5-9 tons per hectare instead of 2 tons per hectare from the traditional variety. The government's help in providing fertilisers means that they can cultivate the maize with less work on the soil, simply spraying the plant with it. Most importantly, we help with buying the grain and maintaining the price, which boost farmers' morale to work better (Fahrul).

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<sup>81</sup> In other regions in Indonesia, where shifting cultivation is a common practice, 'sleeping land' is usually forest fallows to allow the vegetation to regenerate and it is an important issue in terms of biodiversity (C. Colfer, pers. comm., 2008) as oppose to the official view of it being a 'wasted land' (Dove, 1983).



**Figure 8.6** The aggressively promoted and highly subsidised *agropolitan* programme to boost Gorontalo’s image as a new province.

In principle, respondents supported this programme because of its economic utility, especially to poor and landless farmers to whom the various subsidies were made available. They also witnessed a considerable increase in the production of maize and improved marketing, particularly for export purposes. Together, the implementation of ‘entrepreneurial governance’ (Fahrul’s words, in an interview on 15/9/2005) has dramatically improved the image of Gorontalo, as it was nationally known as a lagging district. However, several respondents, from both within and outside the government sector, were very concerned about the socio-economic and environmental sustainability of the programme. Many respondents observed serious problems with the distribution of the programme’s socio-economic benefits (interview with Bani, 15/9/2005), abuse of the subsidy (interview with Roni, 5/9/2005), and the farmers’ increased dependence on government handouts with no improvement in their institutional capacity (interviews with Sole 12/9/2005). Many observed environmental problems with soil and reduced food crop diversity, as illustrated below:

Everyone is told to plant maize, everywhere, except under our bed or the land on which our houses stand. We prefer to eat our local variety, so we grow maize for both our own consumption and for sale, but we are losing other varieties of staple food, like sweet potatoes, *talas*, and *singkong* (lbra, a traditional leader).

Once the subsidy ceases, farmers won’t be able to deal with soil compaction problems because of the continued use of chemical fertilisers. The fertiliser overdose can also kill the plants and poison the soil, as happened in China. Without incorporating soil conservation measures I think this programme is unsustainable because maize exhausts soil nutrients very quickly; its fine and short roots do not hold soil, especially in steep-sloping land (Ardo, a local environmental activist).

The most common measure of success in this programme is through increased yield. However, its impacts on the soil are not considered. People do not see the links with the sedimentation problem in Lake Limboto and in the silting of Gorontalo harbour (Bobi, a resource manager).

For these reasons, respondents highlighted the need for agriculture, plantations, and forestry agencies to improve their collaboration in the intensification of productive land that simultaneously develops tree-based crops in marginal land to prevent soil erosion. For this to happen, they underlined the need to revitalise some extension programmes, specifically in

villages in the vicinity of the PAs (interview with Rizal, 13/9/2005), with the planting of multi-purposes species.

#### *Local physical infrastructure projects*

As a new province, several physical infrastructure projects were constructed to support its socio-economic development. According to Beruga (a planner), despite the existence of a spatial planning system to guide the implementation of these projects at the provincial and district levels, it is not uncommon that development plans have often led to the alteration of the spatial plan. This section provides a few examples of such projects which included the construction of government buildings associated with the creation of new districts, roads through a protected area, and transmigration sites. According to 28 respondents, all these were perceived as having negative impacts on PAs. For example, respondents remarked that the creation of new districts was purely for political reasons without proper regard to local conditions:

When building an administration centre for the new district, the contractors bought local timber taken from the BWNP. We confiscated the timber on one Friday morning and then took it to the local forestry office. But on the same day, the contractor collected the timber from there. The district head told me to keep quiet that he allowed this for 'development' in the district. Well, at least I have let him know that the timber used was stolen from the park (Barat, a resource manager).

Moreover, some observed that behind the mask of timber exploitation to meet this local need, large quantities of timber are transported to other regions (see Section 8.2.1). Others underlined that while the need for construction timber is great, there is no legal supply for it.

Other examples of controversial infrastructure projects were the construction of the Pangea transmigration site (Box 8.6) and a road to Pinogu village (Box 8.7). As reviewed in Chapter 4, Gorontalo has been one of the transmigration destinations in Sulawesi since the 1970s. This state-funded project, which typically involved clearing of natural forests for both settlement and associated agricultural development, was administered by the Department of Transmigration (Dick 1991). About these projects, Beruga (a planner) remarked:

The Pangea transmigration project and the plan to open the road to connect Tapa and Atinggola, which cuts through the BWNP for about 6 kilometres, showed that our government undermines the importance of forest. The road would have shortened the Manado-Gorontalo route, but it would have negative impacts on the park. The local research and development agency insisted on strict requirements should this plan go ahead, but the plan to build this road was aborted in the end. Two other examples were the plans to built fishery harbours in Kwandang and Anggrek, both would involve drainage of extensive mangrove forests.

Indeed, according to Herry (a planner) the town of Marisa (capital of Pohuwato District) that borders the Panua Reserve, the Paguyaman sub-district near Nantu (of Boalemo District), and Suwawa (the capital town of Bone Bolango District) were developed through transmigration projects. Here is how he highlighted some of the problems associated with the site selection:

In the coastal town of Marisa, the site selected was at a high altitude although there were empty lands at lower altitude. This was because the price of state-owned land was cheap, so there was almost no compensation to be paid for the land. Also, when formerly forested land was cleared, the developer benefited from the timber they cut during the forest clearance.

Respondents' views about the controversies surrounding the infrastructure projects underlined the problems of poor governance and inter-agency co-ordination that reflect a classic conflict between development and conservation efforts. With the exception of the road to Pinogu, the transmigration projects and the *agropolitan* programme typically occur in the

periphery of PAs. Another local activity that occurs deep within PAs is gold mining, discussed in the final section.

**Box 8.6 The construction of Pangea settlement: a conservation and development conflict**

The Pangea 1 settlement project was to build 200 houses for a transmigration project (70% from Java and the rest from the local region) in 2003. The site was selected in co-ordination with the newly created Boalemo District, which welcomed the project. The chosen site was not a protected forest although it is located immediately to the west of the NWS. More importantly, the district benefits from the associated road development, a health centre, and a local market for the isolated neighbouring villages, all of which are funded by the central government. Moreover, as in any other government projects, Boalemo received 10% of the project budget (interview with Rasid, 23/9/2005).

However, the leaders of the District of Gorontalo, where the NWS is located, were not consulted (Toro, 9/9/2005). They strongly protested the plan but the project went ahead. During the construction phase the developer didn't coordinate with Boalemo's planning agency. Later on, when the construction was completed it was discovered that the site was not constructed on the specified site in the approved plan. It was also revealed that one of the reasons for the change of site was inadequate timber in the specified site. It was assumed that the timber was to be taken from the clearance of nearby forests; hence it was not included in the project budget.

So they moved to a different site where timber was available (interview with Dote, 7/9/2005).

The NFCP, with strong support from important community figures in Gorontalo District, continued its protest, demanding the transmigration project be stopped (interview with Rizal, 13/9/2005) in order to prevent encroachment into Nantu forest. This was primarily because of the existing tradition of shifting agriculture, given the limited capacity for enforcing conservation laws. Many respondents believed that it would be a serious threat to Nantu. During this conflict, the number of forest guards on patrol was tripled because some of the houses had been illegally inhabited but most were still vacant (Serau, 6/9/2005). At the time of research, many of the houses had deteriorated (field notes, 5/12/2005).

Boalemo's officials were outraged by this, particularly because the Ministry of Forestry (MoF) kept pressuring for relocation. The conflict between the Ministry of Transmigration and the Ministry of Forestry went on for several months without a satisfactory solution. In the end it was suggested that the closest row of houses, directly opposite the research station/Adudu mud-pool, be used as a patrolling post for Nantu's rangers, and two new transmigration sites were constructed at the boundary of BWNP.

As discussed in Section 8.2, the construction of the Trans-Sulawesi road has facilitated the increased trade in wildlife. As it cuts through the Panua reserve, it encouraged development of settlements (and inevitable encroachment into the reserve). In Nantu, the construction of a logging road in the 1980s made access to it easier. An examination of 150 models of deforestation around the globe concluded that road building has a stronger impact in regions dominated by commercial agriculture with better soil quality than in marginal land inhabited by small-scale farmers who practise shifting cultivation (Contreras-Hermosilla 2000; Whitten 1987).

While road construction can be a plausible cause of forest loss, it can be argued that frequently it is a result of a desire on the part of a politically powerful group to deforest and benefit from the timber. This can be seen in the case of the construction of Pangea settlement. As respondents indicated in Section 8.2.3, the expansion of the sugar plantations and the construction of roads for transporting sugar cane in Mohyolo in the 1990s increased the land value around it. This led many villagers to sell their land to the plantations and they moved farther into the forest frontier of Pangahu. Finally, during the field work of this research Pangahu villagers were actively lobbying the local government to build a road to Nantu to

facilitate eco-tourism development there (interview with Araz, 6/9/2005). To date there has been no response from the district government.

### Box 8.7 The road to Pinogu

The Pinogu village, with a population of approximately 4,000 people, is an enclave within the BWNP. It existed before the park was established in 1991. The villagers are known for their environmentally sound traditional farming system. In 2000 the village requested an access road to help market its agricultural products. During the local election of a district head they were promised this road. However, the park authority refused it on the grounds that the proposed 40 kilometre road would cut through the park and would open access to the resources within it (interview with Sole, 12/9/2005).

The case was brought to the MoF, who later issued a permission to build a basic access road for motorbikes only, with strict requirements to mini-

mise disturbance to the forest ecosystems (interview Araf, 8/9/2005). However, the contractors did not comply with the site specifications; many big trees were cut to make way for a much wider road (6-7 metres). Consequently, a huge and well supported protest exploded, led by the local environmental NGOs. They sued the district head for non-compliance with the specified construction requirements. Supporters of the road project, on the other hand, accused the NGOs and the BWNP of favouring animal protection rather than the needs of the Pinogu villagers (interview with Jola, 8/9/2005). The lengthy court process ended with the imprisonment of an NGO director on the grounds of defamation of government officials (interviews with Aton, 3/9/2005).

### 8.1.5 Small-scale gold mining

Traditional gold-mining or panning is another common small-scale activity that occurs throughout Indonesia (Erman 2005). In gold-rich Sulawesi island, it started in the pre-independence period and continues today in North Sulawesi, typically on the immediate borders of large-scale mining concessions (Kambey et al. 2001a). Respondents in this research stated that the forests of Panua Reserve and Bogani Nani Wartabone National Park respectively have been known to have rich gold deposits.

Like the term ‘illegal logging’, ‘illegal mining’ (*penambangan liar*) began during the New Order period (see Chapter 2). *Penambangan liar* refers to small-scale mining activities that are undertaken without official licences, use traditional methods, rely on manual labour, and have little regard to health and safety considerations to protect human and environmental health (James 1994; Kambey et al. 2001b; Limbong et al. 2003). The popular official Indonesian acronym, ‘PETI’ (*penambangan tanpa ijin*) or mining without licence, appeared in the post-Suharto era. Unlike the earlier term, which was limited to small-scale operations, the latter also includes legal mining companies that carry out illegal practices, such as mining outside their concession areas.

According to 19 respondents, mining of minerals other than gold, such as sand, stone, and corals, has occurred for generations in Gorontalo. However, since no legal large-scale gold mining in Gorontalo officially exists, in this chapter PETI refers to gold panning only. It is perceived as degrading the forest and river ecosystems in Gorontalo, primarily due to the direct removal of forest vegetation and the use and disposal of poisonous chemicals.

Historically, the Panua Reserve and the BWNP have been the main targets for PETI. However, as gold deposits there are considered to be declining, it has recently started in the northern part of Nantu (Clayton et al. 2007). Due to its illegality, it is difficult to ascertain the

extent of PETI. However, as an indication, PETI offers thousands of poor people an important means of livelihood in forest borders where gold deposits are perceived to exist. According to the most official record, the total number of miners throughout Gorontalo is estimated to involve approximately 7,000 miners. They are spread in about 100 pits in three districts (Pohuwato, Gorontalo, and Bone Bolango), covering a total area of 269 ha (Anonymous 2007).

Compared to the other two reserves, PETI has been most intense in Panua because of its long history that pre-dated the establishment of the reserve. For example, in Pohuwato, PETI has been organised under a village co-operative unit (*Koperasi Unit Desa–KUD*) that pays a small fee to the local government. Other places in Gorontalo where PETI is occurring are Sumalata, Bumela, and Bone Pantai in Bone Bolango district (interview with Wanti, a legislator in Gorontalo district, 27/9/2005). It continues to operate despite the issuance of a new regulation that bans the KUD from organising gold mining inside the PA (No. 41 of 1999). Regarding this, Iksan (a senior resource manager) commented:

The local government gets nothing because PETI is illegal. Ironically all the known gold deposits here are located within protected areas, but the Mining and Forestry departments can never sit together to resolve this conflict and find a satisfactory solution, which has perpetuated this illegal activity.

Respondents stated that PETI players are mainly paid labourers, who in the absence of alternative jobs, find this risky work (e.g., in term of health and legality) more attractive than working on subsistence dry-land farming due to the quick cash income from gold (interview with Karina, a legislator in Pohuwato, 2/10/2005). An example of miners' perceptions about PETI is provided below:

We need no permission to search for gold; only in the 1990s when we had to. We mostly work in groups, where members take turns to work for a few months, depending on the amount of digging needed. We dig a hole like a small well until we find a light brown soil underground, called a *rep*, then we dig further following this 'sign'. Once the *rep* has stopped, then we stop digging, sometimes reaching a depth of 100 metres [sic]. We use a blower, and a plastic hose that connects the diggers to give some air. Once we finish with the digging, we cover the mouth of the holes with branches or leaves to prevent other miners from falling in. To be part of a miner group we had to pay Rp 25,000 per person to get a permit from the KUD. It has been more difficult to find gold nowadays. I don't know, it is our fate or perhaps God has stopped giving us this gold. When found gold, it gives a lot of money quickly (Masni, a miner).

As in other extractive activities described in previous sections, there are other actors in illegal gold mining, which leads to difficulties in enforcing conservation laws against it. The following are some examples:

The miners feel that in their risky job, the government does not contribute anything to their well-being so they just do it at their own risk. The absence of local government regulation has led the fittest and strongest to survive. Some local leaders themselves own *tromol* [see Box 8.8] or act as *cukong*. These leaders were elected because of their economic status, not for their skills and ability to represent their people. Therefore, regulating PETI is almost impossible. In fact, as members of the local legislature, they become an internal challenge because they always argue [for the *status quo*] that they are obliged to take care of the miners' needs, but actually they are protecting their own interests. The PETI 'mafia' is very strong here, who benefit the most from PETI (Karina, a legislator in Pohuwato).

We have tried to deal with PETI here but there is a lack of co-operation with other government agencies. We can only deal with the poor miners, not the financially powerful people behind them. The poor miners often complain that the rich are always free. Government officials themselves are involved but they are not affected by the enforcement, so what can we say? (Samsu, a ranger of Panua Reserve).

Why can't we regulate PETI in Pohuwato? Because the people who are behind this lucrative activity will be taxed, and there will be less gain to them. Also if it was made legal, then big companies will be the main players and these local actors would certainly not want that to happen (Asrul, a journalist).

### Box 8.8 Peasant gold mining and its health and environmental hazards

Peasant gold mining in many regions of Sulawesi typically uses mercury or cyanide, which forms an amalgam with gold, to separate gold from the ore. The processing of the amalgam is undertaken with a low level of technical knowledge and skills and relies mainly on manual labour. In this process, vertical shafts and tunnels are dug manually to a maximum depth of approximately 30 m, where gold-bearing deposits are mined.

Crude assay methods are used to estimate gold recovery and to guide the direction of underground excavation. The ore taken out of these shafts is then packed in sacks and transported, manually or more recently by motorbikes, to a nearby processing plant or sometimes on site, where the ore is crushed and processed further. At this phase, ingenious pebble mills, made of steel drums, known as *tromol*, serve both for gold production and bulk sample assay. The drums are filled with a standard quantity of rock and river cobbles; approximately 30-40 kg of ore are loaded into a *tromol* per batch, and the grinding commences by rotating it manually, to break down the ore to fine sand, thus releasing gold grains. After it has rotated for 3 to 4 hours, it is turned off and 1 kg or more mercury (Hg) is added. Then, the mill is rotated for another half hour for amalgamation, whereby fine gold will attach itself to the Hg. Afterwards, water is channelled through the *tromol* for a period of time in order to pour out the slurry.

The contents of the *tromol* are then dumped into a large basin, and the heavy metal alloy is allowed to settle down to the bottom. Water is again added to remove the slurry, leaving behind the amalgamated Hg through the panning process. This is then collected and placed in a fine-woven cloth, and by twisting the cloth the excess Hg is separated from the amalgam, which remains in the cloth.

Thus, the amalgam still contains Hg. To separate the gold from Hg, the amalgam is then heated in a circular clay pot in order to vaporize the Hg. Borax is added to the burning amalgam to remove impurities from the gold.

Amalgamation is popular in peasant gold mining since it is a simple process and it requires only low investment. The production of gold Hg amalgam through manual manipulation leads to contamination of the environment in several ways: (1) unintentionally, Hg can spill onto the ground; (2) Hg enters water bodies through deposition at normal temperature; and (3) Hg is often discharged together with other wastes into inadequate tailings ponds, or is disposed of directly into rivers and waterways; (4) Hg pollutes the environment during the purifying of the amalgam by burning and vaporized Hg is released into the atmosphere. The Hg pollution problem in the Talawaan Watershed, for example, has generated several potential health threats in the surrounding areas. The immediate health threat of the use of Hg for gold extraction affects those who work or live in areas around processing plants, resulting in skin irritation and over time in insanity, deformities in fetuses, and other problems. Moreover, the disposal of metallic Hg into rivers, which in many rural areas are used for many domestic purposes. Finally, because Hg that is consumed by micro-organisms can bioaccumulate along the food chains, (e.g., in fish and other wildlife), they can attain Hg levels of toxicological concern (e.g., as evident in the Minamata Bay in Japan and in the Buyat Bay in North Sulawesi) that can cause serious brain and skin diseases.

Sources: Anonymous (2007); James (1994); Kambey et al. (2001); and Limbong et al. (2003).

In all of these places PETI typically followed official explorations for large-scale mining operations by the State Mining Company (ANTAM) in the early 1970s. However, none of them materialised due to lack of investors. Nevertheless, the exploration caused the local

people to believe in the existence of gold, which they then mined illegally. Studies of illegal gold mining in North Sulawesi showed that the number of illegal miners soared as a result of the 1997/98 economic crisis. Workers who lost their jobs in other sectors during the extended period of this crisis were absorbed in this sector.<sup>82</sup> In 2001 there were approximately 400 small-scale processing plants in the Talawaan Watershed of the western coast of North Sulawesi province, involving tens of thousands of workers. The depreciation of the Rupiah also made the mining business more lucrative for the locals because the trade in gold was in dollars (Erman 2005; Limbong et al. 2003). As with the case of illegal logging, many *cukong* were willing to provide financial and capital investment because of the high and short-term financial return from gold mining (Erman 2005). This phenomenon is confirmed by several respondents in this current research, who said that PETI in Gorontalo was booming in the late 1990s.

Many respondents acknowledged that PETI has given some rural people the opportunity to improve their economy. For example, Sole (a local planner in Bone Bolango) said that some of them became wealthy quickly. However, as Karina indicated earlier, the distribution of its economic benefit is skewed, while its impacts on the health of local communities and their biophysical environment are very difficult to prevent or mitigate. They expressed a deep concern about the latter, especially as a survey of the level of mercury in the river near Panua showed that it has increased significantly. Many people have had skin irritation problems from using the river water nearby because the rivers provide the main source of freshwater for their daily needs (Chapter 7). However, they are generally not aware of the health risks associated with the use of mercury (see Box 8.8). A government official in Boalemo (interview with Dote, a resource manager in, 7/9/2005) told me that miners and their communities insisted that this pollution problem does not affect their health. Respondents' examples of other environmental impacts of PETI were:

PETI inside protected forests is environmentally destructive and because it is illegal, people are competing among themselves (Hamid, a trader of forest products).

The digging of mining pits destabilises the land because miners not only dig the land but they build huts to live in and work on the land around the mining holes to grow crops as well (Roni, a local journalist).

PETI is a real problem within this national park [BWNP], especially the polluting impact of the hazardous waste, such as cyanide and mercury, which has increased in many rivers. Also, given the hilly terrain, a lot of the forested parts are cut, causing soil erosion. The Bone River [which flows out of BWNP] is the main source of freshwater for the domestic and agricultural need, but the miners do not think about this impact (Muti, a community development activist in Bone Bolango).

In Marisa, many parts of the hills have holes underground because of the mining and whenever rainwater flushes them, it causes flooding of sand and water in the rice fields (Masni, a miner).

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<sup>82</sup> In East Kalimantan the Uma' Jalan Kenyah used to mine gold (in the rivers with gold pans) when there were various economic or climatic crises (C. Colfer, pers. comm. 2008).



**Figure 8.7** *Tromol* – a traditional tool for processing gold ore through amalgamation with mercury (Source: Anonymous 2007).

In response to the pervasiveness of PETI, local government agencies have been pushing for the possibility of underground mining in Panua and the BWNP. They proposed the creation of tunnels from outside the protected areas boundary, which they believed to be a better alternative to the current PETI operations. Indeed, during the interviews for this research, several senior government officials expressed their enthusiasm for the revenue that might be generated from this gold mining, for which there was strong interest from some foreign investors. However, others expressed a deep concern regarding this move, as the following respondents showed:

De facto PETI inside the Panua reserve has been going on for a long time. Its legal status has prevented any development activity within its boundary. The reserve has great potential for local government to generate revenue from timber and gold, if they are regulated. So far PETI generates nothing for the local government and I know there are loopholes in the conservation law that allow mining activity within a protected area and I agree that we must weigh its costs and benefits, both economically and environmentally. I think that if ANTAM operates legally, at least the environmental impact can be reduced and monitored (Johan, a senior planner).

Mining of the gold [within the BWNP] will certainly boost local revenue. The potential environmental impacts may be huge, but if we employ environmentally friendly mining technology, and the two local governments work together [Gorontalo and Bone Bolango Districts], I think we can reduce the negative impacts and local miners will benefit from the employment opportunity (Sole, a planner in Bone Bolango).

I object to the proposal to mine the gold within the BWNP. While the potential economic benefits from this venture are widely publicised, the potential environmental impacts aren't. There might not be immediate environmental problems, but how about in the long run? People only see the potential money that can be generated, but forget the disastrous effect of mining in Buyat [in North Sulawesi] and Free Port [in Papua] (Rizal, a legislator).

Some government officials lobbied for the alteration of boundaries of protected forests to allow large-scale gold mining. This is a very dangerous proposition as it will set a precedent for other protected areas. Unfortunately we can never have a satisfactory discussion about the trade-offs of mining in protected areas, economically and environmentally (Beruga, a planner).

At the time of writing this thesis, little progress had been made in the proposed plans to mine the gold in the two PAs, but PETI continues and has become more widespread. Indeed in the field visit in December 2007, there were more workshops that manufacture and sell *tromol* openly on one of the main roads in Gorontalo city. Several respondents commented that the local invention of *bentor* (see Chapter 4) and easier credit access for buying motorbikes have

facilitated the recent marked increase in PETI in the BWNP (interview with Kamis, 27/11/2007). Increased mobility of people and more convenient ways of transporting traditional *tromol* and other mining equipment (which used to be carried manually) has meant that previously inaccessible areas have become easier to reach. In fact, the increased activity has led some respondents to believe there is a growing ‘mining town’ inside the park (interview with Dani, 6/12/2007).

According to respondents, all of the five local activities described in this section were, on the one hand, perceived to have detrimental effects on forest and other major ecosystems. On the other hand, they showed the importance of the natural forest in providing various goods and services to sustain the well-being of local society, especially those in the PAs’ periphery. Since legal logging supposedly has ceased to operate, cash income (through taxes and license fees) for local government has effectively stopped and that of IPKTM was only short-lived. Officially, all of the activities described above, with the exception of rattan extraction, bring no income for the local government. Nevertheless, they represent an important, albeit meagre, source of income for resident communities who typically lack alternative sources of livelihood. In respondents’ views, these activities persist because of the socio-economic conditions that underpin them (see a summary in Figure 8.2). A good understanding of these conditions is therefore important, as without it these same practices are likely to continue and further endanger the resource base and the economic and social development being pursued.

## 8.2 Perceived Underlying Causes

According to respondents, the main local roots of the direct drivers of forest biodiversity loss included institutional failures (86 respondents), various forms of poverty (37 respondents), poor awareness about the fuller benefits of protected forests (29 respondents), and population growth (21 respondents), which together affect the state of PAs. Table 8.1 shows the summary of respondents’ explanations for each of these reasons. These and their links with a given activity are presented in the following subsections.

**Table 8.1 Perceived root causes of local activities that threaten local forest biodiversity**

Type of local activity (perceived relative strength)	Perceived Root Causes				
	Institutional Failures	Poverty	Lack of awareness	Population growth	Total
1. Illegal logging (55)	36	12	16	11	75
2. Extraction of NTFPs (33)	4	4	2	1	11
3. Shifting agriculture (54)	20	15	10	9	54
4. Local infrastructure projects (46)	18	0	0	0	18
5. Illegal gold mining (22)	8	6	1	0	15
Total number of responses	86	37	29	21	173

### 8.2.1 Institutional failures

The failures of national and local institutions to legally manage production, protection, and conservation of forests, which are typically located close to each other, were the most frequently cited root cause of all the local activities listed in Table 8.1. Respondents at the national level commented that the fundamental problem in the management of Indonesia’s

forests is that the MoF is in charge of both generating revenue from forest resource exploitation and of conservation and rehabilitation (i.e., it has conflicting mandates). While timber exploitation has generated a large portion of the state's revenue (see Chapter 2), the management of vast PAs has been under-resourced and access to resources within them has often been contested, by both local communities and local government. At the local level, some of the institutional failures are reflected in ineffective enforcement of timber production and forest conservation regulations (48 respondents), low capacity to demarcate field boundaries between different forest categories to settle the contested ones (19 respondents), and conflicts between conservation and development policies (19 respondents). Evidence of these is presented below.

### *Ineffective law enforcement*

Respondents use the term 'lack of enforcement' (*penegakan hukum tidak tegas*) narrowly to refer to surveillance or patrolling activities, and only a few linked it with the prosecution of offenders. Government officials who were interviewed in this research acknowledged the existence of good logging and conservation regulations. However, they faced a very challenging task in enforcing them, particularly due to lack of staff (both in number and capacity), collusion between enforcers and offenders, and poverty in rural areas, as the following respondents illustrated.

We have no resources to patrol [vast forest areas] systematically against illegal logging. We can patrol one side but they [illegal loggers] come out the other side. With our limited resources, the government has to deal with other pressing issues (Gani, a senior government official).

When an illegal activity is reported, the forestry office has little funding to follow it up. They need to work with other agencies as their authority is limited, particularly when the suspected logger has a strong back-up. The enforcement officers are prone to bribery (Mutaf, a resource manager).

I would say that in terms of management of conservation that the relevant government agency does nothing, perhaps they pray that the forest area remains as such ...it is so frustrating that on the one hand they insist on leaving the forest to regenerate naturally [Law No 5 of 1992 on Conservation of Biological Resources and Their Ecosystems] with no management intervention in the reserve [Panua] but they don't take into account the illegal activities that are going on all the time, threatening its existence (Johan, a senior forestry official).

Collusion between some government officials (*oknum*) and those engaged in illegal activities was another factor that makes the latter well protected. Typically such collusion occurs during the transportation and storage of confiscated logs, and the prosecution process. In the latter case, there are also issues of partiality given the biases within the justice system against the poor. Some examples below illustrate these issues.

Despite the enforcement by the police force, there is still free movement of logs from Gorontalo to Palu in the west, and to Bolaang-Mongondow to the east of Gorontalo. While the small players [labourers] are easy to catch, the big and real players remain safe and protected to continue their operations; they have never been caught or prosecuted, because of collusion. For example, when illegal logs were confiscated as evidence of the crime, the police *oknum* helped release them; no one knows where they went. I suspect the officials, who sometimes act as *cukong* themselves, let them go (Asrul, a journalist).

There were cases of illegal logging being brought to court, but only the truck drivers transporting the logs were prosecuted. They confessed that the logs are theirs and they take the punishment themselves, but their *cukong* remained free. Even when these loggers are put in prison, the punishment is too light. In the end, the forest is already destroyed. It seems that we have no power against illegal logging (Bobi, a resource manager).

Abuse of the IPKTM permit is a problem here because the forestry offices that issue the licence have no monitoring capacity for its implementation. Once the B Commission [of the local legislative body] assisted with the surveillance and when we encountered a truck full of logs we informed the police. But the police in fact used the information to tell their colleagues to contact the owners of the truck, who changed the route to avoid being caught (Suwan, a legislator).

When the poor take rattan from the forest and get caught, they are put in jail, but those who destroy the forest remain free and even enjoy protection (Barjo, a ranger).

The collusion that leads to poor law enforcement also occurs in other large PAs, such as the Kerinci Seblat and Gunung Leuser national parks which have strong financial support from the World Bank and the European Union respectively (interview with Adri, 22/8/2005, a senior official of a national conservation NGO).

Several law enforcers stated technical and social constraints on law enforcement, especially the inadequate communication and transportation facilities. These made enforcement very difficult because of the remoteness of the forest where illegal activities occur. Many of the offenders are poor shifting cultivators and paid loggers, which complicate the ethics of enforcement of the laws. Their experiences were:

Despite our assistance to some communities [in building essential public facilities, such as a mosque], some offenders keep trying to push the boundaries. We need alternative activities [apart from policing] that give clear benefits to these people (Zaid, a ranger).

When enforcers are dealing with illegal loggers, we tell them to stop, but we cannot provide them with alternative sources of income. Unlike in Kalimantan, where all the *cukong* there have been 'overfed' with profits from logging, here the limited source of timber has been a source of hope for the livelihoods of the local people (Warno, a law enforcer).

While illegal logging is prohibited, people who are hungry break the rules. No matter how strict the enforcement law is, as long as the enforcers themselves cannot meet their basic needs, they are prone to bribery (Farid, a traditional leader).

Another form of institutional failure is the lack of policy to secure alternative sources of timber. Since legal logging was officially stopped in 2002, demand for local timber continues to increase (see Section 8.2.4). Several respondents claimed that most timber in Gorontalo is from illegal sources (see Section 8.2.1). Some, such as the following interviewees, suggested that local government should inventory the valid logging permits and monitors their implementation properly to improve the current management of production forests:

While many HPHs still hold the legal permit, they are not operating fully, but they use the permit as a guise for the logs they extract. Efforts to combat illegal logging have never brought satisfactory results because there is no clear data on where the legal sources of timber are, which would help to find out whether timber comes from legal or illegal sources. The production forest category is now on paper only! (Johan, a senior forestry official).

Respondents noted another aspect of ineffective law enforcement against forest encroachment, namely the absence of a penalty for the offenders (interview with Midas, a trader of forest product 28/11/2005). Examples of efforts to deal with this problem are shown in Chapter 9. Here, Jusa (a government official) stressed the need to give more support to local communities along with enforcement work:

The problem is that cultivators have no seeds or tree seedlings to replant the cleared forest, so the government should help them to replant the cleared plots, say with seedlings of teak or cacao that have cash value that can be harvested for many years.

Despite the perceived ineffectiveness of law enforcement on logging noted above, respondents believed that the national policy to combat illegal logging (Presidential Instruction No. 5 of 2004) has had some deterrent effect. Specifically, law enforcers found this policy has given them much needed energy and political support to stop illegal logging. For example, the collaboration between the military and police forces with forestry agencies has brought some encouraging results to protect Nantu. Respondents acknowledged that as a result of the continued presence of the enforcement officers and their regular patrolling of the borders, the cases of encroachment and illegal logging have been much reduced. They said:

Over the past ten months that I have worked here [Nantu], we have been able to confiscate 50-60 cubic metres of timber in the first patrolling operation, and then 20 cubic metres in the second one, and the last one only 3 cubic metres. The problem is that when we arrived at the location of the crime, we only found the logs, some of them had been sawn, but the loggers had disappeared. We do not have funding to transport these logs to the police sector office [Polres] so we wait until we can get some help. In most cases, nobody came to claim the timber, so we usually auction the timber, and the money goes into government coffers (Arman, a law enforcer).

Since the *Brimob* got involved, encroachment into Nantu forest has ceased, I guess people started to understand the seriousness of forest protection. We had a combined team from the rangers [from both forestry and conservation offices - KSDA] - but the presence of *Brimob* makes a difference in terms of law compliance (Barjo, a ranger).

The pressure [of illegal logging] has come from every direction of protected areas. I think the joint 'sweeping operation' has worked much better than in the past in apprehending the offenders and prosecuting them. However, the latter is very lax. In addition to collusion between law enforcers and offenders, few resources are allocated to legally process the cases (Lisda, a community development activist).

Respondents who are traders of forest products also experienced the impact of recent collaborative law enforcement against illegal logging. They said that getting timber is difficult because loggers are afraid of getting caught. Moreover, the natural supply of timber has been depleted. However, some respondents questioned the sustainability of employing *Brimob* in Nantu, which has been externally funded. The fact that only the southern border of Nantu has been clearly demarcated makes it likely that similar pressure could come from other directions. The issue of boundaries in the management of PAs is discussed in detail in the next section.

#### *Contested boundaries of protected areas*

Respondents considered this an ongoing problem in many villages bordering the three PAs, with Panua receiving the most intense pressure. Fundamentally, they said that it was due to the inability of the MoF (through their provincial office and the BKSDA, which are tasked with the management of production forest and PAs respectively) to establish legitimate boundaries to their jurisdictions. Some government officials acknowledged that limited resources had only enabled them to demarcate the reserves and their immediate villages, leaving other distant parts of PAs without boundary marks (an interview with Araf, a resource manager, 6/9/2005). For example, although the BWNP was established in 1987, its field boundaries have never been completed. This has hampered local government's attempts to develop agroforestry systems with the resident farmers and in accessing the gold within it, both of which were regarded as valuable ways of generating local revenue (an interview with Sole, a planner, 12/9/2005). Moreover, the lack of field boundaries means that only holders of logging permits have maps that delineate their legal area, but their logging activity is rarely

checked in the field. Others added that when the field boundaries do exist, they are usually difficult to access, making strict surveillance for illegal logging difficult.

The lack of resources within the government conservation agency has so far limited their activities to surveillance against illegal activities – their field staff are like security guards for biodiversity, instead of managers of the public good and communicators of conservation values. This has changed recently, as a few of the national park directors have forged a meaningful collaboration with local government, such as in the area of strengthening the support for PAs in watershed protection (interview with Yatno, a senior official of an international conservation NGO, 9/8/2005).

Respondents also pointed out the other important reasons for contested boundaries, which included: (1) local communities' perceptions about forests as 'free land' on the one hand, and the appropriation of traditionally owned land by the state on the other; (2) the lack of notification of and limited local involvement in the process of boundary demarcation; and (3) local communities' ignorance about existing boundaries or their deliberate action to open land within PA boundaries. A dramatic example of the first reason is found in the villages of Lombongo (BWNP), where hundreds of hectares of the park area have been encroached upon (interview with Dani, an activist from a local NGO, 8/9/2005) and in Pangahu (Nantu) (Clayton et al. 2007). In the latter, where there were previously no boundary marks, villagers treated the forestland and resources within it as 'free', but since the nearby forest has become a PA, their access to the forest has been closed (interview with Mahar, a trader of forest products).

Limited local participation, during both the establishment and maintenance of field boundaries has resulted in misplaced boundary marks (e.g., interviews with Timu, a resource manager, 9/9/2005 and Muti, a community development activist 16/9/2005). However, some government officials and law enforcers argued that even in areas where boundary marks between villages and the PAs are clear, and despite many awareness-raising and livelihood assistance programmes that the park authority has implemented, trespassing is common because people need land to grow food crops to survive (interview with Arman, 6/9/2005). So, in many cases, people simply moved the marks. These law enforcers also emphasised that the lack of field boundaries often hampers their enforcement work, especially on the occasions when 'transgressors' used their ignorance of the boundary as an excuse for their actions. Specific examples in the BWNP are provided below:

The park authority has done a lot of awareness-raising about the park's boundary in the surrounding villages. However, some of them pretended not to know or said that the boundary is unclear. They were established in 1983 and they have been there for 22 years! I myself was involved with the setting of the boundary then and some members of local communities did participate. Ironically, people who recently demanded the boundary revision were those who were not even born when the boundary was first set. So if we just follow what they want, this issue never ends (Jafar, a ranger).

Some local communities were involved by providing labour to establish the park's boundaries. They carried heavy poles manually and in higher places they got tired carrying the poles, so they just put them in the most convenient site they could manage. This happened a lot. For example, a graveyard in Kotamobagu was included inside the park area. I think because these people were only paid for their labour, they did not think about the consequences of their action. As rangers we actually enforce the existing boundaries where these people put them themselves but since the reform era people have become more assertive; there were cases of rangers being attacked because of this conflict (Kamis, a ranger).

During the boundary enforcement in 1997, the *Brimob* burnt some huts that were inside the boundary of Nantu forest. To them these were just huts but in fact they were dwelling places for some families who had lived there for some time. Since then there has been animosity between villagers and these officers. We have requested the District government to review the current boundary together with us because we had cleared the land before the reserve was established. Some of us have planted coconut trees that were already quite tall. Yes, some of us opened the forest for *ladang*, but this was not prohibited before [1997] (Kepes, a local community leader).

The problems with contested boundaries have continued, and in some cases intensified, because they have not been satisfactorily resolved (Box 8.9). This and the new local power embedded in the decentralisation policy have incited some local communities to demand the revision or reconstruction of field boundaries (an interview with Muti, 16/9/2005), as the following respondent illustrated:

The Panua Reserve was established during the Dutch colonial government and people knew the boundary, but they ignored it. In 1997 the area was enlarged from 1000 ha to 45,500 ha and since then we have had endless problems with contested boundaries. Many of the forest residents claimed that their lands were taken by the reserve and they demanded reconstruction of field boundaries. While many boundary marks have naturally deteriorated it is estimated that 30-40 per cent of the boundary marks, especially the ones close to some villages, have been removed. Typically these farmers do not like us and they accuse us of being more concerned about the well-being of animals than about local people's needs (Samsu, a ranger).

A senior official in the MoF (interview with Lusi, 17/8/2005) agreed that the central government has been inconsistent about the legal status of some forests. For example, in the 1990s Nantu's category was production forest, the logging right for which was leased to a HPH. The HPH agreed to the proposal to change Nantu into a PA without much objection. Lusi suspected the HPH received something behind the door, such as a permit to open forest for plantation or for a transmigration project. She stressed also that in other regions, those interested in converting natural forest for other uses just used similar government policies, such as IPK and HTI, to get timber from the forest at a minimum cost to themselves. The MoF often faces a dilemma. By not leasing the right to a HPH, the forest practically becomes an open resource, prone to encroachment. If a licence is given for small-scale logging, the local government want to keep the revenue, but they have no management capacity to ensure that it is managed sustainably. Meanwhile the logged-over forest (*lahan kosong*) is left to the MoF to restore.

### Box 8.9 Demarcation of field boundaries: a socio-political issue in protected area management in Indonesia

The Indonesian legal basis for the classification of forest functions (*Tata Guna Hutan Kesepakatan – TGHK*) was established in 1984. At the provincial level, the TGHK was set by relevant government agencies and approved at ministerial level by the central government. This policy defines ‘forestland’ (*kawasan hutan*) as covering all lands not otherwise identified with existing agricultural or urban uses. In other words, it does not always mean ‘forested land’. For example, in West Nusa Tenggara, the savannah ecosystems that did not contain trees were included as ‘forestland’.

Moreover, due to lack of actual information, the setting of boundaries between different land categories was only based on an estimate.

Politically, this was primarily done in a heavy-handed manner on the part of government with little consultation with and participation from other stakeholders. It is not surprising, therefore, that when they are enforced contentions are very common. Nevertheless the classification was a starting point for all subsequent estimates of the forest inventory. Following the enactment of Law 24 of 1992 on Spatial Management, the TGHK was integrated with the provincial Spatial Planning (*Rencana Tata Ruang Propinsi – RTRWP*). However, given the generally low conservation awareness across society and short-term exploitation of timber as a primary focus in forest management, the RTRWP actually has many loopholes, such as mining within protected areas.

Source: Goulam (2000).

#### *Conflicts between conservation and development policies*

Twenty four respondents who discussed these issues mostly linked them with the recent construction of a transmigration site (18 interviewees) and mining activities inside PAs (6 interviewees). At the root of policy conflicts was the implementation of the Classification of Forest Function policy (see Box 8.9). They remarked that whenever a conflict between economic development and forest conservation occurred, the former always won. As Beruga indicated (see Section 8.2.4), the construction of Pangea settlement near Nantu is a reflection of the local decision-makers’ low appreciation of the environmental values of PAs, ignorance of the potential impacts of their decision (interview with Aton, 6/9/2005), and poor co-ordination among relevant government agencies, at both the local and national levels. The following are examples of respondents’ remarks:

Clearly, the site selected and subsequent construction of houses there, just across Nantu, is a quick way of ‘killing’ the reserve. It seems to me that the government itself does not care if the forest around it is destroyed. If it was not for the research on *babi rusa*, Nantu forest would have been gone years ago and the Gorontaloese around it would suffer much flooding (Barat, a resource manager)

Quite a lot of its protected forest had been taken by the surrounding villages even before Pangea was constructed. The head of the transmigration agency in North Sulawesi should be sued and demoted because of the dubious process in planning and site selection. We seemed to be satisfied by having this project stopped (Bukar, a legislator).

As for mining activities, Iksan (a resource manager) stated that the village co-operative for gold mining in Panua did indeed have the use rights (*Ijin Kuasa Pertambangan*), but it expired when Law No. 41 of 1999 (a revision of the Basic Forestry Law of 1967) came into effect in 2002. However, illegal mining within the PA continues. Consequently, everyone loses, except for the illegal miners. He also argued that, assuming that the required investment is available, gold could be mined by a less destructive method in the lower part of the reserve in order to keep the forest at a higher altitude protected. This is what the local governments were lobbying for in Panua and BWNP.

### 8.2.2 Poverty in rural areas

According to respondents (43% of the total 83 interviewees) poverty among communities around the focus PAs was the second most prominent root of the local activities described in Section 8.2. As indicated in Chapter 4, the most recent official records indicate that 30%-70% of the province's rural population lives below the poverty line (BPS Gorontalo 2006).

Poverty has many forms (see Box 3.2), but respondents used the term to refer specifically to: (1) landlessness or limited access to arable land; (2) lack of skills among the rural population to engage in alternative livelihoods; and (3) inequality of rights and access to forest resources.

First, landlessness, or limited access and rights to arable land has been the main driver for shifting agriculture in Gorontalo because people need arable land to grow food for their own consumption, not for sale (interview with Hamsah 6/10/05).<sup>83</sup> Moreover, soil on forested land is generally perceived as fertile, albeit for a short period of time. Despite the low level of agricultural productivity and lack of transport to market the occasional surplus of food products, shifting agriculture is very common in the hills of the Anggrek, Sumalata, Triangular, Boliohuto, and Atinggola subdistricts that surround NWS and WNP (interview with Barat, 29/11/2005). Due to the lack of alternative employment for forest communities many respondents said that shifting agriculture is often carried out in tandem with illegal logging and rattan extraction:

I visited a village near Nantu where many of the residents are shifting cultivators. In one of the households, only the wife was at home, suffering chronic diarrhoea; her husband went to the forest as a paid logger. I wholeheartedly support the fighting of illegal logging but it has been very hard to find a solution for these poor people to meet their basic needs. If I stop them doing what they are doing, what will they eat? (Iban, a senior government official).

Encroachment or land occupation is the main problem in Panua; in total about 7,000 ha [of the total 45,000 ha] has been encroached upon, some of which has become permanent settlement. Because shifting cultivators are generally very poor, their activity is often backed up by *oknum*, who act as land speculators, to buy land that has been cleared. We have managed to move people who came into the reserve out, but the forest [where they did their farming] had been degraded as a result of their activity (Zaid, a ranger).

Barat provided another example of encroachment in BWNP. He recorded instances of the use of fire for forest clearance on steep sloping land for maize planting. He highlighted the fact that most of these shifting cultivators are highly dependent on the natural nutrients in the soil because they have neither capital nor access to agricultural inputs. Meanwhile, soil conservation measures, such as terracing or planting perennials, often require huge labour investment. Regarding the latter, Iban (a former agricultural extension worker, 2/10/2005) explained that shifting cultivators generally prefer to work on sloping land for their *ladang* because gravity reduces the workload in the land clearance and maize post-harvesting stages; thus terracing is simply too expensive for them in terms of labour investment, especially for

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<sup>83</sup> In three areas (East and West Kalimantan and West Sumatra) where actual experiments were conducted, the final conclusion was that shifting agriculture was the best approach for food crop production. Tree crops were more suited to permanent agriculture, but they had other problems, such as dependence on fluctuating international prices (C. Colfer pers. comm. 2008).

land on which they have no legal rights. Closely related to landlessness, respondents perceived that limited skills among forest communities make them heavily dependent on forest resources for sustenance and cash income (interview with Jafar, a ranger, 12/9/2005). The following quote provides another illustration.

Our land-based economic activity increases pressure on the forest and causes degradation because we rely on extractive activities. When the rural population increases but land availability is limited, shifting cultivators still expand their land by clearing forest extensively. An example of this occurred during the expansion of sugar-cane plantation [near Nantu]. It attracted local farmers to sell their small-size cultivated land near the factory and they went further into the forest to grow their food crops (Herry, a planner).

Furthermore, respondents testified that the distribution of benefits from extraction of forest resources is characterised by inequality. With illegal logging, for example, a small group of powerful players enjoyed the largest share of the benefit but most of the (environmental and social) costs are borne by the public; they emphasised that it is the poorest members of society who ultimately have to bear these. Consequently, and due to poor enforcement of conservation and logging regulations (see section 8.3), either local governments do not receive any revenue or only certain bureaucrats enjoyed it (interview with Rudi, 6/12/2005). At the same time, the potential long-term revenue from extraction of forest resources is lost. Examples of respondents' observations are provided below:

People around protected areas will suffer because where there is nothing left in the forest, they will have nothing to sell or promote for tourism, for example, in places like the Nantu forest (Fatom, a member of a local conservation club).

Communities around the forest become dependent on illegal logging for their cash income. This has a serious social impact because its pervasiveness means there is less social control. When almost everybody is involved, it becomes more accepted by the wider community (Mutaf, a resource manager).

Illegal logging has a moral and ethical implication as its players and victims are the poorest of the poor; it aggravates their poverty further. If local people received help to find alternative livelihoods they would be less likely to go to the forest. As well as risky, loggers' income isn't very much and the *cukong* gets the largest share of benefits. This means that local people are becoming more dependent on *cukong* for their income, not on the forest (Tina, an educator).

These various forms of poverty are common in all three study sites. Some government officials (interview with Timu, 9/9/2005) asserted that poverty has been used as an excuse for encroachment, and this has prevented people from finding workable solutions and simply caused them to accept its perpetuation. He underlined that despite the social forestry programmes that have been implemented, whereby free seedlings of tree species are given to shifting cultivators, they keep encroaching. This, he continued, makes patrolling the PAs – the main target for encroachment – an almost impossible task (see Chapter 9).

### 8.2.3 Poor awareness of the multiple benefits of natural forests

Respondents considered that this social issue, which they believed occurs across local society, underpins all activities discussed in Section 8.2 (see Table 8.1). A detailed account of respondents' views about this is presented in Section 9.3.5. The following example illustrates the poor awareness about protected species and their conservation values that lead to ongoing wildlife hunting:

The people who live around these forests only see the forest as a source of timber, biodiversity is beyond them. There is limited public education to increase awareness of the forest and its functions. People do not care much as long as they can harvest something from the forests. For example, we have the unique *maleo* bird population, but they don't care about the state of its population, it is more important for them to enjoy the free eggs from these birds (Hamsah, a senior resource manager).

This view resonates with the results of a long-term study on Sulawesi's wildlife trade (Lee et al. 2005), which showed a very poor awareness of existing laws (approximately 150 that protect wild species and ecosystems) among law enforcers and a poor technical and managerial capacity among local conservation and law enforcement agencies. Added to these were lack of information about wildlife populations, particularly their ecology, distribution, and level of extraction, lack of monitoring on the state of populations of wildlife, the trend in their trade (amount and frequency), and the increasing demands for meat in North Sulawesi (ibid).

#### 8.2.4 Population growth

As Table 8.1 shows, 21 respondents regarded population growth in rural areas as the least strong threat, among the six root causes suggested, to forest biodiversity. They added that perceived employment opportunities in this new province have attracted recent in-migration from other regions. Official records show that Gorontalo's population grew from 844,000 to 890,000 or about 10,000 annually between 2002 and 2006 (BPS Gorontalo 2003, 2006).

Moreover, perceived economic activities in urban areas have also attracted people from rural areas. However, migration in the opposite direction has also occurred due to the arrival of new investors. Respondents noted some positive effects of this on the local economy, but it has driven a rise in the price of cultivated land, leading to a change in ownership of productive lands (interview with Asrul, a journalist, 6/10/2005) and encouraging migration to rural areas. These were believed to lead to increased pressure on PAs, specifically through extraction of forest resources and agricultural encroachment, 12 and 9 respondents respectively. For example, in the case of encroachment, landless married male children typically join their fathers to open new land in the forest (interview with Muti, 12/9/2005). They acknowledged that it was a common practice in the past and the environment could sustain it. However, the growing population in rural areas, especially due to in-migration, means that the demand on forest resources is increasing, while arable land to support the population is limited (interview with Suwan, a legislator, 27/9/2005). The establishment of Pangahu village was a clear example. Within a decade the population of this hamlet grew to about 400 households (interview with Herman, a community development activist, 14/9/2005). While this was initiated by the farmers themselves, the neighbouring villages of NWS (Sari Tani and Tangga) grew as a result of the government sponsored transmigration project.<sup>84</sup> In 2003 the BWNP

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<sup>84</sup> The term 'transmigration' was officially only used for planned (and occasionally 'spontaneous') resettlement of people from one province to another, while 'resettlement' was always used for moving people about within a province. Transmigration was a nationally-funded (and coerced) programme, while resettlement was funded by three agencies (Forestry, Internal Affairs, and Social Affairs). Now, resettlement would be funded by district governments. The term 'local transmigration' was also used; technically it refers to local residents who were included in a nationally-funded transmigration project (for which there was a special allocation of 10% of the places) to keep the locals happy (T. Babcock pers. comm. 2008).

authority attempted to evict and resettle resident communities from inside the park due to their increasing number. However, the office of social affairs which handles this relocation was unable to provide new land for them (interview with Jafar, 12/9/2005). In these villages, respondents observed the influence of technology on the rate and the speed of agricultural encroachment:

In Puhubala, Paguyaman subdistrict, encroachment has started since 1985 when people used manual saws only to clear forest, but more recently as access to modern tools like chainsaws is easier, they move upwards to steeper areas faster (Jusa, a government official).

According to the village record, in 1982 there were 500 household in this village [Pangahu, near Nantu]; they came as transmigrants. However, only a third stayed, the rest went back to their villages of origin, having sold their land to the sugar plantation company. Those who stayed then moved further to the forest border. In 1993, the plantation company planned to expand their area for another 7,200 ha, but at that time NFCP had started to work in the forest and this planned expansion was aborted (Araz, a traditional leader).

In addition to these four perceived local underlying causes of forest decline, interviews with 25 national stakeholders (see Chapter 5) revealed other factors which reinforced the local pressures on forest ecosystems and shed light on the external underpinning factors. These included market and policy failures, which are discussed briefly in the following two sections.

### 8.2.5 Market failures

As detailed in Chapter 5 and Section 8.2 the decline in forest biodiversity is a result of the actions of individual and corporate players. The root of this is the discrepancy between the values of these players and those of society in general (Contreras-Hermosilla 2000). As a public good, society's value of the forest is reflected in government action to protect it or regulate the use of resources from it. In the case of Indonesia, the political economy of forest management indicated that the pervasive practice of KKN has facilitated both the distortion of the market value of the forest and the profit-maximising motivation of private corporations (see Chapter 2).

Over the past four decades this distortion fundamentally stems from valuing natural forest narrowly for its timber. The monetary value of other goods and services that the forest provides are either not known or considered as of little or no market value. They are generally treated as 'free', although society in general must pay the costs (e.g., environmental, social, and economic) of poor logging practices as they are not internalised or reflected in the pricing of timber (interview with Eli, a senior economist in the Ministry of Environment). Thus, they are not an important part of the corporate private sector's decisions. Meanwhile, a large forested district, such as Bone Bolango, receives no financial compensation for the existence of forest and for not logging the forest, which serves as a carbon sink, protects the watershed that benefits the wider economy and protects the scenic beauty and other social services (Chapter 7). Understandably, local government is very keen to lobby for access to gold deposits that are believed to exist within the PAs boundary (interview with Sole, a planner).

Moreover, forest biodiversity, the value of which is generally of a long-term nature, has no monetary value for local decision-makers, whose primary interest is to exploit timber to generate revenue (interview with Dojo 24/8/2005). The narrow focus on timber exploitation has meant that other NTFPs, which are important as a source of income for small-scale or

subsistence farmers are only valued at as little as 5% of the total value of forest; typically it is not included in official statistics. The value of various environmental services that natural forests provide is not factored into the equation either (interview with Prio, a senior official in MoF, 19/8/2005). In addition to the case of transmigration projects discussed in Section 8.2.4, Adri (a senior official of a national conservation NGO) gave another example to illustrate market distortion. He explained:

The government very often put the economic value of forested land much lower than other types of land use, such as for mining and plantation concessions for reasons of economic development and provision of employment. The private sector is interested in mining in protected forest because the land value in it is much cheaper. Moreover, at the forest clearance stage, they often enjoy the benefit of valuable timber at a low or no fee paid to the government. The government get a low compensation for the land, and the Ministry of Forestry has low bargaining power because many of the environmental services such as watershed protection and biodiversity conservation, which are provided by natural forests, have no market value.

Only relatively recently, fuelled by increased incidents of human-induced and natural disasters and social conflicts around legal and illegal logging, the conflict between satisfying private corporates' objectives and those of wider society has become more apparent. Because the primary agents of forest decline do not have to pay the external costs of their activity, there is little incentive to maintain the forest to meet the wider society's objectives. These costs, such as timber scarcity that can lead to an increased timber price, loss of biodiversity, water scarcity, and the loss of resources for future use, are important for society as a whole, but not for private agents. Moreover, the scarcity of logs is not necessarily reflected in the price because they are obtained illegally; the loggers are not paying logging and other extraction fees and no revenue is generated for the government. An ultimate victim of this failure is forest biodiversity.

Moreover, timber extraction has been the government priority because it generates quick revenue to pay for the socio-economic development of the nation's huge population and for many officials at all levels it provides an easy source of illicit 'income' (Smith et al. 2003, see Chapter 2). However, the trade in forest products has been limited to exporting raw materials, particularly for rattan and other NTFPs because of Indonesia's limited technology in processing and manufacturing them. This has meant that only a small portion of the economic value of forest resource extraction is retained in the country (interview with Marda, an academic, 29/8/2005).

In sum, the failure of the market to account for non-market benefits and costs may be the main underlying cause for biodiversity loss as it shapes the various agents' actions that are incompatible with forest protection. Increasingly, more work has been done to correct this market distortion by capturing the NTFPs' and forest's ecological services (Contreras-Hermosilla 2000) to increase the chance of preserving the world's tropical forests. The balancing of society's goals and those of private and corporate agents may have to rely on market systems that are able to explicitly put monetary value on the forest resources. Some of the early work in quantifying the value of conservation forests for watershed protection in Indonesia is reviewed in IBSAP (2003), and indeed this has been a key strategy to gain conservation support from other stakeholders (interview with Wira, head of a large national park in Sumatra, 7/12/2007).

More recently, the value of the natural forest as a carbon sink has received increased political and market support, particularly after the UN Conference on Climate Change at the end of

2007. These valuations, however, typically require intensive and longitudinal data, which are seriously lacking in developing countries, such as Indonesia. Despite the state's legal ownership of these forests, due to many reasons illegal activities in and around it are rampant (see Section 8.2). The high insecurity of forest ownership has been acknowledged as a setback to competing and capturing the carbon market to date. Moreover, as capturing forest benefits requires a long gestation, the poorer the decision-makers, the greater their interest to exhaust the resources in the short term. This is particularly true in conditions, such as Indonesia, where they have no certainty of maintaining access to such resources either for themselves or their children (e.g., due to uncertain tenure) (Constanza 2000; Constanza & Daly 1992; Constanza & Folke 1997; Constanza et al. 1997; Pearce & Moran 1994; Pearce et al. 1998).

### 8.2.6 Policy failures

As policies in the forestry sector (e.g., subsidies in the forest industrial development and the associated log export ban to support it) have been reviewed in detail in Chapter 2, this section focuses on examples of policies on conservation, non-forestry sectors (e.g., mining, agriculture, and transmigration), and decentralisation, which local and national respondents believed were relevant to the decline in Gorontalo's forest biodiversity.

The two forms of institutional failures described in Section 8.2.1 are related to the ongoing 'tug of war' between the central and local conservation authorities in the management of protected areas, which has frustrated the latter. A senior forestry official in Gorontalo, Johan, explained:

It is very frustrating for us having large conservation forests, while Jakarta has a full control over them but on the other hand its commitment on the ground is so insignificant. Moreover, their local conservation offices [BKSDA] have no clear management authority and extremely limited capacity. The BWNP, Panua, and Nantu, each have their own problems. For example, based on Law No 5 of 1990 [The Conservation of Biological Resources and Their Ecosystems], the management of a national park requires zoning for different allowable activities [i.e., core, utilisation, and buffer zones], but ten years after the park was established, there is still no such plan. Likewise the BKSDA's branch office in Gorontalo is manned by fewer than ten staff for an area of more than 100,000 hectares. They are so passive; they have no work plan!

Johan also underlined Gorontalo's good fortune in having received long-term assistance from the Nantu Forest Conservation Programme (NFCP, funded by the UK-based DISS, since 1997). Under the programme, enforcement around the Nantu forest boundary has significantly reduced the main threats of illegal logging, hunting, and the collection of NTFPs. To improve the ecological sustainability of the NWS, in 2002 the NFCP proposed an enlargement of the area to include the nearby protected forest of Biliohuto (20,000 ha) to make NWS into a national park (with a total area of 50,000 ha). An essential part of this proposal is a strong component of local involvement in its management (Clayton et al. 2007). Johan highlighted that while the local forestry offices and Gorontalo District strongly supported this proposal, Jakarta's response was very slow. Other respondents who supported this proposal also hoped that by changing Nantu's legal status, there will be a separate and better resourced management unit, which will further improve its performance as a site for biodiversity conservation. In addition, it will open some opportunities for the local community to conduct some legal economic activities within the utilisation zone of a national park. During the fieldwork in December 2005, a national assessment team, consisting of experts from the Ministry of Forestry, the Ministry of Environment, and the Indonesian Institute of Sciences, paid a visit to Gorontalo to assess the viability of the proposition.

However, at the time of writing it is almost five years since the submission of the proposal, and no decision has been made.

Some respondents at the national level commented on another aspect of the centralised conservation policy, which they believed has been the biggest challenge in getting local support for conservation. They said:

We need to work more on adapting conservation theories which have primarily been developed in western countries with little adaptation to our socio-economic conditions. The 'blueprint' application of these approaches in the management of conservation areas, through collaborations between MoF (via the PHKA) and various national and international NGOs, has been proven to be ineffective in achieving conservation goals. Our failure in integrating or developing indigenous conservation has been part of the problem. We need a greater engagement of local communities to increase the socio-political legitimacy of these conservation areas (Marda, a senior academic specialising in conservation biology).

The conservation focus on charismatic species has so far been applied with little regard to the need of local communities who rely heavily on the resources in the same forest. Very often these communities have to pay the opportunity cost for conservation; their access to resources within protected areas becomes restricted or totally prohibited as a direct result of their establishment (Manu, a senior academic specialising in forest economics).

As discussed in detail in Section 8.2, respondents commented on unintended negative effects of decentralisation policy on forest environment. Most national respondents commented that while local governments understandably welcomed the policy that provides them with greater share of revenues from the extraction of natural resources for them, their capacity to manage the resources in their jurisdiction was generally poor and their ability to enforce the logging regulations limited (interview with Adri, a senior official of a national conservation NGO, 22/8/2005). During this phase of political transition, local respondents expressed their concerns about increasing pressures on natural forests on the one hand, and the frustrations that stem from the ambiguous authority in the management of production forest on the other. Their remarks are as follows:

Many agricultural extension workers were recruited to fill the administration posts in line with the implementation of decentralisation policy. We need to re-activate the programme to face the challenge of developing our agriculture (Suwan, a legislator).

Because production forests are mostly logged, HPHs are no longer operating, and there is now promotion of plantation forests [*Hutan Tanaman Indonesia* – HTI]. There were a few interested investors in this new venture, but the red tape was so frustrating – these people are going to plant the forest, not to log it! This half-hearted policy in forest management gives little incentive to the local authority to manage the forest for long-term benefit. Moreover, the demarcation of forest boundaries, which is Jakarta's job, has not been fulfilled. How do you expect enforcement to be done? While Jakarta takes a bigger share of the revenue, we locals have to bear the ongoing problems of contested boundaries. The Ministry of Forestry has changed its priority to forest rehabilitation and conservation now. While the budget and programme activity for rehabilitation are clear, there is almost nothing for the conservation component. Unfortunately the local conservation staff lack creativity to adapt to local situations and just turn a blind eye to activities that make natural succession in the forest impossible! (Johan, a senior forestry official in Gorontalo)

While the primary objective is to improve democracy, the clear chain of command that characterised the Suharto era no longer works and every region just thinks about extracting the remaining natural resources as quickly as they can. Moreover, the decentralised authority to manage natural resources in a more democratic manner is not supported by strong accountability and critical thinking among the public has been little developed as a result of previous authoritarian rule (Bowo, a development planner at the national level).

I personally think that it is not feasible for the Bone Bolango to be a separate district [a large part of its jurisdiction is within the BWNP forest]. But the creation of this district received political support, as a way of getting more funding from Jakarta for our local development activities; this will not be forever. Government Regulation No. 8 of 2003 [on the establishment of Gorontalo Province] clearly states that we have to be increasingly more independent in generating our own revenue [PAD]. Now we have to think about exploring our resources, including the gold deposit inside the park, to do that (Barat, a resource manager).

This section has demonstrated the six socio-economic and political conditions that were perceived as root causes of the decline in Gorontalo's forest biodiversity. As respondents testified, these conditions generally operate synergistically, perpetuating and intensifying the local forest-based economic activities described in Section 8.1. Understanding how these underpinning factors work is important in order to find solutions that effectively address the direct drivers of biodiversity loss.

### **8.3 Chapter Summary**

This chapter described five types of local economic activity which respondents perceived as threatening forest biodiversity in Gorontalo. From the strongest to the weakest, these were illegal logging, shifting cultivation, physical infrastructure projects, extraction of NTFPs, and illegal gold mining. The extraction of timber and NTFPs were believed to have reduced the local plant diversity and population; and the remaining activities have physically reduced or degraded the local natural forests. Apart from the government-sponsored infrastructure projects, the agents of all other activities are individuals and small-scale groups of forest resource users who conduct such activities for subsistence purposes. Behind these primary agents, however, were other 'invisible' actors who play a prominent role in providing them with financial and other 'protection' support. The local perceptions of direct causes of loss of forest biodiversity broadly reflect those identified globally (e.g., Wood et al. 2000). However, the effects of climate change and pollution on biodiversity were not apparent to respondents. The gap in the former (see also Section 7.2 for the perceived benefit of forests as a carbon sink) represents an important element in the development of strategies to adapt and mitigate the impacts of climate change on the livelihoods of forest communities.

Respondents believed that all the perceived direct drivers of decline or loss of forest biodiversity have persisted, or in many cases intensified, due to socio-economic conditions, both at the local level and outside the research site. These included institutional failures in managing natural forest for timber production and for biodiversity conservation, poverty around PAs, poor awareness about the full value of PAs that runs across all segments of society, and the growth of rural population around the PAs. The failure of the local conservation agency in managing PAs was reflected in poor and ineffective law enforcement against illegal activities. Specifically, the management of PAs is characterised by shortage of resources to maintain their field boundaries. This situation provides opportunities for encroachment and extraction of forest resources within their boundaries. The activities are economically benefiting agents of forest decline by providing them with cash income. This is vital to them because of their landlessness, the absence of secure employment, and the limited skills they have to engage in the few economic activities which are available. In addition, the poor awareness of the full value of PAs was reflected in policy conflict in local development activities (e.g., mining, agricultural intensification, and transmigration projects).

Respondents also noted other factors that underpin the local socio-economic conditions. These were policies within the forestry sector, which included industrial forest development with various types of subsidies associated with it and the highly centralised management of PAs. Policies in other sectors that affect the state of the natural forest were transmigration, and to a lesser extent, mining. Overarching these policies on forest resource extraction was market distortion in valuing the resource. At all levels of analysis (i.e., local, national, and international) natural forest have been narrowly valued for its timber, leaving other goods and services undervalued or overlooked. In other words, the social and environmental costs of illegal timber extraction are not internalised in the price of timber. The distorted price has encouraged wasteful practices in the harvesting and processing of wood products at the expense of the forest's social, economic, and ecological sustainability. Some of the local efforts to maintain the various values of local natural forests and their biodiversity are discussed in the final results chapter.

## CHAPTER 9

# STAKEHOLDERS' ATTITUDES TOWARD FOREST CONSERVATION

Conservation of forest is generally seen as a hindrance to socio-economic development and it gets very little political support here (Barat, a resource manager in Gorontalo).

It is not only the general public who do not understand conservation and its benefits to society. Decision makers and government officials are the same; they generally have a negative attitude toward conservation (Aton, an educator).

The findings presented in Chapter 7 illustrated the prominent economic and ecological benefits of natural forests to local stakeholders in Gorontalo. Despite these benefits, the forests are threatened by various human activities, the details of which were discussed in Chapter 8. One of the most significant perceived drivers is economic necessity – poverty drives legal and illegal forest uses. Such economic activity is evident on an individual basis (e.g., swidden farmers, paid-labour illegal loggers, and peasant gold miners) and through collective enterprises (e.g., logging companies and local agricultural and forestry agencies). Given the high reliance on forest goods and services to sustain Gorontalo's economic and the general well-being of its population, the conservation or sustainable use of these natural resources is likely to be a priority.

This chapter presents local stakeholders' attitudes to forest conservation policy and activities; they are presented in three parts. The first section describes respondents' attitudes toward forest conservation. The second section elaborates five main conservation activities that the respondents talked about during the interviews. In each activity the focus was on the extent to which a given activity has achieved its conservation goals and addressed the economic and social pressure on forest ecosystems. For both of these sections, the findings are derived from a systematic analysis of 83 semi-structured interviews. Responses to the final research question were classified into positive, neutral, or negative. This was done at the coding stage (see Section 5.4) where respondents' views were tallied (e.g., Appendix 9.1). Examples of actual quotes on which the respondents' views were classified are provided throughout the sections of this chapter. A positive response reflects respondents' support for the national conservation policy (e.g., establishment of PAs) and the five conservation activities that they referred to, regardless of the limitations of each in achieving its stated goals (see Section 2.5). Conversely, a negative response denotes resentment toward the policy and activities which the respondents' regarded as ineffective. A small number of respondents gave both positive and negative responses. They are excluded in the analysis as the discussion in each subsection focuses on the more dominant response. For example, the discussion in Section 9.1 focuses on the negative response to forest conservation policy whereas the section on livelihoods assistance (9.2.3) focuses on the positive response.

The final section presents respondents' reasons for protecting the remaining natural forests. The analysis is based on the MDM results (performed by 146 individuals). Their views were grouped into six categories of reasons (i.e., biological uniqueness, economic utility, aesthetic attributes, research and education, cultural significance, and ecological services; see Section

3.3), using the same themes applied in assessing respondents' views of the benefits of the natural forests (Chapter 7).

## 9.1 Attitudes to Forest Conservation Policy

As noted in Chapter 4, about 44% of the forest in Gorontalo is officially under legal protection (24% as conservation areas and 20% as protected forest). All 83 interviews were analysed, allowing the research participants to be identified as follows. In total, 72 people (86% of the total interviews) answered the final research question about local stakeholders' attitudes to biodiversity conservation. More than half of these people (65%) held a negative view of the centrally controlled and preservationist policy, 21 respondents (29%) were positive about it, and 6% gave both positive and negative responses. Given the local stakeholders' high reliance on resources and ecological services provided by the natural forest, the dominance of the negative attitude demands further investigation in Gorontalo. In order to improve policy intervention and greater support for forest conservation, it is important to examine the influence of respondents' demographics on their negative attitudes.

As explained in Sections 4.1 and 5.3, in general respondents are culturally predisposed to express their opinion in an indirect manner. Indeed, only about 10% of them, specifically senior government officials, or those with high education levels, confidently used the phrase 'I think' in expressing their views. Instead of talking about their own views of forest conservation policy, some examples quoted in this section show how most respondents talked about views or attitudes of others. The following quote is an example:

Government officials' perceptions of conservation are generally negative. The governor only thinks about planting maize and farmers do this on steep slopes without any conservation measures, like terracing. There's very little education about this. We lack skills and human resources on this crucial method of sustaining our agricultural development (Aton, an educator).

In general, respondents' positive attitudes to forest conservation were closely linked with its economic and ecological utility, either for themselves or for the wider communities. The proportion of the actual and potential economic benefit (i.e., from forest products and from forest-based ecotourism) was slightly higher (59% of the total 80 responses) and the ecological benefits (41% of total responses, e.g., biodiversity, heritage, research and education, see Appendix 9.1). However, the link between a particular benefit and an attitude to conservation can be either positive or negative, as several respondents stated below:

We gave our full support for the protection of Nantu forest to ensure the continuity of our development. For our local government, this forest is an essential support system for our agricultural production in the whole Bone Bolango catchment. We want to make an agreement among members of local communities around this protected area so that encroachment into it can be stopped (Dabo, a senior local government official).

The fate of protected forest would have been worse had it not been given that legal status. At least we have a chance to improve our well-being and to have the forest for longer. Now, the forest is almost gone but the level of ordinary people's well-being is still low (Kupu, a member of a local nature conservation club).

I support the proposition to enlarge Nantu Wildlife Sanctuary as a national park because I think when the forest is properly protected, the wildlife in it will be safe, eco-tourism development will enable members of the local community to participate in the related economic activity, such as development of tree-based agriculture that will give continuous products without cutting the trees. I think to achieve these various purposes, the national park status gives us more hope (Herman, an activist of a local community development NGO).

As Herman noted above, respondents also believed that other potential long-term economic benefits, such as from tourism activities in the recreation zone of BWNP, can offer employment for local people. A ranger gave a good example of this in Tangkoko (in North Sulawesi), where locals work as guides or sell food stuffs. They have become more involved with the protection of biodiversity there because it directly benefits them. Herman also referred to the Gede-Pangrango National Park (near Bogor, West Java) as a model for the development of Nantu as a national park and how eco-tourism development can benefit local communities. The future use of forest resources (e.g., for research opportunities and as a source of genetic resources) was also identified as a link to a positive attitude. The excerpts below illustrate these points:

Within the conservation areas there are sites that could be developed for recreational purposes. Tourism development is probably the fastest way for local people to reap the benefits of the forest, and when these people see this direct benefit, they will be more willing to conserve the forest and they themselves are more involved in protecting it. But if they only received occasional assistance in managing the utilisation zones of the park, for one or two months it may be okay, but later on people will start all over again searching for new land and the old place of activities will be abandoned (Kamis, a park ranger).

I think we could learn a lot from the NFCP of fifteen years work in protecting the forest in Nantu. Despite the continuous challenges, the wider communities have benefited from it. Local communities have received assistance in health and education, specifically for children, training for local leaders about the importance of forests, and the international publicity, both through national and international TV channels, such as NHK and BBC, has attracted tourists to come and visit it. But the most important beneficiary of forest protection in Nantu is us, the Gorontaloese, because the Paguyaman River is an important source of our freshwater (Rizal, a legislator).

The flora and fauna that exist within protected areas have recently declined and some species have even become extinct. So we need to put more effort into preventing further extinction or saving what is left so that we can learn about their potential and have access to them in the future (Iksan, a resource manager).

It is very important to conserve biodiversity because it is the source of materials to meet our needs in the future (Arin, a community development activist).

Conversely, the lack of a direct link to the economic benefit of protected areas was perceived as the primary reason for negative attitudes to conservation. For example, although many respondents supported, in principle, the proposed plan to increase the size of Nantu forest to become a national park, their observation of the limited benefits from the conventional park management approach and their knowledge of local socio-economic circumstances made them sceptical. They argued that:

The benefit of having this national park [BWNP] is very little. Some members of local communities even said that not having it would have been better than leaving them hungry. That's why for the Nantu forest, I think there should be more local involvement in the management, should this proposition [to enlarge it as a national park] be accepted [by the central government]. The conventional national park management has been of very little benefit to both the public and the environment. Sadly, the response from the central government has been very slow (Rizal, a legislator).

In addition, the perceived costs of conservation actions, both in conservation areas and in other land-use systems (e.g., agriculture) were deemed an influencing factor of respondents' negative attitudes to conservation. They were also well aware of the ongoing tensions among local stakeholders about the short-term economic gains and long-term sustainable use of

forest, or between the need to put human well-being against that of other creatures. Their testimonies are quoted as follows:

For the agricultural development programme, the Governor set a target for maize production but there are no clear guidelines as to where the maize should be produced or not. Consequently many unsuitable areas are now planted, only to achieve the production target (Aton, an educator).

Even among the elite members of society, understanding of conservation is very limited. They often accuse conservation-minded people of caring more for animals than for the poor human beings (Bani, a local government official).

The people here have become more critical of government's effort to balance economic growth and environmental sustainability. For example, the plan to build a fishery harbour was stopped because people protested it on the basis of potential damage to the coral reefs. When we do something like this, there are people who blame us as 'anti-development' even though we are open to discussing the costs and benefits of every development project (Wina, a senior planner).

There have been tensions in our effort to protect the remaining forests here. While local government [particularly the Gorontalo District] has been supportive, there are many who were opposed to it because they would lose access to the forest land or potential income from the forest resources. Meanwhile our executives felt that the economic imperative to generate income from our forest is more important than saving it for longer-term benefits (Rizal, a legislator).

As indicated earlier, the real economic benefit derived from natural forests can also be a common rationale for pursuing unsustainable economic activities (i.e., less support for conservation), at the expense of the forest's ecological well-being. Barat's view, quoted at the beginning of this chapter, illustrates the negative attitude to forest conservation among government officials, certain sections of society, and the general public in Gorontalo. Respondents observed some evidence or indications of this negative attitude. They reasoned that it is largely due to the perceived forgone economic benefits (e.g., local government revenue from the extraction of timber and other forest products). Legal access to resources within protected areas has also become more restricted. Others underlined the inability of certain groups in their society to see the long-term benefits of forest conservation. Their specific statements were:

I think the people in Gorontalo consider forest as something to be cut. More commonly, they don't see the relevance of forests to the quality of life. I think this kind of thinking is still beyond most people (Toni, a religious leader).

We need to meet our needs today without compromising the ability to meet our needs in the future. Our reality is the opposite, as long as our needs today are met, we don't think about the future. We need to raise awareness among the young generation to think about the future (Jola, a local government official).

There is no real [economic] benefit from forest [conservation] to rural people (Kupu, a member of a local conservation club).

I think it is a waste of time to conserve the forest here because our local [swidden] farmers keep burning it to plant food crops, and then move on to other places. So I cannot think what benefit we get from conservation. I know that, theoretically, there are many benefits, but I cannot see what these are in reality. But I know that not having the forest conserved means that we are losing our forest. I also know that there are people who always want to cut the forest down (Roni, a local journalist).

The only time we think about the [usefulness] of conserving the forest is when disasters, like flood, strike. Only then do we think about what we have done to our forest (Abdul, a local journalist).

Several respondents expressed their disappointment with the negative attitudes among government officials and local leaders. They underlined the leaders' lack of awareness about the ecological benefits of natural forests, which in turn led to lack of environmentally sound actions in forest resource management in general. More specifically, they emphasised the short-term economic gain in the agricultural programme, which is commonly used as an excuse for not incorporating a long-term development strategy. Their extensive comments illustrate these causes.

Efforts to protect natural forests have been hampered by people who practise unsustainable use of resources and have low awareness of the functions of these forests. Some of protected areas here are already half-dead, and the operational budget [typically from central government] for them is very small. Meanwhile, attempts to generate support for these reserves from local bodies have had little outcome. For example, in one of the hearings with a local representative body, they told me off for caring more for animals than people. So I told them about the role of hornbills in dispersing seeds of fruit trees as far as 50 kilometres away from the forest, helping some forest to regenerate at no cost to us. Yet, the government's tree planting project has a budget of Rp 64 billion [approximately US\$7.5 million], for planting tree seedlings only! This shows how ignorant these local leaders are. They should be the main target of awareness-raising activities. In their mind, the forest is only worth its timber (Isdu, a conservation activist).

The agricultural agency has been too busy distributing fertilisers but they do not understand that the soil can become hardened, and there is no work to improve or maintain the soil quality. Sadly, many of the agricultural extension workers have been 'liquidated'. It seems to me that we are in the process of killing ourselves! Meanwhile, we still have very little capacity to access funding from outside to help [protect the forest] (Barat, a senior resource manager).

Because we are a new province, our local government is working very hard to catch up with other regions to improve our socio-economic development. But we are still using the old paradigm, taking the environmental factor for granted. I think ecological sustainability is nowhere explicit in our development plan here. Sustainable development is still not part of the local development strategy. I will make noise about this when the current government is reporting their progress next year (Nano, an educator).

Rudi went on to explain that five to six years after the province's creation, it still has no 'baseline' information about developing a (sustainable) forestry programme. The revitalisation of production forest has been discussed for many years, but there is no real budget allocation to improve the current management of the forests. He highlighted the severe forest degradation in the western and northern sides of Gorontalo and the unlikelihood of rehabilitation of the degraded environments. He illustrated it with the more frequent floods in Kwandang (the northeast border of the province) and Tilamuta (the capital town of Boalemo district), which can reach a depth of one metre. This was not known in the 1970s and 1980s. He believed the loss of forests around those regions, and the resulting reduction in the capacity to retain groundwater, was the root of these floods. However, the government only paid attention to the lowlands where the floods occurred; not to the land-use activities in the upland areas. Indeed, Lade (a legislator) explained this sad reality, which has become common knowledge, that although the support for forest conservation is generally weak, infrastructure projects to mitigate environmental disasters due to lack of conservation actions are often attractive to their leaders. He remarked:

I agree with the belief that government officials and members of the legislature just want to have instant solutions to environmental problems. There are many [physical infrastructure] projects that bring in money. For example, to solve the problem of floods, they are keen to get river engineering in place every year in Gorontalo, for which billions of rupiah are budgeted, but the root cause of the flood, that is the deforestation in the upland, they are less willing to think about. Sadly, the forestry people seem to have no voice on this matter.

One of the main perceived underlying factors that led to the prevalence of a negative attitudes to forest conservation was poverty, specifically among rural communities around the PAs (see Sections 8.2.2. and 8.2.3). Even among those with a positive attitude to conservation, and a belief that conservation is necessary, the costs of implementing conservation measures are beyond them, in terms of both real financial and opportunity costs. Finally, a weak connection between local culture and the forest (i.e., the dominant anthropocentric worldview) was considered as leading to a negative attitude to conservation. Respondents' specific comments about these issues were:

The Nantu forest has received much exposure as a place rich in biodiversity but I think the Gorontaloese themselves have little appreciation of it. Maybe this is because of our lack of knowledge about the forest and its biodiversity. You are asking me about our local biodiversity and I feel ashamed of my ignorance (Lisda, a community development activist).

I think we still do not have an institution that deals with conservation here. Conservation has been managed as 'projects' that are often unsustainable, and not 'programmes'. We know that conservation is a long-term endeavour. There should be a clear link between the bureaucrats, educators, and implementers of conservation (Aton, an educator).

The wider public does not know the real benefit [of conservation] although we see the problems of sedimentation at the end of the Bone River, the more frequent floods, and the dying fishing activity in the coastal areas (Rizal, a legislator).

Most people see the forest as a scary place. So to make it more interesting and less scary, people think it is okay to get rid of the scary animals such as snakes because they have no benefit to humans (Rusdi, a researcher).

Among the contrasting opinions outlined above, several respondents noted the shift in attitude about forest conservation, from negative to positive. They observed that this gradual change is taking place in some sections of local society. In particular, this change was observed among communities around the Nantu forest, largely due to a long-term active enforcement of conservation laws (see details in Section 9.3) and a wide range of activities that addressed local educational and livelihood needs. Their testimonies illustrate these.

I have seen a change in terms of awareness of the importance of conservation, not only within the relevant forestry agency but also among the local NGOs and the younger generation, who want to be involved in community institutions such as the Village Council, which I think shows a growing commitment (Suwan, a legislator).

The local people around here used to be very suspicious of what the NFCP were doing. They questioned its activities and why it is concerned with the forest and animals. They did not realise the long-term benefit of protecting the forest. They spread rumours that NFCP was actually looking for gold and wanted to keep the good timber from the forest for its own benefit. This necessitated a hearing with local parliament about the forest. It has taken over a decade for people to realise what the NFCP is actually doing. The people who live around the Nantu forest were mostly transmigrants from Java but there are also some local Gorontaloese. For example, the Tangga village [just across the river from the research station] now has about 75 families. I am not sure whether they are legal occupants but they have been there for a while. Another village, Pangahu, used to be just *ladang* with some working huts in it. It used to be a part of Mohyolo village, but it recently [2002] became an independent village. These people move from time to time following cropping activities but since we actively patrol the boundary they no longer move further into the forest (Barjo, a ranger).

Rizal (a legislator), who was often frustrated with his colleagues' ignorance about forest conservation, supported Barjo's view by emphasising the impact of a field visit he took to Nantu with some of the local leaders, which significantly changed their attitudes toward conservation. He commented that:

Members of the legislative body just made noises [about the need for local economic development and the cost of forest conservation] but once they were taken to see the Nantu forest, they saw for themselves and appreciated the NFCP's effort to get it protected; some of them came home with a different attitude. What this project did has been invaluable to the people of Gorontalo. Our so called technical experts are steered by the executives, even those in the local planning body. They simply don't think about the long-term benefit of protecting the forests. They only think about how to make government's development programmes successful.

In summary, the findings from analysis of interview data revealed that the majority (65% of the total 68 responses) of respondents held a negative attitude to forest conservation policy (i.e., establishment of protected areas). Both NGO and government official sub-groups were proportionately represented among the negative responses (36% and 64% respectively). When analysed further on the basis of stakeholder groups,<sup>85</sup> resource managers represented the largest proportion (39%) of the negative responses (see Figure 9.1, left), which is broadly consistent with the size of this group within the sample.

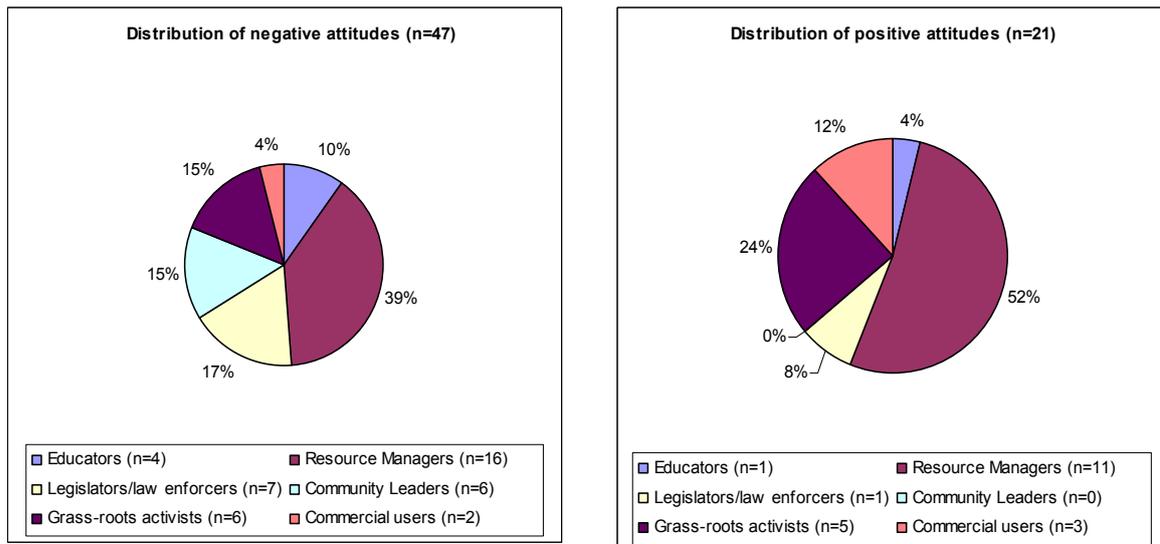
On the basis of respondents' education, the sub-populations of the low, medium, and high education groups comprised of 6 (9%), 30 (44%), and 32(47%) respectively. The findings revealed that the negative attitude was proportionately distributed across the three groups. The age- and gender-based<sup>86</sup> analyses also showed a similar pattern of proportionate representation for each sub-population. Overall, the data showed that no one stakeholder or demographic variable appeared to be dominant among those classified as holding negative attitudes towards forest conservation policy. It is also important to acknowledge that the very small numbers of respondents only permit very basic, descriptive analysis. The data do not allow for micro-analysis of each stakeholder group.

As several of the quotes in this section indicated, government officials were more articulate in commenting on the inadequacy of their own agency or other agencies in implementing relevant conservation actions. Their negative attitude to forest conservation, therefore, may not mean that they themselves do not support conservation policy. Rather, they are more aware of the gaps between policy and actions, or of policies that have little relevance to the everyday needs of the locals, or of the lack of enabling conditions (e.g., funding, skilled staff, clear rights and responsibilities concerning the use of forest resources, see Section 9.3) to support conservation.

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<sup>85</sup> On the basis of stakeholder groups, responses (68) were distributed as follows: educators (7 individuals or 10%); resource managers (29 individuals or 42%); legislators/law enforcers (9 individuals or 13%); community leaders (6 individuals or 9%); grass-roots activists (12 individuals or 18%); and commercial users (5 individuals or 7%).

<sup>86</sup> Based on the age of respondents, the population of responses was distributed as follows: young (6 individuals or 9%); Middle (53 individuals or 78%); and oldest (9 individuals or 13%). Female respondents were represented by 10 individuals (15% of the total responses) and male respondents comprised of 58 individuals (85% of the total responses).



**Figure 9.1** The distribution of respondents' attitudes towards the national forest conservation policy, based on the types of respondents' occupation.

Despite the tangible and indirect benefits that the three protected areas provide for Gorontalo (Chapter 7), respondents' attitude toward their conservation was largely negative. The data suggest that it was widespread across society. In fact, the forest is regarded as an expendable resource to be exploited for quick cash rather than as a renewable resource that can be sustainably managed (Chapters 7 and 8). Closely related to this were the high economic and social costs of conservation, particularly for the management of protected areas, which were beyond the means and ability of local stakeholders. Added to these was limited awareness about the long-term benefits of forest conservation. Other practical aspects (e.g., contested boundaries and a lack of information about practical benefits of forest conservation, see Section 8.2) were some of the perceived reasons for the lack of local support for PAs. Section 9.2 elaborates the local perceptions of conservation activities that have been implemented in Gorontalo.

## 9.2 Attitudes to Conservation Activities

Overall, 66 respondents referred to five main conservation activities in the interviews. The relative strength of each activity and respondents' attitudes toward them (positive, neutral, or negative) is indicated by the total number of individuals who discussed it (i.e., the number of responses). Note that some respondents talked about more than one issue and Table 9.2 shows that the total number of responses (147) exceeds the total number of interviewees (66). Enforcement of conservation laws received the highest responses (47 or 32% of the total responses) but it was the least favoured, as shown by the highest number of negative responses (25). Meanwhile, strong support, indicated by the number of positive responses, existed for the second and the third activity in Table 9.1. In the subsequent analyses of responses in each conservation activity, the neutral responses were excluded. For example, in the first listed activity, the total responses analysed were 46; 35 responses in the second activity, and so forth.

**Table 9.1 A summary of respondents' attitudes to conservation activities in Gorontalo province**

Type of activity	Positive	Negative	Neutral	Total
1. Enforcement of conservation laws	21	25	1	47
2. The land and forest rehabilitation programmes	19	16	2	37
3. Provision of livelihood assistance	19	3	1	23
4. Regulatory approach to extractions of natural resources	4	12	6	22
5. Awareness-raising activities	13	5	0	18
Total of responses	77	61	10	147

### 9.2.1 Enforcement of Conservation Policies

As noted in Chapter 4, PNR and BWNP were established as a follow-up to Indonesia's commitment made at the Third World Congress of National Park in Bali 1982. Both protected areas and the NWS (established in 1999) were created with the primary goals of protecting Sulawesi's unique biodiversity. However, this central government's commitment was either not followed by determination of field boundaries in these PAs, or as many respondents reported, occurred with little consultation with communities on their immediate borders. This has led to an ongoing contestation of field boundaries – commonly used as a reason for agricultural encroachment into the PAs (Section 8.2). Villagers felt they had various claims on the resources inside the PA boundaries, although, like almost all folks indigenous to forest areas in Indonesia, they have no legal proof of their ownership, of either land or resources. For example, hunting of wildlife and extraction of rattan are important for their sustenance or to supplement their income from dry-land farming (see Chapters 6 and 7). In many cases, field boundaries do not exist or have deteriorated, and the maps that delineate them are not accessible to the public. As several respondents noted, the maps are mostly outdated and do not reflect field reality. The conservation authority has very limited or no resources to enforce the conservation law against these local communities' pre-existing activities inside the PAs (Table 9.2). To some members of rural communities, whose livelihoods depend upon forest resources, this means restriction of their limited livelihood options and no formal social safety net is available. Rudi (a religious leader) noted that:

When establishing protected areas, our government does not adequately deal with the poverty and other social economic issues of local communities.

In the early 1980s, some parts of lowlands forest near Panua and Nantu were cleared for legal logging and settlements for transmigration (interview with Samsu, 29/9/2005). The road access built through these schemes has made agricultural encroachment, illegal logging, and rattan collection easier and extended human activities to the forest frontier. Moreover, with the exception of Nantu, gold deposits are believed to exist inside the Panua and BWNP boundaries (Anonymous 2007). Peasant gold mining, which has been one of the main economic activities for a small number of villagers since Dutch colonial times, is another ongoing battle that enforcers have faced. Recently, both the scale of activities and the number of people involved have increased due to easier access to credit for motorbikes and the high price of gold (interview with Jufar, a resource manager, 27/9/2005, and Kamis, a park ranger, 27/11/2007).

Unlike Panua and BWNP, Nantu is relatively more isolated and access to the upper reaches of Paguyaman River is limited to longboats. Despite its legal status since 1997, pressures from illegal logging, wildlife hunting, collection of rattan, and agricultural encroachment and

its associated human settlement in the mid-1990s continue here (Anonymous 2007) and have been as intense as in the other two PAs. To date, forest resources within the Nantu forest are in much better condition (Clayton et al. 2007).

**Table 9.2 Permitted and prohibited human activities in the protected areas in Indonesia, with specific reference to Gorontalo**

Protected area	Panua Nature Reserve	Nantu Wildlife Sanctuary	Bogani Nani Wartabone National Park				Protection Forest
			Cz	Wz	Iu		
Human activities	x	x	x	x	x	x	
Growing food crops	x	x	x	x	x	v	
Growing tree crops	x	x	x	x	x	x	
Human settlement	x	x	x	x	x	x	
Commercial logging	x	x	x	x	x	v	
Collecting herbs and firewood	x	x	x	x	v	v	
Hunting	x	x	x	x	x	v	
Fishing	x	x	x	vx	v	v	
Camping	x	vx	x	vx	x	v	
Scientific collection with permit	v	vx	v	v	v	v	
Active habitat management	vx	v	x	v	v	v	
Non-exotic introduction	x	v	x	v	v	v	
Rattan collection with permit	x	x	x	x	x	v	
Mineral exploitation	x	x	x	x	x	v	
Wildlife control	x	v	x	v	v	v	
Visitor use	x	vx	x	vx	v	v	
Exotic introduction	x	x	x	x	x	x	

Note: v = activity permitted; x = activity prohibited; vx = limited activity permitted; Cz = Core zone; Wz = Wilderness zone; Iu = Intensive-use zone; PF = Protection Forest (*hutan lindung*). Source: Adapted from MoF and FAO 1991.

Many respondents reported that allocated funds from the central government for management costs (staff salary and operational costs, mainly patrolling) of the PAs is far too small compared to the size of the forests they are responsible for and the complexity of the problems they have to deal with. In reality, according to respondents, while patrolling the protected forest is the most challenging, it remains a priority because these forests are the main target for encroachment.

As noted in Chapter 8, the lack of field boundaries has been a common excuse to clear forest land and 'land occupation' has spread to many parts of the PAs. Specifically, many resource managers underlined the poor financial contribution from the district and provincial governments, except during the occasional joint enforcement work or emergency operations (e.g., dealing with forest fires) with the local police. Several respondents illustrated the serious lack of resources to enforce conservation law as follows:

We patrol the boundaries of this reserve [Panua and BWNP] twice a month only because there is not enough staff. For the management of Panua (45,575 ha) and the other four smaller ones [Tangale Reserve, 113 ha, Tanjung Panjang Reserve, 3000 ha, and Pulomas Popayaraja Reserve, 160 ha] we have only four staff. Now that Gorontalo is an independent province we wish there was a separate conservation office. As it is, the funding we need to carry out our work has always been late in coming.

For example, when we confiscated protected animals that were hunted, we need funding to transfer and feed them to keep them alive. When we co-ordinate the work with the police force, we have to pay them. But for everything we do we have to rely on the funding approved by Manado [the head office] (Samsu, a resource manager).

This 110,000 ha of national park is only staffed by 17 people, so it is impossible to do our job properly. We work hard on patrolling but you can understand that thieves are always clever at avoiding being caught; when they do get caught encroaching, we proceed with legal prosecution to deter people. But the same problem continues because there are too many of them doing it. The protected area being encroached upon is now reaching 50 hectares, and is widespread around the national park (Kamis, a park ranger).

The line of argument [encroachment into PAs] has been a dead end one, worsening the problem because government officials do not think about the solutions. Even though there has been some social forestry programme, whereby people were given free seedlings of tree species and crop plants, they still look for new free land from the forests (Timu, a resource manager).

Other respondents stressed the priority of law enforcement because of the existing pattern of resource use in the surrounding areas. The following summary of enforcement work in Nantu forest, reported in Clayton et al. (2007), illustrates this:

The enforcement team, which consisted of local police personnel present at the remote Nantu field station at all times and local assistants, patrols the Nantu Forest daily, particularly in the reserve's south-east boundary. Since the early 1990s there has been a sustained upward wave of forest burning along the Paguyaman River. Along the Nantu River, for example, 1000 ha of primary floodplain forest were burned during the long dry season of 1997 (4 months) by settlers backed by local land speculators. Prior to, and at the start of their deployment in 1998, ten rafts of illegal timber per day (40m<sup>3</sup>) were being extracted from the Nantu watershed [measured by daily records of rafts passing the Nantu field station/guard post]. Outside the reserve, however, joint patrols with local wildlife department and police detained 70 m<sup>3</sup> of timber cut in a few days from the western branch of the Paguyaman River. The presence of these patrols had prevented the destruction of NWS from swidden farming and illegal logging, despite intense pressure. However, continued vigilance is needed as today illegal logging is again occurring in Nantu's remote south-east corner.

At the same time, local communities' perceptions of their rights to forest land and their different interpretation of the Regional Autonomy Law (RAL) have recently made law enforcement work more difficult for the law enforcers. They said that:

We have been taking some preventive measures for forest protection, such as patrolling the forest but people still conduct destructive activities because in these rural areas, their level of education is very low and there are no choices for earning a living (Laren, a forest ranger)

Many people who live in the forest edges perceive that the government took their rights to forest and its resources, so they resent the enforcement of the forest law. Since the reform began, they have become bolder and insist on getting their right back to use 'their' forest land (Muti, a community development activist).

Since the early 2000s, sometime I felt like I was putting my life in danger when I was doing enforcement work around the [Panua] reserve, because some local communities became bolder in occupying lands inside the reserve (Zaid, a ranger).

Respondents also recognised some major limitations in current law enforcement. While they acknowledged the existence of good regulations (such as Presidential Instruction No. 4 of 2005 on the Eradication of Illegal Logging in State Forestland) to safeguard the forest for the benefit of the wider society, their implementation has been poor. Their reasons include

inconsistency and partiality in applying sanctions to offenders, largely due to the systemic corruption and collusion between illegal loggers and the law enforcers (see Chapter 8; detailed studies of this in the Aceh province are reported in McCarthy 2000), which resulted in unsatisfactory prosecution of offenders. Meanwhile, no incentive existed for successful law enforcement actions. The quotes below illustrate these points:

The role of government in the enforcement effort is so important, but sometimes these law enforcers themselves also take part in encroaching on protected forest (Midas, a forest product trader).

During our patrol, we confiscated a large volume of sawn timber in the forest. But, during a meeting with provincial government officials they did not consider this as an achievement on our part. Rightly, they say that the trees are cut already. They were just being pragmatic and suggested the timber be auctioned. So, essentially, the government just turns illegal timber into a legal source of revenue. There is no enforcement for timber business people who export our logs to other regions either (Samsu, a resource manager).

Our forest environment is now degraded. This shows that the local government has no real policy for its management. The ineffective enforcement means that illegal activities are allowed to persist. In the past we had some programmes to move people out from a protected area, to comply with the conservation law, but then the national park authority was accused of violating their human rights. Furthermore, to date no illegal loggers have been prosecuted. Only the poor loggers have been caught, but the *cukongs* are free. Even when these loggers are jailed, the punishment is too light. In the end the forest is already destroyed (Bobi, a resource manager).

Unlike Panua and BWNP, which rely solely on government funding for their management activities, Nantu has received long-term external technical and financial assistance for its management (Clayton 2003). Nonetheless, the enforcement activity in all three PAs has, as many respondents aptly stated, operated in a ‘cat and mouse’ mode. The ‘empty stomach’ reason that offenders use for conducting illicit activity within the protected areas has influenced law enforcers to apply sanctions arbitrarily, as the respondents below stated:

By doing nothing about small-scale gold mining in protected areas, I think the government itself has been inconsistent in enforcing the [conservation] law (Rudi, a religious leader).

When I started working here five years ago, there were not as many swidden farmers; even so, it was difficult to stop people encroaching. We prosecuted people who were caught trespassing. But then again, our conscience has always been challenged by the fact that these people are hungry, their children have no jobs. What we did [enforce the conservation law] we are accused as anti-poor people (Kamis, a park ranger).

A senior member of the NFCP acknowledged that given the socio-economic and political circumstances surrounding the Nantu forest (e.g., rampant illegal logging, wildlife hunting, and encroachment), its protection has so far relied heavily on continuous patrol. One of the rangers, Barjo (5/9/2005) reported that, following the official establishment of Nantu as a conservation forest, the boundaries were set to exclude areas previously cleared by local people so as to avoid conflict with them. These people cleared the forest by traditional methods, not with chainsaws, so their impact was quite small. They were given free teak seedlings to grow, but they initially refused the offer for fear that the timber would be claimed by the government. Some people tried to influence others to do the same. During routine patrols, for example, people who were caught entering the forest spread rumours on law enforcers’ use of violence during their patrol; they were angry when the rangers confiscated the evidence, such as rattan canes, logs, or their chainsaws. Recently, as some of the boundary marks have weathered, reconstruction work and participatory boundary protection amongst local communities have been conducted so that settlers now living along

the reserve boundary might each assist in preventing incursions along ‘their’ section of the Nantu boundary. All of these patrols were conducted through a long-term partnership with relevant local authorities (the military and police force, the district forestry office, and the SBKSDA Gorontalo), for the following reasons:

Before the *Brimob* was involved, the small number of rangers and regular police officers [two officers for each fortnightly rotation] could only stand working in the forest for 1-2 days then they wanted to go home. Then in 1997 an official request was made to the Provincial Police Office because the regular police force involvement did not really work. The *Brimob* have more discipline and a better level of endurance. They are also better respected by local people; they apply the law equally, resulting in a much decreased encroachment into Nantu forest. I guess people started to understand the seriousness of forest protection. We had a combined team from the project and the rangers from the conservation office (KSDA) - but the *Brimob* presence made a difference in terms of compliance (Barjo, a ranger).

Many respondents regarded the law enforcement activities around the PAs as beneficial to the larger communities, particularly because they reduced encroachment and deterred potential offenders from committing prohibited activities. Examples of their observations are as follows:

I think it is good that people who come in and out of the reserve boundary [Nantu] are questioned by the rangers or the *Brimob*. Without them the land grab will continue and people will fight each other (Mahar, a forest product trader).

The local forestry agency lacks resources to enforce the forestry regulations and to follow up with legal prosecutions for the offenders. Nevertheless, what they did in the BWNP has had a deterrent effect on local people. To date, three people are being prosecuted (Rizal, a legislator).

However, several respondents criticised the formal arrangement of involving the police force on the grounds of human rights violations. Critics also included local government officials who questioned the sustainability of this activity, specifically due to the financial cost involved. They maintained that:

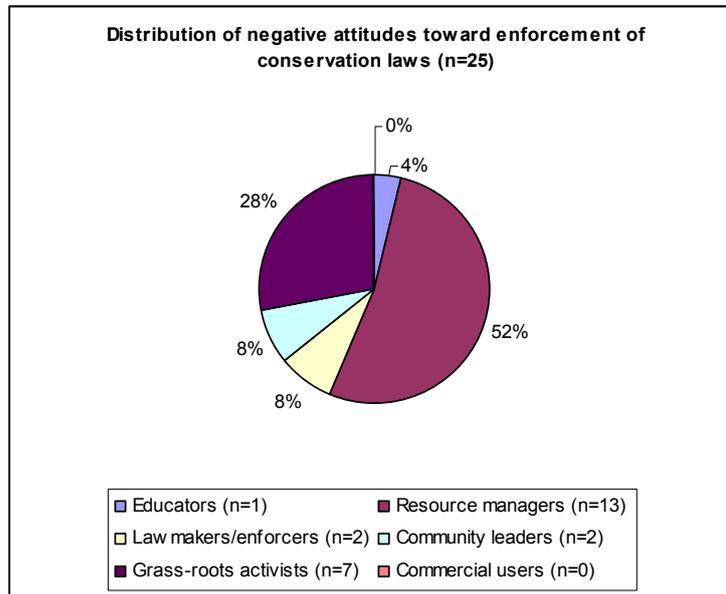
Local communities resented the presence of *Brimob* because, at the beginning of their enforcement work in 1997, they burned houses on the cleared forestland. I lost my three huts, two were burned but the other one, where I stored my maize, was only slashed during this operation (Kepes, a government official).

The presence of *Brimob* officers patrolling the village borders (of Nantu) evokes a sense of fear among the villagers, particularly because of what happened in Pangahu [the burning of huts noted by Kepes above] (Dani, a community development activist).

I disagree with the involvement of *Brimob* to enforce the forest protection law. It is a temporary solution only and it is not financially sustainable (Iban, a senior government official).

Despite the necessity for law enforcement to sustain the variety of benefits of protected forest, 54% of responses were negative; suggesting that this activity was considered ineffective in achieving the conservation goals. Furthermore, given the government officials’ proportion of the total respondents (31 individuals or 67% of 46 responses) and that of NGO activists (15 individuals or 33%) the share of each sub-group (18 individuals or 72% for government officials vs 7 individuals or 28% for NGO activists) among the negative

responses is even. Further analysis, based on the stakeholder groups,<sup>87</sup> showed that resource managers represented the largest proportion (13 individuals or 52% of the negative responses, see figure 9.3). However, the negative attitude is distributed proportionally across the stakeholder groups.



**Figure 9.2** The distribution of respondents' attitudes towards the enforcement of conservation laws.

The influence of respondents' education and age on their attitude to law enforcement is similar to their attitude to forest conservation in general. Although those with medium education and middle age-group shared the highest proportion of the negative attitudes (see Appendix 9.2), the data revealed that on the whole, no one stakeholder or demographic variables was dominant. The primary reasons for this pattern are similar to those elaborated in Section 9.1. However, bearing in mind the dwindling forest resources and increased human population around the PAs, the preservationist approach to conservation is evidently unpopular for protecting natural forest and its biodiversity. Respondents asserted that greater local participation in PA management and a clear definition of the rights and responsibilities of all relevant parties are needed to gain stronger support for conservation. They also believed that it must be combined with activities which can have clear benefits for local communities. The next section sheds light on this.

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<sup>87</sup> On the basis of stakeholder groups, responses (46) were distributed as follows: educators (4 individuals or 9%); resource managers (21 individuals or 45%); legislators/law enforcers (6 individuals or 13%); community leaders (3 individuals or 6%); grass-roots activists (10 individuals or 21%); and commercial users (3 individuals or 6%).

### 9.2.2 The Land and Forest Rehabilitation Programme

As indicated in Section 2.5 this centrally funded national programme, popularly known in Indonesia as *Program Penghijauan dan Reboisasi*, began in 1976 and has been implemented in Gorontalo since then; *Gerhan* commenced in 2003. Of the 37 respondents who discussed this forest rehabilitation scheme, 51% were positive about it, 43% were negative, and only 5% were neutral (Table 9.2). The slightly higher proportion of positive attitudes towards this scheme is largely due to the change of approach to land and forest rehabilitation from the formerly top-down to a more participatory one. Respondents believed that this change has enabled this activity to: (1) allow greater participation from stakeholders other than the regional forestry office; (2) provide temporary employment for the rural poor; (3) give greater opportunity for local communities to select tree species and apply multi-cropping systems; and (4) allow a potentially greater sense of programme ownership by the participating communities. In addition, some of the *Gerhan* pilot projects have served as a means to raise people's awareness of more sustainable management of forest and tree-based farming, which provides multiple benefits to the wider population. Specifically, the benefits include improving the productivity of abandoned lands, where they are planted with timber species such as teak, candlenut, and jackfruit. Furthermore, the fund goes more directly than formerly to the planters, who receive wages for the land preparation and the planting of seedlings. The *Gerhan* also provides training opportunities for community groups to learn about tree-based farming. Respondents showed their support for this programme:

The main target planting area is the critical lands, both outside and inside forest areas, but *Gerhan* serves a wider goal for preventing soil erosion and improving hydrological function (Bobi, a resource manager).

*Gerhan* is much better now than it was in the past because of its multi-stakeholder operation, with involvement of the army, NGOs, members of local communities (Hamsah, a senior resource manager).

The jackfruit is a very popular species for the replanting of community forest because people can harvest the fruits as well as good timber for local housing construction. The rate of seedling survival is also higher in community land because there is greater certainty about the ownership of the fruits and timber, compared to the replanting of forest where the future sharing of benefit from the timber still needs to be arranged (Fayab, a traditional leader).

*Gerhan* has been quite good. From the targeted 5,000 hectares, we planted 1,400 ha in 2004 and 2,200 ha in 2005 (Barat, a resource manager).

Araf (a resource manager) claimed that *Gerhan* has achieved three main goals: rehabilitating critical land, improving the livelihoods of some rural communities, and increasing plant diversity. However, the two respondents who were neutral perceived little difference between the old and the new systems. Apart from the name change, according to these respondents, everything else about this activity is the same. While these respondents recognised minor changes in the programme implementation (e.g., the choice of species by local participants) they considered all the planning and implementation to be the same, and the evaluation is basically limited to the administrative aspect only. Their comments were:

It is good that we have this *Gerhan* every year but the rate of seedling survival is very low and there is no funding for replanting those that die. I cannot see the difference between protection forest and other categories of forest – both have no trees in them (Mupol, a law enforcer).

In Biyonga village [at the edge of Lake Limboto], tree planting in 2004 produced a good results. The various fruit trees that were planted in a common land now attract people to visit. People were made

aware of the multiple effects of this. Not only will they have timber in the future, some of them have established nursery businesses, which take their attention and energy away from going to the forest to cut trees.

Despite the greater local participation of other stakeholders, respondents who had negative attitudes toward *Gerhan* emphasised the fact that the project contractors still enjoy the largest share of the benefit. Indeed, as many respondents reported, the participants can select the tree species for planting, but the rest is controlled by the government. Basically, the participants (including the NGOs, members of police and army forces, and members of communities who did the land preparation and the planting) are paid labourers, who are told what to do. Other negative comments from respondents to illustrate these points are provided below:

Given that this activity has been done every year [since 2003], had it been done properly, even the roofs of our houses would have had trees growing on them. The fact that we see very little improvement in our forest means that it has basically failed. We are so obsessed with big numbers (of area planted and of seedlings provided) to satisfy the administrative requirement that the fund is spent by the end of the project period. On the other hand, provision of funding for maintenance is inadequate. I have no idea under what criteria Gorontalo district was declared as successful in implementing *Gerhan* by the national government. Furthermore, while funding for technical aspects (seedlings, wages for labourers, and supervision) is available, the training component is not (Jola, a government official).

*Gerhan* has no impact on saving the forest, let alone the wider environment (Mutaf, a resource manager).

The tree planting programme is reactive and there is no real long-term programme to address the core problem of deforestation in the upland. It is basically still implemented with a project approach (Abdul, a journalist).

Less than half of the area targeted for planting is actually planted. The planting activity also focuses in the easier terrain only, where it is more visible. *Gerhan* only deals with problems in the lowland; the core problem upland is not even touched upon. Moreover, in places where the terrain is difficult, they are not planted at all. Nobody really counts how many seedlings actually were planted and survived. If in the end 10 percent of the planted seedlings survived, it is already very good (Bukar, a legislator).

Other respondents criticised some of the technical and financial aspects of *Gerhan*. These included selection of species and the vulnerability of funding to abuse or unfair distribution. As Jola noted above, these resulted in little improvement in the critical land and forest being targeted for replanting. Respondents' specific views are provided below:

The species selected are not suitable to grow on steep-sloping lands. If indeed the *Gerhan* is implemented on critical land, at least we would have seen reduced sedimentation level in Lake Limboto, but we have not. This is very frustrating! (Rusdi, a researcher).

The basic requirement of seedling quality is not addressed yet. I agree that the requirement for certified seedlings is stricter now, involving more agencies. The quality check for the seedlings was basically based on the size and appearance only; the fundamental importance of their genetic properties is still not considered. This can potentially be disappointing because when people plant fruit trees, they want to harvest a good crop, but no one can guarantee it (Johan, a resource manager).

The funding allocation should be larger for districts with forested areas that suffer degradation, but the City of Gorontalo government received more than us. I can not understand the logic. Also, the scale of funding is far too small compared to the size of degraded land and forest that need rehabilitation. Field evaluation on the percentages of planted seedlings that survive is rarely done (Iban, a senior government official)

*Gerhan* is prone to various kinds of corruption, in the size of area planted, the number of seedlings, the sub-contracting systems – and it is impossible to deal with critical lands that have already lost their fertile surface due to erosion (Rasid, a traditional leader).

*Gerhan* is a waste of government money – a big budget but not for safeguarding the existing forest because its main target is areas outside the forest. Yet, it is a fact that conservation forests are under continuous attack from illegal activities (Rizal, a legislator).

While funding for technical aspects of *Gerhan* is much better now, there remains one flaw, insufficient funding for training dry-land farmers in tree-based farming (Araz, a resource manager).

As Table 9.1 shows, the proportion of positive responses was only slightly higher than negative responses (54% vs 46%). Analyses of selected demographic attributes revealed that the share of government officials in the positive response (12 of 19 responses, or 63%) was in proportion to their sub-group size (12 of 17 responses, or 70%), see Appendix 9.2b. Among negative responses, these two stakeholder groups shared an equal proportion of 31% of the negative attitude. However, for the NGO activists, this represents 45% of the total responses for that sub-group, whereas the proportion of the resource managers represents 29% of that sub-group. Taken together, this suggests that government officials tend to be more positive about *Gerhan* than the NGO activists. Furthermore, within the education sub-group the negative response was dominated by the medium group (63%). This is not surprising given that the group represents 54% of the total responses.<sup>88</sup> Education- and age-based differences in the positive responses appear to be less striking (Figure 9.3, left). Both sub-groups<sup>89</sup> were proportionately represented among positive and negative responses.

As the quotes in this section indicated, along with the discussion in Section 9.2.1, those from medium level of education and the middle age-group were the most critical about *Gerhan* and its various pitfalls (Figure 9.3). Again, the size of sampled population is small to rely on the data to defend this conclusion. In general, respondents have greater awareness of *Gerhan* because it takes place outside the forests and therefore is more visible. They were less aware, however, of a similar tree-planting activity which has been implemented in villages bordering protected forests by the local conservation agency (Section 9.2.3).

### 9.2.3 Provision of Livelihood Assistance

Most respondents (83%) who discussed this livelihood assistance programme were positive about it. The primary reasons for this were poverty among the villagers around Nantu, Panua, and BWNP and a lack of alternative livelihoods for them. The specific comments for this support are illustrated by the following respondents' comments:

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<sup>88</sup> Based on the level of respondents' education, the total population of 35 responses was distributed as follows: Low (4 individuals or 11%); Medium (19 individuals or 54%); and High (12 individuals or 35%).

<sup>89</sup> Based on the ages of respondents, the total population of 35 responses was distributed as follows: young (3 individuals or 9%); Middle (26 individuals or 74%); and oldest (6 individuals or 17%). Female respondents were represented by 3 individuals (9% of the total responses) and male respondents comprised of 32 individuals (91% of the total responses).

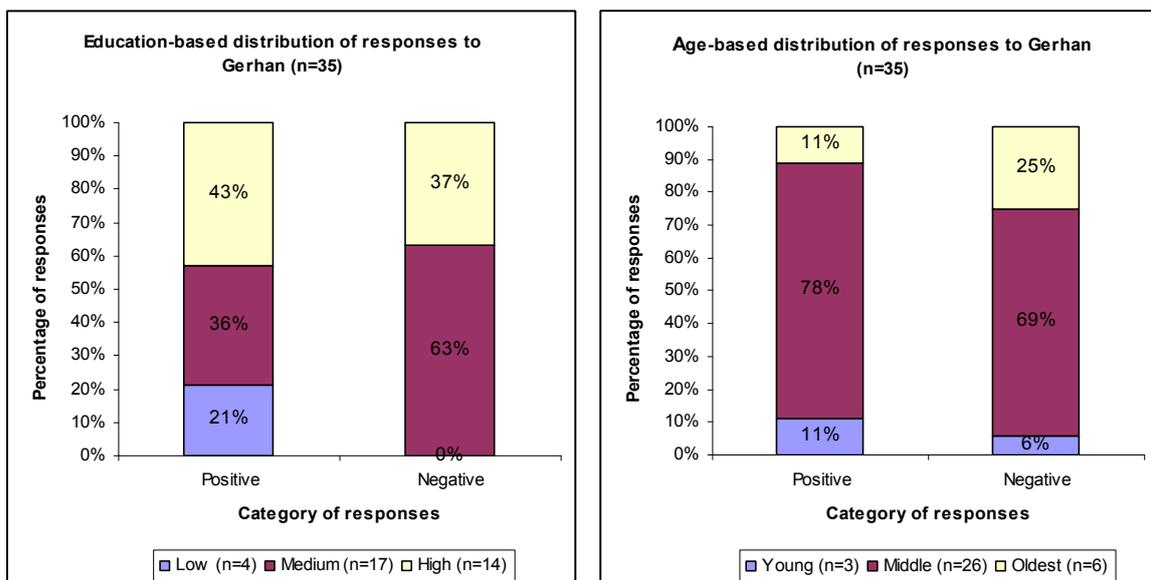
The people who live around the forest are so poor. So, anything that will bring cash to them is very attractive, including hunting of wildlife and growing maize regardless of the suitability of the land (Fatom, a member of a local conservation club).

Local people, who live around the forest, are lagging behind in many ways. They are limited in their capability to use local resources. So they are often out-competed by outsiders who have more knowledge and skills (Aton, an educator).

The problem with the villagers in the buffer zone of this national park is that they have nowhere else to go to earn a living. Our focus should be on helping them to develop sustainable use of resources while maintaining the population at a low level (Arin, a community development activist).

I think people understand the function of the national park, but their economic situation has left them with few or no choices and they keep entering the forest to get some of its resources (Muti, a community development activist).

Aware of the rural socio-economic situation, the local conservation authorities have used livelihood assistance programmes as a strategy to gain conservation support from some communities bordering the PAs. The common agricultural focus in these villages is on maize-based farming, but it is not based on sustainable soil management. Tree-based livelihoods remain scarce and the development of this technique is not the core task of either agricultural or conservation agencies (Clayton et al. 2007). As a ranger, Kamis acknowledged the difficulty in dealing with problems of unsustainable farming. He said: ‘We are not trained in that field. We don’t have the technical knowledge about it.’ Meanwhile, these villages are generally too remote for the agricultural agency to reach and most of them do not have access to government agricultural programmes. He underlined the crucial roles of livelihood assistance pilot projects in addressing the economic and conservation needs there.



**Figure 9.3** The distribution of respondents’ attitudes towards the *Gerhan* programme, based on education (left) and age (right).

Typically, these projects involved several agencies: the watershed management office (BPDAS) provides free candle-nut seedlings; a local NGO facilitates the training on agroforestry and participatory mapping; and the agricultural agency gives free fruit tree seedlings. For example, in the early 2000s, according to Barjo (a senior park ranger), the NFCP project provided 20,000 cocoa and 8,000 teak seedlings, grown in community nurseries, to settlers. These were for planting as a buffer-zone crop on privately owned and communal land where demonstration plots were established. Obviously, as Jafar (a park ranger) highlighted, the free seedlings available for this scheme were limited, compared to what the villagers wished to have, because of the shortage of funding. In other conservation areas, this assistance also included livestock and other activities, as respondents below showed.

We helped people by giving them free seedlings of cash crops [cacao, coffee and candlenuts] so that people can grow in the abandoned land within the protected area which is no longer productive. Our purpose is primarily to stop people opening land further up. We also gave them livestock too, but it did not work out (Kamis, a park ranger).

A local university worked together with the district government to help communities around the Dulamayo protection forest. Between 2003 and 2004 the project spent about Rp 400 million to grow vegetables in their own land in order to shift their attention away from extracting timber from the protected forests. We also established nurseries so villagers can buy seedlings of multi-purposes species at a relatively cheap price. They welcome these activities because at least they receive wages for their labour. We also tried bee-keeping and fish-rearing in floating cages with them in some parts of the nearby river. The results of these are hard to see immediately but they serve to demonstrate the practical benefits of keeping the forest protection upstream. More support for these activities is needed because there are so many villages around the forests (Bani, a local government official).

Once [in Panua] we gave them goats with the hope that they will look after them but they just killed and ate them! We help the co-operative to buy cutlery and tents that they can rent cheaply to villagers for village functions, but they did not look after them either. We try to provide something they need to gain their support, but so far it has not worked that well (Samsu, a park ranger).

As expected, most (83%) of the positive responses came from government officials. In all stakeholder groups, all sub-groups gave a positive response (Appendix 9.2c). Within the education- and age-based sub-populations, the positive response was distributed proportionately to the sizes of their sub-populations.

In contrast with the response towards enforcement of conservation laws (Section 9.2.1) the findings above show that the livelihood assistance programme has been the most obvious way through which respondents can see the benefits of PAs. Many saw the development of tree-based farming in the aforementioned respondents' examples as a key step for gaining local support for forest conservation. However, the *ad hoc* manners in which they have been implemented and the uncertainty of funding associated with it raise a question of sustainability. As often happens, while this scheme has worked for small rural populations, its very success can become a magnet to attract more people to rural areas bordering the forest. This has happened in many ICDP programmes (see Wells et al. 1997 for a detailed review of ICDPs in Indonesia), such as in the Kerinci Seblat National Park, one of the large internationally funded conservation programmes in Indonesia (interview with Lusi, a former director of the park, 15/8/2005).

#### 9.2.4 Regulatory Approaches to the Extraction of Forest Resources

One of the outcomes of the implementation of the RAL is a prolific growth of local government regulations (*Peraturan Daerah* or *Perda*). This policy, together with the Forestry Law (No. 41 of 1999) and Conservation Law (No. 5 of 1990), are the three main national policies governing the management of forest resources in Indonesia. The limited success associated with the implementation of sustainable forest management policies was discussed in Chapter 8. In this chapter the focus is on respondents' views of the local regulations governing forest resources, created since Gorontalo became an independent province in 2002. Based on the interview data, these include district regulations on spatial planning, extraction of forest resources, and the protection of Nantu Wildlife Sanctuary. The perceived reasons for the creation of these regulations and how they affect the natural forests are described below.

Because of the high reliance of the local economy on forest resources, many respondents thought that a regulatory approach was an important way to improve past practices. For example, Dabo, a senior government official, stated that:

The natural forest is a source of livelihood for many rural people here. As well as regulating the use of forest resources, the government is tasked with protecting it. I think making local regulations is the first step and then we have to find alternative sources of income and economic activities for these people away from the forests. Experience has shown that regulations that only tell them to stop entering the forest have not worked well.

The first example of regulatory approaches raised by respondents in the interviews was the spatial planning regulation. As noted in Chapter 2, as an implementation of the Spatial Planning Law (SPL - No 24 of 1992), the Functional Forest Classification (TGHK) was revised and synchronised with the regional spatial arrangement at provincial and district levels (*Rencana Tata Ruang Wilayah Propinsi* or *Kabupaten*, RTRWP/RTRWK) to guide land allocation for local development activities. However, according to Beruga (a planner) these are not respected either by local or central governments. She said:

Instead of guiding the planning for our development activities the RTRWP/RTRWK often follow the direction of development activities; it is the other way around here.

A specific example of this was the construction of a transmigration site just opposite the Nantu forest, in early 2000 (see Chapter 8) while the plan to enlarge the size of the reserve was still being discussed. As explained in Chapter 4, the forests surrounding NWS were previously allocated as production forests. As a result of the NFCP's work, conducted in partnership with the local government and wildlife department (SBKSDA Gorontalo), the area of Nantu forest was expanded to include the entire Nantu watershed. As noted in Section 9.3.1, the protection of NWS between 1989 and 2007 relied primarily on enforcement of conservation law against deforestation in the Paguyaman Watershed. To illustrate the problem of spatial planning regulations and the need for creating local regulations for the protection of Nantu, the NFCP's report (Clayton et al. 2007) is summarised here:

In 1989 the entire Paguyaman watershed, the east and western branches, upriver from Potangga was completely covered by undisturbed primary rain forest. In 1991 a large sugar cane factory [owned by PT Barito Pacific Timber Company] was established at Lakea and this was a contributing factor to movement of settlers upriver. Our observations indicated that about half of the primary forest covering the Paguyaman watershed in 1989 has now been destroyed, particularly the left branch of the Paguyaman River. This was due to a large scale logging [40,000 ha concession] during 1994-1998, followed by groups of settlers coming in along the logging road. Further settlement of this formerly pristine forest area occurred when a transmigration settlement (200 families) was in 2005, on the southern boundary of the Nantu Wildlife Sanctuary. Today, Nantu remains an intact pristine forest, one of Sulawesi's few remaining representative rainforest ecosystems.

When Gorontalo became an independent province the RTRWP/RTRWK clearly made NWS a protected area. Given the high conservation potential of Nantu's unique biodiversity, the practical benefits of protecting it to sustain subsistence agriculture along the Paguyaman Watershed, and the ongoing threats of deforestation, local stakeholders lobbied intensively to enlarge its area and propose it as a national park (Clayton et al. 2007). In partnership with the local wildlife department (SBKSDA Gorontalo), the NFCP worked with the Gorontalo District to prepare a local regulation on the protection of Nantu forests. The regulation was approved by the local legislative body (*Dewan Perwakilan Rakyat Daerah*, DPRD) in 2004, by which the NWS was expanded from 31,000 ha to 52,000 ha, and called the Nantu Boliyohuto conservation forest, which includes 21,000 ha of protection and production forest (ibid). Respondents who support this proposal testified that:

One important aspect was still left unfinished - the institutional arrangement to create a local management authority in the management of the proposed park. We do not want the park to be managed like conventional national parks in the rest of the country, which have so many problems, specifically with the lack of involvement of local stakeholders. Unfortunately, many of the local key players were too busy with the local election campaigns, and it stopped there. This local initiative is perhaps uncommon and we suspect the central government will contest it. By creating this local regulation we wanted to give stronger local support for the protection of Nantu. We have been giving public notices [see the creation of sign-posts that Araf noted below], specifically because of the threats from the bordering villages and forests [from the construction of a transmigration site in the south-western border of Nantu] (Bani, a local government official).

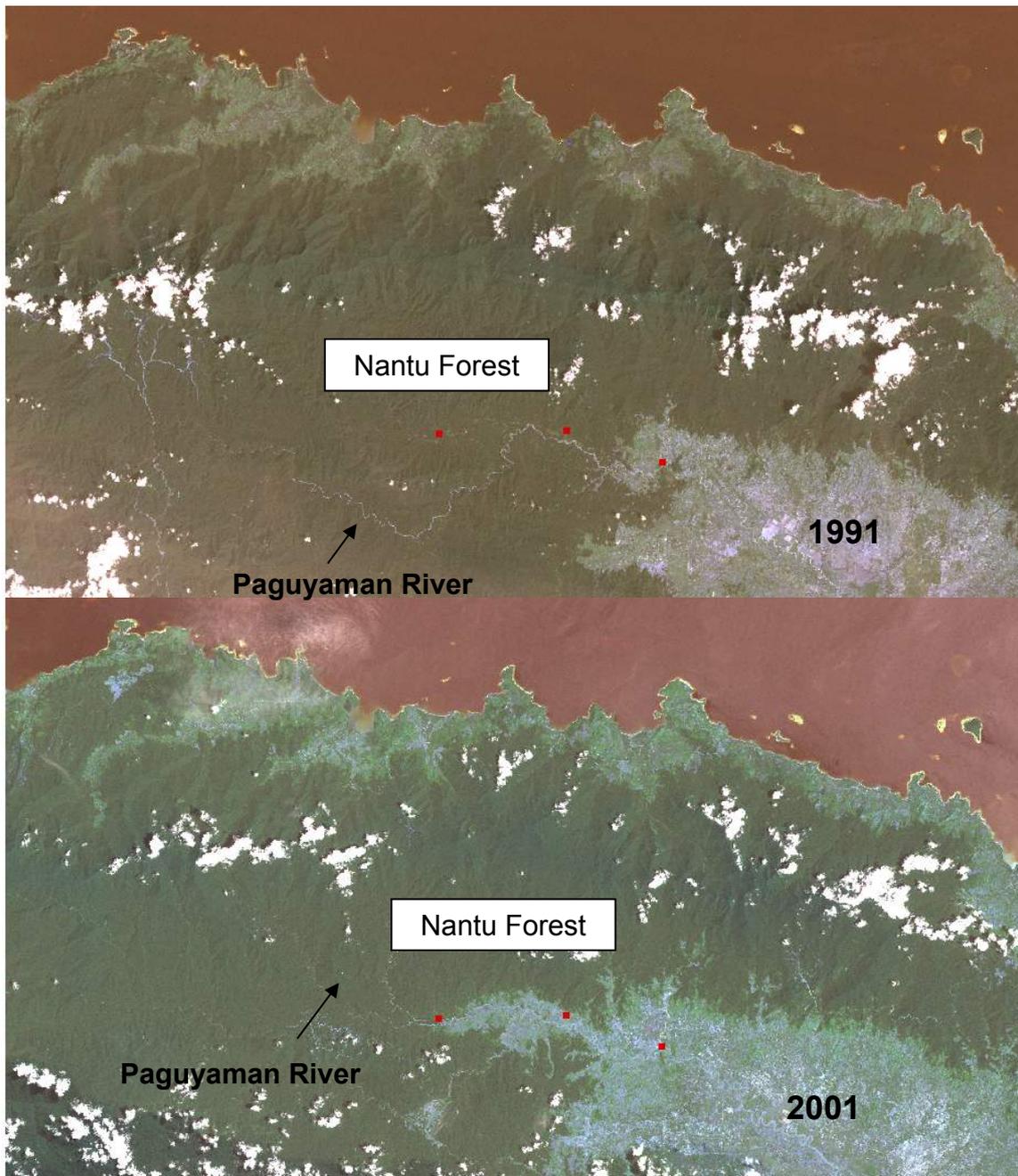
To prevent people entering the Nantu Wildlife Sanctuary, the Gorontalo District Forestry office erected signposts along the borders of its nearby villages, warning the people of the fine of Rp 400 million as stipulated in Forestry Law No 41 of 1999 for illegally entering it (Araf, a resource manager).

Many respondents reported an awareness of this *Perda* but none commented whether this has had any effect or not on the protection of NWS. In response to this proposal, an integrated national team (from the Ministry of Forestry, Ministry of Environment, and the Indonesian Institute of Sciences - LIPI) made a field visit at the end of 2005 to assess NWS's feasibility as a national park. However, to date the outcome of the proposal is still unknown.

The second type of local regulation concerned the extraction of timber and rattan from natural forests. While respondents recognised the existence of good regulations about forest management, they underlined the fact that these are only good on paper; the implementation is very poor. They said:

The head of Pangahu village should know that the Nantu forest is protected but he did nothing to stop villagers entering it. Also, because rattan grows in the wild, villagers perceive it as something they can collect freely, regardless of its location inside a state-owned forest. The forest managers are often not strict enough. If they were, these villagers would not have been able to enter it. If the village government takes an active role in telling the villagers about the status of Nantu forest, the problem [of encroachment and rattan collection] can be reduced (Araz, a traditional leader).

Good regulations for rattan extraction exist, according to which the permit holders are only allowed to harvest rattan and nothing else. But the problem is that these are not enforced (Harun, a trader of forest products).



**Figure 9.4** The destruction of primary forest in the Paguyaman watershed (1991-2001), where Nantu forest is located, due to the upward human activities at the Paguyaman River. The red dots indicate human settlements (Source: ICRAF in Clayton et al. 2007).

Although, officially, there has been no large-scale legal logging operation since 2002, many respondents believed that local small-scale logging permits (IPKTM) have caused similar, if not worse, problems. The perceived problems essentially stem from the poor management capacity of the local forestry office, as illustrated below.

The [local] government, who holds the authority to issue logging licences, must be more selective in issuing logging permits and also more serious about enforcing the laws regarding logging. This is because abuses of permits are very common here and yet the capacity to enforce the law is very limited. For example, enforcers cannot tell where the source of timber is when they are doing the inspection. Loggers can show they hold a permit for a certain area, but there is no way of knowing

whether the timber comes from the area where they have a legal right or not (Fatom, a member of local nature conservation club).

While the police job is to enforce the law against illegal logging and encroachment, the district forestry offices must also apply a more strict regulation for issuing the licenses. In addition, the sale and use of chainsaws must also be more regulated because they are the tools for destroying the forests. Currently, there are too many chainsaws in the hands of people because it is very easy to get them (Warno, a law enforcer).

Other local and more specific regulations were created to combat illegal logging, specifically in the ownership and use of chainsaws, and to regulate rattan extraction (*Perda* 06 of 2003) from natural forests. In both cases, however, respondents commented on the limited extent to which these *Perda* have been implemented:

We have conducted 'chainsaw operations' in the past by confiscating from people who have no permit for logging. However, there was a strong protest demanding the government to provide food and employment for those involved. The confiscated chainsaws were returned because the government feared the potential consequences and it was not able to meet the demands of the people (Warno, a law enforcer).

This *Perda* basically regulates the use of chainsaws, the fee charged to the owners, which is very expensive for ordinary people to pay. But I am not sure how effective its implementation is so far (Suwan, a legislator).

The local government regulation on the extraction of rattan is aimed at mitigating the destruction of this resource. But it is essentially a legal basis for local government to derive revenue from the rattan collection fee. It is assumed that regardless of the level of extraction, the supply will be available through natural regeneration (Timu, a resource manager).

We have been having problems with the issuance of licences for rattan collection. The root of this problem is because the forestry office is required to generate revenue from the forests for local government [PAD] who decide the percentage of income that must come from forest, regardless of the legality of the sources. So they basically issue licences to achieve this goal and this has been going on a long time. Although the forestry office specifies the location of activity in the permits, people just go into national park areas regardless. For example, in Suwawa near Lombongo, there were a few hectares of production forest bordering the national park area. In this case the licence must be issued after consultation with the park authority. But because the rattan can only be found in natural forest, which is within the national park, people just collect rattan from it (Kamis, a park ranger).

Many respondents acknowledged the limitation of regulatory approaches and the high costs for creating and then implementing them. Nevertheless, they believed that they are necessary as legal frameworks for governing the use of local resources for the common good of the people. The following assertions from respondents sum up the basic aforementioned limitations of the regulatory approach.

Several existing local government regulations only deal with the utilisation of resources but the protection of the environment is not considered. Many people do not realise that Gorontalo's physical environment is fragile. We need to develop something like an 'environment watch' to monitor the change in our environment that is well documented and publicised widely (Nano, an educator).

Our government is slack in implementing development policies themselves. There are government projects that do not comply with the requirements for environmental impact assessment [AMDAL]. For example, I looked at them and found out that of the 76 local development activities, 64 percent do not meet the AMDAL requirements. Having made this public, I heard no response whatsoever from members of the legislative body. I suspect that some of them benefit from this situation themselves (Rusdi, a researcher).

As noted above, a limited number of respondents commented on the regulatory approaches because most of the *Perdas* are only at the early stage of implementation. Most (67%) of the negative response was of government officials; half of this was from the resource managers. On the basis of education and age, the negative response largely came from those with high education level and those of medium age (Appendix 9.2d). In sum, respondents regarded the approach to be of little effect in protecting the forest environment because of the great difficulties in implementing them.

As Dabo indicated in the beginning of this section, and as is further confirmed by two senior staff from the *Balitbangpedalda* (the province's research, development, and environmental management agency) (interview with Beruga, 27/11/2007), the process of drafting a *Perda* is very expensive, and is hampered by many technical and complex social problems. For example, the management plan for Lake Limboto has taken three years to prepare. In addition to the poor implementation of other *Perdas* noted above, the Limboto case may have explained the dominant negative attitude. Moreover, government officials, in whose hands lie the planning and implementing tasks, are unrealistic about how little can be achieved through regulatory approaches.

### 9.2.5 Awareness-Raising Activities

As detailed in Section 7.4, many respondents asserted that a lack of awareness about conservation issues, for example, the different status and functions of natural forests, is a serious impediment to conservation. Among the 18 respondents who offered views on this subject 13 people (72%) were positive about several outreach activities that they were aware of. The remaining five respondents were categorised as having a negative perspective, not because they perceived the awareness-raising activity as ineffective, but due to their views of the various hindrances to the conservation of the natural forests. This section presents the reported reasons for this perceived lack of awareness. It focuses on activities that respondents referred to in the interviews and their suggestions for improving local stakeholders' awareness.

Respondents considered limited availability of information about, and understanding of, the multiple roles of natural forests as the main reasons for the lack of awareness among the local stakeholders (see Section 7.4). They observed that:

There is a gap in knowledge about local biodiversity among young people here. My nieces and other primary school children know very little about the natural history of Gorontalo because in our school curriculum the materials mainly cover very general knowledge that has very little local content. I know this because that was what I learned from school and it has not changed much today (Lisda, a community development activist).

I think there is a gap between what the religion [Islam] teaches about environmental care and its real application; the religious leaders themselves don't really know what the teachings are. Now, our government also puts priority on earning from the forest and the high level of income is considered an achievement, although it results in degradation. When we activists voice our concern, the response has been very defensive, that environmental issues are not urgent. This is for me a sign that they do not really understand (Rudi, a religious leader).

There is limited public education to increase awareness of the forest and its functions. Neither is there a place to see the wildlife here. I heard there is a plan to build a zoo. I think this is a good idea; at least it would help to educate people. In general people do not care so much as long as they can harvest something from the forests. We have the unique *maleo* bird population, but they don't care about the state of its population. It is more important for them to enjoy the free eggs from these birds.

Conservation is a new idea but the condition of our forest has been so degraded as a result of mining and forest clearance for planting food crops. Those people are hungry for land to meet their subsistence needs, not for commercial purposes (Hamsah, a resource manager).

Respondents pointed out the basic problem of ignorance about different categories of forests, specifically those of conservation forest. According to Asrul (a local journalist), most people here do not know what the different legal statuses (i.e., Panua Nature Reserve, Nantu Wildlife Sanctuary, Bogani Nanti Wartabone National Park) actually mean and which ones allow some type of utilisation and which ones don't. To them, all mean protected forest (*hutan lindung*, primarily for watershed protection but of low biodiversity conservation value). Consequently, in all these protected areas, except Nantu, the forest may look green and beautiful from the roadside, but a few hundred metres in they are degraded. This poor awareness is widespread among the public, the local leaders, and especially among buffer-zone communities around protected areas. Respondents' comments are quoted below:

All the root of our environmental problems lies in the public's limited understanding of the benefits of conserving our forest. Most people do not know which ones are forest for watershed protection and conservation and which are for production. As long as they have trees large enough to get the timber from, they will cut them. Our local leaders also consider our forest as a commodity for sale as quickly as possible (Hamsah, a resource manager).

The low quality of human resources here is the main factor for the unsustainable forest use; it is one of the reasons for the difficulty to get local support for conservation. There is no local group concerned with and interested in conserving our local and unique wildlife. These are exacerbated by government policies that are often in conflict with each other. Without support from this kind of group, it is very hard to protect the forest to sustain its benefits. Conversely, when these animals and their habitats are protected, there are wider benefits that the society can enjoy, not just from timber in the forest (Bobi, a resource manager).

I think part of the problem is that many people with a decision-making capacity have no background or interest in environmental issues, and generally they are trained in social and economic fields, so everything tends to be viewed from political aspects only (Rudi, a religious leader).

It is written in the *Perda* on the protection of Nantu that there are three groups of people here with regards to forest conservation: those who have knowledge but have no power to act, those who have power but have no knowledge about how to conserve the forest, and those who have neither power nor knowledge about the need to protect our forests (Roni, a local junior journalist).

Because of local leaders' ignorance about the importance of forest conservation (as noted in Section 9.1), some respondents underlined the importance of reaching these leaders as specific targets for awareness-raising activities. For instance, Aton (an educator) elaborated his rationale and confidence that when the true and practical benefits of conserving natural forests are known to decision-makers, it is easier to convince them that the forest is worth conserving and using in a sustainable manner. He said:

People do not see the impacts of loss of forest cover: a decline in the quantity of organisms, followed by a decline in their survival and continuity because they only think about economic benefits of the forest. Strategy to deal with lack of awareness and understanding among the public and decision-makers must include: formal/informal education, socialisation, formation of interest groups for people who live around conservation areas, and training of preachers [for the mosques]. Most importantly, however, people who make critical decisions should be the most intensively trained about conservation because the implications of their decision is huge and is structurally destructive; the scale of destruction resulting from their ignorance is very serious, but we usually put the blame on poor farmers. The problem with transmigration site development in Pangea is just a case in point where provincial government does not

understand the function of conservation areas such as Nantu and the potential disasters of this project for the neighbouring protection forest, and for the whole of Gorontalo.

Aton went on to stress a disconnection in the flow of relevant information that requires inter-agency co-ordination. He gave a common example of inter-agency meetings, where those who have the authority to make decisions do not stay on, leaving the meeting to their subordinates, with little guarantee that the technical information will reach higher-ups. Consequently, the subjects that require inter-agency discussion are not well understood, which has often led to bad decisions. Therefore, he underlined the importance of educating the decision-makers to build a common understanding of a complex issue such as the environment. This is particularly important as many of these local decision-makers do not have the relevant training in environmental management; the bureaucrats are dominated by traders whose main interest is to obtain maximum economic gains.

Awareness-raising activities about forest functions and other benefits of forest protection were conducted by the SBKSDA Gorontalo alongside the livelihood assistance programme (see Section 9.2.3). Environmental education programmes have also been a key feature for the NCFP, particularly in the Sari Tani village (a population of about 300 families) and Pangahu village (about 150 families) that border the Nantu Forest. These included creation of a children's story book,<sup>90</sup> teaching about the local environment, assistance with village ecology libraries, and children's study visits to the Nantu Forest.<sup>91</sup> Some examples of these activities are:

Our awareness-raising activities were conducted in some buffer-zone villages [of BWNP]. There was a local government plan to resettle some of the villagers [who occupy land inside the park boundaries] through a local transmigration scheme. However, in 2003 the social affair agency gave up the plan for lack of funding, particularly since the Bone Bolango became an independent district. Its jurisdiction is mostly covered by the national park. They suggested redoing the field boundaries which were constructed 22 years ago (Jufar, a ranger).

We did it through the local mosques. We taught people about the difference of water quality between rivers which are surrounded by forested areas and those which are not. They can understand that in the former the water is much clearer even during the dry season whereas in the latter it is very different (Kamis, a park ranger).

The original boundary marks have either deteriorated or been moved by local people. We [NCFP] held a workshop for local leaders to raise their awareness of regulations related to forest conservation for three days in 2000 and 2001. In 2005 we held workshops and field training for local stakeholders on biodiversity conservation and the Islamic basis for nature conservation [see Section 6.5]. We trained them about the importance of forest protection, specifically in regulating the supply of freshwater to support their subsistence agriculture and for their daily needs (Barjo, a senior ranger).

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<sup>90</sup> Five thousand copies of the book, *The Special Place in the Forest* about Nantu forest and the special Adudu salt-lick where unique mammals and birds can be observed with relative ease, were distributed to children and schools throughout Gorontalo province and beyond.

<sup>91</sup> During the course of this research (December 2005) I led a three-day expedition to Nantu forest for senior primary school children from two local schools and six of their teachers. For almost all of them this was their first experience of being exposed to the rich and unusual biodiversity in their 'backyard'.

The research station in Nantu has served as a field station for biodiversity and as a climate change education. In June 2007, a three-day field workshop on climate change issues and hands-on carbon stock measurement was held for 30 local stakeholders. This was conducted in collaboration with an international research institute in agroforestry (Clayton et al. 2007). Several respondents made specific comments about the activities in Nantu, especially its non-conventional activities, but also about the concern of their long-term sustainability, as illustrated in the following quotes:

I think the unusual approach of involving the *Brimob* to protect Nantu forest is because our awareness of the functions of this forest is very low (Dote, a planner).

I have seen the success of integrating religious teaching with the care of environment in West Nusa Tenggara province, where Muslims are a minority. They were able to keep the rivers clean because they prohibit people from using rivers as a public toilet by linking it with the Islamic teaching of cleanliness. The religious teachers are respected there. But here, where Islam is a majority, this kind of clear link is lacking. When I was a child I was not allowed to swim in the upper reaches of rivers or damage the river environment so as not to anger the spirits who guard the rivers. If we did, we would be sick as a result. I know from a religious point of view this teaching on fear of spirits is not good. But at least it taught us then to be respectful to nature. This is now lost and yet the alternative for teaching this kind of attitude is lacking. Meanwhile children spend a lot of time watching TV, most of which is just violence (Iban, a senior government official).

I am aware that local conservation NGOs, such as Japesda [a local network of environmental NGOs] and the Nantu Forest Conservation Programme, are working to raise people's awareness. But I am not sure what will happen when the project is no longer there. I think empowering local communities is the key for better protection of the forest, because if they can see that it directly benefits them, they will be more inclined to protect the forest (Hamsah, a resource manager).

Because of the limited geographic scale and scope of the above-mentioned activities, respondents suggested the promotion of a more systematic mainstreaming of forest conservation into the education (formally and through the local mosques) and resource management systems. In Boalemo District, for example, the local government has developed a vocational education programme to improve human resources there, especially in the field of fisheries and agriculture (interview with Iban, a senior government official, 7/9/2005). In addition, as Rudi noted in Section 7.4, respondents underlined the importance of developing an environmental curriculum from the primary to the tertiary education level because the current school curriculum does not have components about the local environment. To achieve this goal, Rudi went further and underlined that more help is required, not only for teachers to integrate conservation education in the already over-loaded school curriculum, but also in integrating the care of the environment into the training of religious leaders (such as through the Institute of Islamic Studies). To this end, forging collaboration between schools, scout groups, and youth from the mosques to work together with conservation organisations was also suggested. Others emphasised a need to focus on improving the farming systems, specifically targeting the shifting farmers to reduce pressures from encroachment and improve the chance of conserving the forests. Respondents' comments about these were:

I think it is not only the watershed authority that should be working on these but it requires collaboration among relevant agencies responsible for both lowland and upland management. The biophysical condition of Gorontalo and its natural resources remains largely unexplored. The first challenge is to raise awareness of these and to encourage them to work with both local and national government in order to reap the maximum benefits derived from them. Certainly the local government needs financial assistance for this to happen (Samat, a resource manager).

Technical assistances to improve the traditional farming system are crucial because living costs keep increasing; it is very important that farmers get help to improve their well-being (Abdul, a local journalist).

In our work with local communities we were often confronted with their limited capacity to learn and improve their farming system. They have neither resource to fund this kind of activity nor local social institutions that enable them to work together (Dani, a community development activist).

We need to improve the traditional farming system but there is no more funding to employ agricultural extension workers. Some of these front-line workers have, unfortunately, been recruited to work in village administration (Lade, a legislator).

The overwhelming evidence of a lack of awareness (Section 7.4) not only sheds some light on the low support of forest conservation. It underlines the ongoing conflict between pursuing economic growth and sustaining that growth that is based on extraction of natural resources at a local scale (Chapters 7 and 8). In contrast to other conservation activities discussed in this chapter, respondents recognised the serious gap in local awareness and the majority of them (73%) showed support for addressing it (Appendix 9.2e).

Judging by the number of respondents who indicated a positive attitude to conservation activities, *Gerhan* and livelihood assistance programmes were the most favoured because they provide more tangible benefits to ordinary people and enable them to participate in their implementation. Conversely, enforcement of conservation law was the least preferred activity. An awareness raising programme was the least discussed in the interviews, but most respondents were positive about it. By contrast, more than half of the respondents who discussed the regulatory approach were sceptical about it, possibly because most of the newly created local government regulations are only at the early stage of implementation.

The types of conservation activities that respondents discussed were all necessary and complementary. On the one hand, respondents had a high expectation of the local conservation agency to deal with conservation issues. On the other hand, the threats to conservation areas have largely come from economic activities outside the PAs. They are also characterised by a high reliance on the forest's ecological services. Bearing in mind that the current pattern of forest resource use will continue, explicit synergies of economic and conservation activities to achieve both conservation and development goals are required. As outlined in the previous two chapters, the current local socio-economic conditions mean that the existing local resources alone are insufficient to undertake this fundamental move towards sustainability. The external financial and technical help from the NFCP has provided many examples of how local stakeholders can sustain the practical benefits from conservation. Certain activities that can be done locally using local resources are suggested in Chapter 10. The local stakeholders themselves need to be clear about what they want from the forest, for what kind of time frame (long-, medium-, and short-terms) and why they want to conserve the remaining natural forests.

### **9.3 Reasons for Protecting the Natural Forests**

As noted in the chapter's introduction, the findings presented in this section are based on analysis of the MDM data only (see Section 5.3). The full statements used in the data generation and the summary of results are shown in Table 9.3. Overall, the provision of ecological services from the natural forest was considered the strongest reason (mean score

5.4) for its protection, whereas aesthetic attributes was the weakest (mean score 3.1). The relative importance of the other four reasons, in descending order, is: cultural obligations (mean score 5.1), opportunities for research and education (mean score 4.2), economic activities (mean score 3.7), and biological uniqueness (mean score 3.5) (Table 9.3). Data showed a similarity with the overall trend across demographic variables (i.e., gender, age, level of education, and type of occupation or stakeholder group), although slight variation occurred within each variable.<sup>92</sup> A detailed description, based on the relative strength of each reason, follows. As partly noted in the footnote, it is important to emphasise the limitations of the statistics in this section. Of relevance to the discussion is the relative ordering of the reasons, not the exact differences between the mean scores. These means are indicative of differences, but cannot be treated as statistically significant.

### 9.3.1 Ecological Services

Table 9.4 shows that, as expected, the salaried stakeholders placed a considerably higher value than the non-salaried stakeholders, except the grass-roots activists who scored the same as the resource managers (mean score 5.7). This was likely because it is a major part of their jobs (of the 45 respondents in the resource managers group, 26 work for organisations with an explicit mandate for forest conservation) to ensure forest protection, for ecological reasons. As discussed in Section 9.3.2, grass-roots activists also considered ecological services as the most important. This appeared to be linked with livelihood opportunities for them but also with the increased involvement of NGOs in local awareness raising activities related to the forest. Surprisingly, the educators and community leaders placed the lowest value (4.8 and 4.1) on this ecological reason. For the former, as discussed at length (Sections 7.4 and 9.3.5), one of the main reasons was a lack of appropriate information about the ecological benefits of the forest.

The low score among the community leaders (almost all of whom were from the oldest age-groups) may be due to their lack of ability to absorb the relatively new information about ecological benefits of the forest (see Section 7.2 for a comparison between respondents' understanding of the forest's role in regulating water vs absorbing carbon), which is largely gained through formal education. The data that show the influences of age, where the older age-groups provide slightly lower scores (5.2 vs 5.4), support this finding; so did the difference in scores based on respondents' education.

### 9.3.2 Cultural Importance

Surprisingly, while respondents perceived very few cultural benefits from natural forests (Section 7.6), they ranked it the second most important reason for protecting the forest (Table 9.4). This occurred in all six stakeholder groups, except the commercial users, who also gave considerably higher scores than the average overall score of 5.1. Specifically, the salaried

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<sup>92</sup> The differences in scores found within demographic variables are not statistically tested. I use a simple quantification in the discussion throughout this section, however, to indicate the degree of difference in scores: slight (0.1-0.5), moderate (0.6-1.0), and substantial (> 1).

stakeholders showed a slightly stronger support than those of non-salaried groups (5.4 vs 5) for this cultural reason.

There was a marked difference in respondents' views based on gender, but not on the basis of education and age. Compared to women, male respondents showed a moderately stronger support for the cultural reason for forest protection. Respondents with higher education put a higher score for the cultural reason, but the age-based difference was only slight.

**Table 9.3 Six reasons for protecting natural forests and the relative strength of each in the overall findings, based on the MDM ranking data**

Category of reasons	Explanation															
Biological uniqueness	Natural forest contain unique plant and animal species and a great variety of different life forms	<table border="1"> <caption>Mean scores for six reasons for protecting natural forests</caption> <thead> <tr> <th>Category of reasons</th> <th>Mean score</th> </tr> </thead> <tbody> <tr> <td>Uniqueness</td> <td>3.5</td> </tr> <tr> <td>Economic</td> <td>3.8</td> </tr> <tr> <td>Aesthetic</td> <td>3.0</td> </tr> <tr> <td>Res./Educ.</td> <td>4.2</td> </tr> <tr> <td>Cultural</td> <td>5.0</td> </tr> <tr> <td>Ecological</td> <td>5.4</td> </tr> </tbody> </table>	Category of reasons	Mean score	Uniqueness	3.5	Economic	3.8	Aesthetic	3.0	Res./Educ.	4.2	Cultural	5.0	Ecological	5.4
Category of reasons	Mean score															
Uniqueness	3.5															
Economic	3.8															
Aesthetic	3.0															
Res./Educ.	4.2															
Cultural	5.0															
Ecological	5.4															
Economic activities	Natural forests provide a wide variety of resources (timber and non-timber) that are economically valuable															
Aesthetic values	Natural forests are areas of unique beauty presenting the great diversity of life on Earth that are of recreational and spiritual values															
Education and research opportunities	Natural forests provide opportunities for basic and applied research about the natural environment, its wildlife and natural forest products.															
Cultural* importance	Protecting natural forests is our moral responsibility to both current and future generations of human and other species															
Ecological functions	Natural forests provide ecological services, such as regulating water release, and reducing soil erosion, flooding and silting.															

Note: \* see the narrow definition of this in Appendix 7.1.

### 9.3.3 Opportunities for Research and Education

Among the salaried stakeholders, conserving natural forest for research and education was more important than for the non-salaried groups (4.5 vs 4.0). As many respondents highlighted in Section 7.4, their lower degree of support for conservation or environmental education, especially about forests, was influenced by the lack of facilities and support to promote it throughout the formal education systems. The lowest score of resource managers can be explained by the fact that their jobs are more concerned with management and administering resource-use than research. As for the non-salaried stakeholders, the commercial users and grass-roots activists did not consider this reason important (score of 3.9), perhaps because it is not immediately relevant to their livelihoods.

Differences in their scores based on education were slight. A considerably higher support for research and education came from the younger age-groups (4.3 vs 3.6; Table 9.4). One of the reasons may be that younger people have greater opportunities to access education, and research and education activities are more available now than in the past. Analysis of the economic reason below supports this as well.

**Table 9.4** The relative strength of reasons for protecting natural forests in Gorontalo, based on the MDM data

Category of reasons	n	Uniqueness	Economic	Aesthetic	Res./Educ.	Cultural	Ecological
<b>Overall mean score</b>	146	3.5	3.7	3.1	4.2	5.1	<b>5.4</b>
<b>Gender</b>							
Male	97	3.4	3.6	3.0	4.3	<b>5.4</b>	5.2
Female	49	3.8	4.1	3.1	4.0	4.9	<b>5.3</b>
<b>Stakeholders group</b>							
Educators	20	<b>4.0</b>	3.9	2.9	4.4	5.3	4.8
Resource managers	45	3.5	3.5	2.9	4.2	5.3	<b>5.7</b>
Legislators/Law enforcers	19	3.6	3.4	3.5	<b>4.9</b>	<b>5.6</b>	5.3
Community leaders	10	3.2	4.3	3.7	4.4	5.3	4.1
Grass-roots activists	34	3.4	3.8	2.8	3.9	5.4	<b>5.7</b>
Commercial users	18	3.6	<b>4.6</b>	3.7	3.9	4.4	<b>4.8</b>
<b>Education level</b>							
Low	62	<b>3.7</b>	3.8	<b>3.2</b>	3.9	4.9	<b>5.5</b>
Medium	64	3.4	3.6	3.1	<b>4.4</b>	5.2	5.3
High	20	3.3	<b>4.0</b>	2.6	4.3	<b>5.4</b>	<b>5.5</b>
<b>Age-group</b>							
Young	43	3.4	3.7	2.9	4.3	<b>5.3</b>	<b>5.4</b>
Middle	78	<b>3.7</b>	3.6	3.1	4.3	5.2	5.2
Old	25	3.2	<b>4.4</b>	<b>3.4</b>	3.6	5.2	5.2

### 9.3.4 Economic Activities

In contrast to the three above-mentioned reasons, Table 9.4 shows that the salaried stakeholders placed the economic reason for protecting natural forest considerably lower than the non-salaried stakeholders (4.3 vs 3.6). As expected, the highest score for it came from the commercial users (4.6), indicating its high relevance to their livelihoods. Like the findings in the perceived benefits of natural forests (Section 7.2), this economic reason was also more important for female respondents than for the males, as indicated by their much higher score (4.1 vs 3.6). The influence of education and age was only slight. Those with high education level gave the highest score for protecting the forest for economic benefits, even though their appreciation of this benefit was lower than those in the lower education group (Section 7.1). At the surface this seems to be contradictory but perhaps those in the high education group have a realistic outlook about the reliance of the local economy on forest resources (Figure 9.2a). As Figure 9.2b shows, the oldest age-group also showed the strongest support to protect the forest for economic reasons (4.4; see also Section 7.1 for the plausible reasons).

### 9.3.5 Biological Uniqueness

The findings (Table 9.4) suggest that women showed a slightly stronger support for forest protection due its unique plants and animals. Predictably, the educators gave the highest support for the same reason the women did. Things that are ‘unique’ to outsiders may be commonplace where they are endogenous. This was reflected by the community leaders, from whom leadership in the preservation of natural beauty and uniqueness are expected, who gave the lowest (3.2) support for this uniqueness, even lower than that of commercial users (3.6).

Even more surprising was the highest support from respondents with low education level (3.7). This perhaps reflects, in light of the discussion in Section 7.1, the fact that the uniqueness of wildlife and plants in the forests are valuable for their economic utility. Respondents with high education showed a greater awareness of the actual state of the forest and its biodiversity; they were also more aware of the lack of educational facilities to appreciate it. These may have influenced their perceptions, leading them to be more sceptical about using the uniqueness of the forest as a reason to support its conservation. These same reasons may apply to the oldest age-group, who also showed the weakest support. Owing to their life experiences and the abundant forest resources in the past compared to the much degraded state now, they are less convinced about the strength of this reason.

### 9.3.6 Aesthetic Attributes

As the forest’s aesthetic attributes were valued relatively low, it is not surprising that they were perceived as the least important reason for forest protection. Similar to the findings regarding the economic reasons (Section 9.3.4) differences between salaried stakeholders and non-salaried stakeholders, and on the basis of age, gender, and education were only slight.

The detailed explanations in this section lead to the following conclusions. First, the provision of ecological services from natural forests featured prominently as the strongest reason for protection. This might be explained by the high reliance of local economic activities (e.g., subsistence agriculture and extraction of forest resources) on the forest to provide ecological services. The forest’s roles in regulating freshwater flow and prevention of soil erosion and siltation (e.g., of wetlands of economic importance for fishery activities), were among the most valued. This finding is consistent with the research results (see Section 7.2), which show that the forest’s ecological services are among the most appreciated benefits. Conversely, the forest’s aesthetic attributes were considered the least likely as reasons for forest conservation, due to the social and economic constraints discussed in Chapters 7 and 8.

Moreover, for all the six reasons of forest protection, except for the economic and aesthetic, the salaried stakeholders showed higher support than the non-salaried stakeholders. The latter’s stronger support for the aesthetic attributes and economic reasons may also be pragmatic, such as providing employment from implementation of *Gerhan* (Section 9.2.2) and forest-based ecotourism. Although the relative strength of perceptions between groups within each demographic variable was not great, female respondents gave much stronger support for the economic and biological uniqueness reasons. Possibly, this was because the unique resources that come from the natural forest have more tangible economic value for women. It is likely that the male respondents’ stronger support for cultural obligations and research and education is because of cultural expectations of male leadership in these fields, specifically related to forests. Finally, differences in respondents’ education, gender, and age

varied very slightly across sub-populations and all types of reasons. This suggests that no one demographic variable appeared to influence respondents' reasons for supporting forest conservation.

Overall, results from both interview and MDM data showed that local support for natural forest conservation was strongly linked with tangible economic benefit, such as supply of freshwater for agricultural production, preservation of wildlife, job provision from tourism activities, future use of forest resources (e.g., research, genetic resources), and protection of other ecosystems (e.g., lake, rivers, coastal areas) that are important for freshwater and marine fisheries.

## **9.4 Chapter Summary**

Establishing protected areas has been the primary national policy for conserving unique flora, fauna, and ecosystems in Indonesia. However, more than half of the respondents in this study held a negative attitude toward this centrally-controlled preservationist policy. The findings also suggest that no one stakeholder or demographic variable appeared to be dominant. This means that the negative response was distributed proportionately across different sub-populations.

Respondents were concerned about several conservation activities, presented here from the most to the least frequently mentioned: (1) enforcement of conservation laws; (2) land and forest rehabilitation programme; (3) provision of livelihood assistance; (4) regulatory approaches to extraction of natural resources; and (5) awareness-raising activities. A positive response towards these activities appeared to be largely due to more tangible benefits to ordinary people and the degree of participation they have in their implementation. By contrast, responses to law enforcement were largely negative, particularly because of the unresolved problems of contested boundaries, poor enforcement against illegal logging, and other traditional uses of forest resources. Many respondents felt that there was very limited awareness-raising activity, but they gave strong support for the few activities that have been implemented.

Respondents ranked the provision of ecological services from natural forests as the strongest reason for protection and the aesthetic attribute as the weakest argument to gain support for its conservation. More specifically, salaried stakeholders tended to give stronger support for ecological, cultural, research and education, and biological uniqueness reasons. By contrast, stronger support to economic reason for forest protection came from non-salaried stakeholders, female respondents, and those from the older age-groups. Differences in respondents' education, gender, and age did not appear to influence their particular reasons for supporting forest conservation.

In sum, the chapter provides evidence of negative responses to conservation policy and activities and sheds light on the gaps of achieving forest conservation objectives. The chapter also outlines the factors that are conducive for gaining local support for forest conservation. The findings serve as the basis for making policy and research recommendations in the concluding chapter.

## **CHAPTER 10**

### **CONCLUSION AND RECOMMENDATIONS**

Having presented the detailed findings of this research in the previous four chapters, this chapter reflects on the extent to which the study's objectives have been achieved (Section 10.1). Specifically, the reflection focuses on the value of the tools used in generating and analysing the data and how they produced particular information presented as key findings. These findings substantiate the unique contributions of this research (Section 10.2), provide specific recommendations (Section 10.3), and offer suggestions for further research (Section 10.4).

#### **10.1 Revisiting Research Objectives and Design**

My interest in this project arose from a concern about the alarming rate at which Indonesia is losing its natural forest in the Outer Islands, including Gorontalo where the research was conducted, over the past four decades. My earlier training in wildlife conservation gave me particular lenses through which to look at the country's rich and unique biodiversity and the importance of conserving them. The conservation of biodiversity (albeit indirectly, through biological research, publication of biodiversity-related books, and advocacy work) has also been an important part of my livelihood, and I appreciate wildlife (an element of biodiversity) largely for its intrinsic value and the sense of awe it evokes in me. With this personal and professional background, my own interpretation of biodiversity conservation represents the biological/scientific perspective that dominates the setting of priorities and strategies to establish PAs as a means for protecting biodiversity in Indonesia.

The limited achievement of the biological approach (i.e., Gunarso and Davie 2000; Wells et al. 1997) and the increasing social conflicts around the management of the forest (Wulan et al. 2004) in Indonesia compelled me to ask a basic question of how other stakeholders, who are largely non-biologists, view biodiversity and its conservation. To investigate this I used a combination of qualitative and quantitative approaches. I interviewed different groups of stakeholders (see Chapter 5) in a biodiversity-rich region of Gorontalo (see Chapter 4) to find answers to my main questions about: (1) their knowledge of the local biodiversity; (2) their appreciation for it; (3) their perceptions of forces that hinder its conservation; and (4) their attitude towards biodiversity conservation.

While Gorontalo's rare and unique biodiversity has attracted global interest (e.g., as manifested in the provision of long-term financial and technical assistance to implement international conservation policies, such as the CBD and CITES in the Nantu forest), many parts of the same protected forests in the region have also been the 'fruit baskets', both individually (e.g., hunters, rattan collectors, loggers, and shifting cultivators) and collectively (e.g., private logging companies and local government). In addition, forested watersheds have played a crucial role in supporting the region's subsistence economy and fresh water resources. Thus, the value of unique and rare wildlife (which is largely the basis for establishing PAs) is much less paramount to local stakeholders. So, in a nutshell, the research found that local perceptions of biodiversity conservation (the main title of the thesis 'Your biodiversity in my backyard') differed considerably from that of the distant stakeholders (i.e.,

the global and national communities of scientists and policy makers). In order for more people to feel committed to conserving biodiversity, there must be a sense of acknowledgement of its benefits, and ownership of the problems to which its demise may lead. The word ‘your’ biodiversity (rather than ‘our’) in the thesis’ title implies a gulf between the western developed world notion of conservation (i.e., must lock up forests to protect its biodiversity) and the poverty stricken developing world, whose ‘backyards’ and ‘fruit baskets’ are most affected by calls to conserve the planet’s resources. This conclusion demands an explanation regarding the tools I used to generate and analyse the data that led to this conclusion.

For the first research objective I used a qualitative interview approach through comparing local perceptions of biodiversity with the scientific concept enshrined in the Convention on Biological Diversity (CBD). The study reveals that local stakeholders only understood the concept of biodiversity at a general level. Most respondents defined it in terms of its *elements* rather than recognising *interactional* attributes, through which diverse ecological services are performed. They understood biodiversity as species diversity; a few included ecosystems and micro-organisms. These findings are consistent with studies conducted in several developed countries, such as Japan and North America (DeLong Jr. 1996; Hunter & Brehm 2003; Kellert 1991, 1996; Watson et al. 2004), where resources are more readily available than is the case in Gorontalo and in developing countries of Asia and Africa (Abbot & Thomas 2001; Acharya et al. 2004, 2005). Respondents have a fairly good knowledge of local biodiversity, but it is largely limited to ‘iconic’ animal species, many of which are disappearing or already extinct. Local stakeholders’ knowledge of local plants was also very limited, focusing primarily on those with commercial value. The narrow understanding of the essential roles of biodiversity (e.g., its elements and interactions that produce goods and ecosystem services) means that there is no real local constituency for its conservation.

For the second and fourth research objectives, I combined the interviews with asking respondents to rank a wide range of benefits of natural forests (i.e., the MDM) which I adapted from the classification that Murray (1990) developed. The different methods yielded different results, in terms of the relative strength of each category of benefit. This warrants an explanation regarding the value of combining the two methods. First, despite the many advantages that interviewing has as a method for generating data (see Section 5.3), the information it generates is largely a ‘snap shot’ of the time it was conducted; it is salient in nature. For example, based on the interview data, the natural forest has been narrowly valued for its economic utility, particularly for commercially valuable forest products (e.g., timber, rattan, and wild meat). This perception occurred across society, from villagers to decision-makers. The findings reflect why there were unsound economic development decisions that undermined the forest’s ecological services and its long-term benefits.

Further, the benefit from exploiting timber from the natural forests had largely been taken out of the region. The recent change in the share of revenue afforded by the decentralised forest management was short-lived and limited only to the management of production forests. Meanwhile, the management of PAs remained centrally controlled. While the poor capacity to manage the PAs remains, pressures from dwindling timber resources in production forests are inevitably increasing on protected forests. The long-term conservation work through law enforcement in Nantu has prevented further deforestation there, but the ongoing challenges of keeping the forest standing in the three PAs, let alone from further decline, are enormous. So far, the local contribution to the PAs has been very limited. Biodiversity conservation is economically costly to local stakeholders, and they have little interest in supporting it due to a

lack of financial incentives (Chapter 9). The difficulty in continuing the enforcement work to address the identified threats has been hampered by the lack of resources and incentives to implement activities that benefit forest conservation.

The economic imperative of forest exploitation is reflected in the stakeholders' appreciation of the diverse economic activities that are generated from it. The forests' ecological services also featured prominently in respondents' views, as they are essential for the survival of their land-based economic activities, and more importantly, they are 'free' in monetary terms. However, as the forest and its biodiversity declines, its ability to perform these services will be compromised and in turn will jeopardise the stakeholders' ability to sustain local social and economic well-being. There are also social justice issues in the distribution of the economic benefits of the natural forest. The unregulated small-scale extraction of resources means that local governments do not generate revenue from these forests. Further, goods obtained illegally and traded at low prices do not reflect the full value of the resources. In other words, the negative (e.g., decline in biodiversity, increases in soil erosion, silting of aquatic ecosystem) and positive (e.g., preservation of biodiversity, regulation of local and global climate) externalities of forest management are not factored into the price of the goods.

While economic benefits featured prominently in the interviews, I also gave respondents the opportunity to assess other benefits that have been known elsewhere (i.e., Murray's six categories of values). This way, respondents had a chance to see these other benefits that were not immediately apparent (i.e., salient) in their mind during the interview. While performing the MDM, they were actually thinking and demonstrating their appreciation for the other benefits as well. They could have put all the matchsticks on the 'economic' category, but none of them did. Each respondent distributed the matchsticks across the six types of benefit to represent their views. Based on the MDM analysis, respondents valued the forest's ecological services the most and the economic benefit only ranked the second lowest. This showed that respondents recognised other benefits of forests. However, due to time constraints in the interview, they were unable to articulate the other benefits. Thus, the two methods enabled me to capture more than the interview alone could have achieved; the outcomes are more robust because they are based on different sets of stakeholders' perceptions based on different types of prompts and approach. The MDM findings provided a wider perspective and illustrated a greater range of options and the interview generated greater details about the reasons stakeholders held certain perceptions.

Given that the human systems (e.g., perceptions) are not always consistent, policy makers need a diverse tool and different ways of engaging diverse stakeholders. This is because no single policy, designed with a single perspective, can adequately address the complex problem of forest governance. For example, the production of timber was very important and illegal logging was the problem. However, the forest's ecological services are as important. So the policy challenge is how to bridge these two needs in order to allocate resources that support the maintenance of ecological services and at the same time provide a rationale for decreasing logging activities. Policy to combat illegal logging (e.g., policing the harvest and transportation of logs) without considering the livelihoods element would not work to address forest loss. It must include shifting people's anxiety of policing illegal logging toward supporting ecological services that allow local people to meet their basic needs now and for the future.

For examining the forces that hinder forest conservation (i.e., the third research objective) I adopted the political-ecology framework to analyse the direct and root causes of biodiversity loss (Wood et al. 2000; Chapter 3). The use of this tool demands some methodological reflection. The interdisciplinary nature of the framework was helpful in shedding light on the complex and inter-related socio-economic conditions that allow the drivers of biodiversity decline to perpetuate. First, it helped me to systematically sort the massive interview data into broad categories of causes (i.e., policy, economic, demographic, and social) that have been known as influencing global environmental changes.

Second, the framework helped me to differentiate and better understand the issues around biodiversity conservation at different geographic and temporal scales. This case study highlights the competition amongst diverse interests and groups, with different socio-economic and political power, over the same biological resources located within a specific site. While local actions that degrade natural forests took place locally, the study shows how national and international factors do exert influences on local patterns of resource use. For example, in the past, the natural forests of Gorontalo have played a crucial role in providing livelihoods for the majority of its rural population and as a source of revenue, through large-scale commercial logging during Suharto's era (Chapter 8). The establishment of PAs in a large part of the natural forest has limited local communities' access to forest resources; their once socially accepted traditional land-use practice began to be labelled as illegal. Efforts to enforce the conservation laws, by combating illegal activities and by encouraging shifting cultivators to practice sedentary farming, were seen as ineffective (Chapter 9).

Third, the framework was useful in revealing the ongoing tensions in meeting the varied and often conflicting needs of the distant global community's desire to preserve the rare life forms in the local forests and the resident communities' needs to generate revenue from the same forests to fund their socio-economic development. As discussed in Chapter 8, the perceived underlying causes of these main threats to protected areas are highly complex. These include various forms of poverty, institutional failures in managing the PAs, the political transition that has affected the management of the forest (e.g., the differing interpretations of decentralisation policy), conflict of policies for socio-economic development projects, and market distortions for forest products. These causes are often interlinked: each plays a role in perpetuating or exacerbating any given activity, the intensity of which varies from one activity to another. Changing local perceptions about the fuller benefits of forests requires education at all levels and alleviation of poverty. Appreciating the non-economic benefits of the natural forest is possible when the primary needs of stakeholders have been met.

Fourth, although the framework was generic in its nature, it led to a certain direction that highlighted the prominent factors that operate at local, national, and international levels. For example, poverty and dependence on forest resources as a source of local revenue and livelihoods have driven the economic valuation of the forest mainly for its timber. This was driven by Indonesia's national policy in the development of forest-based industry that began in the mid-1980s. Beyond the local and national spheres, the international trade in tropical timber drove the unsustainable exploitation of timber at the expense of other forest products. This over-simplification of causes and effects illustrates the disconnections between international and national policies and the local reality of forest users. The links between local timber extraction and market and macro-economic failures in the pricing of forest products were not apparent to local stakeholders. When analysing the underlying factors of forest loss the framework facilitated the understanding of the linkages between local activities

and external factors (Chapter 2). Moreover, the analysis on policy and institutional failures in the management of conservation areas revealed not only the ongoing contested boundaries, but also the fundamental issue of legitimacy in the establishment of PAs and the problem of forest/land tenure security. The conflict of PA boundaries, for example, was a serious issue hampering the role of PAs in protecting biodiversity throughout Indonesia (Suryadi et al. 2006, Wiratno pers. comm. 2007), including Gorontalo. However, it did not appear in the ten Asian and African case studies of biodiversity loss that Wood et al. (2000) documented. Furthermore, while the social ill of corruption, collusion and nepotism (KKN) and their influence in the allocation of right to forest resources in Indonesia is well documented, the multi-scales analysis have enabled me to gain more specific insight than other research highlights about this subject. The findings should be useful to others interested in addressing the issue of illegal logging.

Similarly, many international and national policies in biodiversity conservation were set with inadequate consideration of local needs of forest resources (Abbot & Thomas 2001; Adams & McShane 1992; Sunderlin et al. 2005; Wilshusen et al. 2002). The intensity of threats varies among the PAs in Gorontalo, but they are of similar types. The perceived direct drivers of the forest decline largely occurred on a small scale and were conducted by individuals or small groups of actors, except the past large-scale logging and transmigration projects, and more recently the local government's *agropolitan* programmes (Chapter 8). In the eyes of government officials, however, the activities are illegal. Yet, the regulations that govern the use of forest resources have either been ambiguous or non-existent, further exacerbating conflicts over rights to access the resources, which in turn threatens the resource base.

There are strong arguments for the merit of conservation in sustaining the generation of goods and services from the forest, but these are long-term in nature. Meanwhile, the short-term and immediate needs of exploiting the resources for livelihoods must be met. Despite the multiple benefits that local stakeholders enjoy from the natural forest and their reliance on forest resources for their economy, setting natural forests aside for conservation purposes is of low priority for a society that is preoccupied with economic survival. There was a strong sense of the cultural value of biodiversity and the participants' social and religious obligation to keep the forest for future generations – but this has not been translated into activities or strategies that support forest conservation. These reasons are likely to have influenced the majority of respondents who held negative attitudes towards Indonesia's centrally-controlled and preservationist biodiversity conservation policy (Chapter 9). Consequently, local stakeholders regarded the global and national conservation policies as ineffective in achieving conservation goals, let alone meeting local needs.

Overall, besides confirming the theory of drivers of global environmental changes (Wood et al. 2000) and how they interlinked at different geographical and temporal scales, the framework identified serious gaps in local understanding. These include the role of invasive alien species, pollution, and climate change as important drivers of local biodiversity. Only a few respondents observed and articulated local examples of these factors.

There are also factors external to the sites that influence the likelihood of success in biodiversity conservation. While they are beyond the control of local stakeholders, many of the identified problems must be understood and addressed in order to generate local support for achieving the long-term goals of biodiversity conservation. The findings of this study show that local support for natural forest conservation was strongly linked with the diverse benefits clearly tangible to stakeholders. Therefore, incorporating local needs in policy

reforms and addressing market failures (e.g., through the provision of financial compensation for forested regions) are key points to bring the benefits of conservation closer to local stakeholders.

The findings also highlight the urgent need to strengthen the links between science, policy, and livelihoods. As noted in the beginning of this section, there is a gap in people's understanding about the ways through which forest ecosystems work to produce essential ecological services. For example, most respondents understood the forest's hydrological role, and only a few comprehended its function as a carbon sink. Moreover, because of a lack of baseline scientific data, the formulation of conservation policy and priority actions were mainly driven by political expedience. While the 'blue-print' application of PA establishment (e.g., the concept of a national park in less densely populated countries in Europe and North America) are scientifically sound, the implementation in the Indonesian context has been extremely difficult due to the weak or non-existent links with the needs of local people (Chapter 7). As the forests are degraded, people need to adapt to both imminent biophysical and social changes associated with forest loss. Science-based policy that adequately considers local knowledge, perceptions, and attitudes of local people will facilitate the change in behaviour in order to adapt to changes. Thus, a closer connection between science, policy, and people is required.

Changing local attitudes towards the necessity of forest conservation requires addressing both the direct and underlying causes of decline in biodiversity. One of the main steps is improving collaboration between relevant government agencies and local communities, by increasing the latter's participation in the management of PAs. An equally important approach would be improving activities in the villages adjacent to the PAs. The recommendations outlined in Section 10.3 are made on the basis of the evidence I obtained through applying the combined methods and the theoretical framework of analysing global environmental changes. By virtue of using these tools, I found something new about policy and decision making in the use of forest resources; this would not have been revealed without using the approaches outlined above. Specific contributions of this research to the literature, and potentially to the policy change on the ground, are outlined below.

## **10.2 Contribution of this research**

Examining local stakeholders' perceptions of biodiversity conservation has academic and practical value. First, academically, the findings provide empirical evidence of: (1) the diverse ways in which the scientific concept of biodiversity is understood and (2) the application of theories of environmental change and the factors that influence people in making decisions regarding the use of forest resources. The latter provides an indicator of the level of people's awareness about the roles of natural forest in sustaining their livelihoods and the impacts of their activities on it. Second, the aggregated perceptions resulting from the study can help to bring about greater participation in decision-making regarding the use of biological resources, which in turn can improve local support for the conservation of forest biodiversity. In the context of policy and improving participation in resource management decisions, the study gives insights into stakeholders' understanding of ecological principles that serve as the basis for conservation actions. This is necessary because local people's interpretation of their own environment might give conservationists some insights into ecological functioning that they would not otherwise have. Since a better understanding of the essential ecological processes by these decision makers is required for maintaining

biodiversity and ecosystem stability, recognition of these will assist in formulating a more appropriate conservation and sustainable use policy.

Third, the compilation of shared perceptions of the benefits of biodiversity should be useful to design activities that can demonstrate the benefits of its conservation in practical terms. For example, the identified views may be incorporated in planning and management, in exploring more diverse alternative interventions, and in improving the distribution of costs and benefits of conservation actions. All of these are very important for conservation efforts to succeed and for preventing environmental crises resulting from biodiversity loss.

Fourth, by listening to local voices and concerns that may have been neglected or overlooked in previous conservation planning, the power in the national and local debates around forest biodiversity will be more balanced. This study provides examples of the interplay of perceptions and power and the factors that influence them. The current lack of perceptions (i.e., about a wide range of benefits that the natural forest provides) among both the powerful and powerless actors in Gorontalo can be better addressed, and better trade-offs between conservation and sustainable use of forest resources can be negotiated.

Finally, because implementation of any conservation policy needs support from relevant stakeholders, their perceptions and values are important considerations for policy formulation. Directly or indirectly, the wider community bears the costs and/or enjoys the benefits of such policies. This investigation of local stakeholders' perceptions of forest conservation and the factors that shape the way they assign value to it contributes to the body of knowledge regarding the application of a scientific concept of biodiversity for forest management practices.

In summary, this case study is a microcosm. While the primary role of the investigation was to represent the case, much of what has been learned here can be applied elsewhere; to some degree, almost all the conflicts of development and conservation in Gorontalo occur throughout Indonesia. The political ecology framework was very useful as a tool for identifying the forces that have led to forest loss in Gorontalo and the various socio-economic and political barriers (at the local, national, and global spheres) to manage the remaining natural forests (i.e., within the PAs boundaries) sustainably. As well as confirming major drivers of environmental changes (e.g., biodiversity loss) which local stakeholders identified in the study site, it highlights the gaps in their perceptions of other equally, if not more, important drivers such as climate change and the effect of invasive alien species on local biodiversity. Furthermore, the use of the framework revealed important disconnections between global/national conservation policies and the needs of local forest-related livelihoods. Finally, it underscored the importance of local people as the main agents that affect the state of biodiversity. The case study demonstrated that conservation of biodiversity cannot be considered in isolation from local people and broader patterns of natural resource use. Nor can it be separated from the socio-political context in which people carry out their lives.

### **10.3 Recommendations**

This study shows the inter-connectedness between a social phenomenon (i.e., people's perceptions, values, and attitudes), physical activities (e.g., extraction of forest resources), and their socio-economic root causes of biodiversity loss (e.g., poverty and institutional and policy failures). Due to differences (e.g., geographic and temporal scales) in the identified

drivers of this loss, the suggested solutions require integrated measures to halt or change the direction of the use of forest resources. The following recommendations are grouped into local, national, and international levels. However, bearing in mind the current political transition in Indonesia, local actions may still have to be directed or approved by the national government.

### 10.3.1 Local level

Specific recommendations at the local level include: (1) improving ecological literacy across stakeholders; (2) strengthening enforcement of forest regulations; (3) improving conservation and development planning; and (4) designing innovative economic activities. Each of these specific recommendations is discussed below.

First, to improve ecological literacy, the local conservation agency (BKSDA) needs to work together with local conservation/community development NGOs to promote awareness-raising activities. This can be achieved through: (1) publishing information about local biodiversity, protected areas and their different status and the benefits of forest protection for the socio-economic and environmental well-being of the region; (2) working with schools to explicitly integrate this information (in Indonesian or Gorontaloese languages) in the local content of school curricula and other local institutions, such as Islamic boarding schools (*madrasah*) and mosques; (3) providing training for decision makers, legislators, and law enforcers to improve forest governance; and (4) empowering conservation agency staff in their communication and outreach skills to improve working relationships between them and with communities.

Second, to strengthen enforcement of forest regulations, government agencies must improve the capacity of the forest protection units, not only at detection level, but also the investigation and prosecution level. This requires a stronger collaboration between the PAs and other agencies, such as the police, forestry services, prosecutor offices, courts, port administration, and customs at the district, province, regional, and national levels. To this end, it is necessary to: (1) prioritise boundary demarcation of protected area boundaries and zoning, especially those under intensive pressure from agriculture and extractive activities; (2) improve policy coordination among conservation agencies, agriculture, and forestry, attempting to eliminate jurisdictional ambiguity through regular forums among them, and (3) develop a communication strategy for informing the local and wider community, in particular funding agencies, about the importance of the study areas, the threats to biodiversity, and the root causes of past and current biodiversity loss.

Third, given the existing issues of power and behaviour of powerful local actors (as elaborated in Chapters 6 to 9) to improve conservation and development planning, local authorities need to develop more stringent planning of development projects that require decision-makers to substantiate the fuller value of forests and their role in sustaining their economic activities. Some necessary steps to achieve this include: (1) disseminating abbreviated findings of this case study to governmental and non-governmental officials, with special emphasis on the relevance of socio-economic factors to the state of local biodiversity and the environmental and social impacts of past historic exploitation of forest resources on biodiversity; (2) strengthening local stakeholders' commitment to biodiversity conservation through demonstrating economic and environmental benefit of rational resource use and forest restoration through the aforementioned points; (3) developing and proposing a series of sustainable resource-use scenarios, which ensure a safer future for existing biodiversity, (4) seeking opportunities to consult with local stakeholders about participatory management of

the PAs by holding workshops and public awareness events to publicise the initiative and begin to identify appropriate individuals and organisations willing and able to push forward the development of an action plan; (5) presenting these initiatives to stakeholders in order to guide and lead the participatory planning process in a satisfactory direction towards longer-term activities; (6) conducting local monitoring of progress and widely publicising this to improve transparency; and (7) addressing illegal logging and improve management of forest production and conservation areas through participatory land use planning and management of buffer zones, especially the establishment of boundaries to improve security of land tenure (both PA and local community). This will provide the basis for effective land ownership and create conditions for sustainable use; (8) formulating regional policy reform to govern small-scale resource extraction (e.g., wildlife hunting, rattan extraction, and peasant gold-mining), thus promoting integrated approaches through better cooperation among local forestry (i.e., conservation and watershed management), agriculture, and fishery offices to ensure protection and conservation of the forest, lake, and coastal areas; and (9) seeking opportunities for collaborative, participatory and collective action with the surrounding districts and provinces.

Finally, to design innovative economic activities local authorities need to understand that the main reason for biodiversity loss can be summed up as widespread and persistent failure to properly understand, quantify, or value the goods, services, functions and capital value of the natural forests, at both national and local levels. The distorted pricing of forest resources continues to lead to the decline in forest cover and the biodiversity within it. This implies that if the market and economic biases are addressed, more sustainable use of forest resources will result. Practical solutions to address the economic aspect of biodiversity conservation must include: (1) developing of agroforestry systems and other appropriate technology for the cultivation of marginal lands for subsistence and cash crops; (2) exploring alternative and ecologically friendly crops for sale and subsistence in order to reduce reliance on extensive farming systems; (3) improving involvement of local communities in regulating and monitoring wildlife hunting and extraction of rattan as these have clearly had negative impacts on the natural populations of these forest products. The role of these activities in the local economy needs to be addressed more realistically, as the declining resource base will jeopardise people's future incomes. However, it is difficult to convince decision-makers who, by nature, often see the natural forests in purely economic terms or have a very strong sectoral bias, particularly when full knowledge of the economic value of the natural forest does not exist. Perhaps, the lack of interest in knowing the fuller value of the natural forests is politically expedient for the decision-makers, who are typically interested in short-term gain. Much progress is being made worldwide in the development of tools to quantify other services and goods generated from the forest (Barbier et al. 1994b), but little has been applied in the Gorontalo context.

Controlling these activities also requires regulating and ending illegal trading beyond the district and provincial boundaries. Moreover, the current expansion of agricultural land only provides subsistence living for those involved, and the continued practice cannot be seen as a long-term option for the region as it comes at the expense of forest lands that have a range of ecological values. More sustainable agricultural practices and provision of more diverse livelihood strategies for the villagers in the PA buffer zones will require closer collaboration between the agricultural extension workers and the PAs' field staff (rangers).

As the natural forest has been undervalued on all economic, social and environmental fronts, correcting the distorted price is one way to address this, but making the environmental value

of the forest explicit is another. Since base line information to translate these values is seriously lacking, getting the price and policy right is crucial. Finally, it is essential that local authorities regulate the trade in forest products for consumers, both within and beyond the research sites.

### 10.3.2 National level

As noted in Chapter 2 and respondents' observations in Section 8.6 the 'tug of war' between the central and local governments in the management of Indonesia's forests continues, specifically those under the conservation forest category. On the one hand, despite the limited capacity and resources to manage conservation forests the central government is still very reluctant to devolve power to the region and increase the latter's participation in the management of the PAs. On the other hand, as many respondents of this research testified, many of the PAs are in a degraded state and are increasingly threatened by unsustainable economic activities in their surrounding areas. Since 2004, the MoF has opened the door for some forms of community-based or collaborative management of PAs with local communities in some districts in East Kalimantan and Sulawesi, with some encouraging results (Wahyudi Wardoyo, personal communication, 2007). Because tenure security has been an ongoing issue in the forestry sector, a national reform is required to: (1) increase the legitimacy of PAs and their boundaries as well as clarify the boundaries of local people's legitimate lands; (2) create enabling conditions for sustainable use of forest resources (e.g., transparency in the allocation of right to exploit land and forest resources); and (3) clarify rights and responsibilities to reduce illegal activities. In the long run it is equally important to translate commitment to sustainability by improving inter-departmental coordination (e.g., agriculture, forestry, mining, fishery, trade, and industry) in the planning and management for development projects that affect the state of natural forests. For example, this should be achieved through mandatory integration of biodiversity conservation in any infrastructural projects. Despite the existence of the national strategy for biodiversity conservation (IBSAP 2003), it is still not part of the resource management plan. Therefore, it needs to be integrated in local resource management plans.

### 10.3.3 International level

Lack of resources has been the major constraint for many activities suggested above. The externally funded long-term work of NFCP has demonstrated its positive impacts on meeting local needs and conserving biodiversity that have high global conservation value. In order to improve the efficacy of CBD implementation locally and nationally, external assistance must be sought for the short- and middle term.

Specifically, international funding is needed for campaigning to improve ecological literacy, conducting research in resource valuation of the forest's ecological services, and for improving local governance of forest uses. To support these activities, lobbying tools should be designed through collaborations between government and NGOs, both nationally and internationally. This process will help to shape the participatory debate and planning of activities that affect forest ecosystems.

Moreover, given the prevalence of illegal activities (logging and wildlife poaching) and the high demand of timber and other products from the forest for domestic and international markets, practical measures to improve transparency in the products harvesting and trading must be developed, locally and in collaboration with the more environmentally-minded international consumers. To this end, the strategies for conservation and a portfolio of development projects need to be developed and aligned with the criteria for loans (e.g.,

bilateral and multilateral organisations, such as the World Bank and Asian Development Bank) to achieve the United Nations' Millennium Development Goals. Specifically, this involves biodiversity protection and poverty alleviation through eliminating the identified root causes. In order to achieve this, the international level organisations and funders need to be more aware of local perceptions and insist on mechanisms for integrating local people in these activities.

#### **10.4 Suggestions for Further studies**

Besides contributing to knowledge about the links between science, policy, and people's perceptions and livelihoods (see Section 10.2) the study identified some important gaps that warrant further research to be attempted. First, the valuation of protected forests' ecological services (e.g., watershed protection) has been proven effective in gaining local support for conservation. This kind of valuation is dependent on a proper understanding of all the various functions that the natural forest performs. Further studies on ecological literacy across a wide range of stakeholders and generations will be useful in strengthening science-based policy and decision-making. Assigning economic values to previously under-valued forest functions, such as groundwater recharge, carbon sink, and prevention and control of soil erosion would be important to convince decision-makers and the general public that the PAs are conserving. This quantification of benefits of forest ecosystems can be used as the basis for seeking financial compensations for the forested regions (e.g., through REDD).

Second, this study has qualitatively identified the perceived direct and root causes of biodiversity loss. To improve the support for sustainable use of biodiversity, some of the identified values of the natural forest, and the costs for conserving it need to be known. These may include: (1) establishing baseline information on economically valuable plants and wildlife in order to support the monitoring of their population trends and enforcement against illegal extraction; (2) conducting specific studies of buffer zone villages (which are under-represented in this study) in order to determine their actual economic dependence on forest resources and to design livelihood activities that are compatible with the conservation goals; and (3) establishing the easily accessible Lake Limboto as a research centre to conduct socio-economic and ecological studies of the lake. The demonstration of how human activities affect the natural ecosystems and vice versa can assist local stakeholders across generations to address the knowledge gaps identified in this study. At the same time, it will assist the formulation of policy to govern the use of resources therein and to design activities that are socially acceptable, economically viable, and ecologically sustainable.

Overall, this case study presented a detailed analysis of the social dimensions of an environmental management policy (i.e., biodiversity conservation). The existing centralised preservationist policy of protecting Gorontalo's unique biodiversity has been proven ineffective. This was largely due to its inability to manage the protected areas and to deal with intense exploitation of forest resources to meet the local needs. As local people are among the main agents that affect the state of biodiversity, local perspectives on the benefits of conservation should be integrated in designing conservation strategy. In other words, biodiversity conservation policy cannot be considered in isolation from local people and broader patterns of natural resource use. Nor can it be separated from the socio-political context in which people carry out their lives.

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## Appendices

### Appendix 3.1. Selected legislation related to biodiversity management in Indonesia

Legislation	Aspects of biodiversity
Act No. 5/1990 on Conservation of Natural Resources and Ecosystems	Protection of buffer zones, preservation of species diversity, definition of types of protected areas. It emphasises terrestrial conservation areas; does not have provisions on genetic diversity.
Act No. 24/1992 on Spatial Planning and Presidential Decree No 32/1990 on Protected Areas	Management of protected areas, delegation of authority to regional government to determine protected areas but not to manage them.
Act No. 5/1994 on the Ratification of CBD	Regulates conservation and sustainable use of biodiversity and the equitable sharing of benefits from biodiversity, protection of traditional knowledge, and biosafety.
Act No. 23/1997 on Environmental Management	Regulates the principle, objectives and goals of environmental management in Indonesia; authority in environmental management and conservation of ecological functions. Article 8 provides for environmental policies related to the management of natural and human-made resources, including genetic resources. Article 37 provides rights to communities to file class action suits and for environmental organisations to file lawsuits on behalf of environmental protection.
Act No. 22/1999 on Regional Government and	Regulates decentralisation of authority to manage natural resources. Regulates the sharing of development funds between the national and regional level, including revenues from the use of natural resources.
Act No. 25/1999 on Fiscal Balance between the Central and Regional government	
Act No. 14/2000 on Patents	Regulates patent rights, including biological materials/life forms.
National Agenda 21 of 1997	Chapter 16 deals with the management of biodiversity.
Decree of MPR No. IX/2001 on Agrarian Reform and Natural Resource Management	Provides the basis for management of all natural resources under one umbrella law.
Act No. 41/1999 on Forestry	Regulates the function, planning and management of forest as a working unit or area rather than ecosystem.
Act No. 29/2000 on Plant Variety Protection	Regulates the protection of plant breeders' rights and the use of plant varieties protected by intellectual property rights.

Source: National Development Planning Agency (2003).

#### Appendix 4.1 Selected examples of definitions of 'biological diversity' and 'biodiversity'

Source	Definition
Reid & Miller, 1989	'Biodiversity is the variety of the world's organisms, including their genetic diversity and the assemblages they form. It is the blanket term for the natural biological wealth that undergirds human life and well-being. <i>The breadth of the concept reflects the inter-relatedness of genes, species and ecosystems.</i> '
McNeely <i>et al.</i> , 1990	'Biological diversity encompasses all species of plants, animals, and micro organisms and the ecosystems and ecological processes of which they are parts. <i>It is an umbrella term for the degree of nature's variety, including both the number and frequency of ecosystems, species, or genes in a given assemblage.</i> '
McAllister, 1991	'Biodiversity is the genetic, taxonomic and ecosystem variety in living organisms of a given area, environment, ecosystem or the whole planet.'
Wilson, 1992	'[biodiversity] The variety of organisms considered at all levels, from genetic variants belonging to the same species through arrays of species to arrays of genera, families, and still higher taxonomic levels; includes the variety of ecosystems, which comprise both the communities of organisms within particular habitats and the physical conditions under which they live.'
The Convention on Biological Diversity, 1992	'Biological diversity' means the variability among living organisms from all sources including, <i>inter alia</i> , terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.'
Sandlund <i>et al.</i> 1993	'... biodiversity - the structural and functional variety of life forms at genetic, population, species, community, and ecosystem levels'.
The US National Commission on Science for Sustainable Forestry (2005)	'The variety and abundance of all life forms in a place – plants, animals and other living organism – and the processes, functions, and structures that sustain that variety and allow it to adapt to changing circumstances'.

Source: Compiled from various sources.

## Appendix 4.2 A summary of instrumental events in western countries that led to the development of biodiversity conservation

- 13th century – St Francis of Assisi shifted the focus on nature's function to meet human needs to the celebration of the diversity of other living beings.
- 14th century – Britain and France started to pass regulations on protection of certain species of animals.
- 15th century – Scotland passed a regulation on salmon fishing.
- 16th century – Germany revoked community land rights because they led to forest destruction.
- 17th century – Russia enacted 67 hunting laws, felling trees was forbidden in Siberia and forests were protected to conserve individual tree species or to reduce flooding.
- 1752 – Sweden started what might be described as a scientific effort in forest management through replanting.
- 1776 – The British colonies in the Caribbean signed an ordinance to protect the 'Tobago Forest Reserve'.
- 19th century – the British and US governments started building awareness of the need for maintaining the Earth's diversity by enacting the following laws on:
- 1847 protection of forests in Madras, India – UK colony
  - 1873 conservation of natural resources in the USA
  - 1907 integrated legislation for nature reserves in the USSR
- 1948 – IUCN (International Union for Conservation of Nature and Natural Resources) was founded to promote or support action which will ensure the perpetuation of wild nature and natural resources on a world-wide scale, not only for their intrinsic cultural or scientific values, but for the long-term economic and social welfare of humankind.
- 1949 – The Red Data List of threatened species was initiated (it later became the Red Data Book of IUCN).
- 1961 – The World Wildlife Fund was founded to raise funds for IUCN (now known as the World Wide Fund for Nature).
- 1968 – The first international journal for conservation, *Journal of Conservation Biology*, was launched
- 1970 – UNESCO launched the 'Man and The Biosphere' programme to foster sustainable use of natural resources.
- 1972 – The World Heritage Convention was adopted internationally, with the main mission to preserve and protect unique biota and ecosystems of the world.
- The United Nations Conference on Humans and the Environment, The Stockholm Declaration, and the subsequent establishment of the United National Environment Programme (UNEP)
- 1979 – Publication of the Sinking Ark by Norman Myers, the first synthesis of modern conservation.
- 1980 – IUCN, UNEP and WWF launched the World Conservation Strategy. Its key components are: Maintenance of ecological processes, preservation of genetic diversity, and sustainable use of species and ecosystems.
- 1982 – The World Charter for Nature was adopted by the UN Assembly, calling on the need to protect our environment, particularly as the basis for our resources.
- The need for an international framework to protect biodiversity in its entirety was first suggested during the 3rd World Congress on National Parks in Bali.
- 1987 – Our Common Future or The Brundtland Report (by the World Commission on Environment and Development) on the State of the World's Environment was published – the concept of sustainable development was born.
- 1988 – After years of diplomacy with Southern nations wary of a Northern Agenda, the UNEP instigated proceedings for a CBD with substantial input from the IUCN (now known as the World Conservation Union). It convened a series of *ad hoc* meetings of expert scientists to address the need for a global framework to mobilise conservation efforts of governments in both 'Northern' and 'Southern' countries. In response the Convention on Biological Diversity (CBD) was established as a framework convention. This means that it would provide a platform for continuing scientific input (the modus operandi of the Subsidiary body on Scientific, Technical and Technological Advice - SBSTTA) and evolution of the policy through feedback at Conferences of the Parties (CoPs). The clearing house mechanism was established for information exchange between SBSTTA and CoPs.
- 1990 – Subgroups were formed, focussing on the biotechnology aspects: examining biotechnology transfer, in situ and ex situ conservation, access to genetic resources and technology, safety of Genetically Modified Organisms (GMO) and funding sources and mechanisms. Ad hoc legal and technical experts working group was established to help prepare the legal document.

**Appendix 4.2 A summary of instrumental events in western countries that led to the development of biodiversity conservation (Continued)**

- 1991 – The formal draft of the CBD was reviewed by the intergovernmental Negotiating Committee
- 1992 – After ten years of preparation and negotiations, the CBD was finalised and on the 5th of June 1992 was adopted internationally at the 1992 UN Conference on Environment and Development (Earth Summit) in Rio de Janeiro, Brazil.
- 1993 – In May, the governing Council established the Intergovernmental Committee on the Convention on Biological Diversity (ICCBD) to set up the first meeting of the Conference of the Parties (COP). Initially expert panels were set up to inform the ICCBD on Priorities for action and research agenda, Economic implications and Valuation of Biological Resources, Technology Transfer and Financial Resources, Safe transfer, Handling and Use of Genetically Modified Organisms.  
In October, ICCBD had its first session. Working groups were established to address conservation and sustainable use of biological diversity, science and technical work and biosafety, funding issues, planning for the COP and enabling technical cooperation and capacity building.  
The CBD entered into force on 29 December 1993.
- 1994 – The SBSTTA was established and the clearing-house mechanism was advanced (Earth Negotiations Bulletin)
- 1995 – The Global Biodiversity Assessment Project was completed.
- 2002 – The World Summit on Sustainable Development stated its commitment to significantly reduce the loss of world biodiversity by 2010.  
The Bonn Guidelines on access to genetic resources and benefit sharing signed by signatories - (non-binding guidelines).
- 2003 – The Cartagena Protocol of Biosafety was adopted.
- 2004 – The World Summit on Sustainable Development; where the Millennium Development Goals was declared.
- 2007 – The United Nations Conference on Climate Change, Bali, Indonesia.

Sources: Burgiel (2004) and Holdgate (2004).

### Appendix 4.3. Summary of policies in biodiversity conservation in Indonesia

Period	Type of policy
Dutch colonial period (mid-sixteenth to mid-twentieth century)	
1714	Establishment of Depok Nature Reserve (6 ha), the first site protected for its unique ecosystems, which remains intact today despite rapid and extensive urbanisation in the greater Jakarta area.
1889	Establishment of Cibodas Reserve (280 ha), near Bogor, to protect mountain flora of Java. The twin mountains of Gede-Pangrango were included in 1925 as part of this reserve.
1898	Establishment of Bogor Botanic Garden to protect lowland flora and as a reservoir and research centre for economically valuable cash crops.
1909	Issuance of <i>Staatsblad 497</i> and <i>Staatsblad 594</i> , which then became the Law for the Protection of Wild Mammals and Birds ( <i>Ordonnantie tot Bescherming van sommige in het levende Zoog-dieren en Vogels</i> ) in response to massive exploitation and trade of birds of paradise by the colonial government.
1912	The newly founded Dutch Association of Nature Protection ( <i>Nederland's Indische Vereniging tot Natuur Beescherming</i> ) appointed 12 locations in Java (including Banten, Krakatau island, Papandayang crater, Ujung Kulon peninsular, Panaitan island, the sand sea in Mt. Bromo, Nusa Burung island, Purwo peninsular, Ijen crater) as natural monuments prohibited from human use.
1916	Official protection of 55 sites, including those proposed in 1912, as natural monuments ( <i>Staatsblad 278</i> ).
1924	Issuance of the Hunting Ordinance to protect 8 species of mammals (including orangutan) and 53 species of birds.
1925	Establishment of the Dutch Commission for International Nature Protection, responsible for studying and overseeing the selection of protected areas, particularly in Indonesia.
1929	Selection of protected areas was expanded to Sumatra and Kalimantan, notably the two largest ones: Mt. Kerinci in 1929 and Leuser Sanctuary in 1934 (400,000 ha) and other smaller ones, including Mt Indrapura, Way Kambas, Mt. Wilhelmina, and Berbak in Sumatra and Kutai besar, Sampit, Mt. Palung and Mandor in Kalimantan. The Rinca and Padar islands, Mt. Rinjani and Gunung Api Island in the Lesser Sunda Islands (Nusa Tenggara) were also included to protect the endemic komodo dragon.
1931	The Regulation of Wild Fauna Protection ( <i>Dierenbeschermingsverordening</i> ) became official throughout Indonesia, prohibiting the hunting, trapping, killing, and trading of 36 species listed under this regulation, including the one-horned Javan rhino.
1932	The issuance of the Ordinance of Sanctuary and Wildlife Reserves. The terms natural monument ( <i>Natuur Monumenten</i> ) and wildlife reserve ( <i>Wild Reservaten</i> ) were replaced by nature reserve ( <i>Natuur Reservaat</i> ) and nature park ( <i>Natuur Park</i> ). Under this regulation, several areas in Sumatra, Kalimantan, and Nusa Tenggara selected in 1929 were designated as wildlife reserves along with Baluran in East Java to protect the endemic wild cow and dry savannah ecosystems.
1941	The Ordinance of Sanctuary and Wildlife Reserves was replaced by the Regulation of Nature Protection ( <i>Staatsblad 167</i> ). This law completely prohibit hunting in wildlife reserves and the only activity permitted was regular forest use that does not harm the protected wildlife. However, the type of use was never specifically defined.

### Appendix 4.3. Summary of policies in biodiversity conservation in Indonesia (continued)

The Japanese occupation (1942-1945)

During this period nature protection suffered a severe setback through massive exploitation of teak forest in Java for ship-building and for fuelling the Great Asia War. Just before Indonesia's independence in 1945 a total of 117 sites for nature protection had been selected in Sumatra, Java, Kalimantan, Sulawesi, and Bali, covering area of 3 million hectares.

Independence to present time

- 1947 Establishment of West Bali sanctuary based on an initiative of Balinese kings.
- 1952 The Agency for Nature Preservation (*Lembaga Pengawetan Alam*) was formed as part of the Centre for Nature Research of the Bogor Botanic Garden.
- 1956 The Nature Protection Bureau within the Forestry Department became the Nature Protection Division (*Bagian Perlindungan Alam*) with the main task of managing protected areas and wildlife and providing training and support to other institutions.
- 1962 The Agency for Nature Preservation (under the Ministry of Agriculture) was transferred to the Forestry Department, and then merged with the Nature Protection Division to become the Agency for Nature Protection and Preservation (*Badan Perlindungan dan Pengawetan Alam*).
- 1967 Department of Forestry was eliminated, and the Directorate General of Forestry was created under Ministry of Agriculture.
- 1971 The Directorate of Protection and Nature Preservation was created within the DG of Forestry, with the main task of providing technical assistance in the management of wildlife sanctuaries, nature reserves, and zoos and the development of tourism. This then changed when in 1983 a separate Directorate of National Parks and Recreational Parks was created with the sole purpose of managing national parks and other protected areas (nature reserves and wildlife sanctuaries).
- 1982 Indonesia declared 11 sites as national parks after the 3<sup>rd</sup> World Congress on National Parks and Conservation Areas in Bali.
- 1985 Total ban of log exports due to destructive timber exploitation was implemented as a response to domestic and external pressure during the 8<sup>th</sup> World Forestry Congress in Jakarta in 1978.
- 1990 Indonesia ratified the World Conservation Strategy (1980) in the form of Law No 5/1990 concerning Conservation of Natural Resources and Their Ecosystem. The law stipulates the protection of buffer zones, preservation of species diversity, definition of types of protected areas. It emphasises terrestrial conservation areas; it does not have provisions on genetic diversity.
- 1992 Enactment of Law No. 24 of 1992 concerning Spatial Management Plan stipulating the importance of spatial considerations for the management of protection, production, and conversion areas. The law delegates the authority to regional government to determine protected areas but not to manage them.

### Appendix 4.3. Summary of policies in biodiversity conservation in Indonesia (continued)

1993	In response to the Convention on Biological Diversity (CBD) adopted at the Earth Summit 1992 The National Development Planning Agency published the Biodiversity Action Plan for Indonesia (BAPI). The State Ministry of Environment was charged with preparing strategies at policy level and the Department of Forestry was tasked with the implementation of the plan through the management of biodiversity in conservation areas, and the Department of Agriculture was charged with the sustainable use and protection of agro-biodiversity.
1994	Enactment of Law No. 5 of 1994 concerning the Ratification of the CBD. The law regulates conservation and sustainable use of biodiversity and the equitable sharing of benefits from biodiversity, protection of traditional knowledge, and biosafety.
1997	Enactment of Law No. 23 of 1997 concerning Environmental Management. It regulates the principle, objectives and goals of environmental management in Indonesia; authority in environmental management and conservation of ecological functions. Article 8 provides for environmental policies related to the management of natural and human-made resources, including genetic resources. Article 37 provides rights to communities to file class action suits and for environmental organisations to file lawsuits on behalf of environmental protection.  National Agenda 21 of 1997. Chapter 16 deals with the management of biodiversity.
1999	Law No. 22/1999 on Regional Autonomy, regulating decentralisation of authority to manage natural resources.  Law No. 25/1999 on Fiscal Balance between the central and regional government. It regulates the sharing of development funds between the national and regional level, including revenues from the use of natural resources.  Law No. 41/1999 on Forestry regulates the function, planning and management of forest as a working unit or area rather than ecosystem.
2000	National parks are managed separately by management units all over the country (National Parks Office) under the Directorate of Forest Protection and Conservation.  Law No. 14/2000 on Patents regulates patent rights, including biological materials/life forms.  Law No. 29/2000 on Plant Variety Protection. It regulates the protection of plant breeders' rights and the use of plant varieties protected by intellectual property rights.
2001	Decree of MPR No. IX/2001 on Agrarian Reform and Natural Resource Management. It provides the basis for management of all natural resources under one umbrella law
2005	To date there are 241 units of terrestrial Strict Nature Reserves (4.5 million hectares in total), 71 units of Wildlife Reserves (a total of about 5 million hectares), and 43 national parks (a total of 12.3 million hectares) with the number of marine protected areas also in the increase.

Source: Wiratno et al. (2004), National Development Planning Agency (2003), and Ministry of Forestry (2006).

## Appendix 5.1. A consent form for participants of this research

Sri Nurani Kartikasari (Ani)  
Environment, Society and Design Division,  
Lincoln University, Canterbury,  
New Zealand. Phone: 64-3-3253838 ext 8310 Email: kartikas@lincoln.ac.nz

8 August 2005

### CONSENT FORM

#### **Key local stakeholders' perceptions of biodiversity conservation in Gorontalo, Indonesia (Persepsi para pemangku kepentingan utama mengenai konservasi keanekaragaman hayati di Gorontalo, Indonesia).**

I have read and understood the description of the above-named project. On this basis, I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved (*Setelah mendengar maksud dan tujuan penelitian ini, yaitu untuk menggali persepsi para pemangku kepentingan di Gorontalo mengenai konservasi keanekaragaman hayati, saya bersedia berpartisipasi dalam penelitian ini. Saya juga menyetujui informasi yang bersumber dari wawancara ini untuk dipublikasikan, namun kerahasiaan nara sumbernya dijaga.*

I also understand that I may at any time withdraw from the project, including withdrawal of any information I have provided (*Dalam proses wawancara ini saya juga berkesempatan untuk menarik diri dari partisipasi saya, termasuk menarik kembali informasi yang sudah saya berikan*).

NAME/NAMA (please print): .....Signature/Tanda tangan:

Date/Tanggal:

## Appendix 5.2 Criteria for assessing the relevance of stakeholders for the management of forest biodiversity

### Proximity to Forest

Proximity is defined simply as closeness to the Forest and the potential for people living near the forest to have a significant impact on it is acknowledged. People with easy access to the forest can be beneficially involved in forest management. People who perceive themselves to be unjustly excluded from nearby forest also have the ability, directly or indirectly, to degrade it. Some researchers have suggested including emotional, as well as physical, proximity in this dimension, since in some cases those who care about a forest act upon it (sometimes from afar).

### Pre-existing right

In many places, forests under threat are subject to conflicting land claims, indeed even to conflicting paradigms of what land ownership and use should mean. Sometimes, communities that have occupied a given area for decades or centuries have had their traditional rights usurped or severely compromised in recent times. If there are such people in or near a forest, recognition of their rights is important both ethically and pragmatically. Justice requires that people's rights to the forest be acknowledged and respected. From a purely practical point of view, perceived injustice can lead to a variety of ills from disregard of forest policies to increases in conflict, vandalism and violence.

### Dependency

In many forested areas, there are communities who are dependent on the forest for a range of goods and services. The people may hunt, fish, gather foods, medicines and fibres, or practice agroforestry. It is also common for such people to have few realistic alternatives to their existing way of life and that this can change. The needs of people whose livelihoods depend on the forest must be incorporated into sustainable forest management. Ethically, people's access to food is an important consideration. Practically, people whose children are hungry because they are denied access to the forest may not respect forest borders.

### Poverty

This concept has many pitfalls because of different meanings. In this research, the concern is to differentiate those whose use of the forest carries survival implications from those whose use of the forest simply increases an already adequate income.

### Power Deficit

People who live in or near the forest typically have comparatively little power than other stakeholders. Power may be based on education, wealth, connections to government, or locally recognised authority. Where a local power deficit does exist, it may adversely affect the forest, since the people will not have the means to protect their resources from outside forces. Both environmental degradation and reduced human welfare may result. Another element in the power issue pertains to whose knowledge 'counts'. The common silencing, or muting, of some people's voices has a number of potentially dangerous effects, such as reducing their ability and willingness to participate in cooperative forest management or reducing formal managers' access to useful knowledge.

### Forest /culture integration

Cultures (or ways of life) – including those of forest communities – tend to be intimately linked to their environments. There may be sacred sites within the forest, symbolic systems which give meaning to life and are intimately tied to people's sense of self, security functions of forest plants during times of scarcity, and myriad other connections. Insofar as a people's way of life is integrated with the forest, the continuation of their culture is jeopardised by forest loss and the cultural diversity is impoverished. Human well-being is typically adversely affected by cultural disintegration.

### Local knowledge

People who have lived in forested areas often have unique and useful knowledge based on their long-term, local experience. Such knowledge may pertain to animals and their behaviour, plants and their management, uses of various products, techniques for processing forest products, etc. Local knowledge is valuable for its own sake, given the comparative ignorance about the ecology of tropical forests. It can also serve an important function in incorporating local people actively and beneficially in forest management. External recognition and use of their knowledge can serve as tools for empowering local people and enhancing communication and cooperation between them and other forest managers.

Source: Colfer et al. 1999.

## **Appendix 5.3 A guide to the semi-structured in-depth interview**

### **General (optional)**

1. What would you list as the top two or three environmental problems facing Gorontalo today?
2. About the forests, what do they mean to you?
3. Compared to what it was 30 years ago, how would you say the state of the forest is now? And what will it be like in 20 years time?
4. What problems related to forests do you see?

### **The main questions**

1. What is “biological diversity”. What does it mean to you and why is it important?
2. From your observation do you notice any change in the types of habitat, ecosystem, or species in your area?
3. What factors do you think contribute to the loss/decline of biological diversity?
4. What measures of biological diversity conservation (past and present) are you aware of that have been done (by government/ NGOs/local community)?
5. Do you think they are working? Which one(s)? Why or why not?
6. What do you think would be the costs (economic, opportunity costs, etc.) for conserving biological diversity?
7. How important do you think biological diversity conservation is for sustaining the local economic development?
8. Are there other ways that you think are needed to stop or reduce the rate of biological diversity loss?

## Appendix 5.4 An example of translation of interview data and its analysis

Timber extraction	<p>Q. What kind of pressures are the forests here facing?</p> <p>A. First, there is lack of awareness among the people about the benefit of protection forest. Those who live at the forest's edges only see it as a source of timber, biodiversity is not known, there has been very little work in raising people's awareness, so they have no understanding (of benefit of biodiversity) they only concern with what they can get out of it. We have the unique maleo bird here but people do not care about the fate of the bird population, as long as they can collect the eggs (for own consumption or for sale)</p>	<p>T. Faktor apa saja yang mengancam hutan di sini ?</p> <p>J. Pertama pemahaman masyarakat tentang manfaat hutan lindung masih kurang, masyarakat di pinggiran itu hanya melihat hutan sebagai sumber kayu, keanekaragaman hayati kurang dikenal, tidak ada sosialisasi penyuluhan, pemahaman belum punya, tidak mau tahu, yang penting dapat hasil. Kita kan punya burung maleo, mereka tidak mau tahu populasi burung, yang penting dapat telurnya</p>
Illegal mining	<p>Second, for a long time our development activities only concern with economic development and have little regards to the environment. Only very recently the idea of conservation is heard, but the forest and the environment in general has been degraded because of peasant (illegal) mining in the forest. The people here also practise shifting cultivation for generations; they are hungry for land for their subsistence farming. They did not do it for commercial purposes. The shifting agriculture used to be good, but now there are more people and more land is needed but I have not seen any change in the use of the land the land cultivation)</p>	<p>Kedua pembangunan tidak berwawasan lingkungan, sejak dulu cuma ekonomi saja, baru sekarang ada ide konservasi, kalau saya lihat di sini hutan sudah hancur, karena tambang, faktor di sini orang cari lahan untuk pertanian subsisten, belum untuk komersial, dulu ladang pindah itu bagus, tapi sekarang ini makin banyak orangnya, saya lihat belum ada perubahan cara berladang berpindah ini</p>
Poverty	<p>Which part of the population lacks this environmental awareness?</p>	<p>T. Kelompok masyarakat mana yang kurang sadar?</p>
Population growth	<p>The lower part of our society. In the higher level, the environment is seen as a commodity, ready to be traded, and the awareness does not exist, most people have this attitude and only very small number of people (nature lovers) who cares about the environment. There is no such thing as environmental militancy. If environmental resources can all be sold for cash, then they will do so quickly.</p>	<p>Masyarakat bawah, di kalangan lebih atas lingkungan adalah komoditas untuk dijual belikan aja, rasa kepedulian masih belum ada, ini lebih banyak orang yang begini, hanya sedikit kelompok pencinta alam yang lain umumnya begitu tidak ada militansi lingkungan, kalau perlu semua yang bisa dijual semua ya dijual saja</p>
Ignorance	<p>I know that the Japesda is trying to find solution on this. The Nantu forest conservation programme (NFCP) has been doing a lot of good work but I am not sure what will happen when it is no longer here. The local people must be empowered; this is the key because I believe that if they can see the direct benefit of forest for themselves they will guard the resources in it.</p>	<p>Saya tahu Japesda cari jalan keluarnya, program konservasi Nantu juga berbuat banyak, tetapi saya tidak tahu kalau nanti dia tidak ada lagi, masyarakat mesti diajak pemberdayaan masyarakat lokal itu kuncinya, karena dia kan yang akan jaga, kalau hutan penting untuk mereka dan mereka merasakan manfaat langsungnya, tentu maka mereka akan jaga.</p>

## Appendix 5.5 Themes generated through coding

Free nodes/Initial Themes	Integrated themes	Number of Sources	Number of References
Empty forest syndrome	<b>Benefits of biodiversity</b>		
Paper park	Unique features of biodiversity	17	19
recruitment of rangers	Economic benefit of biodiversity	42	80
forest conversion	Aesthetic benefit of biodiversity	22	32
corruption	Education benefit of biodiversity	16	26
cost of soil erosion	Social benefit of biodiversity	21	28
History of Nantu forest	Ecological benefit of biodiversity	54	106
Impacts of regional autonomy			
invasive species	<b>Conservation activities</b>		
law compliance	awareness raising activities	17	31
local institutions	economic assistances	31	48
local livelihood issues	enforcement of conservation laws	38	72
role of traditional laws	Regulatory approach	21	39
tenure of forest land	Soil conservation	8	9
Alternative ways to conserve forests	Tree-planting	36	86
attitudes toward conservation			
Unique features of biodiversity	<b>Efficacy of conservation actions</b>		
Economic benefit of biodiversity	Positive		
Aesthetic benefit of biodiversity	Negative	20	56
Education benefit of biodiversity		13	20
Social benefit of biodiversity	<b>Threats to PAs</b>		
Ecological benefit of biodiversity	lack of enforcement	39	58
	ambiguity in forest management		
Benefits of conservation areas	laws	11	19
Changes in local biodiversity	collection of NTFPs	39	89
awareness raising activities	Conflict of policies	31	59
economic assistances	Contested boundaries	22	47
enforcement of conservation laws	Encroachment	54	112
Regulatory approach	Human population growth	27	34
Soil conservation	Illegal logging	54	139
Tree-planting	lack of alternative livelihood	28	38
Costs of biodiversity conservation	lack of awareness	36	77
	lack of coordination among		
Definitions of biodiversity	government agencies	19	32
Efficacy of conservation actions	lack of information about biodiversity	25	36
	lack of government commitment to conservation		
Importance of biodiversity	conservation	16	28
Local knowledge of biodiversity	lack of resources for conservation	19	38
Links between conservation and sustainability	Mining	17	34
lack of enforcement	Pollution	14	22
ambiguity in forest management laws	Poverty	33	57

collection of NTFPs			
Conflict of policies	<b>Free Nodes</b>		
Contested boundaries	Empty forest syndrome	12	19
Encroachment	Paper park	22	39
Human population growth	recruitment of rangers	1	5
Illegal logging	forest conversion	2	2
lack of alternative livelihood	corruption	19	34
lack of awareness	cost of soil erosion	6	6
lack of coordination among government agencies	History of Nantu forest	7	18
lack of information about biodiversity	Impacts of regional autonomy	17	27
lack of government commitment to conservation	invasive species	5	6
lack of resources for conservation	law compliance	2	7
Mining	local institutions	7	11
Pollution	local livelihood issues	4	4
Poverty	role of traditional laws	16	44
Total free codes (and =53)	tenure of forest land	14	18
	<b>Attitudes toward conservation</b>	34	59
	<b>Benefits of conservation areas</b>	24	40
	<b>Changes in local biodiversity</b>	39	84
	<b>Costs of biodiversity conservation</b>	18	27
	<b>Definitions of biodiversity</b>	30	36
	<b>Importance of biodiversity</b>	13	18
	<b>Local knowledge of biodiversity</b>	25	50
	<b>Links between conservation and sustainability</b>	24	34
	Total Tree Nodes = 4		
	Total Free Nodes = 22		

Notes:

When transcription of all interviews has been completed a coding process began. First a list of themes was constructed. The research questions served as the basis of crating initial themes, which then expanded as other themes emerged from the data. The list of themes generated in this way is called 'free nodes' in Nvivo.

As the coding progressed the free nodes can be integrated into main themes, for which sub-theme under the main themes can be constructed. This process of integration went on until no longer new themes are needed and overlapping themes are merged into main theme. Nvivo node report can assist to rank the frequency of occurrence for each theme to enable a less obvious theme to be merged into other themes.

Coded paragraphs can now be retrieved virtually on a computer screen according to the main theme. This is helpful to focus analysis of a particular theme. Translation of relevant paragraphs, sentences and key word is done in this process.

During this stage, potential quotes are marked to illustrate the discussion of the result.

## Appendix 5.6. Evidence of verification of translation of selected paragraphs reproduced as quotations

### VERIFICATION OF TRANSLATION

I have checked the translation from Indonesian into English of the interviews recorded in this thesis and can confirm that they represent a true and accurate interpretation of the original

I have taught in Indonesia at University level since 1970 including 15 years at Bogor Agricultural University. I am currently retired but still fluent in the national language and have participated in soil and ecology surveys in many of the Indonesian islands.

A handwritten signature in black ink, appearing to read 'M. J. Chambers', with a long horizontal flourish extending to the right.

Dr M.J.Chambers

Bogor. November 2008

**Appendix 7.1 The types of benefits from the natural forests (with corresponding numbers indicated in Figure 7.1).**

A. Biological Uniqueness	
1.	Natural forests contain a large number of plant and animal species and a great variety of different life forms.
2.	Natural forests contain many species that have become rare, and many species which do not live in many other places (or are limited in their distribution).
B. Economic activity	
3.	Natural forests can be exploited carefully to provide timber over a long period, generating secure employment, without damaging the wood supply or the environment.
4.	Natural forests can be exploited carefully to provide a wide variety of other natural resources including rattan, bamboo, edible vegetables, fruits, nuts, spices, resins, fibres, medicines, ornamental plants, and animal products.
5.	Natural forests can be exploited carefully to preserve the maximum number of species of plants and animals ensuring many new resources of benefit to mankind in the future.
6.	Natural forests can be used for agricultural expansion and other development activities.
7.	Natural forested watersheds can protect the quantity and quality of water in the rivers and streams of your area.
8.	Natural forest areas can be managed to encourage tourism, providing employment and local income.
C. Aesthetic Values	
9.	Natural forests are areas of unique beauty presenting the great diversity of life on Earth.
10	Just knowing that such large areas of little-known wildlife and habitat exist improves the quality of life.
11	Remote natural forests are special because they are areas with minimal signs of human impact.
D. Education and Research	
12	Natural forests provide a focus for educating children about the natural environment, its wildlife and natural forest products.
13	Natural forests form part of the national heritage of Indonesia and many other countries.
14	Natural forests provide a reservoir of knowledge as very little is known about natural forest plants, wildlife or other living organisms.
15	Natural forests provide potential and ideas for basic research in the fields of geology, biology, climatology, and sociology as well as for applied research and discovery of new drugs, insecticides and crops.
E. Cultural	
16	Natural forests are home to many spirits.
17	It is part of religious teaching to care for the rest of creation, and we have a responsibility to the current and future generations to properly manage our environment.
18	Natural forests are home to certain ethnic minorities that need to be protected.
F. Environmental services	
19	Natural forests increase local rainfall: by regulating water release, they also provide a more constant water supply. This reduces soil erosion, flooding and siltation.
20	Natural forests contribute to the storage and absorption of carbon dioxide.

Source: adapted from Murray (1990).

## Appendix 8.1 Details of the field research programme and demographic variables of the research participants

Number	Coded Name	Date of interview	Education	Location	Stakeholder type	Gender	Age
						Male	group
1	Aton	3-Sep	1	1	1	1	2
2	Johan	5-Sep	1	1	2	1	2
3	Barjo	5-Sep	3	1	2	1	2
4	Joni	5-Sep	3	1	2	1	1
5	Wina	5-Sep	1	1	2	2	2
6	Tina	5-Sep	2	1	1	2	2
7	Adri	6-Sep	1	2	2	1	2
8	Kepes	6-Sep	3	7	2	1	3
9	***	6-Sep	3	7	3	1	3
10	Araz	6-Sep	3	7	4	1	3
11	Mahar	6-Sep	3	7	6	1	2
12	Serau	6-Sep	2	2	3	1	1
13	Zaid	8-Sep	2	2	2	1	2
14	Araf	8-Sep	2	2	2	1	3
15	Jola	8-Sep	2	2	2	1	2
16	Dani	8-Sep	2	1	5	1	2
17	Roni	8-Sep	2	1	5	1	1
18	***	8-Sep	2	1	5	1	1
19	Fatom	9-Sep	3	1	5	1	1
19a	Kupu	9-Sep	2	2	5	1	1
20	Nano	9-Sep	3	1	5	2	1
21	Toro	9-Sep	2	1	2	1	2
22	***	9-Sep	2	1	2	1	2
23	***	9-Sep	2	1	2	1	1
24	***	10-Sep	3	1	5	2	1
25	***	10-Sep	3	1	5	2	1
26	Fatom	10-Sep	3	1	5	1	1
27	***	10-Sep	3	1	5	1	1
28	***	10-Sep	3	1	5	1	1
29	***	10-Sep	3	1	5	1	1
30	***	10-Sep	1	1	1	1	2
31	***	10-Sep	1	1	1	2	3
32	***	10-Sep	1	1	1	2	2
33	Rizal	13-Sep	2	1	3	1	2
34	Nano	13-Sep	1	1	1	1	2
35	***	12-Sep	3	5	5	2	1
36	Muti	12-Sep	3	5	5	1	2
37	Jafar	12-Sep	2	5	2	1	2
38	***	12-Sep	2	5	2	1	3
39	***	12-Sep	2	5	2	2	1
40	***	12-Sep	2	5	2	1	2
41	***	12-Sep	3	5	2	2	2
42	Sole	12-Sep	2	5	2	1	2
43	Rahmat	7-Sep	3	3	5	1	3
44	Asla	7-Sep	2	3	4	1	1
45	***	7-Sep	3	3	5	1	1
46	***	7-Sep	3	3	5	2	1
47	Dote	7-Sep	2	3	2	1	2

48	***	7-Sep	3	3	2	2	1
49	***	7-Sep	2	3	2	1	1
50	***	7-Sep	2	3	2	1	2
51	***	7-Sep	2	3	2	2	1
52	Fayab	12-Sep	3	3	5	1	3
53	Herman	14-Sep	2	2	5	1	2
54	Bukar	14-Sep	2	1	3	1	2
55	***	14-Sep	3	2	5	1	1
56	***	14-Sep	3	2	5	1	2
57	***	14-Sep	2	1	3	1	3
58	Herry	14-Sep	2	2	2	1	2
59	Bani	15-Sep	2	1	1	1	2
60	***	15-Sep	2	1	1	1	1
61	Isdu	15-Sep	1	1	1	2	1
62	Arin	16-Sep	1	1	1	2	2
63	Gani	16-Sep	1	1	2	1	2
64	Ardo	16-Sep	3	1	5	1	2
65	***	16-Sep	3	1	5	1	2
66b	Timu	19-Sep	2	1	2	1	2
66	Farida	17-Sep	2	1	4	2	3
67	***	17-Sep	3	1	4	2	1
68	Rasid	26-Sep	1	1	4	1	3
69	Rusdi	26-Sep	1	1	2	1	2
70	Wanti	27-Sep	3	2	3	2	3
71	***	27-Sep	3	2	3	1	3
72	***	27-Sep	3	2	3	1	2
73	***	27-Sep	3	2	3	1	2
74	Aswan	27-Sep	2	2	3	1	2
75	Mutaf	28-Sep	2	1	2	1	3
76	Iksan	28-Sep	2	1	2	1	2
76a	***		1	1	3	1	2
77	Suha	29-Sep	1	1	2	1	3
78	Samsu	29-Sep	3	1	2	1	2
79	***	29-Sep	3	2	2	1	2
80	***	29-Sep	3	2	2	1	2
81	Bobi	30-Sep	2	1	2	1	2
82	***	30-Sep	3	2	5	1	2
83	***	1-Oct	3	4	6	1	1
84	Masni	1-Oct	3	4	6	1	1
85	***	1-Oct	3	4	6	1	1
86	***	1-Oct	3	4	6	1	1
87	***	1-Oct	3	2	5	2	1
88	***	1-Oct	2	1	3	1	1
89	Arman	1-Oct	2	1	3	1	1
90	Mupol	2-Oct	2	1	3	1	2
91	Karina	2-Oct	2	4	3	2	2
92	Marot	4-Oct	3	1	6	1	2
93	***	4-Oct	2	2	6	2	2
94	Samat	6-Oct	2	1	2	1	2
95	Hamsah	6-Oct	1	1	2	1	2
96	***	6-Oct	3	1	4	1	2
97	Sasir	6-Oct	3	1	4	1	2
98	***	18-Nov	3	2	1	2	2

99	Adpo	18-Nov	3	2	1	1	1
100	***	18-Nov	3	2	1	2	1
101	***	18-Nov	3	2	6	1	3
102	***	18-Nov	3	2	6	2	2
103	***	18-Nov	2	2	5	1	1
104	Juisa	22-Nov	2	2	2	1	2
105	Rambo	22-Nov	3	2	6	1	3
106	***	22-Nov	3	2	6	2	3
107	***	22-Nov	2	2	3	2	2
108	***	22-Nov	2	2	3	2	2
109	Lisda	23-Nov	2	1	1	2	1
110	***	23-Nov	2	1	1	1	2
111	***	23-Nov	2	1	5	1	2
112	Beruga	24-Nov	1	1	2	2	2
113	***	24-Nov	2	1	2	2	1
114	Fiona	24-Nov	2	1	4	2	2
115	***	24-Nov	3	1	5	2	1
116	***	24-Nov	3	1	5	2	1
117	***	25-Nov	3	2	6	2	1
118	***	25-Nov	3	2	6	1	3
119	Ibra	25-Nov	2	1	6	1	3
120	Hadi	26-Nov	3	1	6	1	3
121	Tuti	26-Nov	1	1	1	2	2
122	Warno	28-Nov	2	1	3	1	3
123	***	28-Nov	2	1	3	1	2
124	Madas	28-Nov	3	1	6	1	2
125	***	28-Nov	3	1	6	1	2
126	Barat	29-Nov	2	5	2	1	2
127	Kamis	29-Nov	2	5	2	1	2
128	***	29-Nov	2	1	2	2	2
129	***	30-Nov	2	1	5	2	1
130	***	30-Nov	2	1	5	2	1
131	Joice	1-Dec	2	1	2	2	2
132	Toni	5-Dec	1	1	4	1	2
133	Iban	11-Sep	2	1	2	2	2
134	***	6-Dec	2	1	2	2	2
135	Rudi	6-Dec	1	1	4	1	2
136	***	7-Dec	3	1	5	2	3
137	***	7-Dec	3	1	5	2	3
138	Abdul	7-Dec	2	1	5	1	2
139	Miya	7-Dec	2	1	3	2	2
140	***	7-Dec	2	1	5	2	2
141	Laren	8-Dec	2	2	2	1	3
142	***	11-Dec	3	7	1	1	2
142	***	11-Dec	2	7	1	2	2
144	***	11-Dec	3	7	1	2	2
145	***	11-Dec	3	7	6	2	2
146	***	11-Dec	3	7	1	2	1
147	Ridwan	8-Jul	1	6	1	1	2
148	Kirun	11-Jul	1	6	1	1	2
149	Yasin	4 Augt	2	6	4	1	2
150	Budi	11 Augt	1	6	1	1	3
151	Manu	5 Augt	1	6	5	1	2

152	Setio	7 Augt	2	6	5	1	2
153	Irma	8 Augt	2	6	5	2	2
154	Yatno	9 Augt	1	6	5	1	3
155	Jodi	12 Augt	1	6	1	1	2
156	Frans	12 Augt	1	6	5	1	2
157	Madi	17 Augt	1	6	4	1	1
158	Lusi	15 Augt	1	6	2	2	2
159	Tania	18 Augt	2	6	5	2	2
160	Prio	19 Augt	1	6	2	1	3
161	Bowo	19 Augt	1	6	2	1	2
162	Darma	19 Augt	1	6	2	1	2
163	Kusno	22 Augt	1	6	1	1	3
164	Andri	22 Augt	1	6	5	1	2
165	Adnan	24 Augt	1	6	2	1	2
166	Dojo	24 Augt	1	6	2	1	3
167	Tono	27 Augt	1	6	6	1	2
168	Marda	29 Augt	1	6	1	2	2
169	Fahrul	10-Sep	1	1	2	1	2
170	Elsa	8 Augt	1	6	2	1	3
171	Tini	26-Augt	1	6	2	2	3
172	Nomo	24-Augt	2	6	5	1	2
173	Nisa	9-Dec	1	6	5	2	2
174	Dabo	15-Sep	2	6	2	1	2

Notes:

Gender: 1 Male, 2 = Female

Location: 1 = Gorontalo Province; 2= Gorontalo District; 3 = kab Boalemo District; 4 = Pohuwato District; 5 = Bone Bolango District, 6 = national stakeholder (e.g., Jakarta and Bogor)

Level of education: 1 = Postgraduate, 2 = Graduate, 3 = primary and secondary schools

Stakeholder type: 1 = academic; 2 = rangers, resource managers, planners; 3 = legislators and law enforcers; 4 = informal/community leaders; 5 = conservation/community development activists; 6 = commercial users of forest resources

Age groups: Young (under 30 years); Middle (between 30 and 50 years old); Oldest (above 50 years old)

\*\*\* = research participants who performed MDM only.

**Appendix 9.1 Respondents' attitude to forest conservation policy and the general links to benefits derived from natural forests in Gorontalo**

Identity	Occupation	Stakeholder group	gender	age	education	Negative	Positive	Neg. & Pos.	Link to benefits
Aton	1	1	1	2	1	1			Economic/agriculture
Johan	1	2	1	2	1	1			Economic/agriculture
Barjo	2	2	1	2	3	1			Economic/ecological/wildlife
Wina	1	2	2	2	1		1		Economic/ecological
Tina	1	1	2	2	2		1		Biodiversity
Idal	1	2	1	2	1		1		Biodiversity
Kepes	1	2	1	3	3	1			Economic
Araz	2	4	1	3	3	1			Economic/ecotourism
Mahar	2	6	1	2	3	1			Economic
Sterau	1	3	1	1	2	1			Biodiversity
Zaid	1	2	1	2	2		1		Biodiversity
Araf	1	2	1	3	2	1			Biodiversity
Jola	1	2	1	2	2	1			Economic/timber
Dani	2	5	1	2	2	1			Economic
Roni	2	5	1	1	2	1			Economic/timber
Toro	1	2	1	2	2	1			Economic
Fatom	2	5	1	1	2	1			Economic/timber
Rizal	2	3	1	2	2	1	1	1	Economic/timber
Nano	1	1	1	2	1	1			Economic/agriculture
Muti	2	5	1	2	3	1			Biodiversity/economic
Jafar	1	2	1	2	2	1			Biodiversity
Sole	1	2	1	2	2	1			Economic/agriculture
Dote	1	2	1	2	2	1			Ecological
Hermes	1	2	1	2	2	1			Economic/agriculture
Fayab	2	5	1	3	3		1		Biodiversity/economic
Herman	2	5	1	2	2		1		Economic
Bukar	2	3	1	2	2	1			Economic
Bani	1	1	1	2	2	1			ecological/wildlife
Isdu	1	5	1	1	1	1			Biodiversity
Arin	1	5	1	2	1		1		Economic/ecotourism
Gatot	1	5	1	2	1	1			Economic
Farida	2	4	2	3	2	1			Heritage
Rasid	1	4	1	3	1	1			Heritage/economic
Rusdi	1	2	1	2	1	1	1	1	Economic/ecotourism
Wani	2	3	2	3	2	1			Ecological
Aswan	2	3	1	2	2		1		Economic/agriculture
Mutaf	1	2	1	3	2	1			Biodiversity
Iksan	1	2	1	2	2		1		Economic/mining
Suha	1	2	1	2	1	1			Biodiversity
Samsu	1	2	1	2	1	1			Biodiversity
Bobu	1	2	1	2	1		1		Biodiversity
Arman	1	3	1	1	1	1			Ecological/economic
Mupol	1	3	1	2	1	1			Ecological/economic
Kabok	2	3	2	2	1	1			Economic
Marot	2	6	1	2	2	1			Economic
Samat	1	2	1	2	1		1		Biodiversity
Husin	1	2	1	2	1	1			Biodiversity
Asrul	2	5	1	2	2		1		Heritage/wildlife
Adpo	1	1	1	2	2	1			Ecological/economic
Juisa	1	2	1	2	2		1		Economic
Lisa	1	1	2	1	1	1			Ecological
Beruga	1	2	2	2	1	1			Research and education
Fiona	2	5	2	2	1		1		Recreation
Ibra	2	4	1	3	2	1			Heritage
Tuti	1	1	2	2	1	1			Education/heritage
Warno	1	3	1	2	1	1			Wildlife
Midas	2	6	1	2	2		1		Economic/timber
Barat	1	2	1	2	1	1			Economic
Kamis	1	2	1	2	2		1		Economic

**Appendix 9.1 Respondents' attitude to forest conservation policy and the general links to benefits derived from natural forests in Gorontalo (Continued)**

Identity	Occupation	Stake-Holder group	gender	age	education	Negative	Posi-tive	Neg. & Pos.	Link to benefits
Joice	1	2	2	2	2		1		Clean air
Toni	2	4	1	2	1	1			Economic
Rudi	2	4	1	2	1	1			Economic
Abdul	2	5	1	2	2	1			Economic
Laren	1	2	1	2	2	1			Economic
Fahrul	1	2	1	2	1		1		Ecological/economic
Dabo	1	2	1	2	1		1		Economic/agriculture
Cribe	2	6	1	2	1		1		Ecotourism
Ronal	2	6	1	2	1		1		Ecotourism
Kupu	2	5	1	1	2	1	1		Economic/timber
Iban	1	2	1	2	2	1			Economic/agriculture
Timu	1	2	1	2	1	1	1	1	Economic/ecological
Lade	2	3	1	2	1	1			Economic/agriculture
TOTAL						51	25	3	

**Appendix 9.2a Respondents' attitudes towards enforcement of conservation laws (n = 47)**

Variable (n; % of total)	Positive			Negative			Neutral		
	Tot.	GO	NGO	Tot.	GO	NGO	Tot.	GO	NGO
Gender									
Male (45; 96%)	20	12	8	24	18	6	1	0	1
Female (2; 4%)	1	1	0	1	0	1	0	0	0
Subtotal	<b>21</b>	<b>13</b>	<b>8</b>	<b>25</b>	<b>18</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>1</b>
Stakeholders group									
Educators (4; 9%)	3	3	0	1	1	0	0	0	0
Resource managers (21; 45%)	8	8	0	13	13	0	0	0	0
Lawmakers/Law enforcers (6; 13%)	4	4	0	2	2	0	0	0	0
Community leaders (3; 6%)	1	0	1	2	0	2	0	0	0
Grass-roots activists (10; 21 %)	2	0	2	7	0	7	1	0	1
Commercial users (3; 6%)	3	0	3	0	0	0	0	0	0
Subtotal	<b>21</b>	<b>15</b>	<b>6</b>	<b>25</b>	<b>16</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>1</b>
Education									
Low (5; 11%)	5	1	4	0	0	0	0	0	0
Medium (25; 53 %)	9	6	3	15	9	6	1	0	1
High (17; 36%)	7	6	1	10	9	1	0	0	0
Subtotal	<b>21</b>	<b>13</b>	<b>8</b>	<b>25</b>	<b>18</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>1</b>
Age									
Young (6; 13%)	2	1	1	3	2	1	1	0	1
Middle (34; 72%)	15	10	5	19	14	5	0	0	0
Old (7; 15%)	4	2	2	3	2	1	0	0	0
Subtotal	<b>21</b>	<b>13</b>	<b>8</b>	<b>25</b>	<b>18</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>1</b>

**Appendix 9.2b Respondents' attitudes towards land and forest rehabilitation programmes, Gerhan (n = 37)**

Variable (n; % of total)	Positive			Negative			Neutral		
	Tot.	GO	NGO	Tot.	GO	NGO	Tot.	GO	NGO
<b>Gender</b>									
Male (32; 91%)	17	11	6	15	9	6	2	0	2
Female (3; 9%)	2	1	1	1	1	0	0	0	0
Subtotal	<b>19</b>	<b>12</b>	<b>7</b>	<b>16</b>	<b>10</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>2</b>
<b>Stakeholders group</b>									
Educators (1; 3%)	0	0	0	1	1	0	0	0	0
Resource managers (17; 46%)	12	12	0	5	5	0	0	0	0
Legislators/Law enforcers (4; 11%)	1	0	1	3	3	0	0	0	0
Community leaders (2; 5%)	0	0	0	2	1	1	0	0	0
Grass-roots activists (11; 30 %)	5	0	5	5	0	5	1	0	1
Commercial users (2; 5%)	1	0	1	0	0	0	1	0	1
Subtotal	<b>19</b>	<b>12</b>	<b>7</b>	<b>16</b>	<b>10</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>2</b>
<b>Education</b>									
Low (4; 11%)	4	0	4	0	0	0	0	0	0
Medium (19; 51%)	7	4	3	10	4	6	2	0	2
High (14; 38%)	8	8	0	6	6	0	0	0	0
Subtotal	<b>19</b>	<b>12</b>	<b>7</b>	<b>16</b>	<b>10</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>2</b>
<b>Age</b>									
Young (4; 11%)	2	0	2	1	1	0	1	0	1
Middle (27; 73%)	15	11	4	11	7	4	1	1	0
Old (6; 16%)	2	1	1	4	2	2	0	0	0
Subtotal	<b>19</b>	<b>12</b>	<b>7</b>	<b>16</b>	<b>10</b>	<b>6</b>	<b>2</b>	<b>1</b>	<b>1</b>

**Appendix 9.2c Respondents' attitudes towards provision of livelihood assistance (n = 23)**

Variable (n; % of total)	Positive			Negative			Neutral		
	Tot.	GO	NGO	Tot.	GO	NGO	Tot.	GO	NGO
Gender									
Male (22; 91%)	18	12	6	3	3	0	1	1	0
Female (1; 9%)	1	0	1	0	0	0	0	0	0
Subtotal	<b>19</b>	<b>12</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>
Stakeholders group									
Educators (3; 13%)	3	3	0	0	0	0	0	0	0
Resource managers (11; 48%)	7	7	0	3	3	0	1	1	0
Legislators/Law enforcers (2; 9%)	2	2	0	0	0	0	0	0	0
Community leaders (3; 13%)	3	0	3	0	0	0	0	0	0
Grass-roots activists (4; 17%)	4	0	4	0	0	0	0	0	0
Commercial users (0)	0	0	0	0	0	0	0	0	0
Subtotal	<b>19</b>	<b>12</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>
Education									
Low (2; 9%)	2	0	2	0	0	0	0	0	0
Medium (13; 57%)	12	7	5	1	1	0	0	0	0
High (8; 35%)	5	5	0	2	2	0	1	0	0
Subtotal	<b>19</b>	<b>12</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
Age-group									
Young (1; 4%)	1	1	0	0	0	0	0	0	0
Middle (21; 91%)	17	11	6	3	3	0	1	1	0
Old (1; 4%)	1	0	1	0	0	0	0	0	0
Subtotal	<b>19</b>	<b>12</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>

**Appendix 9.2d Respondents' attitudes towards regulatory approaches to extraction of natural resources  
(n = 22)**

Variable (n; % of total)	Positive			Negative			Neutral		
	Tot.	GO	NGO	Tot.	GO	NGO	Tot.	GO	NGO
<b>Gender</b>									
Male (19; 86%)	3	2	1	10	6	4	6	4	2
Female (3; 14%)	1	1	0	2	2	0	0	0	0
Subtotal	<b>4</b>	<b>3</b>	<b>1</b>	<b>12</b>	<b>8</b>	<b>4</b>	<b>6</b>	<b>4</b>	<b>2</b>
<b>Stakeholders group</b>									
Educators (3; 14%)	0	0	0	1	1	0	2	2	0
Resource managers (11; 50%)	3	3	0	6	6	0	2	2	0
Legislators/Law enforcers (1; 5%)	0	0	0	1	1	0	0	0	0
Community leaders (1; 5%)	0	0	0	1	0	1	0	0	0
Grass-roots activists (5; 23%)	1	0	1	2	0	2	2	0	2
Commercial users (1; 5%)	0	0	0	1	0	1	0	0	0
Subtotal	<b>4</b>	<b>3</b>	<b>1</b>	<b>12</b>	<b>8</b>	<b>4</b>	<b>6</b>	<b>4</b>	<b>2</b>
<b>Education</b>									
Low (2; 9%)	0	0	0	2	0	2	0	0	0
Medium (8; 36%)	2	1	1	2	1	1	4	2	2
High (12; 55%)	2	2	0	8	7	1	2	2	0
Subtotal	<b>4</b>	<b>3</b>	<b>1</b>	<b>12</b>	<b>8</b>	<b>4</b>	<b>6</b>	<b>4</b>	<b>2</b>
<b>Age</b>									
Young (4; 18%)	1	0	1	2	1	1	1	0	1
Middle (16; 73%)	3	3	0	9	7	2	4	3	1
Old (2; 9%)	0	0	0	1	0	1	1	1	0
Subtotal	<b>4</b>	<b>3</b>	<b>1</b>	<b>12</b>	<b>8</b>	<b>4</b>	<b>6</b>	<b>4</b>	<b>2</b>

**Appendix 9.2e Respondents' attitudes towards awareness-raising activities (n = 18)**

Variable (n; % of total)	Positive			Negative		
	Tot.	GO	NGO	Tot.	GO	NGO
<b>Gender</b>						
Male (17; 94%)	12	7	5	5	1	4
Female (1; 6%)	1	0	1	0	0	0
Subtotal	<b>13</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>4</b>
<b>Stakeholders group</b>						
Educators (2; 11%)	1	1	0	1	1	0
Resource managers (7; 39%)	3	3	0	4	4	0
Legislators/Law enforcers (4; 22%)	4	4	0	0	0	0
Community leaders (4; 22%)	4	0	4	0	0	0
Grass-roots activists (0)	0	0	0	0	0	0
Commercial users (1; 6%)	1	0	1	0	0	0
Subtotal	<b>13</b>	<b>8</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>0</b>
<b>Education</b>						
Low (5; 28%)	3	1	2	2	0	2
Medium (8; 44%)	7	4	3	1	1	0
High (5; 28%)	3	2	1	2	0	2
Subtotal	<b>13</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>4</b>
<b>Age</b>						
Young (4; 22%)	3	1	2	1	0	1
Middle (11; 61%)	7	4	3	4	1	3
Old (3; 17%)	3	2	1	0	0	0
Subtotal	<b>13</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>4</b>