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Potential for Co-management Approaches to Strengthen Livelihoods of Forest-Dependent Communities: A Case Study of the Arabuko-Sokoke Forest Reserve, Kenya

A thesis
submitted in partial fulfilment
of the requirements for the Degree of
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By

Felix Lamech Mogambi Ming'ate

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**Potential for co-management approaches to strengthen livelihoods of
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Planning and Management**

A common, often unstated, assumption in the wide ranging literature advocating co-management approaches to management of forestry, and related natural resources, in developing countries is that co-management has the potential to improve the livelihood outcomes of forest-dependent communities. Consequently, co-management has gained wide acceptance among governments, development agencies and development practitioners as an alternative natural resources management strategy to the top-down or centralised government management approaches. However, many natural resource management scholars have conceptually narrowly focused their research, informed either by the literature on institutional design and evaluation or by the literature on livelihood outcomes *per se,* without explicitly acknowledging and rigorously examining possible linkages between the two. Thus, a major gap in the current literature on the evaluation of co-management institutional arrangements is the extent to which co-management can strengthen the livelihoods of the poor forest-dependent communities.

This gap is addressed in this thesis by developing and testing an argument that well designed co-management arrangements have the potential to strengthen the livelihood outcomes of forest-dependent communities. A hybrid analytical framework was developed that situates the design criteria for co-management institutions in the broader context of the sustainable livelihood framework. It then uses this analytical framework to evaluate the Arabuko-Sokoke Forest Reserve (ASFR) co-management initiative in Kenya, based on a three-step process. First, the thesis provides an overview of current institutional arrangements for governance of the ASFR co-management regime. Second, it evaluates the extent to which these governance

arrangements can be characterised as devolved collaborative governance, informed by Ostrom's (1990) design principles and; third, it evaluates the extent to which the livelihood outcomes of forest-dependent communities which are formally participants in the co-management project, compared to adjacent forest-dependent communities outside the ambit of the co-management arrangement, have strengthened as a result of the ASFR co-management governance arrangements.

The findings from this study demonstrate that institutional arrangements for ASFR co-management are relatively nascent and emerging because the governance arrangements for the ASFR co-management project cannot yet be characterised as fully devolved collaborative governance. Notwithstanding this, the findings reveal that participant forest-dependent communities in the co-management project had stronger livelihoods compared to forest-dependent communities not within the co-management scheme. Thus, the exploratory hypothesis is partially verified with qualifications. A key theoretical significance of the study is that it has conceptually and methodologically forged a link between the co-management discourse and the sustainable development discourse. Based on the study findings, an on-going evaluation of the ASFR co-management initiative is recommended to improve its future sustainability and that of the livelihoods of the communities that depend on it.

Keywords: **co-management, livelihoods, Arabuko-Sokoke Forest, forest-dependent communities, Kenya, institutional design**

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List of Acronyms

ASFMCP	Arabuko-Sokoke Forest Management Conservation Project
ASFMT	Arabuko-Sokoke Forest Management Team
ASFR	Arabuko-Sokoke Forest Reserve
CAQDAS	Computer-Assisted Qualitative Data Analysis Software
CBO	Community Based Organization
CFA	Community Forest Association
CPRs	Common Pool Resources
DFID	Department for International Development
DIFAAFA	Dida Forest Area Adjacent Forest Association
FAO	Food and Agricultural Organization
FD	Forest Department
GECOFA	Gede Community Forest Association
JICOFA	Jirole Community Forest Association
KEFRI	Kenya Forest Research Institute
KIFCON	Kenyan Indigenous Forest Conservation
Kshs	Kenya Shillings
KWS	Kenya Wildlife Services
LUHEC	Lincoln University Human Ethics Committee
NGO	Non-Governmental Organization
NGOs	Non-Governmental Organizations
NMK	National Museums of Kenya
SL	Sustainable Livelihood
SLA	Sustainable Livelihood Approach
SLF	Sustainable Livelihood Framework
VDFCCs	Village Forest Development and Conservation committees

Chapter 1
Introduction

Millions of people in developing countries depend on forests, and the contribution of forest resources to their livelihoods (FAO/DFID, 2001). The World Bank (2000) identifies that one out of four of the world's poor depend, directly or indirectly on forests for their livelihood. The resources that the poor households depend on include: (1) subsistence goods such as fuel wood, medicines, wood for building, rope, bush meat, fodder, mushrooms, honey, edible leaves, roots and fruits; (2) goods for sale for example all of the above subsistence goods, plus arts and crafts, timber and other wood products; (3) income from employment, both in the formal and the informal sectors and; (4) indirect benefits such as land for other uses, social and spiritual values, environmental services, including watershed protection and biodiversity conservation (FAO/DFID, 2001). They also depend on capability benefits such as opportunities for social networking and skills development when user groups are formed and, through income generation, home improvement, improved trails, in-village drinking water sources, support to schools (e.g. salary, building materials, etc.), construction of community buildings, community roads and village electrification (Thoms, 2008). It is difficult to be very precise about the proportion of the poor depending on forest resources because "dependence" can vary according to circumstances and how livelihood patterns evolve over time. Qualitatively speaking, however, there is general agreement about the categories of forest dependence (Dubois, 2003, p. 89): (1) forest dwellers, including hunter-gatherers and swidden cultivators; (2) farmers living next to forests, who use forests as a complement to livelihood diversification (including the landless); (3) commercial users, including small producers, traders and employees; and (4) consumers of forest products among the urban poor.

These categories are not mutually exclusive. Furthermore, it is often convenient to make the distinction between two broad categories of "poor"; that is, the "very poor", who use forest resources mainly as a safety net to subsist, and the "less poor" who have the opportunity to use forest and tree resources beyond meeting their subsistence needs, for example, as sources of income. Dubois (2003) and Shackleton et al. (2007) argue that it is important to note that these two categories of poor often compete for local forest resources. For example, the wealthier may wish to convert forest used as a source of food and medicine by the poorest into agricultural plots. On the other hand, although the wealthier in a community, with more

resources to devote to forest product gathering and production, are often the heaviest users, the poor usually derive a greater share of their overall needs from forest products and activities. Therefore, any significant reduction in the local forest and tree capital affects, primarily, the livelihoods of the poorest section of the population.

A livelihood is defined by Scoones (1998) as comprising the capabilities, assets (including both material and social resources) and activities required for a means of living. Scoones (1998) explains that a livelihood is sustainable when it can cope with, and recover from, stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resources base. Dubois (2003) argues that since it is accepted that trees and forests can potentially make significant contributions to poverty reduction of the poor dependent on the forests, the challenge becomes, how to turn this rhetoric to reality? This thesis examines the potential for co-management approaches to strengthen the livelihood outcomes of forest-dependent communities.

1.1 Definition of the research problem and the research question

In recent decades, there has been a shift globally from a top-down, state-centred model of management of natural resources to a more decentralized approach in which a range of actors participate in the governance of natural resources (Brown, Lassoie, & Wolf, 2007). Governance of many kinds of natural resources such as fisheries, forests, grazing lands, watersheds, wildlife, protected areas and other resources, requires the joint action of multiple parties. The concept of natural resources governance suggests that we look beyond the *government* toward public–private–civil society partnerships, as a way of dealing with the shortcomings of single agency, top-down management (Kooiman, 2003). Co-management, or the sharing of power and responsibility between the government and local resource users, is an arrangement whereby such partnerships can come about (Berkes, 2009). There is no single universally accepted definition of co-management (Armitage, Berkes, & Doubleday, 2007; Berkes, 2009). Many times the term co-management refers to a range of arrangements, with different degrees of power sharing, for joint decision-making by the state and communities (or user groups) about a set of resources or an area (Armitage et al., 2007; Berkes, 2009).

A key question in the current literature is to what extent are co-management approaches appropriate for tropical forest governance and delivery of sustainable livelihood outcomes in developing countries where poverty is a major concern? Tropical forests are diverse, and so is the range of people who look to such forests to meet a variety of subsistence and income

needs. These multiple interests may include overlapping management systems: traditional management for local people's access to a range of products, forest land, and jobs; industrial management for timber harvesting, and governmental efforts to manage for conservation and other goals (Wunder, 2001). Prior to the 1990's, tropical forests were largely managed through top-down highly centralized bureaucracies. Rules and regulations concerning permitted uses were made by remote bureaucrats with little input from the local people. As a result, forest-dependent people often have declining access to resources that are vital to their families' welfare and lack fair representation in forest-related decisions that affect their daily lives (Tole, 2010).

In Kenya, for example, until recently, forest management objectives mostly excluded local resource users from forest decision making. There were minimal and stringent provisions for subsistence extraction and use of forest products. In general, the Forest Department has wielded tremendous power and authority over forest resources, with no accountability to local communities living adjacent to forest areas and decision-making authority in the Forest Department has been quite hierarchical. This practice originated during the colonial period and was continued after independence. Ironically, in spite of the strict protectionist strategy adopted by government forest managers, the destruction and degradation of Kenya's forest resources has been a problem and forest cover has continued to decline over the years (Abwoli, Ongugo, Bahati, Mwangi, & Andersson, n.d.; Matiru, 2000). Similar with other Sub-Saharan countries, this decline has been attributed to factors such as commercial agriculture, charcoal burning, forest cultivation and replacement of indigenous forest with exotic plantations. Further, the weak capacity in forest institutions combined with political interference, inadequate business environments, tight budgetary allocations and corrupt practices have also resulted in poor forest management, abuse in the allocation of forest land and produce as well as preferential licensing, which contributed to a decline in the supply of timber and other products (Geller, McConnell, & Wanyiri, 2007).Thus, improving forest cover and reducing forest destruction and degradation has now emerged as one of the key goals of Kenya's national development strategy (Department of Resource Surveys and Remote Sensing & Kenya Forests Working Group, 2006). Central to this is the government's recognition of the role to be played by forest-dependent communities in ensuring that tree cover is maintained above the current levels of two per cent, let alone to achieve the international country's recommended standard of 10 per cent (Geller et al., 2007; Ministry of Environment and Natural Resources, 2007).

As has been demonstrated in developing areas of the world such as Kenya, conservation and management of natural resources have to actively involve all relevant stakeholders and, particularly the local communities if they are to be successful (Purnomo, Mendoza, Prabhu, & Yasmi, 2005). In forestry this often applies to indigenous people or forest communities living in or near forest concession areas (Purnomo et al., 2005). With the realization that subsistence forest use constitutes an integral part of many rural livelihood systems, devolution of forest management is at the core of national forestry policies in many countries, such as Kenya (Campbell & Luckert, 2002; Cousins, 1996).

Consequently, co-management has gained acceptance among governments, development agencies and development practitioners as an alternative natural resources management strategy to the top-down or centralized government management approach (Cousins, 1996; Pomeroy & Rivera-Guieb, 2006). Co-management has been seen as a logical approach to solving resource management problems by partnership. Partnerships are often essential as local users alone struggle to manage natural resources in the complex contemporary world. Centralized management of local resources is problematic and even very centralized systems are dependent on the local level, for example, for the knowledge and skills of local users. Since many resource management systems are cross-scale, different management problems must be solved simultaneously at different levels (Carlsson & Berkes, 2005). A number of tasks that can more easily be accomplished by establishing well-functioning co-management systems include: (1) data gathering; (2) logistical decisions, such as, who can harvest and when; (3) allocation decisions; (4) protection of resources from environmental damage; (5) enforcement of regulations; (6) enhancement of long-term planning; and (7) more inclusive decision-making (Pinkerton, 1989). This power sharing strategy is also grounded, in part, in the idea that providing local stakeholders with a sense of shared ownership and responsibility for natural resources will improve their livelihood outcomes (Brown et al., 2007). Further, Baumann (2000) and Pagdee, et al. (2006) point out that devolution of forest management authority to local communities provides a good opportunity for improving the living standards of the poor who are involved in co-management of forests, as well as enhancing the management of forest resources.

A key, often implicit, assumption in the forestry co-management literature is that co-management approaches will significantly improve the livelihoods of adjacent forest-dependent communities. However, arguably, the contribution that collaborative forest

management can make to the sustainability of livelihoods of the rural poor forest-dependent communities may be questioned on several grounds. For example, Carter & Gronow (2005) emphasize that ease of access to forests and low capital and skills requirements enable large numbers of people to generate some income from forest products, although rarely enough to escape poverty altogether. Other critics note that from the perspective of the poor, sustainable forest use can only provide contributions rather than whole livelihoods: it can enhance the contribution of forests to improving the living standards of households in rural areas, but it is not a long-term solution to poverty (Jumbe & Angelsen, 2007); has a weak track record in poverty reduction and empowerment of the marginalized (Be´ne' & Neiland, 2004); does not often provide the shortest route out of poverty (Sayer, 2005); appears to be transferring, at best, no significant positive impacts on the livelihoods of the poor dependent on the forest (Edmunds & Wollenberg, 2003); and is not a panacea for legitimacy (Jentoft, 2000). It is useful to note, however, that despite these criticisms the role of devolution of natural resources to local people for poverty alleviation is not as well studied as other devolution outcomes (e.g. equity, sustainable forest management and participatory inclusiveness) (Tole, 2010). These arguments raise an important research question that this study seeks to address: *To what extent can forest co-management strengthen the livelihoods of forest-dependent communities?*

1.2   Thesis objectives

The purpose of this study is to critically examine the potential for the ASFR co-management initiative in the coastal region of Kenya to strengthen the livelihoods of adjacent forest-dependent communities. The exploratory research hypothesis is that a well-designed co-management regime will strengthen the livelihoods of the poor forest-dependent communities and make them more sustainable. Such an hypothesis is predicated on an assumption that the co-management regime in the case study is well-designed and operating effectively. The research, therefore, has three primary objectives:

1)   To examine the current institutional arrangement for governance of the ASFR co-management regime. This objective will be addressed via the following question: What is the structure of the current ASFR co-management regime?
2)   To evaluate the extent to which governance arrangements for governing ASFR co-management can be characterized as devolved collaborative governance.

This objective will be addressed via the following focussing research questions: (a) Does the regime have well-defined boundaries in respect to resources and resource users (individuals or households)? How are they defined? (b) How does co-management ensure proportional equivalence between benefits and costs in the case study? (c) How has the co-management regime ensured collective choice arrangements and what incentives are in place to ensure participation in the modification of rules affecting the communities, and are the rules adapted to the local conditions? (d) How is monitoring of the monitors, who are accountable to the appropriators done? (e) What kind of sanctions are in place for appropriators who violate the rules and how are they applied? (f) Does the regime provide any mechanisms for conflict resolution? What form do such mechanisms take and how are they applied? If not applied, why not? (g) To what extent is the co-management arrangement recognized by the higher level authorities? (h) How are the co-management rules applied within different co-management groups and in the entire co-management regime, in general?

3) To evaluate the design of the current institutions of ASFR governance in terms of strengthening livelihoods outcomes to the poor forest-dependent communities. This objective will be addressed via the following questions: (a). How have the livelihoods assets or capital stocks improved as a result of the co-management arrangement? (b) To what extent has the community vulnerability context been reduced due to the co-management arrangement? (c).To what extent is the community social economic well-being (poverty, income, food security and sustainability of the forest) an outcome of the co-management arrangement?

1.3 Limitation of the study

Although the research has achieved its aims, there were some unavoidable limitations. First, limited time and financial resources mean this research was based on only a few selected villages. Second, the researcher had some difficulties accessing some confidential information available only to a selected Government agency. These constraints may reduce the degree of confidence that can be placed in generalizing the findings to other locations, but the results of the case studies do provide significant, robust insights.

1.4 Organization of the thesis chapters

Chapter1 has introduced the research problem and research question and research objectives of the study. The review of literature in chapter 2 identifies that there is need for building

stronger linkages between sustainable livelihood outcomes and co-management theories. To address this gap, chapter 3 reviews the literature on the sustainable livelihood approach and develops an analytical framework that links co-management and sustainable livelihood outcomes to guide the study. Chapter 4 describes the methods employed in the study. Chapters 5 and 6 presents the results for objective 1 and 2 respectively, while chapter 7 presents objective 3 results. Finally, the discussion and conclusion of the study are provided in chapters 8 and 9, respectively.

Chapter 2
Institutional analysis and design for common pool resources management from a sustainable development perspective

2.1 Introduction

The objective of this thesis is to evaluate the potential for co-management approaches to strengthen the livelihoods of the poor forest-dependent communities. In order to develop a rigours analytical framework for this purpose, the objective of this chapter is to review the recent literature on co-management as an institutional framework for managing common pool resources. Thus, section 2.2 reviews the recent literature on co-management arrangements to put into perspective the co-management arrangements theories that this study is anchored on. Section 2.3 moves on to discuss the design rules for designing institutions for managing common pool resources. It is argued here that while this research scholarship has been very productive, it has a number of drawbacks as a robust framework for institutional analysis from a sustainable development perspective. The chapter concludes that there is an implicit assumption in the common pool resources and co-management literatures that co-management will lead to sustainable livelihood outcomes to the poor, forest-dependent communities, however, this assumption has not been widely tested as the studies that link co-management and livelihood outcomes are rare. Therefore, its veracity needs to be established by critically deconstructing it under different spatial settings.

2.2 An overview of the current literature on co-management arrangements

It has been argued in chapter one that devolution of forest management authority to local communities provides opportunities for improving the livelihoods of the poor involved in co-management of forests and can enhance the management of the forest resources depended on by these communities (Baumann, 2000; Pagdee et al., 2006). However, this argument has also been contested by many scholars such that it is not clear on the extent to which co-management can strengthen livelihoods of the poor forest-dependent communities (Carter & Gronow, 2005; Edmunds & Wollenberg, 2003; Jentoft, 2000; Jumbe & Angelsen, 2007; Sayer, 2005; Tole, 2010). Based on these arguments from chapter one, the review of literature in this section, therefore concentrates on understanding theories for co-management arrangements as institutional arrangements responsible for delivery of sustainable livelihood outcomes to communities dependent on common pool resources such as forests.

2.2.1 The concept of co-management

Collaborative or cooperative management are general terms conveying the sharing of rights and responsibilities by the government and civil society (Plummer & FitzGibbon, 2004). There are several varieties of collaborative governance, including integrated conservation and development, participatory natural resource management, participatory appraisal and participatory action research, decentralization and devolution, and community-based natural resource management and co-management (Berkes, 2002). Co-management, in particular, has evolved as a more recognized natural resources management approach with which to link local communities and governments. Some of these co-management arrangements are codified in law, as in the various indigenous land and resource rights cases in countries such as the United States, Canada, Australia, and New Zealand (Armitage et al., 2007). Early definitions and demonstrations of co-management focused on dualistic power-sharing between the State and local (or indigenous) resource users and the variety of possible co-management arrangements (Berkes et al., 1991; Pinkerton, 1989) (Box 2.1). Subsequently, the variety of individuals potentially involved in co-management was broadened to include a wider group of actors and co-management was advanced as a continuous problem-solving process (Berkes et al., 1991; Plummer & FitzGibbon, 2004). Most recently, the dynamism inherent in the process of co-management has been highlighted with respect to knowledge generation, social learning, and adaptation for transformative changes (Berkes, 2009). It seems, however, that there is no single definition of co-management suitable to all situations because there is a continuum of possible co-management arrangements in the degree of power sharing (Borrini-Feyerabend, Pimbert, Farvar, Kothari, & Renard, 2004).

Box 2.1 Definitions of co-management
The term co-management has been defined as:
- 'the sharing of power and responsibility between the government and local resource users' Berkes et al. (1991, p. 12)
- 'the term given to governance systems that combine state control with local, decentralized decision making and accountability and which, ideally, combine the strengths and mitigate the weaknesses of each (Singleton, 1998, p. 7)
- 'the sharing of responsibilities, rights and duties between the primary stakeholders, in particular, local communities and the nation state; a decentralized approach to decision-making that involves the local users in the decision-making process as equals with the nation-state' (The World Bank, 1999, p. 11)
- "a partnership in which government agencies, local communities and resource users, NGOs and other stakeholders share ... the authority and responsibility for the management of a specific territory or a set of resources"(International Union for Conservation of Nature, 1996 Resolution 1.42)

Nevertheless, Pomeroy (1995, p. 150) argues that co-management aims to achieve joint responsibility and authority for resource management through co-operation between the government and local resources users. The amount of responsibility and authority that the state and local levels have differ and will depend upon country and site-specific conditions. Furthermore, determining what kind of and how much responsibility and authority should be allocated to the local level is a political decision.

There is a continuum of co-management arrangements from those in which the natural resources users (e.g. fishers, community forest users, etc.) are merely consulted by the government before regulations are introduced, to those in which natural resources users design, implement and enforce laws and regulations with advice and assistance from the government (Kuperan et al., n.d; Pomeroy, 1995; Pomeroy & Berkes, 1997) (Figure 2.1). Co-management is a middle ground course between state level concerns in natural resources management (fisheries, forests, etc.) for efficiency and equity, and local level concerns for self-governance, self-regulation and active participation (Pomeroy, 1995).
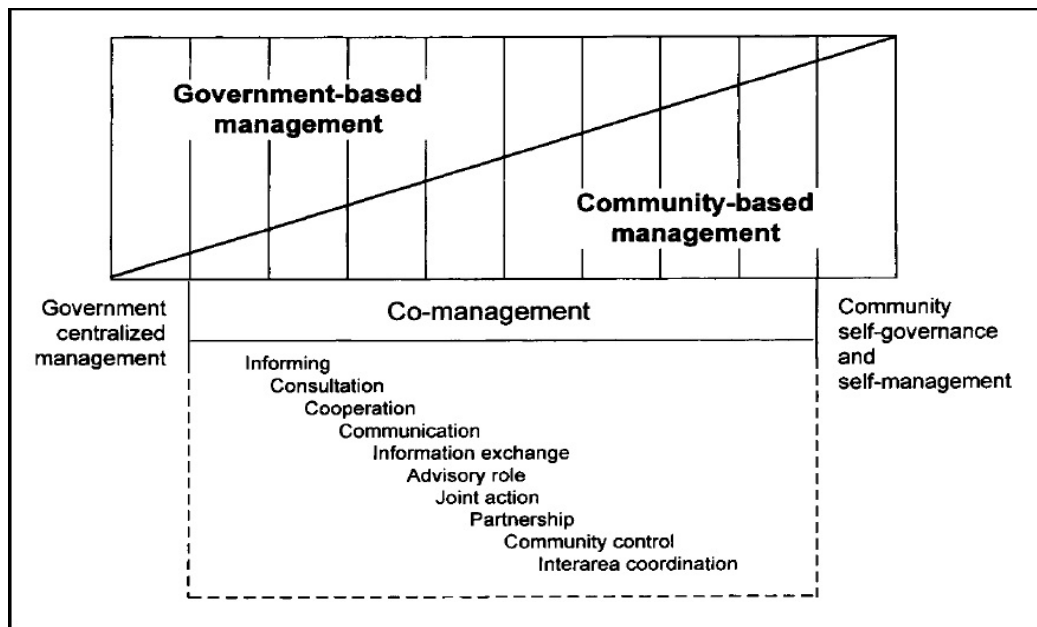
Figure 2.1   Continuum of co-management approaches (Pomeroy & Berkes, 1997, p. 446)

2.2.2 Involvement of communities in co-management arrangements

Co-management arrangements need to be designed in such a way that communities can be involved from the initial stages of decision-making processes (Houde, 2007). Active participation of partners in co-management process is directly related to their sense of ownership and commitment to the co-management arrangements. The partners involved in

co-management need to feel that the process not only benefits them, but that they have a strong sense of involvement in, commitment to and ownership of the process. External agents working to plan and implement co-management arrangements must allow the partners to recognize themselves as the owners and directors of the process. The continuous involvement of partners in co-management demonstrate their commitment to the process (Pomeroy, Katon, & Harkes, 2001).

Arnstein (1969, p. 217) has discussed eight levels of citizen participation in community action programmes, meant to empower the poor to fight poverty, which can be applied in understanding the various levels of community participation in co-management of common pool resources such as forests (Figure 2.2). The bottom rungs in her power hierarchy, labelled (1) *Manipulation* and (2) *Therapy,* describe levels of "non-participation" that have been contrived by some powerful authority to substitute for genuine participation. The real objective is not to enable people to participate for example, in co-management or conducting community programmes, but to enable power holders to "educate" or "cure" participants for example in a co-management regime or community programme. Rungs (3) *Informing* and (4) *Consultation* progress to levels of "tokenism" that allow the poor households involved in co-management regimes to hear and to have a voice. When tokenism is extended by power holders as the whole extent of participation, the co-management participants may certainly hear and be heard. But under these conditions they lack the power to ensure that their views will be considered by the powerful. When participation is restricted to these levels, there is no follow-through, no "muscle", hence no guarantee for changing the status quo of participation. Rung (5) *Placation* is a higher level than tokenism because the ground rules allow the poor individuals or households to advise, but the power holders retain the right to decide. Rung (6) *Partnership* enables citizens to negotiate and engage in adjustments with traditional power holders. While rungs (7) *Delegated Power* and *(8) Citizen Control* apply to situations where poor community households in co-management approaches or community programmes obtain the majority of the decision-making seats, or full managerial power. This thesis uses this ladder to analyze the levels of community participation in the ASFR co-management arrangements.
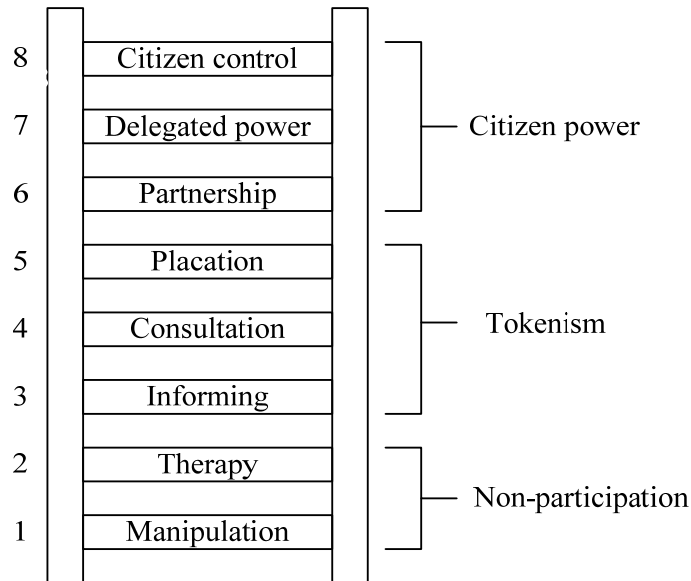
Figure 2.2   Arnstein's ladder of citizen participation (Arnstein, 1969, p.217)

2.2.3 The rationale for co-management of forests

The application of co-management concepts to forests has been a significant theme promoted by scholars and donors in developing countries that have inherited centralised governance systems from colonial powers. The basic precept tends to be that the forests were community run before colonialism, but became central government assets under colonial jurisdictions. Whether this is generally true or not, there has been a move to encourage power sharing with communities whether under the aegis of devolution, decentralisation, community-based resource management or stakeholder/shareholder participation in decision-making. That co-management of forests is desirable seems almost to be a given in the latter half of the 20th Century, despite limited evidence that it has brought benefits (Arnold, 1999). For instance it has been suggested that the livelihood contributions of forests often become more stable and reliable when forests are managed collectively and that this is beneficial to the community as a whole (Thoms, 2008).

Furthermore, there is evidence that community involvement in the management of a forest can substantially improve the quality and condition of the forest, over and above the levels at which governments are able to establish independently. Biodiversity may well be enriched, instead of diminished, by the activities of forest dwellers. Community involvement in forest management, where forests play important roles in rural livelihoods, is likely to lead to substantial changes in the ways forests are managed and ensure the safeguarding and/or diversification of their multiple benefits (Brown et al., 2007).

It is also believed that community-based forest management increases the resource flows to rural populations, leading to important positive effects on poverty alleviation and income distribution (Brown, 1999). For instance, some studies of participatory forest management have found that participatory approaches have the potential to increase social and natural capital, and reduce the vulnerability of forest dwellers, increase their awareness of forest protection and empower them to manage forests to earn income (Habtemariam et al., 2009; Tanvir, Munir, Babar, & Abid, 2007b). Likewise, Thoms (2008), found that community control of forests can open up new livelihood opportunities for local households.

Involving communities and community institutions in forest management (a sector often noticeably lacking in 'good governance') may help to introduce discipline into the management of the sector and offer significant checks and balances on otherwise unregulated public services (Brown, 1999; Schumann, 2007) due to the participation of resource users in management decisions and utilization of data that is credible to them (Schumann, 2007).

It is also believed that participation in co-management by stakeholders may enhance the efficiency and, perhaps the equity of the intertwined common pool resource management and social systems (Castro & Nielsen, 2001).

Co-management may also offer a pathway for resource users to obtain a proprietary share in the authority and decision-making powers that underwrite management (Castro & Nielsen, 2001) and may be developed for a number of reasons, including the recognized failure of centralised arrangements and/or because of economically driven reforms and constraints (Arthur, 2005).

Co-management has also been instituted because of legitimacy reasons (Berkes, 2002). It is used to give legitimacy of management or create equitable regulations (Jentoft, 1989). However, in many instances, institutions are not seen as things that need legitimacy at all because of the way they have obtained their status. In other words, a criteria of legitimate institutions is that their legitimacy is rarely questioned (Jentoft, 2000).

Conversely, the impact of participatory forest management on the human, physical and financial assets of residents has been found to be negligible (Tanvir et al., 2007b). Tanvir et al. (2007a) found, from their comparison of villages participating and not participating in community forestry projects in North West Pakistan, that there were no considerable

differences in the sources of income and livelihood strategies of the respondents of project vis-à-vis non-project villages.

Similarly, Tanvir et al. (2007a) argue that, despite a much greater emphasis on community-based approaches to forest management, there are few instances where this has actually generated substantive economic benefits of a sufficient quality or quantity to compete on economic terms with the unsustainable use of forest land and resources. There are few other comparative studies investigating participation in forestry and livelihoods, so it is difficult to determine the extent to which Tanvir et al.'s findings might apply to other settings. However, Shackleton et al. (2002) also argue that while co-management has been widely implemented, at most sites across Asia and Southern Africa, local people's views are that devolution policies have yielded only limited benefits for them. None of these studies has methodically investigated the specific links between common pool resource theories and livelihood outcomes. This is a significant research gap in common pool resources theories that needs to be addressed.

2.2.4 Conditions for successful co-management

If co-management is to be successful, then it seems probable that a set of conditions for successful co-management should be identifiable (see Pomeroy et al., 2001). In this regard, many researchers have explored conditions for successful co-management (Dietz, Ostrom, & Stern, 2003; Pomeroy et al., 2001; Singh, Pandey, & Prakash, 2011; Singleton, 2000). Pomeroy (2003) argues that co-management can be more successful if it begins through local initiatives. However, he warns that for this local initiative to be successful, basic issues of government action to establish supportive legislation, policies, rights and authority structures must be addressed. Policies and legislation need to spell out jurisdiction and control; provide legitimacy to property rights and decision-making arrangements; define and clarify local responsibility and authority; clarify the rights and responsibilities of partners; support local enforcement and accountability mechanisms; and provide natural resource user groups or organizations the legal right to organize and make arrangements related to their needs (Pomeroy et al., 2001). Problems also exist in developing co-management institutions at the local communities' level. For instance, with reference to fisheries co-management in South East Asia and South Africa, Nielsen et al. (2004) argue that many of the problems and issues facing fisheries can only be solved on a provincial, national or, even, international level. The resource systems on which fisheries rely in most cases are too large to be entirely within

control of a few communities, and fisheries management institutions must, therefore, be able to address problems of resource access and sharing at that level.

It is also argued by scholars of the commons that effective commons' governance is also easier to achieve when; the resources and use of the resources by humans can be monitored, and the information can be verified and understood at relatively low cost (Dietz et al., 2003); rates of change in resources, resource-user populations, technology, and economic and social conditions are moderate (Ambika & Ganesh 2005; Dietz et al., 2003; Singleton, 2000); outsiders can be excluded at relatively low cost from using the resource (new entrants add to the harvesting pressure and typically lack understanding of the rules) (Dietz et al., 2003); users support effective monitoring and rule enforcement (Dietz et al., 2003); and when stakeholders maintain frequent face-to-face communication (Dietz et al., 2003; Singh et al., 2011). Perhaps not surprisingly, many of these have their corollary in Ostrom's design principles (see section 2.3.4). However, Dietz et al. (2003) also raise concerns that the challenge is to devise institutional arrangements that can help to establish all these conditions and that few settings in the world are characterized by all of these conditions.

For instance, Mapedza's (2006) research on Mafungautsi forest co-management in Zimbabwe, found that despite changes in discourse to incorporate community involvement in the management of the forest resources, the co-management was unsuccessful. The institutional arrangements developed through the programme were found to be upwardly accountable to donor, government, and business interests rather than being equal to the community which was supposed to share responsibilities. 'Scientific' knowledge continued to be imposed to justify forest conservation implementation, even though it involved questionable practices. Benefits sharing of forest resources to local level users were strictly limited, making compliance difficult. Tenure insecurity and local community discontent instigated by the programme altered the relationship that forest users had traditionally with the forest. The continued exclusion of local people from decision-making as well as from the benefits of resource exploitation and use led to negative outcomes of the programme. Noble (2000) supports this argument and proposes that the prospects of successful co-management, of natural resources will depend on whether such arrangements can function as viable institutions. According to Mason et al. (2010) and Singleton (2000), both parties must have a real interest and commitment to enter into a co-management arrangement if it is to succeed. Pinkerton, (1989) also argues that co-management can also be successful if the benefits

sought by all the actors are appropriate, more efficient and more equitable to alternative forms of management.

Assuming a state seeks to establish a successful co-management regime, Singleton (2000) argues that a series of difficult dilemmas must be solved by the state. First, it must demonstrate that it is tough and capable, that is, it must show that it operates under clearly-specified rules and restraints, and is willing to punish violators; yet it must also remain flexible enough to distinguish between major and minor violations, and between communities who are routinely opportunistic and those for whom transgressions are an anomaly. Second, it must also strengthen local capacities and be responsive to local concerns while maintaining an independent perspective that is able to represent broader public interests. States with strong institutional capabilities are better equipped to create and maintain successful co-management regimes. Yet it is by states with weak or overtaxed institutional capacities that co-management might be most productively employed (Singleton, 2000).

There is evidence that local communities *can* be successful at managing common pool resources endogenously. But in order to do so they must meet four necessary conditions (Singleton, 2000, p. 4): (1) they must have a *preference* for sustainable management relative to, for example, liquidating the resource and investing the proceeds elsewhere; (2) they must have the *capability,* the social and material resources, to solve the variety of collective action problems associated with creating and maintaining resource management institutions; (3) they must *understand* or have appropriate beliefs about what actions are necessary for sustainable resource use; and (4) they must have sufficient *information* available to them to allow for the creation of effective management regulations.

Others take a narrower perspective. Jentoft (2000), for instance, emphasizes that the key aspect of successful co-management is a mutual agreement regarding power sharing. Other things will follow. For instance, he notes that co-management is formal and has a charter, that specifies mandates, membership and procedures for election, for presentation, provision of knowledge, and how and when to have meetings. Co-management also means that rules for deliberation, voting, reporting and the like exist (p. 259). This is a very formal approach that seems to depend on common understandings of processes and procedures that may not be a cultural fit in all settings.

By reducing conflicts, some co-management agreements may contribute to improved governance at the national and regional levels (Mason et al., 2010). However, Castro & Nielsen (2001) argue that experience also shows that co-management agreements can set into motion new conflicts or cause old ones to escalate. In practice, the result may not be power sharing, but rather a strengthening of the state's control over resource policies, management, and allocation. Instead of contributing to local empowerment, such arrangements may further marginalize indigenous communities. Therefore, what is required is a clear assessment of the benefits and limitations of co-management as a mechanism for promoting conflict resolution, peace building and sustainable development.

Ambika & Ganesh (2005) studied the institutions of community forestry governance and found that generally, the biological sustainability of heavily used local forests is mainly dependent on the robustness of the local institutions that regulate forest use, monitoring, and maintenance. They note the recognition and incorporation of local institutions in the formulation of forest policies are of crucial importance for improving governance and management of the remaining forest resources. The institutional changes must be holistic, encompassing a system paradigm, if they are to be held responsible for increasing people's assets and improving their livelihood outcomes (Tanvir et al., 2007b). However, from the above discussion it is apparent that institutional conditions for successful co-management are not yet clear and they are difficult to achieve (Dietz et al., 2003; Mason et al., 2010). Further, Nielsen & Vedsmand (1999) see co-management as a set of alternative management strategies that are appropriate in certain situations and under particular conditions, but not in others.

2.2.5 Implementation of co-management

The introduction of co-management arrangements in Africa has been, to a great extent initiated by donor funded projects with the assumption that the government departments could take over the activities after the end of the projects. This has not been without its problems. Hara & Raakjær-Nielsen (2003) argue that in many cases the process has been short term and lacked flexibility because of specific donor requirements. In almost all co-management, organization of user communities has been the first step in the implementation process. Government or NGOs have initiated or facilitated the mobilization of the communities for user involvement in the new management regime. New institutions are created with the facilitation of these external agencies, using the western democratic

principles of electing committees as vehicles for participation. In South Africa, most initiatives have been driven by external agents outside the responsible government departments and, thus far there has been a lack of buy-in to the idea of co-management by the government. This lack of total acceptance of communities as partners (or slow warming to the idea of co-management) by government also applies in other countries (Hauck & Sowman, 2001).

In general, Hauck & Sowman (2001) conclude that the fact that community structures have been organized by, or through, the influence of agents from external communities has had a large bearing on the ownership of the process and the acceptability of the new committees intended to be representative bodies for the communities participating in co-management arrangements. In turn, the stability of elected co-management structures has had a great influence on the sustainability of the new regime.

Some studies have shown that the implementation of a co-management regime is not a one-off intervention but a process by which even the pre-implementation period can stretch for as long as ten years, and may suffer if instigated too quickly (Chuenpagdee & Jentoft, 2007; Mason et al., 2010). Thus, co-management pre-implementation may prove to be as slow as the most resistant stakeholders allow. In such circumstances, co-management can easily be seen as failing to deliver, and a cause of disillusionment among communities and governors. The negative connotations that result may hinder co-management from catching on elsewhere (Chuenpagdee & Jentoft, 2007).

In implementation of a co-management regime, the stakeholders who should be most enthusiastic about co-management are likely to be those who would have more to gain, whereas stakeholders with certain advantages in the existing situation may not be willing to embrace co-management, fearing, for instance, the loss of power and existing privileges. Some stakeholders may be unwilling to commit at an early stage of pre-implementation, particularly if the process drags on, thinking that co-management is something that might not happen. For the pre-implementation of co-management, this poses a clear challenge since participation of stakeholders in these different positions may be required. In this case then, co-management entrepreneurs could benefit greatly from government support. Even tacit support would help boost confidence as well as reduce risk. Governments, after all, have the power to block initiatives they dislike (Chuenpagdee & Jentoft, 2007) and many governments or government officials are wary of increasing civil society participation, which can be

perceived as a loss of state authority, because co-management usually involves reconciling both development and conservation objectives, there is the risk that it may compromise the latter or be perceived to do so (Mason et al., 2010). Pomeroy et al. (2004) state that changes in political regimes have not allowed for continuity in the support for co-management efforts.

From the governance perspective, co-management, including in the pre-implementation stage, depends upon contributions, commitments and collaboration from all actors involved, be it the local community, civic organizations (e.g. NGOs) or government agencies (Chuenpagdee & Jentoft, 2007). However, it has been found that user groups of the various resources in a co-management regime are not often involved right from the planning, implementation and evaluation stages of co-management regimes (Sen & Nielsen, 1996). As such it is reasonable to argue that there may be significant weaknesses in the co-management implementation institutions.

2.3 Common pool resources theories

Co-management theory and practice has been informed by common property resource theories (Bromley & Cernae, 1989; Carlsson & Berkes, 2005; Ostrom, 1990). Since, co-management has been explicitly adopted in Kenya for the ASFR and having reviewed the theories aimed at co-management arrangements (the rationale for co-management of forest, conditions for successful co-management, and the implementation in the preceding sections), this section reviews the current literature on the fundamental concepts and theories on common pool resources that can lead to the design of robust co-management institutions.

2.3.1 The concept of common pool resources

The term common-pool resources refers to resources that: (2) are used by multiple-users and/or multiple-user groups, (2) for which joint use involves sub-tractability, that is, use by one user will subtract benefits from another user's enjoyment of the resource system, and (3) from which it is difficult to exclude users (Steins & Edwards, 1999b). On account of these attributes, a major concern is the risk of unsustainable utilisation of common pool resources (referred to as the 'tragedy of the commons') (Dutta & Sundaram, 1993; Hardin, 1968). Several examples of common pool resources provided by Ostrom (2001) include lakes, oceans, irrigation systems, forests or the atmosphere. Mappatoba (2004) argues that in natural resources, property rights play not only a central role in determining patterns of equality in access, they also have a far-reaching impact on the creation of incentives for overall sustainable management and improvement. Bromley (1992) and Steins & Edwards, (1999b)

have classified common property rights as: (1) open access where no use rights are attached to a specific group, resulting in a "free for all"; (2) public property in which access for the public is held in trust by the Crown or state; (3) common property or "commons" where use rights are attached to a specific user group; and (4) private property where the tradable rights are owned by an individual, household or company.

The common property owning groups vary in nature and size of internal structure across a broad spectrum, but they are social units, with definite membership and boundaries, with certain common interests, with at least some interaction among members with common cultural norms, and their endogenous authority systems. Tribal groups, or sub-groups or sub-villages, neighbourhoods, small transhumant groups, kin systems or extended families are all possible examples of common-property regimes. These groupings hold customary ownership of natural resources such as land, grazing land and water grounds (Bromley & Cernae, 1989).

2.3.2 Common pool resource tenure and rights

Tenure security is the degree to which an individual or group believes its relationship to land or other resources is safe rather than in jeopardy (Larson, Barry, Ganga, & Colfer, 2010). The security and permanence of their control and use of the natural resource base is actually more important to most indigenous groups than direct ownership of the land itself. The importance of natural resources for livelihoods is central to demands over forestlands from both indigenous and non-indigenous groups (Larson, Cronkleton, Barry, & Pacheco, 2008). *Tenure rights* are considered as a bundle of rights, ranging from access and use rights to management, exclusion and alienation (Schlager & Ostrom, 1992). *Resource tenure* consists of the social relations and institutions governing access to, and use, of land and natural resources. *Forest tenure* then is concerned about who owns forestland and who uses, manages, and makes decisions about forest resources. *Forest tenure* determines who is allowed to use which resources in which way, for how long and under what conditions, as well as who is entitled to transfer *rights* to others and how (Larson et al., 2010, p. 12). This study uses these tenure arrangements to understand the ASFR tenure rights.

2.3.3 Institutional design principles for stable local common pool resources management

A design principle is defined as a concept used, either consciously or unconsciously, by those constituting and reconstituting a continuing association of individuals about a general

organising principle (Ostrom, 1994). A large number of empirical studies of common property resource management have been informed by new institutionalist thinking (McCay & Acheson, 1987). This body of literature has been termed as common property resource theory (Steins, 1999). This theory is used for understanding common pool resources management, where the emphasis is on institutional arrangements or the rules of the game (Quinn, Huby, Kiwasila, & Lovett, 2007). A common theme that can be distilled from the common property resource theory literature is the concern with the design principles underlying successful collective resource management, though there is debate about what 'successful' and 'not successful' means, and whose perceptions of success count (Ostrom, 1990; Steins & Edwards, 1999a). The starting point and focus of much of the debate has been Ostrom's (1990) design principles for stable local common pool resources management. Eight design principles have been identified by Ostrom (1990, p. 102) (see box 2.2) that can be used to help design institutions for management of common pool resources.

Box 2.2 Design principles of stable local common pool resources management after (Ostrom, 1990, p. 102)

1   *Clearly defined boundaries:* Individual or households with the rights to withdraw resource units from the common pool resources and boundaries of the common pool resources are clearly defined
2   *Congruence between appropriation and provision rules and local conditions:* Appropriation rules restricting time place, technology and/or quantity of resource units are related to local conditions and provision rules requiring labour, materials and/or money
3   *Collective-choice arrangements:* Most individuals' affected by operational rules can participate in modifying them
4   *Monitoring:* Monitors who actively audit common pool resources conditions and appropriators behaviour are accountable and/or are appropriators themselves
5   *Graduated sanctions:* Appropriators who violate rules-in-use are likely to receive graduated sanctions (depending on the seriousness and context of the offense) from other users, from officials accountable to these users, or from both.
6   *Conflict-resolution mechanisms:* Appropriators and their officials have rapid access to low-cost, local arenas to resolve conflict among appropriators or between appropriators and officials.
7   *Minimal recognition of rights to organize:* The rights of appropriators to devise their own rules are not challenged by external government authorities
8   *Nested enterprises:* Appropriation, provision, monitoring, enforcement, conflict resolution and governance activities are organized in multiple layers of nested enterprises.

2.3.4 Applicability of the institutional design principles for stable local common pool resources management

The applicability of existing design principles in more complex natural resource systems, such as forestry, has been questioned by some common pool resources institutional analysts. To begin with, Ostrom has made some criticisms of her own common pool resources design principles. For instance, she has identified a number of threats to establishing sustainable community governance of small scale common pool resources: (1) blueprint thinking in the use of her design principles; (2) over-reliance on simple voting rules as the primary decision mechanism for making all collective choices; (3) transmission failures from one generation to the next of the operational principles on which community governance is based; (4) turning to external sources of help too frequently; (5) international aid that does not take account of indigenous or local knowledge and institutions; (6) corruption and other forms of opportunistic behaviour; (7) lack of: large-scale institutional arrangements related to reliable information collection, aggregation, and dissemination; fair and low-cost conflict-resolution mechanisms; educational and extension facilities; and facilities for helping when natural disasters or other major problems occur at a local level (Ostrom, 1999).

In addition, exogenous and endogenous factors have also been identified by Ostrom (2000a) that challenge the long-term viability of self-organized resource-governance regimes. For instance, major migration (out of or into an area) may be a threat that may or may not be countered effectively. Although out-migration may reduce the likelihood of the carrying capacity of common pool resources from being exceeded, it may also change the economic viability of a regime due to loss of those who contribute needed resources, knowledge or skills. In-migration may bring new participants who do not trust others or are not trusted (are 'outsiders') and who do not rapidly learn social norms that have been established over a long period of time. Nor do they essentially have the sense of 'be-longing' that some ascribe as a key feature in sustainable commons resource management. Ostrom (2000a) thus concludes that since collective action is largely based on mutual trust, some self-organized resource regimes that are in areas of rapid settlement have disintegrated within relatively short time periods.

Additionally, Ostrom (2001) has also identified that some scholars have concluded that only very small groups can organize themselves effectively because they presume that size is related to the homogeneity of a group and that homogeneity is needed to initiate and sustain

self-governance, while heterogeneity of groups is highly contested. She demonstrates that for instance, groups can differ along a diversity of dimensions including their cultural backgrounds, interests and endowments and each group may operate differently. But if groups coming from diverse cultural backgrounds share access to a common resource, the key question affecting the likelihood of self-organized solutions is whether the views of the several groups concerning the structure of the resource, authority, interpretation of rules, trust, and reciprocity differ or remain the same. In other words, she is concerned whether these groups may share a common understanding of their situation.

These criticisms raised by Ostrom have not however addressed the fundamental criteria for designing common pool resources. For instance, Ambika & Ganesh (2005) argue that studying organizations in terms of successes and failures is problematic because the definition of success differs among stakeholders. Agrawal, (2001) argues that although Ostrom's theory of stable local common resource design principles has been applied widely, there is no single widely accepted theory of sustainability of common pool institutions. He argues that most of Ostrom's (1990) principles focus on local institutions or on relationships with local contexts. Only two of the principles (about legal recognition of institutions by higher level authorities and nested institutions) can be seen to express the relationships of a given group with other groups or authorities.

Cox, et al. (2010) observe that some scholars argue that critical social variables (e.g. scale, village size, homogeneity, or the ability to exclude outsiders) need to be included in Ostrom's (1990) design principles for a full account of successful community based natural resources management. However, they point out that, the glue that keeps an institution alive over time is the social mechanisms, (e.g. trust, legitimacy, and transparency).

Furthermore, Ambika & Ganesh (2005) have also identified that Ostrom's design principles have given little consideration to the effects of external factors (markets, technology, states, and population pressures) on common pool resources. They further question whether the design principles can be applied to a wide range of cases beyond those that were used to develop them. Agrawal (2002) also reports that two main deficiencies exist in the studies of sustainable institutions around common-pool resources. First, many scholars of commons have focused narrowly on institutions around common pool resources. A second deficiency of the existing studies of sustainable institutions around common pool resources relates to

methods and this he argues is more primary. Studies that connect the different variables in causal chain relationships or that propose plausible casual mechanisms are rare.

Despite the range of critiques of the applicability of existing design principles, there is, however, also growing evidence that successful collective management does occur, and a rising consensus that common property may be a viable institutional arrangement supportive of sustainable resource use (Kris & Kristen, 2004). For instance, Ashutosh & Tadao (2001) firmly argue that many case studies throughout the world reveal that common pool resources users' self-governance can protect common pool resources from possible degradation. Ostrom (1990) and Ashutosh & Tadao (2001) have also argued that the eight design principles are sufficient to make common pool resources institutions robust and long lasting.

2.4 Chapter summary

This chapter has reviewed the literature on co-management of common pool resources and the institutional analysis and design for common pool resources management from a sustainable development perspective. Through the literature review on common pool resources and co-management theories, the chapter has identified a number of gaps which form the basis for this study. The first gap is that it is not yet clear how to devolve co-management structures sufficiently to manage common pool resources, such as forests, in such a way that they can be able to deliver sustainable livelihoods to the poor forest-dependent communities. A second gap in the empirical studies is that, to date, studies that link the different variables that they identify in a causal chain or propose plausible casual mechanisms are rare in common pool resource discussions. For instance, there seems to be no studies from the review of the literature that link common pool resources management institutions and livelihood outcomes. Finally, the review of the literature identified that studies that have examined the extent to which co-management institutions can deliver livelihoods outcomes to forest-dependent communities are also rare. This thesis addresses these gaps. A significant methodological issue that arises therefore is how to link these institutions with sustainable livelihood outcomes of the forest-dependent communities. To address this limitation there is a need to link co-management with the sustainability of the community; effectively, the sustainability of its livelihood. This research, therefore, seeks to gain insights from linking the two theoretical concepts – the co-management and sustainable livelihood approaches. The next chapter introduces the sustainable livelihood framework and links it with co-management in exploring the ASFR co-management arrangement in Kenya.

Chapter 3
Repositioning co-management within the sustainable development discourse

3.1 Introduction

Chapter 3 builds on chapter 2. A case has been made in chapter 2 that the sustainable development perspective is a weak theme in the common pool resources and co-management literature. An analytical framework for this study, therefore, needs to draw on a wider body of literature on institutional analysis from a sustainable livelihood stance. Not surprisingly, the Sustainable Livelihood Framework (SLF), because of its specific focus on livelihoods, appeared most appropriate to the objectives of this thesis.

Thus the objectives of this chapter are twofold: section 3.2 provides an overview of the SLF in terms of its key elements, its strengths and criticisms. In section 3.3, the SLF is modified as an analytical framework to evaluate co-management arrangements for the ASFR from a sustainable development perspective. This section also highlights the strengths and weaknesses of this evaluative framework for co-management of forest institutions and livelihood outcomes.

3.2 Overview of the sustainable livelihood framework

Sustainable livelihood (SL) is a way of thinking about the objectives, scope and priorities for development, in order to enhance progress in poverty elimination (Farrington, Carney, Ashley, & Turton, 1999). It emerged in the 1990s in response to the failure of development interventions to appropriately conceptualize the cross-scale and complex economic, social, ecological and behavioural choices confronting predominantly rural, agricultural producers (Cox, McConney, & Robin, 2010). Livelihood analysis focuses on the identification of when, where, and how individuals, families, and communities can absorb the shocks and stresses that determine livelihood outcomes (Armitage et al., 2007). This 'Sustainable Livelihoods Approach (SLA)' has since been adopted by a range of development actors (e.g. bi-lateral and multi-lateral banks and development agencies) and provides a reasonably coherent approach for evaluating linked economic–social outcomes associated with co-management. The SLA emphasizes understanding the vulnerability context and the organizational and institutional environment within which poor people draw upon assets of different types in order to implement a livelihood strategy (Armitage et al., 2007; Meinzen-Dick & Adato, 2001). The SLA is operationalized through the Sustainable Livelihood Framework (SLF).

Thus, the SLF seems appropriate for examining the potential for co-management to strengthen the livelihoods of poor forest-dependent communities.

There are several varieties of SLF but the predominant one is that of the Department for International Development (DFID) and, as such, has proven useful in a variety of settings (Carney, n.d). It is the one that has been employed in this thesis. The key components of the DFID sustainable livelihood framework are a set of livelihood assets and the structures and processes that individuals and communities work through in order to transform those assets, into the outcomes they seek, in accordance with particular chosen strategies, these assets, however, are always seen as vulnerable to a variety of threats and that vulnerability may be increased or decreased depending on the nature of the development activities or changes to the structures and processes through which the livelihood strategies are implemented (Figure 3.1). Co-management is, therefore, an institutional structure that may be used as part of a strategy to help the sustainable development of a community (in accordance with its desired outcomes), but it also has the potential to impact positively or negatively on the vulnerability of the assets that the community relies on.
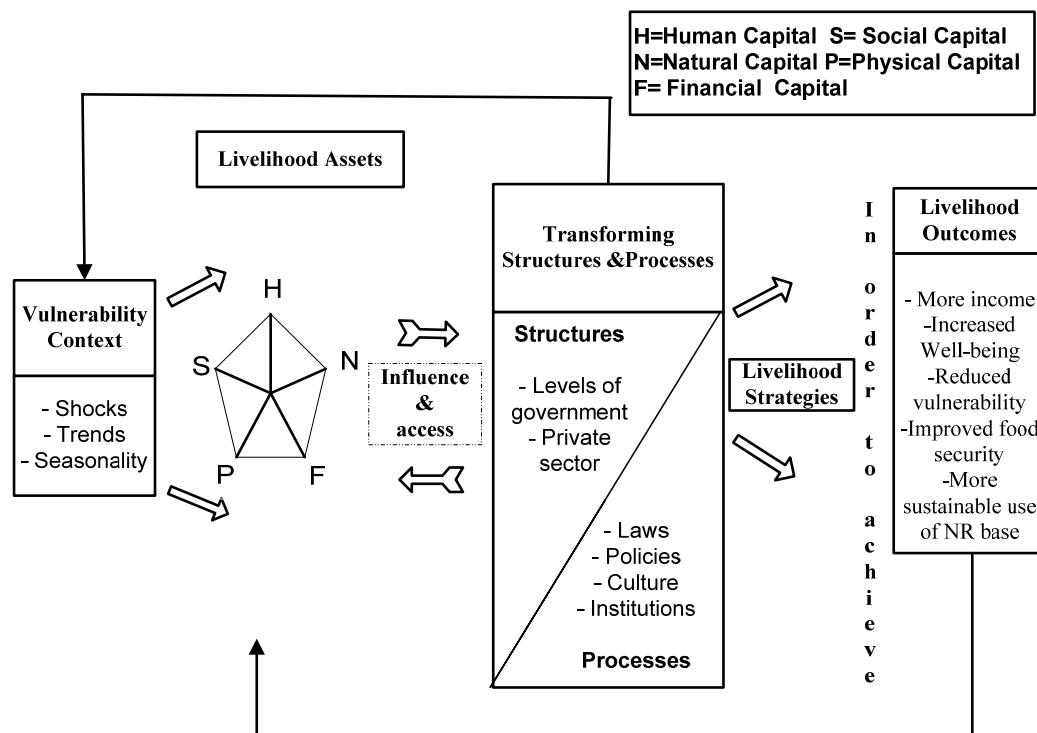
Figure 3.1   DFID sustainable livelihood framework (Carney, 1999)

3.2.1 Livelihood assets

The standard DFID framework identifies five types of capital asset which people can build up and/or draw upon: human, natural, financial, social and physical (DFID, 1999; Farrington et al., 1999). Human capital represents skills, knowledge, ability to labour and good health, that together, enable people to pursue different livelihood strategies and achieve their livelihood objectives (DFID, 1999). Natural capital is the term used for the natural resource stocks from which resources flow and services (e.g. nutrient cycling, erosion protection) useful for livelihoods are derived. There is a wide variation in the resources that make up natural capital, from intangible public goods, such as the atmosphere and biodiversity, to divisible assets used directly for production (e.g. trees, land and forests). Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods. Infrastructure consists of changes to the physical environment that help people to meet their basic needs and to be more productive, whereas producer goods are the tools and equipment that people use to function more productively. The components of infrastructure include: affordable transport; secure shelter and buildings; adequate water supply and sanitation; clean, affordable energy; and access to information (communications). Financial capital denotes the financial resources that people use to achieve their livelihood objectives. There are two main sources of financial capital: (1) savings, which can be held in several forms such as; cash, bank deposits or liquid assets such as livestock and jewellery. Financial resources can also be obtained through credit-providing institutions and; (2) regular inflows of money: the most common types of inflows are pensions, or other transfers from the state, and remittances (DFID, 1999). Social capital is much debated about, notably what exactly is meant by the term 'social capital' (see Portes, 2000). In the context of the sustainable livelihoods framework as employed in this research it is taken to mean the social resources (e.g. friendship) upon which people draw in pursuit of their livelihood objectives. These resources are developed through, and include, social networks and connectedness, membership of more formalised groups and relationships of trust, reciprocity and exchanges that facilitate co-operation, reduce transaction costs and may provide the basis for informal safety nets among the poor. Cahn (2006) has also argued that culture should be regarded as a separate asset that should be sustained and enhanced. The livelihoods that people aspire to and the strategies they choose to achieve those outcomes are both influenced by culture. However, in this research culture is treated within the social capital set.

3.2.2 Transforming structures and processes

Transforming structures and processes within the livelihoods framework are the institutions, organisations, policies and legislation that shape livelihoods. An understanding of structures and processes provides the link between the micro (individual, household and community) and the macro (regional, government, powerful private enterprise) (Cahn, 2003; DFID, 1999; Ellis, 2000; Scoones, 1998), as they effectively determine access, control and use of assets (Cahn, 2003; DFID, 1999). Understanding institutional processes also allows identification of restrictions/barriers and opportunities to sustainable livelihoods and shed light on the social processes which underlie livelihoods sustainability (Cahn, 2003; Scoones, 1998).

3.2.3 Livelihood outcomes

A focus on outcomes leads to a focus on achievements, indicators and progress (Cahn, 2003). Cahn (2003) and DFID (1999) argue that an understanding of livelihood outcomes is intended to provide, through a participatory enquiry, a range of outcomes that will improve well-being and reduce poverty. For instance, more income, reduced vulnerability, improved food security, more sustainable use of the natural resource base, and recovered human dignity (Serrat, 2008).

3.2.4 Livelihood strategies

The livelihood approach seeks to promote choice, opportunity and diversity. Livelihood strategies is a term used to denote the range and combination of activities undertaken, and choices people make, in order to achieve their livelihood goals (including productive activities, investment strategies, reproductive choices, etc.) (DFID, 1999). Depending on the assets people have, the structures and processes that impact on them, Cahn, (2003) would add tradition, and the vulnerability context under which they operate, people theoretically choose livelihood strategies that are expected to best provide them with the sought after livelihood outcomes. Livelihood strategies change as the external environment (over which people have little control) changes. Sometimes unsustainable and unproductive livelihood strategies continue because of tradition, habits or other socio-psychological factors. At other times, livelihood activities are introduced as coping strategies in difficult times (Cahn, 2003).

Scoones, (1998) has identified three types of rural livelihood strategies: agricultural intensification or extensification, livelihood diversification including both paid employment rural enterprises and migration (including income generation and remittances). Carney (1998)

and Cahn (2003) have listed the categories of livelihood strategies as natural resource based, non-natural resource based and migration (but omitted remittances), whereas Cahn (2003) and Ellis (2000) have categorised livelihood strategies as natural resource based activities or non-natural resource based activities (including remittances and other transfers) but omitted migration in their rural livelihood strategies.

In order to understand the diverse and dynamic livelihood strategies it is important that interventions are appropriate (Cahn, 2003). Also, a key issue in the analysis of livelihood strategies is the scale at which an assessment takes place, livelihood strategies, for example, can be described at an individual household and village level as well as at regional or national levels (Scoones, 1998).

3.2.5 Vulnerability context

The vulnerability context frames the external environment in which people exist. People's livelihoods and the wider availability of assets are fundamentally affected by critical trends as well as by shocks and seasonality – over which they have limited or have no control (DFID, 1999). The vulnerability context is also about how people adapt to, and cope with, stresses and shocks (Cahn, 2003). For instance; (1) population trends, resource trends, (including conflict), national/international economic trends, trends in governance (including politics) and technological trends (2) human health shocks (e.g. illness and injury), natural shocks, economic shocks, conflict and crop/livestock health shocks, and; (3) seasonality of prices, production, health and employment opportunities, have a direct impact upon people's asset status and the options open to them in pursuit of beneficial livelihood outcomes (DFID, 1999). Culture (including gender) and household dynamics can also cause risk and vulnerability and can influence the way people perceive risks and vulnerability (Cahn, 2003, 2006). Cahn (2006) reports that risks are culturally defined and the perception of risks are influenced by socially entrenched values and beliefs of a particular culture.

3.2.6 Strengths of the sustainable livelihood approach (SLA)

A number of authors have made claims about the strengths of the sustainable livelihoods approach, but these are mainly in the context of using the SLA as a tool to implement or guide the implementation of sustainable development. These claims include that SLA tries to reflect the complex range of assets and activities on which people depend for their livelihoods, and recognizes the importance to poor people of assets which they do not own. It

provides a framework for addressing the whole range of policy issues relevant to the poor, not just access to health and education, but issues of access to finance, markets, and personal security (Ashley & Carney, 1999). The approach facilitates an understanding of the underlying causes of poverty by focusing on a variety of factors, at different levels, that directly or indirectly determine or constrain poor people's access to resources/assets of different kinds, and thus their livelihoods (Krantz, 2001). It also provides a systematic approach enabling a better understanding of cause and effect relationships, in general (Ashley & Carney, 1999). Krantz (2001) argues that the sustainable livelihoods concept provides a more realistic framework for assessing the direct and indirect effects on people's living conditions than, for example, one dimensional productivity or income criteria. Several principles of the SL approach are not new, but they are lessons that have been learnt in different sectors over recent decades. Some of the principles of the SLA are: it is people centred, dynamic, responsive and participatory (Ashley & Carney, 1999).

3.2.7 Critiques of the SLA

Despite the wide use of the sustainable livelihoods approach, it has received some criticism. The major concern is that the SL approach is too complex to apply in development processes. It is also considered by some that the approach is over-ambitious and offers insufficient practical guidance on the way forward (Cahn, 2003; Carney, 1999). Carney (1999) and Cahn (2003) further argue that most of the research on, and use of, the approach has been carried out in Asia and Africa. The nature of poverty in the Pacific is very different to those continents and the influence of culture and the traditional sector is much stronger. In the early DFID framework, culture is considered as part of the vulnerability context. Culture can also be regarded as a process, along with laws, policies and institutions. Cahn (2003) identifies rules, customs and land tenure as cultural institutional aspects that could modify access to resources in a way that is not highlighted by SL approaches which see culture as part of the vulnerability context. However, this appears to be more a case of poor practice and overly narrow conceptualisation of institutions rather than anything fundamentally wrong with the DFID framework. Notably also none of the SL approaches has discussed on how to identify the poor that is trying to assist (Krantz, 2001), but this again would be context and practitioner-dependent, rather than a fault with the framework itself. It has also been criticized that the transforming structures and processes in the SLA do not work to the benefit of the poor (DFID, 1999). Significantly for this research, the critiques do not touch on matters

that would affect the use of the framework for analyzing the effectiveness of co-management as a transformational institution.

3.3 Evaluative framework for co-management of forests institutions and livelihood outcomes

The purpose of this chapter was to develop an evaluative framework that can be used to link co-management approaches (reviewed in Chapter 2) to the delivery of sustainable livelihood outcomes for poor forest-dependent communities. The review of literature on the sustainable livelihoods framework demonstrated its conceptual utility for framing an approach to an intervention. The development of a co-management approach to managing a common pool resource like a forest is an institutional intervention – it involves transforming the transformational structures through which people pursue their livelihood strategies. The traditional DFID SLF approach to assessing changes to the transformational structures is to consider them in terms of their effect on: access (to various types of capital, livelihood strategies and decision-making bodies and sources of influence); the terms of exchange between different types of capital; and returns (economic and otherwise) to any given livelihood strategy, (DFID, 1999). One might also consider the effects of the institutional change on the vulnerability of the livelihood assets.

To assess the effect on livelihoods of co-management as an institutional change a key component is the equality of the change. The extent to which the co-management regime can be seen as having had an effect on livelihoods is likely to be dependent on the nature of the co-management regime. Consequently, in using the SLF as the evaluative framework for assessing the contribution of co-management to sustainable livelihoods, there needs to be an assessment of co-management regimes such as the ASFR co-management.

Ostrom's (1990) design principles capture the details of common pool resources institutions and, as discussed in Chapter 2, provide a strong indication of the likelihood of the institutions to deliver sustainable outcomes. For instance, the implications of the design principles have been examined with regard to donor-initiated forestry projects in Peru, fisheries stakeholder organisations in New Zealand, irrigation CPRs in Japan, and local forestry institutions in Nepal (Quinn et al., 2007). All these studies have found the design principles useful for analyzing institutional robustness. Further, Ashutosh & Tadao,(2001) point out that Ostroms's design principles are basic, well configured and appropriate for governance of common pool resources. Thus, the evaluative framework used in this thesis places Ostrom's

design principles as the tool to evaluate the nature of a particular institutional regime, the transforming structure, in the DFID framework (Fig 3.2).This enables the study of the institutional design of the ASFR co-management regime on its effects and the sustainability of the livelihoods of the poor forest-dependent communities of ASFR. There may be other aspect of transforming structures and processes that are not captured in Ostrom's (1990) design principles but for the purpose of investigating a co-management arrangement, the approach taken is considered to cover all the relevant aspects.

H=Human Capital S= Social Capital
N=Natural Capital P=Physical Capital
F= Financial Capital

Livelihood Assets

Vulnerability Context
- Shocks
- Trends
- Seasonality

H
S   N
P   F

Influence & access

Design Principles for CPRs

1. Defined boundaries
2. Proportional equivalence between benefits & costs
3. Collective choice arrangement
4. Monitoring
5. Graduated sanctions
6. Conflict resolution mechanisms
7. Minimal recognition of rights to organise
8. Nested enterprises

Livelihood Strategies

In order to achieve

Livelihood Outcomes
- More income
-Increased Well-being
-Reduced vulnerability
-Improved food security
-More sustainable use of NR base

Figure 3.2   Modified SLF from the DFID sustainable livelihoods framework

3.3.1 Application of modified sustainable livelihoods framework in the evaluation of co-management of forests and livelihood outcomes

Despite the critique of the SLF (section.3.2.7, above), it continues to be used in designing projects and programmes. The aim is to develop these projects or programmes around the central concept of poverty. Of greater significance to this research, however, is that it can also be used for monitoring and assessment or evaluation of projects. When monitoring, reviewing and evaluating programmes, the review directs attention toward the positive and negative livelihood (socio-economic) impacts associated with co-management efforts, and the identification of specific co-management interventions that significantly limit livelihood disturbance or minimize costs to livelihoods and how they can be modified to fit better. Such

outcomes can be measured through an examination of the relationship between co-management interventions and the implications or changes for various livelihood assets or capital stocks held by individuals and households. It also looks at how and why co-management worked (or did not work) and why the poor in some instances found it difficult to participate in co-management. Measurements can also be achieved by linking qualitative and quantitative analyses of vulnerability of the key actors in the process (for example, local natural resources users) with co-management interventions (Farrington et al., 1999). It can help to provide a holistic context for understanding the livelihood context of individual people or groups of people (for example, households, geographical communities and interest groups) as a result of co-management or partnerships, for instance, in forests (Hocking, 2003).

The modified framework can also be used to assess co-management approaches by linking them to livelihood parameters (e.g. increased well-being, decreased poverty, increased income, decreased vulnerability context, increased food security and sustainable use of natural resources). This should be indicative of the extent to which they have been achieved through co-management.

When using the SLF for qualitative research it does not seek to establish absolute values for the things that it investigates. Its aim is to build up an accurate interpretation of what is being researched through triangulation of many different descriptive, sources whereas, in quantitative research, it seeks to place reasonably firm, absolute levels or values on the things that it investigates (DFID, 1999).

The key questions to explore and analyse include: (1) what change is occurring at the micro level? (2) How do livelihood strategies influence the degree of local participation? (3) How does the policy and institutional context influence livelihood impact or outcome? (DFID, 1999). Therefore, the key parameters (and examples of secondary parameters) considered when examining livelihood outcomes associated with co-management are those set out in Table 3.1.

Table 3.1   Livelihoods (economic, social) parameters for evaluation

Overarching parameters					
Increased well-being	Decreased poverty	Increased income	Decreased vulnerability	Increased food security	Sustainable natural resource use

Secondary parameters
Livelihoods assets or capital stock
• Human capital (skills, knowledge, ability to labour and good health) • Social capital (networks, groups, rules, norms, sanctions; relationships of trust, reciprocity, exchange) • Natural capital (stocks for example, fish and key ecological services (nutrient cycling), soil, air and water, trees, forest, land, etc. • Physical capital (infrastructure and producer goods/equipment) • Financial capital (financial resources-cash, bank deposits, livestock, jewels and regular inflows of money)
Vulnerability context
• Trends (e.g. market change, population growth, national and international economics, natural resources, politics and technology) • Shocks (economic, biophysical, health problems, drought conflicts and agricultural problems such as pests and diseases) • Seasonality (employment opportunities, price and production)
Design principles for common pool resources
• Clearly defined boundaries • Proportional equivalence between benefits and costs • Collective-choice arrangement • Monitoring • Graduated sanctions • Conflict resolution mechanisms • Minimal recognition of rights to organise • Nested enterprises
Source: Modified by the researcher after Carney (1999)

3.3.2 Strengths and weaknesses of the proposed framework

The strengths of the proposed evaluative framework include: first, its ability to relatively easily evaluate the institutional frameworks of stable common pool resources in achieving sustainable livelihoods by poor forest-dependent communities. Second, the above framework has managed to address one of the key problems in common pool resources studies identified by Agrawal (2002), a lack of a framework that connects different variables in a causal chain. Third, following the strengths described by Ashley & Carney (1999), the framework provides a people centred approach and is able to respond to changing circumstances and can be used

in multiple layers. For instance, it can be used at the national level or public/private partnerships and private sectors to evaluate institutional arrangements of co-management regimes, and the extent to which these institutions are able to deliver sustainable livelihood outcomes to the poor forest-dependent communities. Fourth, it can also be helpful in understanding how institutional arrangements can lead to poverty.

The framework has weaknesses, just like other frameworks. It may be difficult and complex to apply with certainty in a multi-layered rich and intricate socio-political world. Also when using the framework for monitoring, reviewing and evaluating programmes the framework is broad and does not allow the many different factors of livelihoods to be put in context and balanced against each other (Twigg, 2001). For instance, Twigg (2001) argues that when an approach is so broad, problems are likely to arise in identifying the most important needs for analysis. In spite of these weaknesses, Twigg (2001) maintains that the SL framework is a good model for reviewing all aspects of livelihoods. The framework has the ability to provide guidance in the exploration of institutions in a setting where there is both a reliable resource and a co-management agreement in order to ascertain whether there are any sustainable livelihoods outcomes, and, if so what is their nature or extent.

It can be helpful in understanding the interventions that can be included in co-management arrangements to significantly reduce livelihood disturbances of the forest-dependent communities. It can also be used to measure the livelihoods outcomes of the forest-dependent communities involved in co-management institutions, examine the co-management interventions and their implications on the livelihood asset base of the forest-dependent communities and examine co-management interventions and local resource improvements. This framework, therefore, meets its primary purpose of aiding in exploring the extent to which the institutional arrangements of ASFR have strengthened the livelihood strategy of the forest-dependent communities.

3.4   Chapter summary

This chapter has reviewed the literature on the sustainable livelihood approach and its primary methodological contribution. There was a clear indication from the review of literature that since the sustainable livelihood framework emerged in the 1990s it has been adopted by a range of development actors and it provides a reasonably coherent framework for guiding implementation and evaluating linked economic–social outcomes associated with co-management.

The key features to consider when seeking data to explore the impact of co-management of ASFR therefore include; livelihood assets that people have built /or drawn upon as a result of the co-management arrangement (for instance the human, natural, financial, social and physical capitals); Ostrom's 1990 design principles; livelihood outcomes; livelihood strategies and vulnerability context. The framework is systemic, enabling considerations of explanations for linkages and probable cause and effect relationships. It also enables qualitative and quantitative data to be combined into one framework.

As already identified in the review of literature about common pool resources, there are no studies that link co-management institutions and sustainable livelihood outcomes; therefore, the sole purpose of this chapter was to review literature on the sustainable livelihood framework to formulate a framework that can establish these linkages. From the review of the literature it was found that Ostrom's (1990) design principles captures the details of common pool resources institutions and are useful for analyzing the robustness of these institutional arrangements. Therefore, the transforming structures and process in Carney (1999) original SLF framework were replaced with Ostrom's (1990) design principles to form a framework that can be used to explore real world commons such as ASFR.

Chapter 4
Research methods

4.1 Introduction

This chapter builds on previous chapters and describes the research methods used in the study. The chapter is organised around nine sections. The next section 4.2 describes the general characteristics of the study area. Section 4.3 gives a historical overview of the ASFR co-management initiative. The approach used in the study is explained in section 4.4. Section 4.5 discusses the data collection methods. In section 4.6 the human ethical issues and approval process are explained. Section 4.7 explains the data analysis approach used for the study. Section 4.8 explains the process involved in selecting the participants for the study, and finally, section 4.9 provides a summary of the chapter.

4.2 General characteristics of the study area

The study area, the ASFR, is located in the Kilifi and Malindi districts on the north coast of Kenya (Figure 4.1).
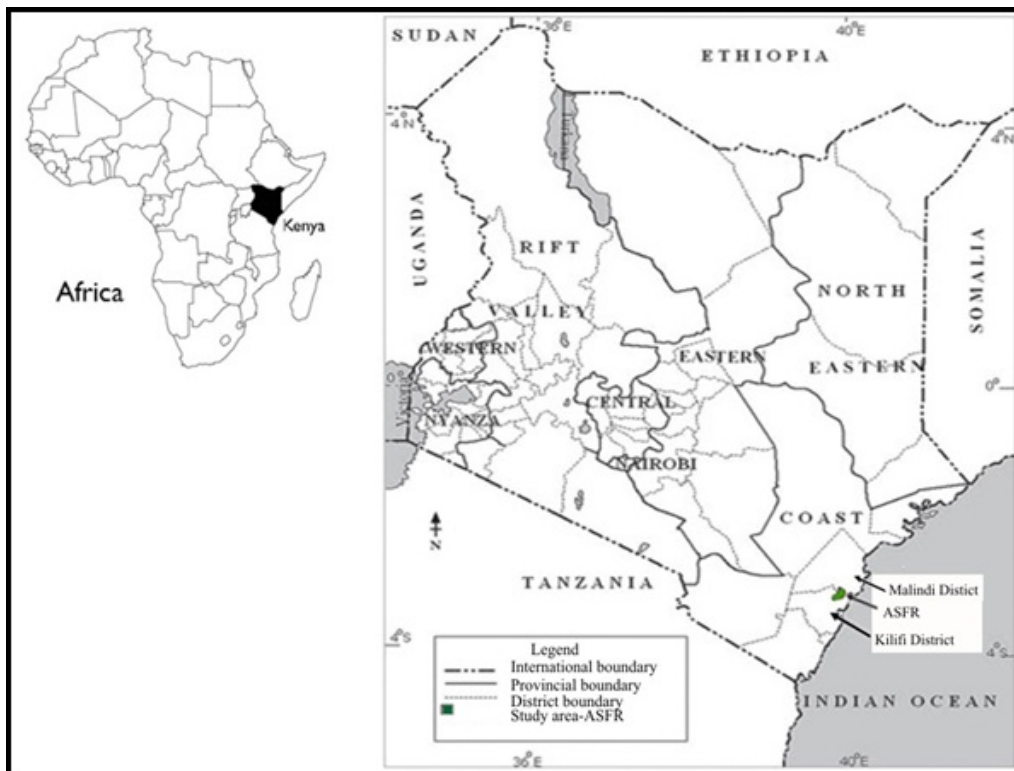
Figure 4.1   Map showing the location of ASFR

The forest covers 41,600 ha, and is the largest single block of coastal forest remaining in East Africa (Arabuko-Sokoke Forest Management Team, 2002). ASFR is located in a hot and humid climate with an average temperature of around 29^0C. There are two rainfall seasons of

over 1000 mm in the wet part of the year, declining to 600 mm in the dry part of the year. This environment has provided tree species of valuable timber for both the furniture and construction industry (Muriithi & Kenyon, 2002). Three distinct vegetation types are identified (Figure 4.2): mixed forest; *Brachystegia* woodland; *Cynometra* forest and thicket; Mixed Forest — this is a dense forest type on wetter coastal sands in the east of ASFR. It has a diverse tree flora including *Afzelia quanzensis*, *Hymenaea verrucosa, Combretum schumannii* and *Manilkara sansibarensis* and the *cycad Encephalartos hildebrandtii. Brachystegia* forest — this is a more open forest, dominated by *Brachystegia spiciformis* on drier and infertile white sands through the centre of the forest. *Cynometra* forest — this is a dense forest or thicket on the north-west side of the ASFR, on the red Magarini sands towards the western side of the forest. It is dominated by trees of *Cynometra webberi* and *Manilkara sulcata*, and the euphorbia species *Euphorbia candelabrum*, but with reducing numbers. *Brachylaena huillensis* also used to be abundant in this zone, but its numbers have been severely reduced by extraction (Arabuko-Sokoke Forest Management Team, 2002).
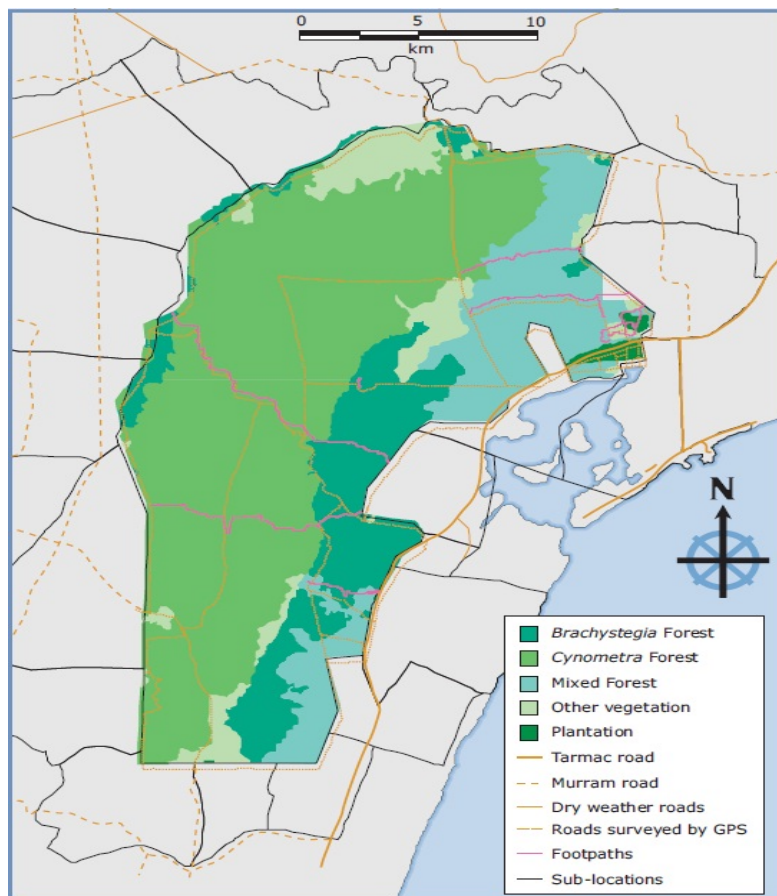
Figure 4.2   Vegetation types in the ASFR modified after (Arabuko-Sokoke Forest Management Team, 2005)

The forest has a high level of biodiversity (Muriithi & Kenyon, 2002). A survey carried out in 1994 identified nearly 600 plant species (Kenya Indigenous Forest Conservation, 1992) and 230 birds, of which six are listed in the Red Data Book for African Birds (Kenya Indigenous Forest Conservation, 1991). One of these birds, Clarke's weaver, is endemic, while the *Sokoke* scops owl, *Amani* sun bird and *Sokoke* pipit are near endemic (Kenya Indigenous Forest Conservation, 1995). The forest is listed as the second in importance for bird conservation in Africa (Wass, 1995). In addition to its importance for birds, the forest also provides a habitat for many species of invertebrates including 250 species of butterflies, as well as large and small mammals (Kenya Indigenous Forest Conservation, 1993). Three globally threatened mammals that occur in the forest are; the Golden-Rumped Elephant Shrew, Sokoke Bush Tailed Mongoose and the Alder's Duiker (Arabuko-Sokoke Forest Management Team, 2002; Kingdon, 1997).

The ASFR is surrounded by about 50 villages, that depend on the forest for their subsistence with a total population of about 104,000 (Figure 4.3), thus making it the most depended upon forest by communities in Kenya (Arabuko-Sokoke Forest Management Team, 2002). The forest is mainly surrounded by the Giriama settlements. The Giriama people are one of the nine Mijikenda sub-communities (namely, the Digo, Duruma, Rabai, Chonyi, Kambe, Ribe, Kauma, and Jibana) who live in the northern part of the Kenya's coastal region. The other groups who live adjacent to the forest are the Sanya who are found in the Mijombani area in Malindi district, the Gede sub-location (which is on the eastern side of the forest) and a few Swahili who live along the coast (Munyi & Mutta, 2008).

The Giriama are mostly small scale subsistence farmers who utilise the forest for some of their livelihood requirements. The main crops grown in the area are maize, cassava and beans. Locally grown cash crops include coconuts, mangoes, cashew-nuts and sesame. Farmers are increasingly taking up dairy farming, although levels are still low (Arabuko-Sokoke Forest Management Team, 2002).

The ASFR is the only forest reserve in Kenya which is managed as a co-management partnership between four government agencies (the Kenya Forest Service, Kenya Wildlife Service, Kenya Forestry Research Institute and National Museums of Kenya) and the local inhabitants living adjacent to the forest who depend on it for their livelihoods. The co-management initiative has been in place for nearly 17 years, however, only Kahingoni, Dida and Kafitsoni villages are actively involved in piloting of the co-management agreement

(Figure 4.3: The villages underlined in blue are the ones piloting co-management while those underlined in red are not, but form part of the case study sample).
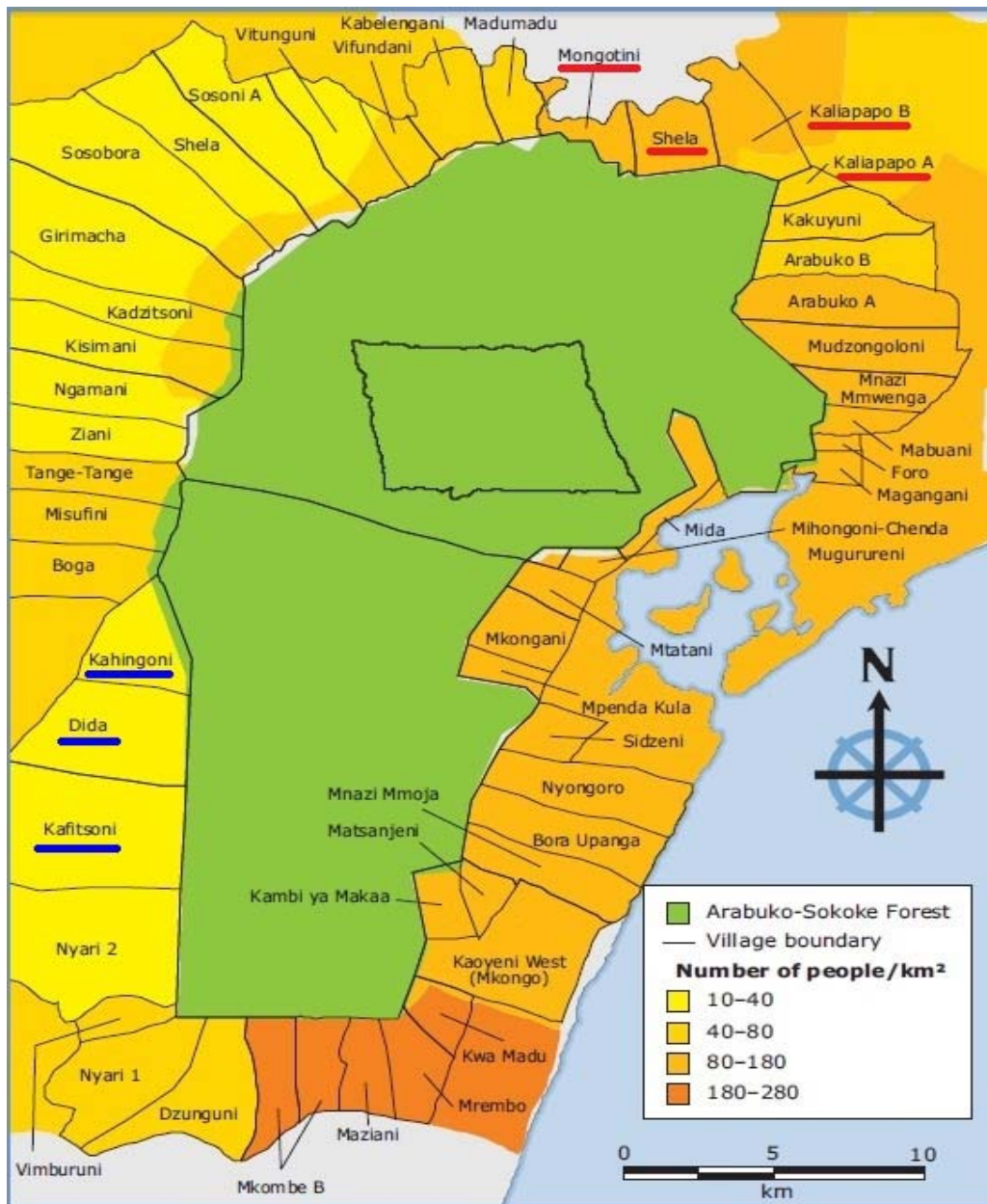
Figure 4.3   Villages dependent for ASFR for their livelihood per square kilometre
                 modified after (Arabuko-Sokoke Forest Management Team, 2005)

4.3 History of ASFR co-management

ASFR is all that remains of what was previously a much more extensive forest. Population growth, coupled with increasing demand for timber and land for agriculture, have contributed to a reduction in the extent and condition of the forest. Much of the forest is now degraded,

particularly through the removal of commercial timber species for wood carving and general construction (Arabuko-Sokoke Forest Management Team, 2002). Fairclough et al. (1995, p. 13) point out that, during the twentieth century, changes to the forest have become more profound and rapid, reflecting the growing population and the ever increasing power of humans to change their environment. Even as recently as the 1950s, ASFR reached the Kilifi Greek, more than 10 kilometres south of its current boundaries.

Forced south by wars in Somalia in the sixteenth century, a tribal group known as the Mijikenda came to dominate the region just inland from the coast. Formed of nine distinct sub-tribes, they settled on the edge of hill tops stretching from Kilifi to the Shimba hills south of Mombasa. Each sub-tribe established fortified villages, called Kaya, in the hilltop forests, many of which survive today. It was from these historical centres that they spread when population growth forced expansion in the mid-1800s. Around the ASFR it was the Giriama sub-tribe of the Mijikenda which displaced the former residents, the Sanya who were forest dwelling hunters and gatherers (Fairclough et al., 1995). Mogaka (1991) points out that, traditionally, before the 1920s, the ASFR is believed to have belonged to the Sanya people who used the forest for hunting.

The colonial period brought about changes in the management of the forest, such that in the 1920's European timber merchants began attracting other people to the area (Glenday, 2005). Fairclough et al.(1995) point out that, in addition to clearing land for sisal and cashew nut plantations, European merchants began systematically to strip the forest of its timber. A number of saw mills depended entirely upon the ASFR and their staff and families needed land for cropping, adding pressure on the forest. Large areas of the forest were cleared for a series of European settlement schemes, hemming in the forest. Glenday (2005) notes that sawmill camps existed within the ASFR at Dida, Kararacha, Mida, Arabuko and Jilore.

With the increase in logging, concern over the forest resource arose and, subsequently, the ASFR was proclaimed as Crown land in 1932 and was gazetted as a forest reserve in 1943 (Arabuko-Sokoke Forest Management Team, 2002). These changes shifted the ownership of the forest from the community to the government. The government entrusted the responsibility of the management of the forest to the Forest Department (Mbuvi & Wairungu, n.d). However, the Forest Department has been in constant conflict with the communities dependent on forest resources as a source of their livelihoods (Mbuvi & Ayiemba, 2005). The community members vandalized the sign posts that spelled "no entry without permission"

and whenever forest patrols were conducted close to their villages, all adults went into hiding. The core cause for the antagonism was that the local communities were not included in the management and benefit sharing of the forest resources. The ASFR authorities worked on the principle of preservation of the forest. This made the forest-adjacent communities struggle to access the benefits they were used to from the forest for their survival (Mbuvi & Ayiemba, 2005).

Due to the ecological importance of the forest, the government was pushing for a very limited use of a narrower range of forest resources, a position that overlooked the importance of the forest to the local economy and livelihoods. This protectionist drive heightened the negative attitude of the community towards the forest: more than 80 percent of the community were of the view that the forest was of no value to them and wanted its land use to be changed to agriculture (Maundu, 1993). As Kusters et al. (2006) note, in the early 1980s, the protectionist paradigm that had dominated the nature conservation movement since the 19th century, began losing ground. It was replaced by a strong notion among conservationists and development practitioners that poverty reduction and environmental conservation should go hand in hand.

Since the ASFR is of immense importance to the forest-adjacent communities whose livelihoods are partly dependent on its resources, the people living adjacent to the ASFR have been associated with poaching and loss of biodiversity (Arabuko-Sokoke Forest Management Team, 2002). As the coast towns of Malindi, Kilifi and Mombasa grew, the forest became a major source of fuel wood, timber and poles for an expanding urban population. In recent years, growth of the international tourism industry along the north coast has led to additional demands on the forest for timber for construction and souvenirs. By 1995, it was estimated that only about 25 percent of the remaining forest had not suffered significant degradation (Fairclough et al., 1995). This led to the need for efforts to conserve the ASFR and, in 1989-92, a new conservation initiative for ASFR co-management began when the European Economic Community funded a project in collaboration with Birdlife International. This financed research on the effects of logging and forest degradation on bird communities, which gave minor, but much needed assistance, to the Forest Department. In 1990, ODA (United Kingdom-Official Development Assistance) funded the Kenyan Indigenous Forest Conservation Programme (KIFCON) which led to some crucial surveys and documentation

of the socio-economic condition of the ASFR-adjacent dwellers. This formed phase one of the programme to conserve the ASFR.

Based on the findings from phase one of the project, KIFCON developed a multi-sectorial proposal for the forest. The proposal included community participation, plantation development, wildlife conservation, rural development, environmental education, and ecotourism. These were to be implemented in phase two of the programme (from January 1993 onwards), but were overtaken by a political impasse between the British and Kenyan Governments. After a year of uncertainty, funding was withdrawn in January 1994 (Arabuko-Sokoke Forest Management Team, 2002). Despite this set back, a crucial advance was made in 1992 with the formation of the Arabuko-Sokoke Forest Management Team (ASFMT) through a memorandum of understanding (MoU) between the Forest Department (FD), currently the KFS, and the Kenya Wildlife Service (KWS), later joined by Kenya Forestry Research Institute (KEFRI) and National Museums of Kenya (NMK). A government informant (KOI04) commented that the MOU essentially forced these government departments to work together.

With the understanding that the Birdlife International was to seek alternative funding, for phase two of the project, the British Government provided support for the operation of the ASFMT. The European Union subsequently funded a revised Birdlife International proposal in 1996, and in 1997 the Arabuko-Sokoke Forest Management Conservation project (ASFMCP) was launched. A key component of this was to adopt a co-management approach to working with the local communities. Three villages: Dida, Kahingoni and Kaftisoni, together with the KFS, KWS, KEFRI and NMK, were involved in piloting co-management of the forest. These communities (Dida, Kahingoni and Kaftisoni) were introduced to projects, such as (agro forestry, butterfly farming and beekeeping), as a strategy for improving their livelihood outcomes, in an attempt to conserve the ASFR resources. In 2002 the ASFMCP funding ended (Arabuko-Sokoke Forest Management Team, 2002). Since then there has been no international funding to support the projects. However, the co-management business started by the donor funding did not fail after they left but they continued largely to operate. The government of Kenya, through the KFS and the three other government agencies (KWS, KEFRI and NMK) continues to work with the participant communities in the co-management initiative.

4.4 The study approach

This study employed an ethnographic research approach. Ethnography usually involves the researcher participating, overtly or covertly in people's daily lives for an extended period of time watching what happens listening to what is said and/or asking questions through informal and formal interviews (Hammersley & Atkinson, 2007). The key features of an ethnographic study include: (1) focusing on the meanings people give to their cultural world; (2) taking an holistic attitude towards culture; (3) using the researcher as a data collection instrument participating in cultural activities; (4) a concentration on interaction, observation and speech; (5) searching for rich points; (6) a description of systems; and (7) lengthy periods spent in the field (Maggs-Rapport, 2001).

The decision to use ethnographic design is strongly influenced by the characteristics of the population, the condition of the research setting and what the researcher needs to know (LeCompte & Schensul, 1999b). A number of reasons led to the selection of ethnographic methods for this study: (1) the ASFR co-management arrangement involves a number of sectors and complexities; (2) the study wanted to elicit information from the communities depended on the ASFR resources for their livelihoods in their own cultural context; and (3) the intension was to fully document the co-management institutional arrangement of ASFR and then understand whether these institutions have contributed to the livelihood outcomes of the forest-dependent communities (see LeCompte & Schensul, 1999b).

Notwithstanding the fact that ethnography has been adopted in this study, it has some limitations. Ethnographic research takes time and is, therefore, relatively expensive compared to other research methods. The findings from ethnographic studies may not be readily encapsulated into a series of neat bullet points (Wllig & Stainton-Rogers, 2008). Wllig & Stainton-Rogers (2008), however, argue that the richness, diversity and complexity of human cultural life from the perspective of 'insiders' is likely to be reflected in good ethnographic research, and this can generate invaluable insights and contribution to knowledge that would not emerge using any other research method. While doing my field work, I focused on understanding the culture of the residents of the study villages, participated in their activities, interacted with them, observed their daily undertakings and conversations, and linked their discussions with the common pool resources management theories.

LeCompte & Schensul (1999b) note that, early in the 20th century, ethnographers lived in a community for 2-3 years, learning aspects of community life as much as possible, but now

ethnographers work for shorter periods of time in communities because, generally, they are focused on a particular aspect or dimension of culture and because it is simply no longer possible for most researchers to spend years in a single site. The latter is the approach adopted in this research and by the end of the period I felt there was little further relevant data coming forward. Unlike the lengthy field work tradition of ethnographic studies, I only took six months since the study was interested in only particular aspects of the ASFR co-management regime. I spent three months in each set of communities (piloting/non-piloting communities) by staying in one village and making it as a base to circulate among the other villages of the study communities.

In order to access information to address the research objectives, I used a case study approach. Case studies enable: (1) grounding of observations about social action and social structures in a natural setting studied at close hand, and; (2) provides information from a number of sources permitting a more holistic study of complex social networks and complexes of social action and social meaning (Feagin, Orum, & Sjoberg, 1991). Case studies are also theoretically exciting and rich in data (Cassell & Symon, 2004).

The ASFR was chosen as the case study because it had sufficient size and complexity had multiple communities and had an established formal attempt at a co-management arrangement. This case seemed likely to provide useful insight into the theories and design principles of interest to this research. It was also one which I, as a Kenyan who had lived in and worked in the coastal region of Kenya, found personally interesting and relevant to the development issues facing my country. Fifty villages have been identified by authorities as dependent on the forest for their livelihoods (Arabuko-Sokoke Forest Management Team, 2002).

I chose to use two sets of community case studies within the ASFR to address the research objectives. One set of cases comprised the three communities that have been involved in piloting the ASFR co-management, namely: Dida, Kahingoni and Kaftsoni. The second set of cases comprised four communities not-piloting co-management, namely: Kaliapapo A, Kaliapapo B, Shela and Mongotini (Figure 4.3). The three villages constitute the Dida sub-location in Kilifi district, and the four villages constitute the Mongotini sub-location in Malindi District.

4.5 Data collection methods

When conducting research there are invariably trade-offs made between depth, breadth, reliability and robustness, and the resources available to the researcher (e.g. time, funds etc.). However, Savenye & Robinson (n.d) recommend that in order to make credible findings more likely, prolonged engagement, persistent observation, conformability and triangulation with multi-methods and various sources of data should be undertaken. Further, Benbasat et al. (1987) note that multiple data collection methods are typically employed in case study research .The goal is to obtain a rich set of data surrounding the specific research issue, as well as capturing the contextual complexity. They identify several sources of evidence that work well in case study research (ibid, p 374): (1) Documentation, which includes written material ranging from memoranda to newspaper clippings to formal reports (including archival records): organisation charts; service, personnel or financial records; (2) interviews, which may be open-ended or focused; (3) direct observation, which involves absorbing and noting details, actions, or subtleties of the field environment on unobtrusive measures and; (4) physical artefacts such as devices, outputs and tools.

However, ethnographers continue to debate whether or not ethnography includes quantitative research (LeCompte & Schensul, 1999a; Schensul & Schenslu, 1999). Many qualitative researchers consider it impossible to transform beliefs or behaviours into numbers, whereas others insist that only numerical data are amenable to so-called objective statistical analysis are scientifically valid and reliable (Schensul & Schenslu, 1999). However, LeCompte & Schensul (1999a) argue that some aspects such as income, infant mortality rates and gross national products can be conveyed quantitatively (LeCompte & Schensul, 1999a). In this research both qualitative and quantitative data were collected using: documents, participant observation, interviews with key organizational and household informants operating in the co-management organizations, a survey of households and a small set of more detailed household interviews by including some questions that required households to give figures (e.g. the extent the co-management arrangement had improved the livelihood outcomes of the forest-dependent communities). These are described in more detail in the following sections.

4.5.1 Use of documents

The use of documents is a major source of data in social sciences (Sapsford & Jupp, 1996). Patton (2002) points out that documents provide the researcher with information about things that cannot otherwise be observed or about which the researcher was unaware. They may

uncover events that took place before the research began and have endured across time. They can also provide evidence that confirms or supports data gathered from other sources, thus providing a key means of triangulation. The weaknesses with documents, however, are that they are snapshots of the time and context in which they were written and from the perspective of the author (s). The subtext of situations may not be represented and documents may, in fact, be quite misleading and have little bearing or information on what happened in reality, or on the major matters relevant to a given situation. If these limitations are kept in mind, however, they can provide valuable insights and information.

Documents drawn on in this research include official documents such as the Arabuko-Sokoke strategic forest management plan, the Arabuko-Sokoke forest co-management guidelines, memoranda from the organizations participating in the co-management approach and relevant reports to the study derived from libraries and files. Admission was sought from the relevant authorities before accessing the libraries and files.

4.5.2 Semi-structured interviews

Semi-structured interviews were chosen for all three surveys: the key informants, the general household survey and the in depth survey undertaken with a smaller set of householders (see below). This method offers participants the opportunity to explore issues they feel are significant. The interviewer does not keep a tight rein on the interview but instead allows the interviewee, through the use of open-ended questions, to explore the subject in as much depth and from as many angles as they please (Longhurst, 2009). Other methods, such as observation, closed questionnaires and structured interviews, do not allow for as much discovery or probing. In-depth, semi-structured interviews, however, offer interviewers and interviewees' time and space to explore issues thoroughly. The method is also useful for collecting a range of opinions on a topic. Second, semi-structured, in-depth interviews were considered appropriate as they can prove particularly useful for investigating personal, sensitive, or confidential issues, which informants might find difficult to disclose and discuss in a group interview or focus group. For instance, the evaluative framework for the research required information on monitoring and graduated sanctions and their enforcement. It was anticipated that there might be some sensitivity around such issues. Such issues are also difficult, if not impossible, to include in a questionnaire as they may be situation-specific or relate to things that might not be anticipated in a structured questionnaire design. I chose to use semi-structured interviews when carrying out all interviews in order to allow the

interviewees a degree of freedom to explain their thoughts and to highlight areas of particular interest and expertise that they felt they had, as well as to enable certain responses and sensitive issues to be questioned in greater depth.

As Longhurst (2009) also notes, one of the weaknesses of semi-structured interviewing is that it tends to be very time consuming and she reports that interviews tend to last, on average, one hour (but this can vary enormously). For example, formulating a schedule of questions and/or prompts, recruiting participants, organizing times and spaces in which to conduct interviews, and transcribing and analyzing interviews all add up to many hours of additional labour. I experienced all these during my research, and the duration of my interviews varied between 30 and 90 minutes. The reasons that contributed to time variance is that some of the interviewees, were brief and to the point in answering their questions, providing little elaboration or expansion on their answers, even when probed, whereas others were quite prepared to go into more detail. There was no particular pattern in relation to these behaviours with people of the same status and from similar organisations being quite different in the way they responded. There was no attempt to 'rush through' the interviews and each interviewee was given sufficient time to respond as fully as they wished.

The semi-structured questions on the households, detailed household case studies and key informants contained both closed and open-ended questions that were designed before going to the field. The design of the questions was informed by extensive reading of materials on the study subject area and linking this to the theoretical framework intended for data analysis. Consequently the questionnaires were thematic in nature. For instance, all the questions that were used to interview households on institutional arrangements were grouped together. The same was done to those questions that sought information on the evaluation of the ASFR institutional arrangements in achieving sustainable livelihoods for the forest-dependent communities. The questions were intended to follow a logical sequence to facilitate household responses. This arrangement of the questions worked well in the field as the respondents seemed at ease in answering the questions because of the connectedness of research themes. The closed questions sought to elicit factual information such as the extent the livelihood of the forest-dependent communities had increased, whereas the other questions sought more descriptive responses.

All the household interviews and detailed household case studies were conducted at the homes of the householders. Detailed household interviews were undertaken subsequent to the

initial household survey. The choice of households for this more in-depth process was based on information gained in the household survey. Each household interview and each detailed household interview was conducted separately in a secluded room or open space far from other household members within the compound, to avoid being overheard and to allow them to answer the questions freely.

The key informant's semi-structured interviews were of two types. The first type was, for the heads of organizations participating in co-management and the second, for the key household informants involved in heading various sections of the co-management at community level in the DIFAAFA and VDFCCs. Interviews with heads of organizations participating in co-management were conducted following appointments in their offices whereas; interviews with key household informants were conducted, at their homes following appointments. In both cases the interviews were done in a separated place to facilitate free response to questions.

4.5.3 Participant observation

Although household survey and interview data were considered necessary for the reasons given above, some researchers have recommended that participant observation be used in ethnographic studies because it aims to generate practical and theoretical truths about human life grounded in realities of daily existence (Jorgensen, 1989). For instance, the data from observations consist of detailed descriptions of people's activities, behaviours, actions, and the full range of interpersonal interactions and organizational processes that are part of observable human experience (Patton (2005).

Nevertheless, participant observation has been criticized, as a research technique even though it has been adopted in this study for data collection. Participant observation cannot be presented as a series of highly mechanical steps that when followed by anyone will result without exception in competent observational research (Jorgensen (1989). Also, Tellis, (1997) has identified that participant observation is costly and time-consuming and involves selectivity (thus the researcher might miss facts).

But, regardless of these criticisms, participant observation is seen as very special strategy and method of gaining access to the interior, seemingly subjective aspects of human existence (Jorgensen (1989). It also makes it possible to check descriptions against facts while noting discrepancies and helps researchers to become aware of systematic distortions made by the

participants understudy (such distortions are less likely to be discovered by interviewing alone) (Holstein & Gubrium, 2003; Sapsford & Jupp, 1996). It is also important because, irrespective of the topic or principal methods that one uses in doing social scientific studies, it enhances the quality and interpretation of the data obtained from the field, whether those data were collected through participant observation or other methods (Dewalt & Dewalt, 2002). Thus, the reasons for adoption of participant observation research technique for this study.

The relationship between the participant as an observer, people in the field setting and the larger context of human interaction, is the key component of ethnographic method. The character of field relationships heavily influences the researchers' ability to collect accurate truthful information. As a participant, the researcher must sustain access once it has been granted and maintain relationships with people in the field (Jorgensen (1989). To gain entry into the field, I contacted the village administration, explained the nature of the research, gave them the information sheet, consent form and research permit and they granted me permission to collect data in the villages. To establish and maintain relationships with the villagers I stayed in the study area when collecting data, thus I was known by the communities' residents and was, able to interact with them freely having made friendships with them. I, therefore, took opportunities to talk with the community members to get more detailed explanations and discussions of issues that I saw or heard them talk about that could support the objectives of the study. All the information from participant observation was recorded through note taking and used to support the research objectives. I also took photographs of the scenes and physical artefacts (e.g. bee hives) that had relevant information to support the research objectives. This enabled later repeat examination and provided prompts during transcription and analysis procedures.

4.6   Human ethics

Since the methods involved interviews and participant observation certain ethical issues needed to be addressed. All researchers must be concerned with preventing subjects from being harmed, protecting their anonymity and privacy and not deceiving them if at all practicable (Erlandson, Harris, Skipper, & Allen, 1993; Punch, 1994). Lincoln University has a nationally recognized Human Ethics Committee (LUHEC) that approved the methods used in this research. This was reflected in the field procedures followed. For instance, no one was interviewed before reading the information sheet and signing the consent form. Erlandson et al. (1993) and Punch (1994) argue that, securing participants' informed consent to the

research should create trust that facilitates the current and future research. After subjecting the research instruments through LUHEC a similar process was undertaken with the National Council for Science and Technology in Kenya, which allowed the researcher to access a permit to conduct the study in accordance with the research requirements of the Government of Kenya.

4.7 Data analysis

Many research designs relegate analysis and interpretation to the final stages of the research process. Data are first collected and when data collection is complete analysis begins, sometimes long after the researcher has left the field or laboratory. However, ethnographers begin the analysis of data almost as soon as they enter the field site, they continue with the process of analysis, hypothesis creation and testing and interpretation throughout the process of collecting data until the final page of the report is complete (LeCompte & Schensul, 1999a). The analytical processes ethnographers use in the initial stages of field work are inscription, description and transcription. LeCompte & Schensul, (1999a) have identified the steps to follow when analyzing ethnographic data as: (1) analysis to create less data, (2) interpretation of data to figure out what the 'crunched' data means, (3) tidying up to seriously keep the researcher's house clean (this happens immediately the researcher has left the field); (4) coding the data to give codes and symbols to represent a group of similar important ideas or phenomena that the researcher has noticed in his or her research; (5) data management and analysis to organize the data until it becomes results. During my field work, I listened to each voice recording to ensure that it was adequately recorded and audible enough to generate data to answer the research objectives. None of the voice recordings was defective. Immediately after the field work I again listened to all the voice recordings and transcribed them. Once the transcription process was over the precision of the transcriptions was verified by re-listening to them alongside each transcript. All the transcripts were then coded manually (Table 4.1) from the first to last.

Table 4.1   Codes used for the various respondents

Interviewee class	Code
Households Case Study1(Communities piloting co-management)	HC1
Households Case Study 2 (Communities not piloting co-management)	HC2
Detailed Household Case Study 1 (Communities piloting co-management)	DHC1
Detailed Household Case Study 2 (Communities not piloting co-management)	DHC2
Key Household Informants	KHI
Key Organizational Informants	KOI

In the case of households piloting co-management the code was coined from *Household Case 1*(HC1), and then the numbering of each transcript was based on this code. For instance, the first transcript was labelled (HC101), the second transcript was labelled (HC102)…, the tenth transcript was labelled (HC110) …, and the last transcript in this category of interviews was labelled (HC138) because there were 38 interviewees in this category. In the households not piloting co-management, the code was coined from the *Households Case Study 2* (HC2). The procedure was then repeated in coding transcripts from households not piloting co-management. That is, the first transcript was labelled (HC201), the second (HC202)… and the last transcript (HC241) because there were 41 interviewees in this category. The coding was undertaken to differentiate interviews between piloting and non-piloting communities' responses to various questions and for keeping the anonymity of the research participants. This procedure was also used in the detailed household interviews in the piloting communities (*Detailed Household Case Study 1-DHC101, DHC102….etc.*); and detailed household interviews in non-piloting communities (*Detailed Household Case Study 2-DHC201, DHC202...etc.*). In the case of the key household and organizational informants' interviews, as only one set of interviews was done in each group there was no need to follow a similar process. Each quote used in the study was accompanied by the code of the transcript it came from (Box 4.1). For instance, a quote with code (KHI02) came from *Key Household Informant* transcript number 2; a quote with code (KOI01) its quote came from *Key Organizational Informant* transcript 1, etc. (Box 4.1).

Box 4.1 An illustration of how the transcripts and quotes were coded for the study

    Households Case Study1 (Communities piloting co-management) (HC101):
M: Do you have to obtain a permit to access each of the resources you use from the forest? If 'yes', how? If 'not', why not?
A: Yes, for example like us who rear the butterflies, if you want a product or the butterflies, from the forest, there are cards that we are issued with, so when you enter into the forest you should have all that tools, then you enter into the forest and collect what you want (HC101)
    Households Case Study 2 (Communities not piloting co-management) (HC201):
M: Is there any other way that the community here participates with the other stakeholders in the management of the forest
A: No, no we haven't (M: eeh) no, we have not reached that stage, no, I cannot cheat you (HC201).
    Detailed Household Case Study 1 (Communities piloting co-management) (DHC101):
M: Now, what about the butterfly farming, how long do you stay before selling them?
F: We take the butterflies at the Museum on Monday and Thursday (M: okay) (DHC101)
    Detailed Household Case Study 2 (Communities not piloting co-management) (DHC201):
M: What is your main source of livelihoods?
D: I do farming, like personally here I do banana farming, but I am not the one who started it, it was started by my father, I used to work but when he died I left working and continued with the farming?(DHC201)
    Key Household Informants (KHI01):
M: What quality of this product(s) are you allowed to collect from the forest?
A: The rule allows that you collect those fuel woods that have fallen down; they are not even allowed to enter with an axe into the forest, cutting a tree that is standing; you have to collect those trees that have fallen down only (KHI01).
    Key Organizational Informants (KOI01):
M: So, do these rules have clearly defined boundaries on what kind of resources can be collected from this area, or that area etc.
F: Yeah, they have been zoned out, yeah the area for fuel wood (M: fuel woods) areas for poles cutting, areas for complete conservations (M: mm) those are the areas that, there is no extraction (M: mm) yeah (KOI01).

The decision to use manual coding and analysis was informed by (Webb, 1999, p. 329) who points out that:

> *I have examined experiences of different approaches of qualitative data analysis by some of my former Ph.D students. What has emerged is that the process of coding qualitative data can be immensely time consuming if there is a large volume of data and that the use of computer-assisted qualitative data analysis software (CAQDAS) can speed this up considerably. However, when the data is not large and this is probably with most Ph.D students, the additional work of data management is not necessary.*

Webb (1999) further argues that the intellectual work of actually conceptualising can only be done by the brain of the researcher. The computer may be able to help, but there is a risk of becoming so concerned with technical aspects that it interferes with the 'artistic' aspects. Further, St John & Johnson (2002) argue that researchers have expressed concern that using QDAS (Qualitative Data Analysis Software) packages may result in: a focus on quantity instead of meaning, homogenisation of qualitative data analysis approaches, a privileging of coding and retrieval methods, distancing of the researcher from the data, inappropriate use of technology, time consumed in learning to use computer packages, pressures or expectations that all qualitative researchers will use them, and increased commercialism.

For these reasons computer assisted coding and analysis methods were not used in this research. After coding, I identified the data that were directly relevant to the objectives of the study and put them together in similar themes and meaning while considering the research objectives and questions, counted them and used the counts to assist in answering the research objectives. No QDAS was used as the data I collected were not large and I wanted to have a personal grip of the data. Cutting and pasting was used when grouping similar themes together. I then reflected on, and interpreted; these data to understand what it meant and organized it to answer the research questions. There were no new themes that emerged that were not originally conceptualized in the formation of the questionnaires as the research was about a particular aspect of the co-management. I was very careful as much as possible not to leave any information out that could assist to address the research objectives.

For the research to articulate the results some qualitative information was converted into a quantitative format. For instance the number of respondents who supported a similar theme were counted, tallied and the numbers were used to support the explanations of the results (e.g. if households were asked to explain whether they were able to monitor the behaviour of

users of the forest resources in the villages, those households who reported that they will monitor the behaviours were grouped together and those who reported that they will not monitor the behaviours were also grouped together and then these numbers were used to support the reasons for each case). Also some of the qualitative data collected produced figures that needed to be interpreted. For instance the study wanted to evaluate the extent to which the current institutions of ASFR governance have managed to strengthen the livelihood outcomes to the poor, forest-dependent communities. The number of times households mentioned the extent a livelihood outcome had improved was counted and tallies were made. Then similar themes were grouped together and percentages calculated. These percentages were used in the presentation of the study results by using histograms. A detailed process is provided in the presentation of these types of results in chapter 7.

To understand how household's livelihood assets had improved a similar process was applied. For instance, the number of times a household mentioned a theme was counted (e.g. type of livelihood asset, "goat", was counted under capital assets to see how many times it was mentioned by the interviewees and tallies were made, etc.) then similar themes were grouped together and comparisons made to understand whether the livelihood assets have improved as a result of the co-management arrangement in the piloting communities or forest related activities in the non-piloting communities.

Content analysis (see Ritchie & Lewis, 2003) was also used for analysis of all the documents that were collected from the field. The approach was similar to that which was used for the transcripts of interviews, but the context in which the documents were written had to be interpreted from information available about their histories or through information provided by interviewees. Bryman, (2008) argues that documents should be examined in terms of, on the one hand, the context which they are produced, and, on the other hand, their implied readership. After accessing the documents, I examined the content of the documents contained and what it implied for the study. The reason for doing this was to ensure that the information from the documents was relevant to the objectives of the study.

4.8   Selection of interviewees

Purposeful sampling was used in choosing all the participants of this study. Purposeful sampling is considered advantageous to study subjects who have specific experiences or subjects with special expertise (Marshall, 1996b). The current research sought people with experience of and those with no experience of, co-management and also sought information

from those with particular special knowledge and roles in the co-management of the ASFR. Interviewees were initially identified on the basis of their positions in organizations involved in the co-management arrangement based on documentary evidence. They were also asked if they may be able to recommend useful potential candidates for study (a form of snowball sampling (Marshall, 1996b). Care was taken in identifying potential interviewees from opposing camps, to avoid falling into the trap of only interviewing people who had similar views (to the first people interviewed).

As noted previously, in section 4.4, two sets of case studies were selected in the ASFR. One set of cases is piloting co-management and another has not been involved in piloting co-management. The purpose for doing this was to see if there are differences in views and experience about co-management to better assess its effectiveness in the delivery of sustainable livelihood outcomes. The information for selection of the villages originated from participant observations, informal discussions with the communities and documents available on ASFR co-management. This yielded a large number of potential villages that were not in co-management that could have been chosen for survey. Following Benbasat et al., (1987, p. 373) two criteria were used to decide the final set of villages: those communities were expected to have similar sustainable livelihood outcomes had co-management not been implemented, and secondly, that were expected to have different outcomes as a result of being same villages having been part of the co-management regime while the others had not. The villages thus were therefore, from the same tribal group, had approximately similar population characteristics and similar resource base and activity relationship with the forest.

A total of 109 interviewees were selected from the two sets of case studies. Despite the choice of two comparable sets of villages, from the outset it was not intended to undertake sampling based on collecting sufficient data to undertake probability statistical analysis. It was felt that the level of knowledge of the ASFR co-management arrangement and the relationship of the villages to the forest was not sufficiently understood to enable a robust survey instrument or sampling. Consequently, non-probability sampling and semi-structured interviews appeared potentially most useful. As Ritchie & Lewis, (2003) note, it is common for qualitative research to use a non-probability sample for selecting the population for study. Patton (2005) further points out that the logic and power of purposeful sampling lies in selecting information-rich cases for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the

inquiry. In a non-probability sample units are deliberately selected to reflect particular features of, or groups within, the sample population. Characteristics of the population are used as a basis for selection. Therefore, the decision to interview 109 interviewees was arrived based on the characteristic of the population under study. From each of the population identified for interview a number of interviewees were selected. Details on how each sample size was arrived at per population thus leading to the total of 109, are well captured by the descriptions of the various population sample types used for the study.

First, 38 households piloting co-management and 41 non-piloting households were selected to allow information from across the community members. The decision to stop at 38 and 41 respondents' interviewees was made by the researcher in the field after discovering that no new themes were emerging, indicating saturation of the data. Such a decision is common in qualitative research (Grady, 1998; Marshall, 1996b). Marshall (1996b) also indicates that an appropriate sample size for a qualitative study is one that adequately answers the research question (s). This point appeared to have been reached.

Nine detailed household case studies were carried out in the set of cases piloting co-management, and six detailed case studies in the set of cases not piloting co-management. The selection of these household case studies was informed by the ability of the interviewees to give clear and detailed answers to questions asked, willingness to provide additional information in a second round and the variation of the activities in which they were involved. For instance, the households involved in the co-management, were selected based on the forest-related activities they are involved in as a source of their livelihood. For the set of the cases where the households are not involved in the co-management regime the selection was based on the activities they use to earn their livelihoods. The purpose of this kind of selection was to understand the differences in livelihood strategies and, consequently, outcomes between the households piloting co-management and those not piloting co-management. Further, the study wanted to establish the levels to which co-management institutions can deliver livelihood outcomes vis-à-vis non-co-management institutions. For those households that could not be interviewed on a first visit, appointments were made at their convenience and follow-up visits were made. All the second appointments were honoured.

A key informant is someone considered an expert source of information. The key informant technique is an ethnographic research method which was originally used in the field of cultural anthropology and is now being used more widely in other branches of social science

investigation (Marshall, 1996a). Further, Marshall (1996a) argues that key informants, as a result of their personal skills, or position within a society, are able to provide more information and a deeper insight into what is going on around them. Kumar et al., (1993) explain that, researchers do not select informants to be representative of the members of a studied organization in any statistical sense. Rather, they are chosen because they are supposedly knowledgeable about the issues being researched and able and willing to communicate about them. Tremblay (1957) points out that, the key informant technique is pre-eminently suited to the gathering of the kind of qualitative and descriptive data that are difficult or time consuming to unearth through structured data gathering techniques such as a questionnaire survey.

Eight household key informants and seven key informants from the organizations operating in the co-management arrangement were interviewed for information specifically on the operation of the regime. In both the key household and key organizational informants, I selected one set of interviewees who had the knowledge about ASFR co-management and who were able to provide more information and a deeper insight into the ASFR co-management piloting communities and non-piloting communities. Individuals in both of these sets of key informant interviewees were selected during the course of my interview exercise using snowball sampling. Through conversations, the interviewees kept mentioning the names of these key informants as being more able to respond to my research question. I obtained their telephone numbers from these interviewees, called them, introduced myself to them and booked appointments. In some cases, the key organizational informants were busy at the initial appointment time and I had to re-book interviews more than once. Also, one organizational informant from a government agency declined to be interviewed, even after several attempts without giving any reason. Unfortunately, this individual had particularly significant responsibilities within the co-management projects; however, I am confident that the information gleaned from other sources has enabled an accurate picture of the arrangement and its operation to emerge. The Table 3.1, below, shows a breakdown of the sample size of participants in the study from the two communities under study.

Table 4.2   Break down of the sample size from the two communities under study

Type of participant	Break down of participants in the study	Number of participants in the study
Communities piloting co-management	Dida	14
	Kahingoni	12
	Kaftsoni	12
	Detailed household case studies*	9
Communities not piloting co-management	Kaliapapo A	10
	Kaliapapo B	7
	Shela	9
	Mongotini	15
	Detailed household case studies*	6
Key Informants	Household	8
	Organizational	7
Total number of interviews*		109

* The total number of interviews includes the second round of interviews labelled as detailed household case study participants. Therefore, a total of 94 individuals were interviewed.

4.9   Chapter summary

This chapter has explained the research methods used in this research. The ASFR is surrounded by 50 villages with a population of about 104,000 people. It is the only forest in Kenya where the management has invited three partners to jointly manage the forest together with the communities. The implementation of the co-management approach has been taking place at the ASFR for nearly 17 years, thus, the effect of the co-management approach on livelihoods are expected to have had sufficient time to be clearly evident. The inclusion of a set of villages that have not been part of the co-management arrangement was expected to make its impacts discernible. Ethnography and case study approaches were adopted to enable the study to document the ASFR co-management in its richness and complexity. Data were collected from three communities piloting co-management in Kilifi district, Dida sub-location, and four non-piloting communities in Malindi district, Mongotini sub-location. Before field work, the literature was reviewed and a modified sustainable framework was formulated to guide in providing indicators for formulating instruments for data collection and analysis. Primary data were gathered through participant observations, semi-structured interviews and detailed case studies, and secondary data were gathered through the review of documents. After the field work all the voice recorded data were transcribed and analyzed manually. The next three chapters display the results from the field work.

Chapter 5
Institutional arrangements for governance of ASFR

5.1 Introduction

The first objective of this thesis is to examine the current institutional arrangements for the governance of ASFR to establish the ground for an evaluation of the extent to which the co-management arrangements can be characterized as devolved collaborative governance. The chapter begins by describing the ASFR governance arrangements. The focus of the following part of the chapter is on the key aspects that shape the ASFR co-management governance arrangements and operation, namely: the roles of the ASFR co-management partners and the villagers' perceptions and awareness of the co-management arrangement. This is followed by reporting on the implications of the co-management agreement for rights to access and use the various forest resources. An explanation on how the co-management arrangements work in practice is finally provided.

5.2 The co-management arrangements

An explicit attempt at co-management has been adopted at ASFR. It involves four Kenyan government departments with direct resource management roles in relation to the governance of ASFR: the Kenya Wildlife Service (KWS), the National Museums of Kenya (NMK), the Kenya Forest Research Institute (KEFRI) and the Kenya Forest Service (KFS). These four have joined local communities and non-government organisations (NGOs) such as Nature Kenya to establish the Arabuko-Sokoke Forest Management Team (ASFMT) (Figure 5.1). The Arabuko-Sokoke Forest Management Team, (2005) guidelines set out the objectives of ASFMT. These include to: provide a coordinated initiative in biodiversity conservation and benefits to forest-adjacent communities, develop and manage long term coordinated monitoring systems and procedures for biodiversity conservation, enhance knowledge of the ASFR and disseminate quality information necessary for sustainable management of forests in Kenya and finally, optimise cost effectiveness through joint planning and use of the institutional resources of the ASFMT to manage the forest.
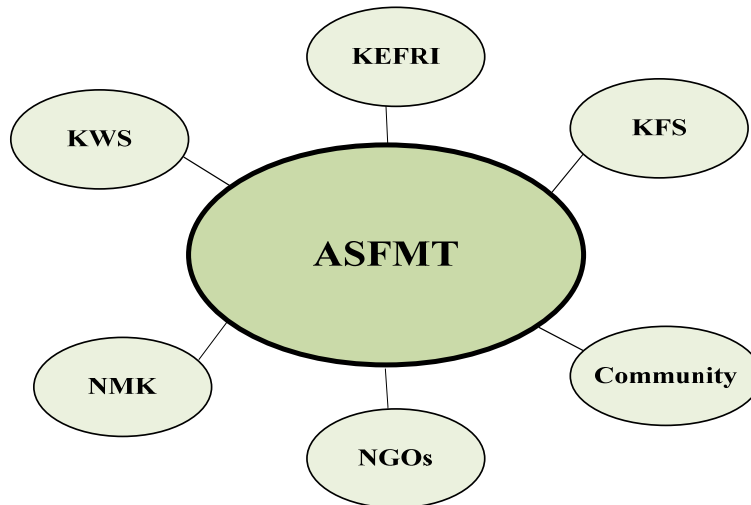
Figure 5.1   The composition of ASFMT

The ASFR covers the districts of Malindi and Kilifi. There are three forest management stations: Arabuko-Sokoke (in Kilifi District) and Gede and Jirole (both in Malindi District). Community Forest Associations (CFAs) have been formed based on these forest management stations. These are the Gede Community Forest Association (GECOFA), the Jirole Community Forest Association (JICOFA) and Arabuko-Sokoke's Dida Forest Area Adjacent Forest Association (DIFAAFA). Each CFA is expected to build its structure with the Village Forest Development and Conservation Committees (VDFCCs) within its community. These may vary between communities. For example, in JICOFA, there are seven VDFCCs; GECOFA has five, and DIFAAFA only three. According to an informant (KH101) the small number of VDFCCs in DIFAAFA is because it is the co-management pilot area and it is planned to increase the number of the VDFCCs as the co-management regime proves itself.

DIFAAFA is the umbrella committee for the three communities currently piloting co-management: Kahingoni, Dida and Kafitsoni. It is responsible for all the co-management related activities in these three communities. Each VDFCC has seven user groups: bee-keepers, butterflies, fuel wood, timbers, pole cutters, herbalists and on-farm tree growing. It also has an executive comprising the chairman, the vice-chairman the treasurer, the organizing secretary and the secretary. Also, each VDFCC has an elders' advisory group and it is involved with government stakeholders in the management of the forest (the KFS, the KWS, and NMK) and it has been involved with NGOs such as Birdlife International, United Kingdom-Official Development Assistance and Nature Kenya which have supported the co-management arrangement activities but withdrawn at some point.

There are 15 committee members in each VDFCC. Each user group elects a member to represent it at the VDFCC making a total of seven members from the user groups. The elders' advisory group and the user groups' executive committee elect one person each to represent them at the VDFCC. There are six slots available for the other stakeholders from the organizations that work in the piloting area that the community may wish to incorporate into the management of the forest, but one of the slots must be for the KFS. These numbers are shown in (Table 5.1).

Table 5.1   VDFCC committee representatives

Type of committee representative at the VDFCC level	Total number of representatives at the VDFCC level
One representative from each of the seven user groups (bee-keepers, butterflies, fuel wood, timbers, pole cutters, herbalists and on-farm tree growing)	7
One representative from the elders' advisory group	1
One representative from the user groups executive committee	1
Other six stakeholders, including KFS	6
Total VDFCCs representatives	15

The DIFAAFA as the umbrella organization of the three villages, comprises of 21 committee members, these include; the chairman, the vice chairman, the treasurer, the secretary and the vice secretary; one representative from each of the seven user groups; one elders' advisory group representative from each of the 3 VDFCCs; and the six stakeholders representatives (Table 5.2).

Table 5.2   DIFAAFA committee representatives

Type of committee representative at DIFAAFA level	Number of representative at DIFAAFA level
Executive members of the committee (the chairman, the vice chairman, the treasurer, secretary and vice secretary)	5
One representatives each from seven user groups (bee-keepers, butterflies, fuel wood, timbers, pole cutters, herbalists and on-farm tree growing)	7
One representative each from advisors of the VDFCCs from the three villages piloting co-management (Kahingoni, Dida and Kafitsoni)	3
Other six stakeholders including KFS	6
Total DIFAAFA committee representatives	21

The DIFAAFA and Kahingoni, Dida and Kafitsoni VDFCCs forest management structures are illustrated in (Figure 5.2) below.
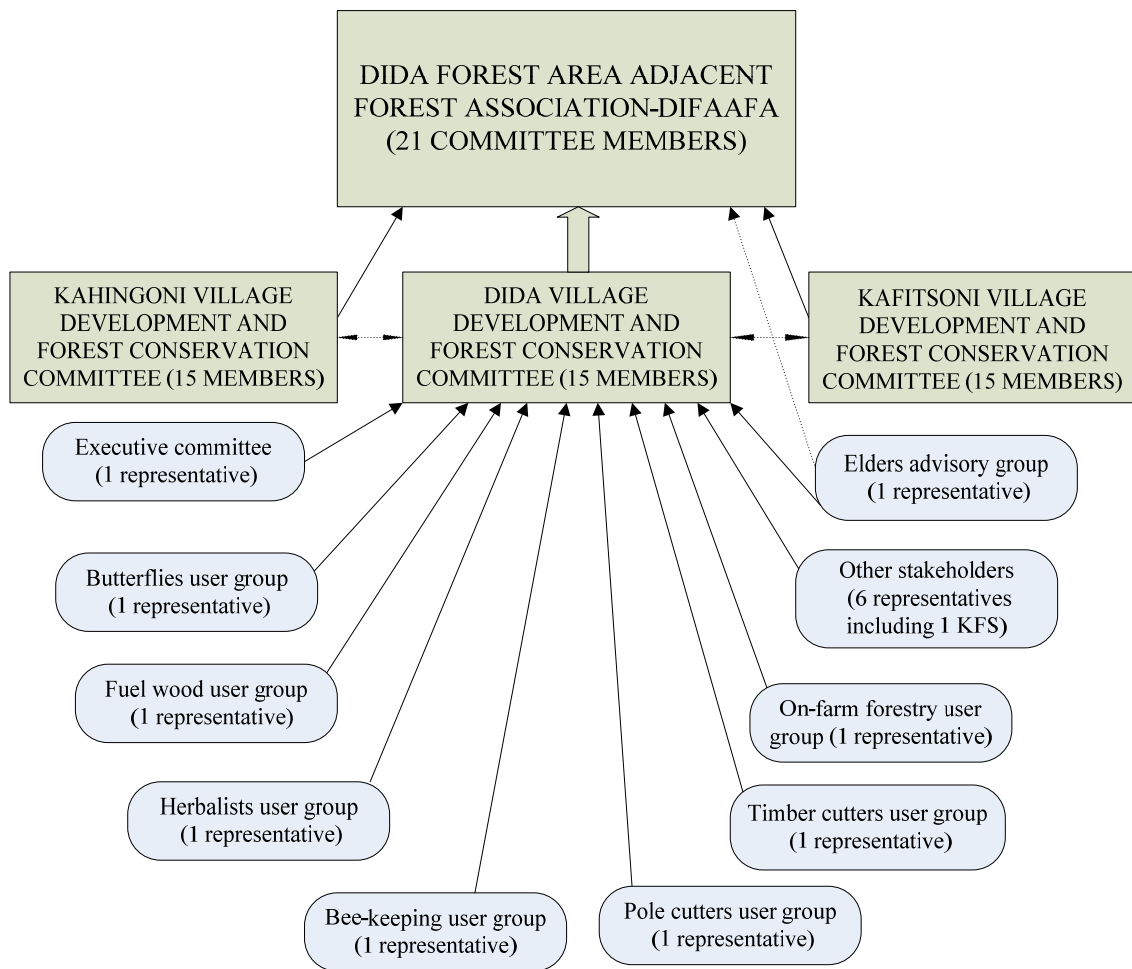
Figure 5.2   The DIFAAFA and the Kahingoni, Dida and Kafitsoni VDFCCs forest management structures

This study, however, found that even though households have been introduced to the ASFR co-management arrangement it has not been formalized as they have not signed a co-management agreement with the government. As one organizational informant put it:

> *… but I would say the only area where, still there is a weakness up to now is that there was no agreement signed between the institutions and the communities. They came in as partners but there was no agreement binding them to come to work together but the ASFMT guidelines provide for the communities to come and work but that is like a local kind of arrangement (KOI04)*

5.3 Roles of the ASFR co-management partners

Each of the government agencies involved in the co-management regime is there because of its particular responsibilities for the ASFR co-management. The NMK is responsible for preservation of flora and fauna, historical sites, technological and cultural heritage that are incidental to the management of natural resources, including forests and wildlife resources. The KFS manages forests, including the protection of wildlife. The KWS is responsible for the management and conservation of wildlife and the KEFRI conducts research on various forest management issues and advises the partners on how to manage the forest (Kenya Forest Services, 1996).

The CFAs have the authority, on behalf of the local forest-adjacent communities, to sign co-management agreements for forest use with the central government, as provided for in the 2005 Forest Act (Government of Kenya, 2005). Guidelines developed by the ASFMT affirm that the local forest-adjacent communities' role in the team is intended to be meaningful participation in the management of the forest as they are the primary beneficiaries of its products and services (Arabuko-Sokoke Forest Management Team, 2005). The NGOs mainly provide funding to support the co-management projects.

According to interviewees and, as set out in its 2005 guidelines (Arabuko-Sokoke Forest Management Team, 2005), to fulfil its role the ASFMT seeks to coordinate socio-economic, cultural, biological and ecological research and surveys related to biological resources (Arabuko-Sokoke Forest Management Team, 2005). The members exchange and provide resources and services with other members of ASFMT and this includes disclosure of partners' financial contributions in meetings and sharing annual work plans at the beginning of each fiscal year. They have agreed to promote sustainable management of the biological resource dynamics, which are described as "protection or production of endemic, rare and endangered biological resources and indigenous knowledge, culture and technology, including the creation of procedures for biodiversity monitoring on a continuous basis, evaluating species use and benefits to communities" (Arabuko-Sokoke Forest Management Team, 2005, p. 3). Joint training programmes have been initiated by the ASFMT partners to try to build inter-institutional capacity and develop community conservation and they also take part in joint applied research and conservation projects (e.g. on-farm tree planting) (Arabuko-Sokoke Forest Management Team, 2005).

5.4 Villager perceptions and awareness of the co-management arrangement

Households were asked to describe the nature of the co-management arrangement. Most of the households who answered this question were not able to describe it. For example, in piloting communities, out of the 24 who responded to this question, only eleven of them attempted to describe what the co-management arrangement is and 13 respondents were not able to describe what the co-management arrangement is. Although less than half could describe it, this contrasted with the communities that are not involved in piloting co-management, where the majority of them had not heard about the ASFR co-management regime. Those who were not involved in piloting co-management commented:

> *No, I cannot explain we are not in the co-management, I don't know if it can happen (HC201)*

> *Truly speaking not yet; I have heard about it but I am very curious to hear how it works (HC225)*

> *This kind of co-management has not started here (HC231)*

However, this was somewhat surprising given that these villagers live in villages that are represented in the co-management arrangement. Those households which agreed that they were aware of the co-management arrangement explained it in different ways. Some saw co-management as the coming together of different stakeholders to manage the forest, for example, the KWS, NMK, KFS and DIFAAFA (HC112). Others viewed co-management as simply getting a permit to access forest resources, for example, butterflies and fuel wood (HC135). Some described co-management as uniting families to manage the forest in the co-management piloting area (HC106). Finally, there was one householder (HC107) who was able to give a very precise and accurate description of the co-management arrangement. In summary, very few of the villagers have a real understanding of the co-management arrangements.

Interestingly, the interviews with the piloting communities' households' revealed not only an awareness of the partners in the co-management arrangements but also that a donor is considered by them to be the most important non-community stakeholder in this co-management regime. The households were positive that the donors make the project work in the communities:

> *The biggest stakeholders in co-management are the donors because without them there is nothing that can continue down here in the*

village, then we have the other organizations like the KEFRI, KWS and the community is now the last one (HC133).

… the major one are the donors because KWS and KFS, KEFRI are government departments, you see and they don't have enough funds … the pulling of out of donors, has demoralized the conservation process here, because one, if we get funds, we would have created co-management around the forest, and the activation of the forest conservation and the law… (HK102)

The non-piloting communities were asked to explain the forest management structure, especially in terms of their part of the forest. Out of the 23 households that responded to this question it was surprising that none of them was able to explain their forest management structure; however, they were aware that there are government forest guards involved in the management of the forest. The non-piloting households explained:

I don't know how they are managing it, because all the time I see the forest guards seated at the barrier (HC225)

I don't know how they manage the forest, because I see them passing here and going, even right now, they were just there, they came here drunk water and then they went (HC222)

The way the forest is right now I can say that there is no management structure, because they are trying but is isn't successful (HC223)

One of these household respondents clarified that the ASFMT visited the non-piloting communities and explained to them that it was intended that the ASFMT would organize them to manage the forest to ensure that they benefit from it, but the ASFMT had not returned. The householder commented:

In fact, the management of this forest, we don't go there at all and maybe in the past they came and said they will make groups at Arabuko-Sokoke forest reserve that could work and ensure that the forest benefits the community, we waited that we will be called, that the project is going to be brought here, up to now we have seen nothing, nothing it is the same way that we were, but we were told that there will be people who will be involved with this forest, maybe if somebody wants trees for building they will have to pass through the office and then the office will allow the person through that group, the group should be responsible for preparing these benefits to the community. But up to now we have not reached that step; they said that that group should come from Arabuko-Sokoke, but organizing until we have that group here it is not easy, in short they said that the co-management arrangement is there but nothing has happened (HC213)

It also came out from the interviews that the ASFR co-management structure has been evolving and emerging in the piloting communities. A number of explanations given by the households and informants show these findings. One of the households (HC126) in the piloting communities explained the current operation of the ASFR co-management, as follows:

> *If, for example they [community] want to collect timber, they do not want anybody to collect it from the forest without plan, building trees, etc. The community has to know that it takes care of the forest and their main work as a community is to manage the forest, so that communities do not get a lot of drought in the villages, and for fuel wood the communities have to collect only the logs that have fallen down the very old logs they split them, they are not allowed to fall any tree, it is not acceptable; they are under the DIFAAFA, which is divided into VDFCCs. The DIFAAFA is the one which was used to pilot the co-management project in the three villages [Dida, Kahingoni and Kafitsoni] and it is like the biggest police in the village, so the villages are in charge of the VDFCCs, but the DIFAAFA is the one with more power in all the three villages.*

Another household (HC112), explained, how the forest is managed, as follows:

> *For example the KFS forest guards and the village forest guards are now working together in patrolling through the forest. We have the community guards they are twelve, Kaftsoni four, Dida four, and Kahingoni four, who work together with the Government forest guards. It depends, they are like volunteers, but if we find any arrangement we would pay them for example from the sale of the trees, or we happen to have any savings we may pay them. In this structures our main role is to inform the people, we call the people in the villages, from Kahingoni we called the people and tell them the importance of the forest and then Kaftsoni and then Dida and then we created the sub-committees, we first created grassroots committees, then we created the VDFCCs, these are the ones that we created before the DIFAAFA, the DIFAAFA is like an umbrella, but we started with the VDFCC, so this VDFCC is the one which has various departments/sections, for example we have those involved with bee keeping, poles, butterflies etc.*

It can be concluded from the above discussion on the structure of the ASFR co-management regime that, the structure for the management of the forest in communities piloting co-management has emerged and has increased the villagers' understanding and awareness of the community. This is in marked contrast to the knowledge and understanding of the structure of forest management held by those in non-piloting villages. The DIFAAFA is more advanced than the other forest associations since it was used to pilot the ASFR co-

management and had received external funding to establish it. The other two CFAs have not been involved in co-management like the DIFAAFA and have not received any funding, but are in the process of forming their structures as they anticipate receiving funding.

5.5 Co-management arrangements for access, ownership and use of forest resources

A key issue in management of a resource like the ASFR is the degree to which communities can access, own and use resources. As the co-management arrangement involves some parties whose primary goal is protection or conservation of some of the resources and others who seek to benefit from the use of the resources for commercial or subsistence purposes, these arrangements are a critical component of the co-management regime. This research sought to understand the ownership, or terms of use or access, to the forest resources by both piloting and non-piloting communities.

The piloting communities' households reported that it was the 2005 Forest Act that had given them a chance to participate in the management of the forest and use some forest resources. In the past there was a lot of enmity between the households and the government (HC136). However, despite the fact that the 2005 Forest Act allows the communities to be involved in the management of the forest and use some of its resources, some households felt that the government had not given the communities enough powers to manage and use the forest resources (HC126). Some confirmed the significance of the DIFAAFA rules as a source of access and use rights to forest resources:

> *We have introduced our group [DIFAAFA] rules so we have trained the people here for a long time so they have got to follow our rules that we have introduced for ourselves. We have established these rules with those government agencies, because we have got to know how the rules should be applied, such that our rules are in line with the government rules, so that we can be able to have our rules in the village. So these rules that we are talking about, the one we are talking about, have not been registered, but once they are registered I can see ourselves using the rules that we have made ourselves, we have our rules (HC107)*

Notable in these comments, is that the proposed local rules are specifically congruent with the government rules, a matter discussed in chapter 6.

Permits are well-recognised as the form of rights that communities use for accessing forest resources (e.g. fuel wood) in both piloting and non-piloting communities:

There is an arrangement, especially the fuel wood, there is an arrangement, and you must be given a permit (HC117)

If you have the permit you can go to the forest without any problem and nobody can arrest you. You can collect your leaves for the butterflies and you will not be arrested. For example, me, when I enter into the forest, when I see the forest guards and I explain to them they cannot arrest me and take me anywhere because they know that we go to the forest to collect fuel wood, leaves for the butterflies, etc. (HC128)

For fuel wood, if you get a permit, for one month which you have to pay 100 shillings, once you pay for this permit, you are expected to collect one head load per day, so you will find that you are allowed 30 head loads per month (HC223)

In the piloting communities, the households believe that they have secure and permanent use of their natural resource base through being able to set the rules. While in the non-piloting communities, a few considered that they have secure and permanent rights to control and use their natural resource base.

The non-piloting community interviewees gave a number of impediments to arrangements for secure access to forest resources. For instance: it is not possible for community members and government to have meetings together on the management of the forest (HC201); the communities have not been involved in the management of the forest, neither have they been told the level up to which they are supposed to manage the forest (HC202); they do not have tenure arrangements because they have never made any rules for the management of the forest (HC233); even though the forest is adjacent to them it is closed and therefore they are not able to access any resources from it (HC223); and that they have never signed an agreement with the government on how to manage the forest (HC232).

Households in both the piloting and non-piloting communities unanimously took the view that they have the right to ownership and use of the forest products because they live adjacent to the forest. The piloting communities reported:

We have the right for owning this forest and its products without any problem because we are the owners of this area [Dida, Kahingoni and Kafitsoni] (HC115)

I will say yes, we have the right of use and ownership of the forest because we are next to it (HC127)

While those in non-piloting households reported:

*We have the right because, we are the ones who know who comes
from where, we also know where a thief comes from, if a thief enters
into the forest I am the first one to see him or her (HC202)*

*We have the right because, we were born here, and the forest is here.
(HC204)*

*We have the right; I have the right to use the forest resources because
the forest is next to me, here I can manage it (HC230)*

However, households in both the piloting and non-piloting communities reported that the
government had refused to give them the rights to ownership and use of the forest resources.
Households in piloting communities explained:

*Okay, there is a problem on this issue and I have to say the truth, we
have a problem, even though the rules have given us the ownership
power and right, but the these government officers, especially those
called KFS officers, they don't want to change from their old
traditions because they see that they are the ones managing the
forest. The transition from Forest Department to Kenya Forest
Services is real disturbing those people a lot, so we are fighting so
much with the DFOs [District Forest Officers], because they don't
want to change, they are still relying on the old system, that the forest
belongs to the government, that is where we now have a problem,
because we have not done cost benefit analysis, even on those rules it
has not been clearly stated, so we still have a problem. You will find
that he [DFO] will send somebody to the forest to cut some logs, cut
some timber, but if you [forest guard] touch him, you will be avoided
until you find yourself [forest guard] transferred, but if a common
community member does this they will be arrested immediately
(HC137)*

*We don't have any right at all, I can tell you the government has
refused us completely from using the forest, we don't have any right,
not only me but all over there is no permission, we are just looking at
the forest right now, even in the past time like this people will be in
the forest cutting trees for building, others cutting fuel wood but now
it is hard (HC116)*

While non-piloting communities households explained:

*We have the right to control, but we haven't been given those powers
to own and use forest resources so we just look at the forest, because
when somebody passes there at the forest, I don't see any reason for
asking the person, maybe the person is going to the forest because of
calls on nature, or whatever, because I am less concern but if the
forest guards would have known that we are also involved in the
management for the forest, at least we could be able to ask the people
who are destroying the forest, but now we are not asked anything*

because we are not recognized in the offices that we may be able to do this and that (HC222)

In short, I have the right to own and use the forest resources but now it is impossible; it is very hard, we have not been given those powers (HC225)

They [government] are denying me my right (HC204)

Notwithstanding the arguments by the households that they have no use rights of the forest resources, comments from the household interviews frequently demonstrated that households in both the piloting and non-piloting communities have some rights to use forest resources. For instance, the piloting communities households frequently reported that they have rights to collect fuel wood, butterflies and leaves to feed the butterflies, herbs and the bees that come from the forest and occupy their hives during the dry season and they can also collect the bees and put them in their farm hives. The households also have the rights to plant aloe vera and pepper on their farms. While the non-piloting communities, have rights for grazing their livestock in the forest during the planting seasons and they can collect fuel wood.

However, the households do not have the rights to cut timber or poles from the forest nor place their bee hives in the forest. They only have the rights to access these products outside the forest, for instance, the *Casurina eqisetifolia* trees which the piloting communities are now planting as a result of the co-management agreement.

5.6 How the co-management arrangements work in practice

To further understand the ASFR co-management institutional arrangements, the study was interested on how the co-management governance operates. The study, therefore, looked at the structure of the co-management arrangement, the implementation of the current co-management structure by the piloting communities, the difficulties experienced in collecting these forest resources and the importance of the forest resources that the households depend from the forest.

5.6.1 Implementation of co-management structure by the piloting communities

The implementation of co-management through the various user groups in the piloting communities was found to be underway in butterfly farming, herbal medicine, fuel wood collection, bee keeping and on-farm forestry. But households have not been introduced to timber and pole cutting, as already identified in section 5.5. While in the non-piloting

communities they are allowed to collect fuel wood, *Kitsapu* grass and graze their livestock in the forest.

Fuel wood collection from the forest is allowed to all the households living near the forest (Plate 5.1). However, only women are allowed to collect fuel wood and only for domestic use. They must pay Kshs (Kenya Shillings) 100 per month to obtain a permit to allow them to collect one head load of fuel wood on a daily basis for 30 days (Plate 5.2). This fuel wood, permit is renewable monthly (DHC105; HC232 and (HC107). The reason the permits were introduced was to prevent the destruction of the forest by fuel wood collectors (HC138). The interviewees considered it was not possible to enter into the forest to collect forest products without a permit (HC138).

Plate 5.1   Women carrying fuel wood from the forest
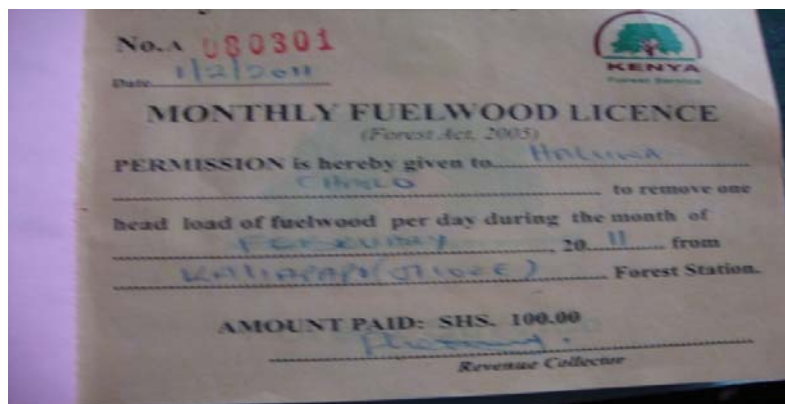
Plate 5.2   Monthly fuel wood licence

In both the piloting and non-piloting communities, it is illegal to collect fuel wood for sale. However, the study found that in the non-piloting communities, once households receive the permit, they collect the fuel wood and look for means and ways of selling it to earn income to

buy food and support their children's education. Some households sometimes burn charcoal from the fuel wood collected to earn a living. Some households from the non-piloting communities commented:

> *I collect the fuel wood, sells or burns charcoal, somebody takes the charcoal and I get the money to buy flour; when I get the permit I collect the fuel wood, I will store the fuel wood for sell, it is like stealing because they don't want, but I sneak the fuel wood and sell. Somebody can come and I give her two head loads, I get money and then I buy flour and the children as well get school uniform (HC211)*

> *I can say that the sources of income here are not there, you have to pay for a permit you enter into the forest and collect the fuel wood, then you come here in the village you use other means you get a customer and sell that is our source of income already, but if we can say like the maize, you cannot do maize farming and you sell, because you will find that, what you get at the farm, is not a lot such that you can sell, but I can say just going to the forest to steal and get something (HC202)*

Whereas, in households the piloting co-management no respondent indicated that they traded fuel wood, but some households are looking for the means to be allowed to sell fuel wood:

> *Truly speaking the fuel wood is not for sale. They are not for sale because those ones for sale we are not allowed. I only collect for cooking. But at home there are those requesting if they can be allowed to collect some fuel wood from the forest especially those ones rotting for sale (DHC105)*

It is apparent that both sets of communities were aware of the rules that the sale of fuel wood was illegal but those in co-management were more likely to follow the rules.

Butterfly farming, is mainly done in the piloting communities. However, there are some other households doing butterfly farming, particularly along the Malindi-Mombasa road, but they must form groups and be registered with the National Museums of Kenya (NMK) in order to be allowed to sell their butterflies to them (KHI05). However, there was no evidence of butterfly farming in the non-piloting communities used for this study. The households that collect the butterflies also collect leaves to feed them. They pay Kshs.100 yearly to the project manager at the National Museums of Kenya (NMK) to access a permit to allow them to collect butterflies and leaves. The manager of the butterfly project has to apply for a general permit for all the farmers, with all their names attached, requesting that KFS allows the farmers to collect the butterflies from the forest. The butterfly' project manager prepares

individual badges for every farmer but only after names have been approved by the Kenya Forest Services and the Kenya Wildlife Services. If an ASFMT stakeholder staff member sees a person in the forest collecting butterflies the person has to show the badge (KOI02).

While one respondent (HC123) said that the butterflies' pupae could be collected during the rainy season, others also collect the butterflies' pupae during the drought season (HC118). Butterflies can also be collected from the trees in the villages where they come to suck nectar. Therefore, it is not necessary for the households to enter into the forest to look for them (KHI05). Further, once one traps the right number of butterflies, it is not necessary to go back to the forest to collect them on a daily basis, but instead keep them and continue rearing them for the production of more pupae. When the households take the butterflies to the market for sale not all of them gets sold. They retain some to produce more pupae for sale (HC101). Most of the butterfly farmers, who collect the leaves to feed their butterflies, collect them on a daily basis because they are not supposed to give them many dry leaves (HC120). Some butterfly farmers have planted trees to produce the leaves that they feed their butterflies in their farms at home, to avoid going to the forest (HC134).

In both the piloting and non-piloting communities the KEFRI has allowed some household herbalists to collect herbal medicine from the forest, but they have to liaise with KEFRI before collecting them. A detailed household interview with one of the herbalists carried out to further understand how often they collect the herbs from the forest, found that the use of herbs has not been officially opened to all the communities. Some households have been trained on which trees cure, the diseases they cure and how to use the trees to cure diseases, so that they can train the rest of the communities' households, but the initial training has not been passed on (DHC101).

Bee beeping is mainly carried out in the co-management piloting area. The bees are not kept in the forest but during the rainy season, due to the coldness in the forest, the bees move to the communities from the forest searching for warmer places, thus ending up in household hives (Plate 5.3 and 5.4). Nobody is allowed to enter the forest to collect bees or place a hive there. When it is the hot season the bees go back to the forest. The households' believed that if the forest did not exist, there may be fewer bees in the villages:

> *We depend on this forest very much because all the bees come from*
> *the forest once they get the heat they go back to the forest, when it*
> *rains because there are many trees and there is a lot of coldness,*

when there is a lot of coldness they move from the forest and come here again. So if it was not for this forest, we will be having very few bees here (HC118)

I keep them there and then the bees come and enter although during the drought season, they go back to the forest because during the drought season, the trees or rather the leaves dry and at the forest the trees don't dry so they just go back to the forest because of shade yes; Yes, they come back, like now they are back I didn't have any in my bee hive but now they are all back (DHC102)

Plate 5.3   Top bar hive

Plate 5.4   Traditional hive carved from a log of a tree

Aloe vera has only been recently introduced in the co-management piloting communities on a commercial basis by Nature Kenya for its medicinal and therapeutic uses (DHC104). The aloe vera growers have not been fully formalized as a user group even though it is recognised as a user group by the communities and the VDFCCs. However, of the nine households where more detailed data was gathered only one had earned income from it. Not surprisingly, the households showed dissatisfaction with the aloe vera project considering the time taken weeding and the land it occupies which, according to the households, is a waste:

> *Aloe vera is good, they told us it was good and they planted in almost every household they gave us five hundred Aloe vera trees to plant, but there is no market, it was given to us by people from Nature Kenya, we planted five hundred Kahigoni, Dida the same, Kafitsoni the same every village got but some threw them away, Aloe vera farming is a user group for VDFCC. It has lots of problems because I have planted one plot I get bored very much I get bored I weed all the time and the problem is that I don't get anything but it's not only me even the others have lost everything (DHC104)*

The household that does earn income from alo evera, however, depended on it for most of its income. The household harvests the aloe vera on a weekly basis and prepares various products for sale (Plate 5.5).

Plate 5.5   Oil and soap products from the aloe vera

On-farm tree planting was also found to be mostly done in the piloting communities, rather than in non-piloting communities. An interview with one of the households that plants *Casuarina equisetifolia* tree seedlings in the co-management piloting area found that in the past households used to collect *Casuarina equisetifolia* trees or seedlings for sale from the forest (Plate 5.6). However, currently, households plant them in their farms (Plate 5.7). According to an interviewee (DHC104), the government gave them the *Casuarina equisetifolia* tree seedlings for free to prevent them from going to the forest. However "lazy" households never planted them. The government also trained households on how to collect seeds from mature trees in the forest and how to prepare them for planting on some farms. Aloe vera is inter-cropped with *Casuarina equisetifolia* trees (Plate 5.8). The piloting communities have planted *Casuarina equisetifolia* trees on their farms for building their houses, and selling instead of going to the forest to collect them:

> *We plant the Casuarina equisetifolia trees and this trees help us in building, right now it is very hard to enter into the forest to collect timber or any other products, because, for example, I have trees in my farm right now, if I went to my farm right now I will find trees for building immediately, I think you are even seeing the trees' (HC126)*

> *Even me, I am using the trees to build let alone selling. There are other trees which are big about three inches diameter, if somebody wants to build then you sell the trees to them, and personally if my*

> *house gets destroyed I can use the trees to build so I can say the trees*
> *are helping very much HC112)*

The tree planting households, however, think that the forest trees are of better quality than the *Casuarina equisetifolia* trees that they plant on their village farms. The forest trees take longer to rot once they use them for building their houses. Therefore, because of the quality of the trees from the forest people from the communities steal trees from the forest whenever they want to build their houses (HC107).

Plate 5.6   Arabuko-Sokoke Forest Reserve

Plate 5.7   *Casuarina equisetifolia* tree farm

Plate 5.8   Aloe vera farm intercropped with the *Casuarina equisetifolia* trees

Finally, the piloting households have been introduced to pepper farming by the Equity Products Company, which later changed its name to Equity Kenya. This is a private company that is helping the communities to improve their livelihoods. It provides farmers with the pepper seeds to plant on their own farms. The farmers do the harvesting of the pepper and weigh their kilos and Equity Kenya takes the pepper and pays the farmers through Equity Bank. For the household interviewees, other than drought that affects the pepper, they have not experienced any payment problems from the sale of pepper nor do they have market problems. However, the selling price is low (DHC108). There is no permit for planting pepper and any household that wishes to plant and sell can plant it on his/her farm.

Interviews with the non-piloting communities confirmed that they are not involved in butterfly farming or bee keeping, but they sometimes collect fuel wood from the forest:

> *Here we don't have butterfly farming (HC203)*
>
> *I don't depend on anything from the forest because if you go to this forest, you are only allowed to collect only one head load of fuel wood for cooking only; but there is no project in this region (HC217)*
>
> *Sometimes our wives go to collect fuel wood for cooking from the forest; the bee keeping and butterflies, not yet (HC212)*

But the non-piloting communities' households have been allowed to graze their livestock in the forest after paying for a permit of Kshs. 50 per cow, regardless of size as long as the cow is able to walk to and from the forest:

> *During the rainy season, for example in our farms, we do the weeding of our maize, we depend for grazing of our livestock in the forest, so there is some amount that we pay every month, we pay fifty shillings per cow, we pay fifty shillings for any cow, if the cow is young and can't be able to go to the forest you live it at home but if the cow is able to walk by itself, we pay for such cow as well (HC234)*
>
> *You have to go to the office [KFS], and you see the secretary, you then tell her the number of cows that you have, then she will give you license and you have to pay 50 shillings per cow per month, so you have to know that if you pay on 1st by 30th you need to pay again and that each cow goes for 50 shillings (DHC201)*

Some households from the non-piloting communities are allowed to collect *Kitsapu* grass from the forest for making baskets (Plate 5.9) and (Plate 5.10). These households pay Kshs. 50 to the KFS to be allowed to collect one head load of grass (Plate 5.11). The sample of baskets in (Plate 5.10) is sold at Kshs. 50 and is woven by both men and women.

Plate 5.9   Kitsapu grass used for making baskets

Plate 5.10   Kitsapu products

Plate 5.11   Kitsapu grass collection payment receipt

Furthermore, the study found that, if the income generating activities (e.g. butterflies, bees, etc.) are stopped and the DIFAAFA is refused a permit or agreement for participating in the management of the forest, it may make it hard for the conservation of the forest to be achieved. One household interviewee suggested that what is required is the empowerment of the CFAs financially so that they are able to support themselves (HC137).

Moreover, both the piloting and non-piloting communities reported breaking the rules. To access non-permitted forest products the households usually bribe the relevant authorities. For instance, the piloting communities explained:

> *I depend on building poles, now, we organize, with the forest guards*
> *and we get the trees from the forest, yes we just help one another, but*

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the trees themselves are not allowed, it is just helping one another (HC117)

The non-piloting communities also reported:

> *If you want to build, it will force you to talk with the manager and he will give you permission. You go to the forest and cut the trees, however you must have something in your pocket. I think when I talk like that you can understand what I mean, because there is no permit for people to use in cutting trees; we help one another, if you give him some little cash you also go to the forest to cut the trees (HC225)*

> *You have to go there begging, please let me give you something, so that I can cut some trees for building, as long as it is not known, but the forest guards themselves know how they will do it. You have to use this stealing method and then the forest guard will steal for you, we steal with the forest guard (HC201)*

That they are aware that what they are doing is illegal is clear-it is 'stealing'. They know the rules, but they want to use different rationalizations that attempt to legitimize their actions regardless of which community they are from, for instance they 'help one another' rationale or 'people must steal so that they can get their food' (HC107, the piloting community). One non-piloting community interviewee in particular, was quite ingenious:

> *I don't get anything from the forest, the way I stay here and know the issues on the forest, I cannot say that I get something from the forest if I don't get it and if I enter into the forest to steal something from the forest can it be counted? What can be counted is what you get rightfully; in short I don't get anything from the forest (HC208)*

The cost of the legitimate trees is, however, one of the key contributors to stealing of the forest trees and corruption in non-piloting communities:

> *Now if you want twenty trees, you are told to pay 2000 Kenya shillings so that you can build, now a house like this one, I have used one hundred trees, now how much money is that? So if you pay 10, 000 Shillings for vertical poles and you have not gotten the cross poles? If you want to buy the cross poles also, 100 of them goes for a 1000 Shillings , and 50 of them goes for 500 shillings. Now truly can you build? (HC201)*

As one household pointed out, the theft of forest resources is seasonality linked with labour availability:

> *The theft is too much as from the month of April, during the drought season, as you know during the rainy season people are more involved with farming, once they harvest the theft reduces, but during*

> *the drought season there is a lot of stealing going on here from the*
> *forest (HC107)*

Attempts to prevent stealing are often fruitless due to forest management complicity:

> *There is one challenge that we face, it is like those people working in*
> *the forest are not paid, I don't know what to do with them, it is like*
> *they organize with the forester and then they enter into the forest and*
> *they cut the trees for sale, once you find them and report them to the*
> *forester, and you find they have been sent by the forester, then we are*
> *forced to remain helpless. Do you understand these challenges?*
> *(HC107)*

However, one of the households in the non-piloting communities identified that there is an option to legitimately buy the trees from the forest management: 'I bought these trees, they have come from the forest but I bought them, it is not that we don't get the trees, but we get them through buying. You can't just go to cut the trees, yes you get a receipt if you go to the forester they sell like 20 shillings or may be 10-15 shillings per pole' (HC220).

5.6.2 Difficulties experienced in collecting these forest resources

The researcher did detailed interviews with the households to understand the difficulties households experienced when collecting the various products. This was to enable an understanding of the problems households encounter in implementing co-management income generating projects. The bee keeping farmers explained their difficulties as follows:

> *If, for instance one uses some certain types of perfumes the bees*
> *confuse the perfume with the scent of the flowers that they suck nectar*
> *from with the perfume thus attacking the person (DHC101)*

This was exacerbated by the lack of protective attire when harvesting honey (DHC103). Other problems were more prosaic. Hives might be attacked by safari ants especially in the rainy season (DHC103), and 'if the honey badger attacks the bee's hives it harvests all the honey. The honey badger fells the hive, urinates in it and the bees are forced to leave even though they have made honey' (DHC102 and DHC103).

In the case of butterflies, one is 'forced to go to the forest with a bottle full of water and irrigate the trees the butterflies feed on so that their butterflies can get food' (KHI05); Safari ants were also identified as a problem for the butterfly farmers, especially if one did not spray insecticides at the bottom of the cages as the ants would climb up the cages and eat the eggs (DHC108). One interviewee also identified that the households have a shortage of butterfly

catching nets (DHC110). In addition to the physical problems, the unreliability of markets was also cited as a problem by butterfly farmers and herbalists (KHI06, DHC105).

Herbal medicine collectors reported that when they want to collect herbs from the forest, they are given forest guards to accompany them; however, they still face the possibility of attack by wild animals. They also get sick because of grinding or crushing the herbs manually due to the lack of grinding machines and protective devices (DHC105).

Aloe vera households also pointed to the lack of protective devices when mixing chemicals for making various products and a lack of knowledge on how to prepare the juice for making a variety of products (DHC109).

However, overall, it came out prominently that drought affects bee keeping and butterfly farming, due to difficulties in finding water and food for them (DHC101) and the *Casuarina equisetifolia* trees (DHC103; DHC108).

5.6.3 Importance of forest resources to the households

Households were asked to explain how important the forest resources are to them. About half of the household respondents from the piloting communities thought that of great importance to the forest-adjacent communities are first, the attraction of rainfall by the forest. The respondents explained that when there is no rainfall, they miss the forest resources (e.g. butterflies and the leaves) from the forest (HC128). Similarly, households from the non-piloting communities supported this finding that through rainfall they are able to plant food crops (e.g. maize) (HC204 and HC206). Furthermore, one household in the non-piloting communities reported that those households staying adjacent to the forest receive more rainfall due to the forest than the villages far from it (HC201). The piloting households also noted that they cannot stay without fuel wood and the only source of fuel wood is the forest and they never use gas for cooking (HC126). This finding was also supported by the non-piloting communities (HC232). The forest is a home for wildlife, sources of tourist attractions income and employment for the forest-adjacent communities (HC137; HC110 and HC106). Another respondent explained that without the forest resources (e.g. butterflies) the communities may face hunger and some households may not be able to educate their children; the forest trees modifies the air and makes it fresh and is a source of beauty (HC115); the non-piloting communities also resonated the forest for purification of air quality

(HC210 and HC216). In addition, the non-piloting communities reported that the forest is useful to them, particularly for grazing their livestock (HC229).

There were some households, however, particularly from the non-piloting communities, who were of the opinion that the forest is not important to them. They explained that the forest management is corrupt (HC214 and HC230), most of the forest products are not removable from the forest (HC213) and that there is no benefit sharing between the government and the community (HC220). However, all the piloting communities said through the detailed household case studies that, they do not have any alternatives if they miss the various resources that they access through the co-management projects (DHC108). This shows the impact of the projects to the piloting communities.

The final word on this question goes to two of the household interviewees:

> *It [forest] is very important to us because if it is not there, there won't be the bees, it will be hard for us to get the butterflies, rainfall will be a problem because in our farms we depend on rain water for farming, we will miss the clean air, etc. (HC101)*

> *The forest is important first, it attracts rainfall, second it has so many products for example bees because they can only be raised in forest areas, three the fuel wood and building poles, if you want building poles you may go for a permit from the forest department and they will allow you to get trees for building your house (HC123)*

5.7 Chapter summary

The objective of this chapter was to examine the current institutional arrangements for governance of the ASFR's co-management regime. The study found that the co-management piloting communities are more aware of the ASFR co-management regime compared to the non-piloting communities. Donors are very important to the success of the co-management projects.

The partners in the co-management arrangement have particular roles assigned to them. However, from the interviews other roles emerged, for example, KEFRI is also responsible for community herbal medicine use training, provision of permission to the herbalist to collect herbs from the forest, transporting and protecting the herbalist groups from wildlife attacks when collecting herbs from the forest. NMK is also responsible for marketing of the forest products such as butterflies and honey. While, KWS and KFS are responsible for approving the names of individuals involved in collecting forest resources such, as butterflies.

The co-management structure in the piloting communities is represented by the DIFAAFA. The DIFAAFA has three VDFCCs and each VDFCC has seven user groups. It also has an executive committee, an elders' advisory group, government stakeholders and NGOs. Two other CFAs are emerging in the ASFR (GECOFA and JICOFA). These CFAs are in the process of formation and have not received donor funding.

Access to the forest is governed by permits, despite the formal co-management agreement not yet signed. The partners however, act largely as if it has been. Only three user groups in the piloting communities are allowed to collect products from the forest, however, households have to pay for a permit to access these products namely: the fuel wood user group that collects fuel wood; the butterfly's user group which collects butterflies; the pupae and the leaves to feed the butterflies; and the herbal user groups which collects herbal medicines and which is largely supported by KEFRI. Other user groups like the aloe vera farming, bee keeping, pepper farming and on-farm tree planting are carried out in the piloting communities' farms. Pole cutting and timber harvests have not been permitted in either the piloting or non-piloting communities.

In the non-piloting communities they have not been introduced to the various income generating activities' however, they are allowed to graze their cows in the forest once they pay for a permit. They are also allowed to collect grass for basketry after paying a fee.

Despite the co-management arrangements, theft of the forest resources exists in both the piloting and non-piloting communities. The difficulties encountered by the households in accessing the various forest products include drought and unreliable markets. Both communities have limited security and permanence to their rights to access and use the forest resources. The ownership rights of the forest resources still rests with the government, but those in the co-management communities consider themselves to have greater security because of the agreement.

There is corruption in accessing the forest resources and stealing of the forest resources at the community and forest management levels despite both the management and the co-management communities being aware of the rules for collecting the forest resources.

The forest is important to both the piloting and non-piloting communities particularly in supplying them with fuel wood and attracting rainfall. Rainfall was found to be important to the piloting communities in maintaining the supply of co-management income generating

activities from the forest resources (e.g. butterflies and the leaves). While for the non-piloting communities, the attraction of rainfall supports their crop production (e.g. maize). It is also important to note that despite the fact that the non-piloting communities are not involved in the co-management of the forest, their sources of livelihood are mainly forest related for instance through farming, basketry and livestock grazing.

This chapter has laid the ground for understanding the institutional arrangements for the ASFR co-management. The next chapter evaluates the extent to which these co-management institutional arrangements discussed in this chapter can be characterized as devolved collaborative governance.

Chapter 6
The devolution of the ASFR co-management institutional arrangements

6.1   Introduction

Chapter 5 provided an account of the evolution of the current institutional arrangements for the ASFR co-management arrangement. Based on chapter 5, the objective of this chapter is to evaluate the extent to which governance arrangements for the ASFR can be characterised as devolved collaborative governance. The chapter addresses this question by drawing on Ostrom's (1990) design principles for common pool resources as an analytical framework.

6.2   An overview of the situation of the ASFR co-management arrangement

For more than a decade, there has been increased interest in the use of co-management in the management of the ASFR in Kenya. Through the support of various government agencies namely: KWS, KEFRI, NMK, and KFS, international development agencies (e.g. ODA) and non-governmental organizations (e.g. Birdlife International) this interest has been translated into action in the ASFR. However, only three villages have been used to pilot the co-management arrangement. It is anticipated that a similar process of implementing this co-management arrangement may be extended to other communities living adjacent to the ASFR forest that depend on it for their livelihood. The piloting communities have been introduced to various income generating activities as already identified in chapter 5, such as (butterfly farming, bee keeping, aloe vera farming, on farm tree planting, collection of herbs from the forest and pepper planting) as a way of giving them alternative livelihood assets, notably, income, in order to stop them from increasing pressure on the forest resources they have been depending on (e.g. trees for building). One of the normative arguments for co-management is that devolution of the natural resources management power (e.g. forests) to the communities dependent on them for their livelihoods, can improve their livelihood outcomes and consequently, make the use of the natural resources more sustainable (Baumann, 2000; Pagdee et al., 2006). Before examining whether co-management could be seen as having aided the development of more sustainable livelihoods, it was prudent to evaluate the ASFR governance institutional arrangements in order to understand if they have been devolved to the communities in a way that they can improve their livelihoods sustainably.

Subsequently, this chapter is structured to assess the current governance arrangements for the ASFR co-management against these design principles. The assessment is informed by the

understandings, perceptions and forest use practices of respondents in the participating and non-participating villages, government officials and NGOs. As discussed in chapter 2, Ostrom's (1990) design principles can be summarised as: clearly defined boundaries, congruence between appropriation and provision rules and local conditions, collective-choice arrangements, monitoring, graduated sanctions, conflict resolution mechanisms, official recognition of rights to organize and nested enterprises.

6.3   Clearly defined boundaries

The first Ostrom principle requires that individuals or households with the rights to withdraw resource units from a common pool resource are clearly identified. To achieve this it is also necessary to clearly define the boundaries of the resource. The analysis of this principle is, consequently, discussed in two parts namely: (1) the definition of boundaries for the forest resources used by the communities, and; (2) the clarity of the ASFR resources users' boundaries is examined.

6.3.1   The boundaries of forest resources

In examining the boundaries of the ASFR resources it is important to recognise that whereas the formal or administrative boundary of the ASFR is readily identifiable (Figure 6.1), the forest provides several interconnected, overlapping natural assets that are identified and used as resources by the communities adjacent to it. For instance trees for building may be habitats for butterflies that are used to stock butterfly farms. Some assets may change, for instance, trees for building may become fuel wood if not harvested and they have fallen. The boundaries are expected to overlap and, in some cases, may be nested within the boundaries of other resources. As the boundaries are effectively defined by the resource users, the most practicable approach to identifying the boundaries for the resources was to ask the people whom might be resource users. From the interviews it became clear that the area piloting the co-management has been mapped and four zones established:

- the pole cutting zone, which runs from the forest boundary and covers one kilometre inwards,
- the fuel wood zone, which covers one to two kilometres from the forest boundary inward to the forest,
- the biodiversity conservation zone, which runs from the second kilometre inwards to the forest to the third kilometre, and

- a household zone, which is an area entirely outside the forest boundaries and it, consists of private land (the household farms). In the co-management piloting communities' households have already been supported in using this zone in carrying out various activities that give them livelihood benefits (e.g. planting of *Casurina eqisetifolia* trees and bee keeping) as a way of contributing to the conservation of the forest (see Figure 6.1 below, for illustration).
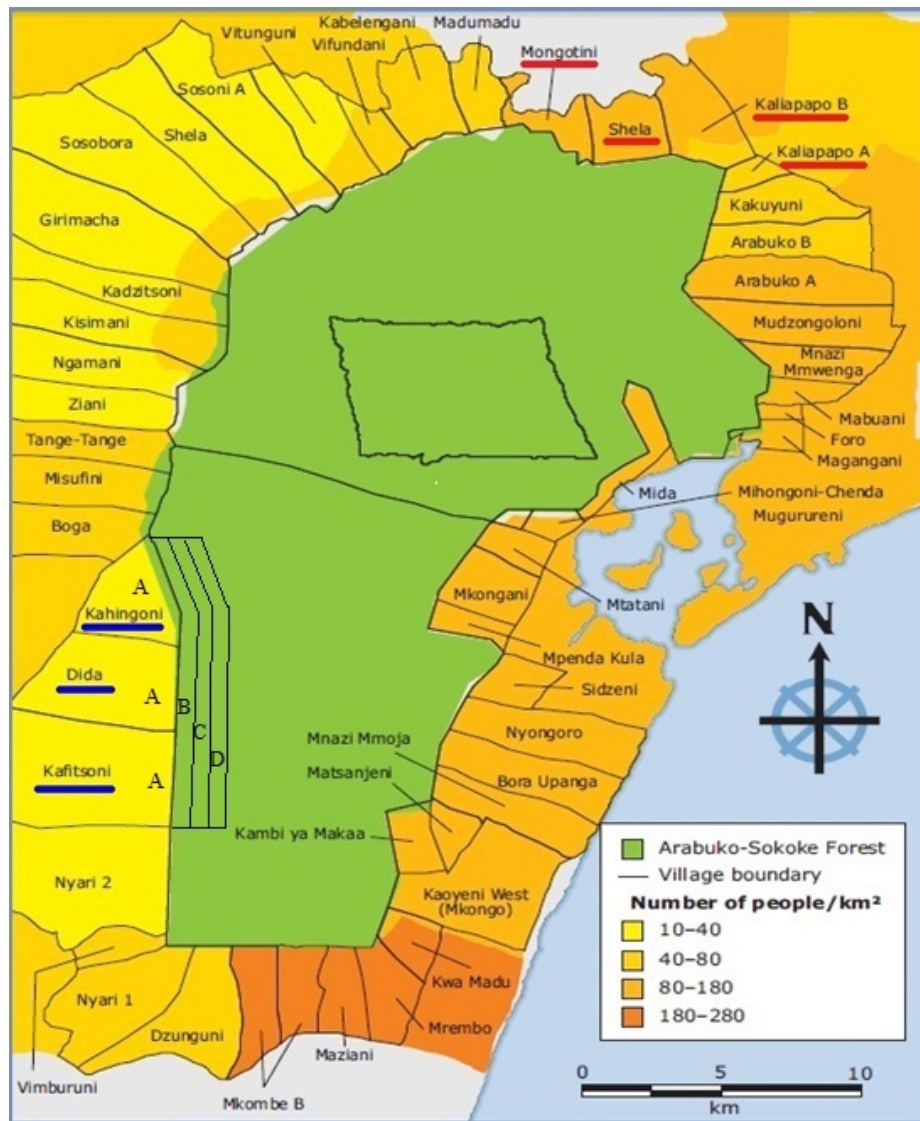
Figure 6.1   ASFR resource use zones in piloting communities and the number of people per square kilometre

Key: ASFR resources use zones
A: Area outside the forest boundaries-private farm land; B: Kilometre 1 pole cutting zone
B&C: Kilometres 1 and 2 fuel wood zone; D: Conservation zone

These zones have been set only in the piloting communities by KEFRI, and their details were sent to the forest management headquarters in Nairobi for approval, approximately a decade

ago, but by the time of the study the communities had not received any feedback from the government (HC103) and no map showing the zones was available. Consequently, several interviewees seemed unaware of them. Moreover, one household (HC125) reported that these zones were only set aside for trials. Zones for taking other forest resources did not exist and no particular areas were identified by interviewees as being of special significance for other activities, such as medicinal herb collecting. This may have been due to reticence in making household or traditional knowledge publicly available, the innovative nature of the activities, or the lack of known pressure on other resources from such activities.

In the non-piloting communities, resource use boundaries have not been set to guide or manage household use of particular forest resources:

> *I have not seen that these people [government] have had defined boundaries, that this area you will cut your fuel wood, here you will do like this, because if that would have been the case with this co-management then, people would have been told then that, here we will do this here we will do this but for now people move to any other place as long as they have been given the permit (HC214)*

6.3.2 Clearly defined boundaries of users

Another aspect of the principle of clearly defined boundaries is that it concerns a clear definition of users with legal rights to use the forest resources. Such rights were found in both co-management piloting and non-piloting communities. For instance, any person within five kilometres of the boundary of ASFR has a legal right to collect forest resources from the forest, as long as one acquires a relevant permit for collecting a permitted resource from the forest. So, the boundaries that have given households the legal rights to collect a forest resource from the forest were found to be hidden in the permits issued to households to collect particular permitted resources. For example, the informants reported that in both the piloting and non-piloting communities' one must have a permit to access fuel wood. In the non-piloting communities for example to graze livestock in the forest or collect *Kitsapu* grass for baskets making one should also have a permit.

In order to be eligible for a permit, a household has to be a registered member of a particular user group. For example in the piloting communities, only butterfly farmers, who are registered members of a butterfly user group, have a right to apply for a permit to collect butterflies and leaves to feed them from the forest. If one is not registered in a butterfly group and thus does not have a permit to collect the butterflies' pupae, then that person cannot sell

the pupae directly to the market, but perhaps, has to illegally sell them through a person who is a registered member in a butterfly group. This is because there is only one pupae purchase outlet and it is under the management of the NMK, which purchases all the pupae from the butterfly farmers and organizes the exporting of pupae on behalf of the farmers. Registered butterfly farmers explained:

> *Yes, it [permit] has been declared because like the butterfly farmers, they have an identification card to go to the forest, we have identification cards, and the people who want fuel wood usually take it from the forest, from the forester, it's those, what do we call them?, those papers to allow them pass [permit], they usually have a duration, when that duration is over you must go and get another paper [permit]. Yes, you cannot just enter but for us we can just enter anytime if you have carried your identification card for butterfly (DHC108)*

> *If you don't have a permit even if you collect the butterflies you can't take them directly [to Kenya Museums] for sale so, unless they collect and come and sell to me here (DHC110)*

A substantial number of household respondents reported that it is an individual decision on which forest resource user group to join. According to an aloe vera farmer, one simply selects which group to join within the co-management arrangement (DHC109). A bee keeping farmer explained it slightly differently, stating that anybody from the age of fifteen is eligible to join the bee keeping group which according to the interviewee currently comprised 30 members in each group. When the bee keeping household was asked to explain the criteria for selecting the 30 members to constitute a full bee keeping group, or which family is to join a particular group the response was:

> *That one is just a number, if you are fifteen if you are thirty provided you are together, so anyone who wishes can join, he joins there is no rule that is restricting people I have not seen that (DHC106)*

According to the bee keeping farmer, if one wished to join the bee keeping group one just went to the group, then is welcomed and registered in that group.

Households that collect herbs from the forest reported that the decision as to who joins the herbs collection group is made by KEFRI, which identifies the traditional herbal medicine households and gives them further training on herbal medicine. In the past, the herbalists used to steal the herbs from the forest. Currently, if the herbalists want to collect the herbs from the forest, they simply report to KEFRI and book an appointment to be allowed to collect the

herbs that they need from the forest. They then wait for another three to five months before they go to collect another batch of the herbs. KEFRI trains the herbalist for free and keeps the records to show their donors or to seek donor funding as described by one of the herbalists:

> *KEFRI doesn't make us to pay what they do is to keep the records of all that we do. Because their records indicate for example we have trained this number of people on herbal medicine and then they take them forward that all of us have moved forward in herbal medicine. So we don't pay they only take the records. Even the other records when they find donors they explain to them what we have been doing (DHC105)*

Thus, one has to be first a traditional herbalist, then be selected and trained by KEFRI and then join the herbalist group in order to be allowed to collect herbs from the forest.

Although the five kilometre boundary means that those outside the boundary are excluded from legal access to the forest, there is no constraint on the number of people who live inside that boundary who can apply to be a member of a particular user group (e.g. the bee keeping, butterfly farming, aloe vera farming or herbalist user group). Further more people can be registered or be a member of more than one of these user groups (DHC104).

6.3.3 How well is the rule functioning?

The respondents were further asked to explain how well Ostrom's (1990) rule of clearly defined boundaries functions. The intention was to understand if the rule is clear, relates well to the resources natural characteristics, to the distance people travel into the forest and if it is designed to be easy for them to identify when they are within the boundary and when they have moved beyond it. It was surprising to find from the interviews with households and the organizational informants that a major constraint facing the establishment of both resource use and household boundaries is that the government has not signed an agreement with the communities:

> *… the agreement [co-management agreement] hasn't been established. If we get that agreement then we will say that those people who are involved in herbal medicine …. will have a committee responsible for herbs, we have another one responsible for bees, the butterflies sub-committee, but right now we only have the permit for collecting fuel wood. But the others even the pole cutting committee, we are even supposed even to have a committee for building trees, even that one not yet, until we are given that big permit[agreement]. And then we will decide on how the trees will be used. For example, we may decide, that each village has one group that will be cutting*

the trees …, such that we continue caring for the forest because we don't want to destroy it, because people are cutting and finishing the trees right now. We must have a clear arrangement on how we will be using the forest resources, for the sake of the current and future generations (HC112)

But there are other things that we won't get from the forest until we sign an agreement, so that we can be able to manage it. But we have not yet got the agreement, but we have organized everything but we have not signed the agreement (KH106)

These sentiments were shared by the NGOs operating in the co-management arrangement:

The zones are incomplete because no community forest association has signed any agreement with KFS on issues of, co-management of the forest… that is what is intended if the process was complete, actually we have even written some management plans for these communities we have done resource assessment so that we can be able to gauge optimum levels which are sustainable. So that is what is targeted, you can harvest this and this and this because that is what is available even in terms of firewood collection, yeah. But now those things have not been finalized (KOI05)

Similarly a key organizational informant confirmed that the rule has not worked:

Okay, up to now we have not yet started implementing that, because, the draft management plan has not been approved by the Director of Forests so even if we have set up the boundaries we have not yet, started implementing those utilization zones, yeah, but some of the utilization zones, will become automatic like the fuel wood zone (KOI02)

Whereas, in non-piloting communities, one of the households reported:

I have not yet gone to the forest, the fee for the permits is very high, because if you what to enter into the forest you need a permit I won't go there, I want to go there but I can't afford, only one hundred, but mostly those people who go to pay for the permit mostly go and pay for the fuel wood mainly of particular purposes, but once you pay for the permit you are allowed (HC212)

This suggests that the formal boundary of the forest is effective to the extent that a permit is required to legally collect fuel wood beyond it, but as previously noted, as these communities are not part of the co-management pilot, there has been no attempt to develop more refined boundaries for different resource user groups in these communities. The lack of such provisions appears to be leading to breaches as is implicit in another non-piloting householder's comment:

In the forest if you are permitted to collect fuel wood, it should be fuel wood they collect and come back home (HC213)

In summary, the definition of boundaries in terms of the forest resources has been partly met in the piloting communities in the sense that the forest has been zoned and some various areas for particular resources identified. However, these zones have not been fully activated and put into full practice due to lack of a formalised co-management agreement. In the non-piloting communities there is no zoning and the communities are using the standard, unrefined government rules.

Also, in both the piloting and non-piloting communities, in the case of defining who are the legitimate users of the forest resources, even though one must have a permit in order to access forest resources, the communities do not have an agreement that categorically gives them legal rights to use resources within the draft resource use zones. The access to all the types of resources, for instance, timber and poles, has also not been drafted, let alone finalized. Therefore, the user boundaries have started to develop in both the piloting and non-piloting communities. The use of the forest is, however, restricted to those households living within five kilometre of the ASFR boundary.

Furthermore, from the discussions, it occurred that it may not be a bad feature if the forest has sufficient resources within one kilometre to meet the combined needs of those who are harvesting trees for buildings and fuel wood as households may access both these resources within the first kilometre. The restriction on users starts at the second kilometre, as households have one kilometre to do one activity (biodiversity conservation) and can only do it (biodiversity conservation) in the second kilometre. Beyond those two kilometres, the forest is zoned for conservation (see Figure 6.1). Essentially, what is being attempted here is a buffer zone enabling mixed use before reaching the more protected area. Informal discussions with the butterfly farmers found that they collect the butterflies within the first kilometre. However, the herbalists can go beyond these two kilometre boundaries depending on where the herbs are found as they are always escorted by KEFRI management to the forest when they collect the herbs.

6.4 Congruence between appropriation and provision rules and local conditions

The second of Ostrom's (1990) design principles is the congruence between the appropriation and provision rules and local conditions. This is the only principle that attempts to directly

address the sustainable use of the natural resource that is the focus of the suite of design principles. The principle addresses operational rules for harvesting forest resources. The rule stipulates that operational rules for harvesting common pool resources should be appropriate in restricting time, place, technology and/or quantity of resources units and should be related to local conditions and provision rules requiring labour, materials and/or money (Ostrom, 2000b; Pomeroy, 1994). Pomeroy (1994) explicitly explains that unless the number of individuals authorised to use a common pool resource is so small that their harvesting patterns do not adversely affect one another, at least some rules related to when, and how different products can be harvested usually have to be designed by the resources users. Uniform rules designed for the entire nation or a large region can rarely take into account the specific resource attributes in a particular location (Ostrom, 1994). To understand the rule of congruence between appropriation and provision rules and local conditions as it applies the ASFR for the sustainable use of the forest resources, it was divided into two parts: (1) congruence between appropriation rules and local conditions and; (2) congruence between provision rules and local conditions. The findings of these two parts are discussed below as they appear in the ASFR co-management arrangement.

6.4.1 Congruence between appropriation rules and local conditions

As already identified by Ostrom (2000b) and Pomeroy (1994) in section 6.2.2, to understand the first part of Ostrom's (1990) second design principle, interviewees were asked to explain whether the operational rules they use in harvesting the forest resources restrict them in terms of time, place, technology and the quantity (units) or quality of the products that they harvest from the forest.

6.4.1.1   Time restrictions

The study revealed that restrictions on the periods in which households can access or harvest forest resources have not been clearly established in either the piloting or non-piloting communities. In both the piloting and non-piloting communities most of the respondents reported that there are no time restrictions for collecting forest resources as long as one has a permit. Similarly, an organizational informant explained that time restrictions for households' harvesting fuel wood from the forest as: 'Households are free to leave the forest anytime they wish as long as they have collected only one head load of fuel wood' (KOI02). However, some households in the co-management piloting communities pointed out that they are only allowed to collect forest products during the day:

The rules only allow people to go to the forest during the day alone, not at night (HC108)

We are only allowed to enter into the forest during the day not at night (HC136)

This apparent discrepancy may be due to interviewees automatically assuming that the question only related to the day time, not an entire 24 hour period. One householder interviewed from the non-piloting communities however, noted that KFS, as the authority responsible for the management of the ASFR, decided to indicate the time for collecting forest resources on the households' permits to stop those households who may collect more resources than was desirable:

They stopped that behaviour because they (KFS) realized that somebody can enter into the forest even six times, per day, but they finally resolved that they indicate in your permit the time when you are supposed to collect the forest products, if you indicate that you will be going to the forest in the morning and then you go to the forest in the afternoon, it will be wrong (HC223)

Lack of a co-management agreement arrangement between the communities dependent on the forest for their livelihood with the central government was revealed as an impediment for determining or fixing the time for collecting various products from the forest. Households are, however, of the opinion that restricting them in terms of time for collecting forest resources is inappropriate. As one of the households put it:

Once we sign the agreement maybe we will arrange for them[communities] on how to collect the fuel wood, such that they will go in the morning or in the afternoon, however, it will be difficult because some people will be having busy schedules during that time so I think the free kind of arrangement that we have now is better, as long as these people will follow the rules, because restricting their time won't be good, telling them to go in the morning some people may be involved in other activities (HC112)

6.4.1.2 *Choice of technology*

Households were asked the technology they are allowed to use for harvesting forest resources. Officially, they are only allowed to use a *panga* [*machete*] and an axe. Even though fewer than half of the respondents identified that they are allowed to use an axe, it was surprising, to the point of shocking, to note that the majority of the co-management piloting households were not clear on the technology to use for harvesting fuel wood. Not a single person mentioned a panga [machete]. As shown in Table 6.1, a substantial number of

the households reported that they are not allowed to enter into the forest with a power saw or rip saw because they are only allowed to harvest small dead and fallen trees for cooking (HC125). Some reported that they are only allowed to carry an axe in case they want to cut fuel wood (HC134). Others reported that they are not supposed to carry any tool for cutting trees when they go to the forest to collect fuel wood because they are only supposed to collect fallen fuel wood (HC135). Finally, a few households reported that they have not been told what tools to use or not to use in collecting forest resources (HC121).

Table 6.1   Type of technology for cutting fuel wood

Type technology allowed for cutting fuel wood	Number of respondents n=18
Not allowed to enter with a power or rip saw	7
Are allowed to carry an axe	6
Are not allowed to carry any tool	4
Have not been told the tools to use	2

Correspondingly, the study found that the bee keeping farmers do not have the skills for collecting bees from the forest, but instead they depend on the community people with bee collection skills in order to gather and place the bees into their hives for honey production. As one of the bee keeping farmers reported: 'There are those people who have the knowledge of collecting the bees from the [forest] and putting them in another hive. They charge five hundred shillings per hive' (DHC103). From the discussions, however, the study found that there are no rules that guide those who collect the bees on the choice of technology to use for harvesting the bees from the forest.

However, butterfly farmers were found to be aware of the technology for collecting butterflies and leaves to feed them. For instance, the farmers reported that they use nets for gathering butterflies either from their farms or from the forest (DHC110). They also avoid breaking the buds of tree branches that the butterflies feed on by picking the lower leaves of the trees to evade killing the trees in order to maintain continuous supplies of the leaves to feed the butterflies (HC130). However, the study was not able to establish if there are rules to guide the butterfly farmers on how to collect the butterflies and leaves to feed them. Perhaps then the occupational practices used by the butterfly and leaves harvesters will seem likely to become rules once the rules are made and, at present, they serve as occupationally acknowledged de facto rules that guide their practice.

It was interesting that, in contrast, households in the non-piloting communities displayed an enormous sense of understanding of the technology for collecting fuel wood from the forest compared to the piloting communities. All the 20 households who responded to this question on choice of technology pointed out that when they go to the forest, to harvest fuel wood they are only allowed to carry a *panga* [machete] or an axe. This clearly shows that the non-piloting communities are more aware of the permitted technology for collecting fuel wood relative to the piloting communities:

> *You enter with an axe and a panga [machete], because if you enter*
> *into the forest with something else you are arrested. The permit states*
> *that you are supposed to enter to the forest with an axe and a panga*
> *machete] (HC216)*

Moreover, it seems surprising that the consistency of the answers from the non-piloting communities was not matched by the piloting communities. However, as noted above, the lack of consistency in the response of the piloting communities may not be as significant as it appears at first glance; however, for two of the respondents not to know the rules is surprising. If the question was clearly interpreted by both sets of communities, then this suggests that either the co-management communities do not have the rules enforced as rigorously as the non-piloting communities, leading to some ambiguity as to what the rules might be, or that the ability to be involved in setting their own rules, coupled with the failure to have the co-management regime formalized and the consequent lack of clarity about the rules status, has created less certainty for those involved in the piloting communities.

6.4.1.3   The quantity of products households can harvest

It was found in both the piloting communities and non-piloting communities that they are aware that they are restricted to harvesting one head load of fuel wood per day for 30 days after paying Kshs. 100 for the permit, as a way of limiting them, from overharvesting the fuel wood to enhance continuous supply. If they wish to continue collecting fuel wood they have to renew the permit for the next month. There were no other specific weights or quantity restrictions on any of the resources able to be taken from the forest. For instance, once granted the permit to collect fuel wood, households collect a head load that they are able to carry as per individual strength (KHI01). Even though households are only allowed to collect one head load per day, but if one wishes to go and collect another head load they may do so since there is nobody who inspects to see how many head loads a household has collected:

> *They have been given a limit, because you are told that once you pay*
> *one hundred for fuel wood you will be collecting one head load, every*
> *day not two head loads, so if you will be collecting two head loads*
> *that will depend on your knowledge, but what your permit states, is*
> *one head load per day; there isn't anybody who checks to see how*
> *many head loads you have collected; you can go to collect that one*
> *head load without even meeting with the forest guards at all (HC130)*

For the butterfly farmers who collect butterflies and leaves to feed the butterflies, there are no restrictions on the number that they can collect from the forest:

> *When I go to collect the butterflies, once you have been given that*
> *card, once you go collecting you don't collect too much you go with*
> *your tin and collect what is enough for you and then you move out.*
> *(HC115)*

> *I may not be able to tell you the quantity of the leaves I used to collect*
> *on a daily basis but I can tell you that I used to go to the forest twice*
> *a day to collect the leaves, because there is need for the leaves in the*
> *morning, and there was need for leaves in the evening which the*
> *butterflies eat as they sleep in their nets, and when you go to the*
> *forest you don't go picking just one leave but so many leaves, so that*
> *once they eat and finish they don't disturb you because you will be*
> *having more, such that you give them enough food to enable you do*
> *another job (HC130)*

Some of the butterfly farmers reported that they have planted trees that produce leaves that the butterflies fed on at their homes and that there is no need for them to collect them from the forest (see section 5.3.2):

> *For butterflies, we already have food for the butterflies here at home,*
> *outside our house. This depends on the various types of butterflies*
> *that you are keeping, if you have different species some of the trees*
> *are found in the forest, and others outside the forest, but if they are*
> *found outside here, there is no need for going to the forest we collect*
> *them from here (HC111)*

Interviews with a herbalist and officials were not able to establish the quantity of herbs they are allowed to collect from the forest. However, in practice:

> *You pick little by little of each herb as you fill you basket after you*
> *finish you put all your herbs into the vehicle and you come back home*
> *(DHC105)*

The non-piloting households are allowed to collect one head load of *Kitsapu* grass once they pay 50 shillings. But there was no specific weight for this head load. The same comments regarding fuel wood apply here.

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6.4.1.4   Quality of the forest products

Surprisingly, the study found that, other than fuel wood, none of the household interviewees from the piloting communities was able to specify the quality of the other products that they are permitted to harvest from the forest, such as leaves, butterflies and herbs. As demonstrated in section 5.3.2 both the piloting and non-piloting communities' households are allowed to harvest fuel wood for domestic use only. Both the piloting and non-piloting communities were clear on the quality of wood they are allowed to collect for fuel:

> *When in the forest, you are only allowed to split a tree that has fallen down so that you can be able to carry the fuel wood (HC112)*

> *The products are many, some are trees that have rotten and fallen down (HC121)*

> *When I go to the forest, maybe I should know this is small and should not be cut, I only wait for the tree to mature and if it is old and falls down, then I can get my fuel wood (HC202)*

Officials also only reported a quality control on fuel wood:

> *They are supposed only to collect the dead, those ones that are dead (KOI01)*

6.4.1.5   Place for collecting forest resources

When asked if the co-management arrangement has allocated them specific places for harvesting the permitted resources in both the piloting and non-piloting communities, it was clear that, except as described in section 6.3, there were no specific places where the communities are allocated to harvest the forest resources. In the piloting communities, for instance one household that collects fuel wood reported:

> *We have not been given places where different communities or households can collect the forest products. You go anywhere and collect, even if it is fuel wood, as long as you have the permit, you just go anywhere and collect the fuel wood and then you move out. (HC119)*

Interviews with herbalists on the place where they are allowed to collect the herbs found that they have planted some of the herbs in their gardens. However, they collect some from the forest, others from the rivers, others from the oceans and others from individual household farms in the villages. They do not have specific places in the forest where they collect the herbs; they simply search for the herbs once they enter the forest (DHC105).

The bee farmers have placed their bee hives on their farms. There was no bee farmer who was able to identify a specific place where they harvest the bees from the forest, perhaps in part, as most use contract bee collectors. The bee keeping farmers reported:

> *We make the bee hive and then we smear it with crushed bee wax and then they come and enter the bee hive themselves. Once we make the bee hives we put them in our farm big forests. So we don't go to the forest (DHC107)*

> *I keep them there [his/her farm] and then the bees come and enter although during the drought season, they go back to the forest because during the drought season, the trees, or rather the leaves dry and at the forest the trees don't dry so they just go back to the forest because of shade, yes. Yes, they come back, like now they are back. I didn't have any in my bee hive but now they are all back (DHC102)*

Butterfly keeping households reported that they may collect the butterflies from flowering cashew nut trees on their farms and, therefore, it is not necessary for them to harvest them from the forest:

> *Some products like butterflies we can get them from the cashew nuts when they are flowering, Those butterflies instead of us going to the forest they come outside the forest to suck that honey from the flowers …., so you can get them from the cashew nuts. They are attracted by the cashew nuts, they come from the forest. The cashew nuts are found in our farms which are adjacent to the forest. Then the butterflies come from the forest some times in the year to come and suck the cashew nut flowers. Time like this one there is no need for going into the forest moving around searching for them, you can catch them from there (KHI05)*

However, one of the household informants noted that going deep into the forest to harvest resources is risky because of the presence of the wildlife. Households are cautious and just go up to about two kilometres deep for collecting forest resources:

> *It depends on where somebody is going in the forest, also the wildlife, as you go deeper to the forest that is when you will find that there is wildlife and that is risky. So that is why you find that people just move around two kilometres, this is the furthest they can go, especially the women who go to collect the fuel wood (KHI01)*

While in the non-piloting communities' one household interviewee concluded:

> *No, in the forest we don't have [a place for collecting forest resources]; even if you ask anybody in this area if they have a section in the forest they will tell you no (HC201)*

6.4.1.6 *Congruence with local ecological conditions*

It is clear that there are appropriation and provision rules, although these do not cover all resources and have largely not been formally implemented. In both the piloting and non-piloting communities, households have no specific time for collecting forest resources. There appears to be no consideration of the seasonal abundance of resources, other than to allow bees to return to the forest in dry seasons. Households pointed out that restricting their access times may inconvenience their other activities or routines. However, KFS has indicated it wishes to restrict households' time for collecting because the current lack of restrictions makes it easy for some households to make multiple return trips in the same day.

Despite the fact that the non-piloting communities have a more clear understanding of the technology used in harvesting forest resources (e.g. fuel wood) than the piloting communities in section. 6.4.1.2, the study found that in both the piloting and non-piloting communities the technology they use for harvesting fuel wood is appropriate to the local community conditions.

The use of nets is potentially indiscriminate, but the butterfly collectors' practice of collecting leaves in a way that avoids killing the trees fits well with the local ecology. The technology is, however, well understood by the butterfly farmers, whereas that for harvesting bees is not. This means the beekeepers are reliant on individuals with the skills in the communities to collect the bees from the forest.

In the ASFR in terms of quantity of resources households can collect from the forest, both the piloting and non-piloting communities are restricted to one head load of fuel wood per day, but there is no specific weight of quantity of head load per day. There are no modalities to ensure that permitted households harvest one head load per day as recommended by the fuel wood collection permit. Also, quantities have not been specified for all the other forest resources collected from the forest. In terms of quantity, however, fuel wood that households are allowed to collect is appropriate to local condition as one head load reduces over collection.

In the ASFR the quality of fuel wood in both the piloting and non-piloting communities is that which has fallen down or dead. Thus, the quality of fuel wood harvested is congruent with the provision rules in the sense that it only involves fuel wood that has fallen down or dead thus ensuring the continuation of the forest trees. However, the study was not able to

establish the quality requirement of the other types of products, and, therefore, resources, that households are permitted to harvest from the forest (e.g. the quality of leaves and butterflies one can collect from the forest).

There are no specific places for harvesting forest resources by households and proposed zones have yet to be formalized, although householders seldom go further than two kilometres into the forest. The proposed zones in the co-management communities therefore relate to the normal distances that people walk to carry out their activities. Resources may be overexploited in particular areas as households are not aware of or are unwilling to visit other places to harvest particular resources at particular times. Fuel wood is most likely to be vulnerable to over exploitation and this is likely to occur within two kilometres of households (e.g. on the margins of the forest).

In summary, the only area in which rules for appropriation and provision have been significantly developed relate to fuel wood (Table 6.2). Restricting the households in terms of the equipment to use for harvesting fuel wood (e.g. an axe or machete), only taking dead wood or fallen trees, and only being allowed to use head loads for the most 'in demand' resource, seems to be an excellent attempt to match the use of fuel wood to the local peoples condition, to maintain sustainable use of the resources. Thus, these rules are generally congruent with the local conditions with the exception of the lack of ability to prevent multiple trips in the one day, although this is more an enforcement issue. The remaining resources used are addressed primarily through the practice of the resource users rather than rules. Technology is not restricted for those other uses and, in the case of bees, this means that there is a mismatch between the skills of the householders and that of the technology required for harvesting bees.

Table 6.2   Restrictions on resource use

Type of resource	Time	Technology	Quantity	Quality	Place
Wood fuel (both piloting and non-piloting)	Restricted to one trip/day, proposed to tighten to part of a day	Restricted to nothing more than an axe or machete when harvesting	One head load, but no other weight limit	Restricted to fallen or dead	No restriction, for place but intended to limit households to 1km from boundary in the co-management area
Butterflies (piloting only)	None	None, but practice limited to nets	None	None	None
Bee harvesting (Piloting only)	None	None, but depend on community people with bee harvesting skills	None	None	No, restrictions for place of harvesting bees but farmers must keep the hives on their farm and not in the forest
Herb gathering (Piloting and non-piloting)	None	None	None	None	Anywhere in the forest where they can find them
Leaves for butterflies (piloting only)	None	Restricted to picking of leaves	None	Restricted to lower leaves of tree branches and not the buds to avoid killing the trees	None from the forest, but some households have planted the trees the butterflies feed on at their homes
Grass (non-piloting only)	None	None	No restriction but a head load which is sold to households by KFS for fifty Kenyan shillings	None	None

Overall, based on the foregoing discussion, congruence between appropriation rules and local conditions has been partially developed in both the piloting and non-piloting communities.

6.4.2 Congruence between provision rules and local ecological conditions

The second part of design principle 2 concerns matching appropriation rules to local conditions. By local condition, Ostrom (1990) implies the ecological conditions and the other attributes of the resource (Ambika & Ganesh 2005). The households were asked to explain whether the restrictions put on for the sustainable use of the forest resources are related to their local circumstances and the established rules for appropriation of forest resources. The responses from households indicated a lack of understanding or consideration for the

ecological conditions and sustainability of the ecosystem and related ecosystem services. In fact, the community was almost entirely focused on what was good for their (short term) needs rather than on sustainability of the resources on which their livelihood depends. This was held whether they were in the piloting or non-piloting communities. For instance, stealing of forest products was found to exist in both the piloting and non-piloting communities. Households were also keen to know when they will sign an agreement with the government so they can be allowed to collect timber and poles for sale.

However, it is worth noting that despite the fact that the households response showed a lack of consideration of the ecological issues, the discussion in section 5.3.2 indicates that the restrictions from cutting poles or harvesting timber in the ASFR, shows that the rule of congruence between appropriation and local conditions has been established, in the sense that this restriction may be seen as a strategy by the central government to conserve the ecological condition for the communities. However, the challenge is that the government has not made it clear to communities.

The introduction of on-farm trees to the households in the piloting communities for building their houses instead of going to the forest to collect them may also be seen as strategy to conserve the communities' ecological conditions as well as easing pressure to the forest from the communities that are more interested in the forest trees. It is also worth noting that the ASFR co-management team has considered the livelihood assets for both the piloting and non-piloting communities and has allowed the households to collect some forest resources in a way aimed at conserving the forest (e.g. bee keeping, herbal medicine collection and fuel wood collection). Moreover, households have been restricted in terms of equipment to use for harvesting fuel wood (e.g. an axe or machete) and the quality of some resources (e.g. taking dead wood or fallen trees), and quantity (e.g. only being allowed to use head loads) to maintain sustainable use of the resources.

In conclusion, congruence between the provision rules and local condition has been partially achieved in both the piloting and non-piloting communities. The tension between the overall conservation objectives of the ASFR and its use and the livelihood routines and expectations of local communities may underlie some of the delays in making more rapid progress on this principle. One organizational informant summed up this finding:

> *The first thing is that understanding that you see… the information given to the communities … they should know from the start the*

objectives the co-management that conservation is the key and what they are supposed to get from the forest are only those benefits that do not bring about poor conservation we need to conserve the biodiversity so they should know that from the start. Because if they are told okay come and you will be getting some benefits from the forest in their thinking they will think that we will be felling trees and do lumbering that is what others will say. Others will say that we will be building and we will depend on the forest, those are the benefits. When somebody talks of benefits from the forest they think in terms of cutting the forest timber lumbering, that is what comes into their thinking. So they should be made aware from the start what are we talking about when we talk of getting some benefits from the forest. Because ... they have that mentality that we shall get benefits from the forest and then they will find out that those benefits that they were talking about are not nearby (KOI01)

6.4.3 Appropriation and provision rules and local conditions

To further understand if the rule of congruence between the appropriation and provision rules and local conditions works, the households were asked to explain how well they thought the rule has functioned. The study found that the rule has worked in some respects. One household informant put it plainly that if one wants to collect fuel wood one has to go to the forest with a permit, but there is no permit that allows them to collect all the forest products (KH107). While there were some households that felt that the rules were working because, they were not aware of anyone who had complained about them (HC134). This lack of complaint, however, may reflect the extent to which the rules have actually had an impact on peoples' lives. This is a function of the congruence with local ecological and social conditions, understanding and awareness of the rules, the extent of pressure by particular users on the resources, the level and type of enforcement and associated interference with existing livelihood routines. The simplicity, appropriateness and relatively low number of rules that currently exist may be the reason for their relative acceptance.

6.5 Collective-choice arrangements

The third Ostrom (1990) principle states that most individuals affected by operational rules can participate in modifying the operational rules. Operational rules regulate their daily activities (e.g. the intensity of harvesting or methods of cultivating)(Quinn et al., 2007). Pomeroy (1994, pp. 37-38) argues that the CPR, institutions that use this principle are able to tailor rules to better suit local circumstances since individuals who directly interact with one another and with the physical world can modify the rules over time, so as to better fit them to the specific characteristics of their settings. The rules governing forest use are government

rules, and although the co-management structures, theoretically, allow piloting communities much greater say in those rules, they require government approval to have legal weight. Respondents were asked to explain if the collective choice rules they use allow them to participate in changing the operational rules used in the ASFR co-management regime.

The study found that the principle of collective choice decision-making is lacking in both piloting and non-piloting communities. For example, the majority of the households in the piloting communities reported that it is not possible to modify the co-management rules. They gave a number of reasons as to why this is the case. First, the households involved in ASFR co-management 'had not yet reached at that level' (HC108). Second, other households expressed their concerns that it is not possible for the households to change the operational rules because 'the co-management involves different stakeholders, you cannot change the rules' (HC111). The implication is that the number of stakeholders involved has created (or maintained) a sense of powerlessness. Third, other households explained that changing co-management operational rules cannot happen because the government expects the villagers to protect the forest resources for the future generation: 'There is no way, there is no way at all, they tell you that there is a generation coming so you have to respect the government' (HC116). Fourth, some households expressed their apathy to changing co-management rules: 'No need if there is rainfall, for me to be able to change. If there is rainfall, I can be able to plant even tomatoes and I get money, I then don't need to change the rules because I don't need to go to the forest because I am able to get money without going there' (HC128). Fifth, other households were of the opinion that it is not possible to change rules that are not working: 'the rules they have now are not working, what you can change is what is already working, if something is not working how you can change it?' (HC129). Sixth, it is hard because the forest is closed and the villages are only accessing a few products because the government is not willing to open the forest for more of the forest products: 'we can say so, but for now it is very difficult, because they said that the forest is already closed, so as you know it is not easy for them to open up the forest, that is very difficult, so we are only benefitting from the few products that we collect from the forest' (HC134). Seventh, some household interviewees and organizational informants confirmed that the households can only be able to change the rules for co-management when the communities and the government sign an agreement with respect to the forest resources used:

Yes, but we have to sign the agreement first (HC112)

> *We can be able to change the rules after getting that agreement and then we can make by laws, because we will only do that after we have signed the agreement. It has already been made and everything is there waiting signatures (KHI06)*

Those households in the piloting communities which reported that they have the right to participate in changing the rules pointed out that the forest does not belong to an individual or the government alone. As one household put it:

> *The community has the right to change the rules, because the forest doesn't belong to an individual or the government itself, the forest belongs to the community so, if I see that there is a clause that is not good, or that requires to be changed, I also have the right to say what should be done (HC102)*

Another household also explained that, in the past, the youth used to get beaten seriously because of stealing forest resources, but the community requested the government that instead of beating them; let them be taken to court and fined. That request has been effected (HC125).

The majority of the households in non-piloting communities did not feel that they could easily make collective choice decisions about the forest:

> *It is not easy. It is the government that makes these rules (HC123)*

> *No, the rules must come from the forest department but it is hard for us. They are the ones to give us the rules, how can we change the rules, the rules belong to them, the rules should come from the forest people guiding us on what we can do (HC232)*

This finding is supported by one of the household informants who pointed out that the communities follow the rules made by the government (KHI03). Further, there are rules that communities cannot participate in changing, for example, rules derived from Acts of Parliament, because that is the work of Parliament. Some of the rules KFS uses to allow the communities to access the forest resources are an Act's rules, such as the fees for accessing resources from the forest, which are gazetted by the government every year through an Act of Parliament which makes it hard for communities to participate in changing this rule. An official informant (KOI02), however, affirmed that some rules can be changed by communities if they wished (e.g. those controlling butterfly harvesting).

Households in the non-piloting communities clearly expected that co-management would enable them to modify rules that they could not change under the existing regime:

> *Why not, the rules that are managing the forest now come from the forest office, but if we shall have been given the forest, then it will force us to make our own rules for managing it, but now how can we formulate the rules and yet we haven't been given the forest? (HC202)*

Finally, one of the organizational informants (KOI06) concluded that: 'Yeah, but the whole issue is that I don't think that there is a rule that can be changed' (KOI06).

Failure of leadership at both the community and government levels, were identified by the non-pilot community householders as the key barriers to being able to change collective choice rules:

> *… if we shall have got a leader who can make us to work together, then we can go and change this rules … we can fight for ourselves, but now, we must have a leader who understands the issues in the co-management arrangement (HC213).*

Second, lack of involvement of the communities by the government in their meetings:

> *… say 'no' to something or accepting it, you must have been involved. Now, in the past when they used to organize their meetings, they used to call those people staying adjacent to this forest, but now, the way it is, we don't see them having such meetings involving the community. They just continue with their meetings and we are not involved. Now even though you have something that you want to contribute, you will remain like that because, you don't know anything going on in their meetings. So, there is need for them to change, so that they can tell us what is supposed to be done. So that we can know whether it is important to change this rules or not. But they don't do like that. Now they continue squeezing us (HC225)*

In summary, despite the government recognizing the importance of co-management by introducing the 2005 Forest Act that allows communities to be involved in the management of the forest, the principle of collective choice remains absent in the non-piloting communities. In the co-management piloting communities there has been greater involvement in planning, but until the co-management agreement and the plans are formally agreed to by the government, the piloting communities have little real empowerment. The decisions remain with the government.

6.6   Monitoring the behaviour of forest users

Households were asked whether they were able to monitor the behaviour of users of the forest resources in the villages. According to Cox et al. (2010), monitoring makes those who

do not comply with the rules visible to the community, which facilitates the effectiveness of the rule enforcement mechanisms and informs strategic and contingent behaviour for those who do comply with the rules. It was anticipated that because they have a closer relationship with authorities the piloting communities would be better able to monitor the behaviour of forest users than those in the non-piloting communities. The study found that monitoring the behaviour of the users of the forest resources has developed in the piloting communities, but not in the non-piloting communities.

In the case of the piloting communities for instance, the majority of the households (28 out of 34) reported that the rules allow them to monitor the behaviour of those destroying the forest resources. A great number of these 28 respondents testified that once they see a person destroying the forest resources they report the incident to the government through the government forest guards:

> *Yes, they allow; if I see somebody with that behaviour I go and report, we report the person to the government, the forest guards (HC133)*
>
> *No, if we get them destroying the forest we just make a call to the forest guards to come and arrest this person (HC137)*

However, the report is given carefully so that the violators do not know who gave the report to the forest guards. This clearly shows how difficult it is for the households to deal with rule-breakers as they lack protection from the violators. The following two comments support this finding:

> *We are not also supposed to ask the person why he is doing what he is doing, we are supposed to call the forest guards to come and they arrest the person themselves. The person may not know who may have reported him/her to the forest guards, that is what we do (HC111)*
>
> *No, what you can do is that once you see somebody destroying the forest then you go to the forest guards and explain to them, that you need to take care, there is something that you have seen taking places somewhere somebody destroying the forest because we have seen the person destroying the forest and we don't know whether you know or not, that is how we can assist, telling the forest guards soberly that there is somebody destroying the forest (HC119)*

Some of the households from the piloting communities noted that they report those violating the rules for co-management to the village advisory committees who then take the violators to the forest management authority:

> *We take the person forward; we have the village advisory old men;*
> *they are then taken to Gede [one of the ASFR forest station] (HC131)*

This village advisory committee comprise of two village elders per village from the three communities participating in co-management, thus forming a committee of six village elders who are meant to receive reports on the violators of the rules. This village advisory committee does the job voluntarily, for the most part, but may occasionally get a little pay when they participate in stakeholder meetings (KHI107).

The government forest management bodies argued that they can and do check on the activities of those using the forest and that they do receive reports of illegal activities:

> *… we monitor through just checking, we go and check what they are*
> *doing here yeah, the forest guards, and even myself as an officer I can*
> *go and check, what they are doing, the activities they are doing ….*
> *We have heard some cases whereby they [community members]*
> *report, some communities have reported to this office (KOI01)*

However, it was clear that there was some confusion over who the illegal activities should be reported to, the CFA or government:

> *If you see that there are people doing forest destruction you report*
> *and we take action and reported to the CFA leaders (KHI04)*

> *You go to KFS or KWS and you report that some areas are being*
> *destroyed, people are going to the forest to destroy, so, what time do*
> *they enter into the forest you tell them the time, if you move around*
> *that area at this time you will see them (HKI07)*

It was surprising also to find that there were six households out of 34 household respondents from the communities piloting co-management who said that they cannot monitor the behaviour of those people destroying the forest resources. Half of these six households reported that, they cannot speak out even though they see somebody destroying, stealing or poaching from the forest, because the thief is earning a living, or for whatever reason, you may end up being accused of worse behaviour. The respondents explained:

> *No, I cannot say, truly speaking, I cannot speak out, but somebody is*
> *going to earn a living (HC105)*

No, there are those kind of people [thieves/poaching] but they do so because they want to help themselves; If I see somebody helping himself from the forest anywhere I don't talk, because I want to help myself and him or her too (HC128)

No, I don't, for example, there are those involved in the management of the forest, you can go to report them, and sometimes you will be seen as having the worst behaviour (HC129)

While another one household in the non-piloting communities pointed out that they also steal a few of the forest products such as trees so they fear reporting the others (HC214).

The other households explained that they cannot report the behaviour of those who destroyed the forest resources because there are community forest guards assigned the job:

No, I don't monitor, because there are people [community forest guards] who have been assigned this work, who watch and see if there are people going to the forest to destroy it; these people have got their own groups which do this work (HC111)

This view point was also held by one household informant:

… we have our community forest guards and every member of this association [DIFAAFA] is a watchdog of the community (KHI02)

The households perhaps felt it was not in their interest to report illegal actions of the community, especially when there was no formal, legal backing for doing so: 'It [DIFAAFA] was supposed to be registered but not yet' (HC107).

However, these community forest guards are not paid: 'they [community forest guards] are volunteers, they have offered ourselves, to the organization [DIFAAFA]' (HC107).

Cox et al., (2010) argue that in other cases, monitors constitute a separate position that is compensated. Further, Agrawal & Yadama, (1997) studied the strength of local forest institutions in Himalaya, India, and found that the number of months a guard was hired has a very strong and statistically highly significant direct effect on the condition of a forest. From the ASFR interviews, the feeling was that these forest guards work on a voluntarily basis for the DIFAAFA in the hope that one day it [DIFAAFA] may be registered, and they will gain paid employment.

Moreover, the village forest guards do not have power to arrest anybody and cannot do patrols alone in monitoring violators of the co-management rules as they do not have rules

protecting them in case violators of the rules harm them. But once the KFS and community forest guards conduct a forest patrol together and it is over the KFS forest guards report the situation to their management station while the community forest guards report to the village advisory committee:

> *The village forest guards don't have the powers to arrest. The village forest guards cannot arrest somebody themselves, they cannot go to patrols themselves, because if they go themselves and they are hurt, there is no any policy covering that village forest guard, so when they go to patrols they go together (HC137)*

> *You find that the KFS forest guard patrol with a community forest guard. So we are helping one another. Once the patrols are over they go and report to the KFS and also we report to the DIFAAFA what kind of work we have done, if there is somebody who was caught destroying the forest we report, and then the DIFAAFA [village advisory committee] takes up its responsibility (HC107)*

One organizational informant claimed that the monitoring rules for the forest resources should be in the management plans of the communities because the villages have structures. For instance, the village committees are supposed to monitor the use of the forest resources, but this could only happen if the government and the communities formalise the agreement:

> *It's a good arrangement but I don't know whether it's going to work from the minute its put to use because now it's like a document, documents cannot be used but when it comes to implementing, then it can become better [how they monitor]. It is there, but it has to be put into use (KOI05)*

The old forest management system mentality ('us versus them'), as opposed to more open sharing of information in a monitoring approach, was still present, as one organizational informant reported: 'I don't think we do monitoring of the people who are poaching the forest but what we do is, we hunt each other, it is like hunting each other'(KOI02).

The study also found from the organizational informants that the communities can complain if a forest officer is seen destroying the forest, by reporting the incident to the forest management authorities. A forest officer is not supposed to destroy the forest resources, but to protect them. The communities do not have power to deal with nor arrest the forest official, but can inform the management: As an organizational informant put it:

> *... the rule is very clear that if you see a forest officer making a mistake you can go and complain within even the constitution and*

also the rules give them very clear avenues of complaint, if it's a government officer who is making a mistake …[the rules], allows more reporting than arresting because, you know, arresting and you get injured is now a bit difficult, you are supposed complain of mismanagement to the management, the CFA can actually call anybody and say that these officer here is making a mistake and this is what the person has been doing (KOI04)

In the case of the non-piloting communities, a majority of the respondents who answered this question pointed out that they cannot monitor the behaviour of those violating the rules for co-management, with the majority of the respondents reporting that it is not their responsibility to monitor such rule-breakers because forest guards are there to guard the forest (HC239). Additionally, households wish to avoid household conflicts (HC223) and other households pointed out that they have never been involved in the management of the forest so they cannot be able to monitor the behaviours of those who violate the rules (HC203); others said that they cannot monitor the behaviour of rule-breakers because they are not getting any benefits from the forest (HC204); one household pointed out that it is hard to monitor the behaviour of the forest resources users because the violators know that the trees do not belong to the government (HC215); other households pointed out that if they see somebody going against the rules they are not concerned because they automatically assume that the forest guards have been bribed:

No, we are not concerned, we know that the lions [forest guards] are there, the lions will know, they will know. First if you see somebody entering the forest you will know that the lions [forest guards] have eaten something; we cannot tell the forest people because we know that, this lions [forest guards] knows. What will happen if you ask the person and tells you that I have given the lion [forest guard] some meat to eat? You know once one enters into the forest must have given something small, we know that the person has given something because that is the system here (HC201)

One household in the non-piloting communities summed up the situation:

Why do you monitor and you don't have any authority, there is nobody who is involved in monitoring the forest at all. If you see people entering into the forest, you just leave them to enter into the forest because it is none of your concerns (HC222)

Nevertheless, there was one household from the piloting and another from the non-piloting communities who directly advise the violators of the breaches of co-management rules.

6.6.1 How well is the rule functioning

The respondents in the piloting communities were asked to comment further on how well they thought the monitoring rules were functioning. A majority of the respondents to this question reported that monitoring works because people fear the consequences and forest destruction has gone down:

> *Yes, even right now if they get hold of you destroying the forest you will be taken to jail! They work (HC113)*

> *Yes, in our area here, it is still working; I see there is no much destruction (HC114)*

In contrast, other respondents pointed out that the rule does not work because it is hard to implement due to the procedures involved: 'It doesn't work well it has a lot of process, it is weak' (HC136)

Overall, in communities piloting co-management, the behaviour of rule violators is monitored to some extent, whereas those non-piloting communities seem to consider it is not their responsibility. It appears, therefore, that those in the piloting communities might have greater faith in the systems than do those in the non-piloting communities. Also despite informal co-management being practiced in piloting communities, forest destruction still continues. This shows an inadequate enforcement of the rules. The community forest guards are not paid, which makes it hard for them to be accountable to the resource users or the communities. Households not piloting co-management do not report violations and there was no sense of an effective monitoring system in their villages.

6.7 Graduated sanctions

The graduated sanction design principle means that violators of operational and collective choice rules are assessed on the severity of their infractions by other resource users or officials acting on their behalf and punished accordingly (Quinn et al., 2007). Further, Cox et al. (2010) point out that graduated sanctioning deters the participants from excessive violation of the community rules. Graduated sanctions progress incrementally based either on the severity or the repetition of the violations. Graduated sanctions help to create community cohesion, while genuinely punishing severe cases. They also maintain proportionality between the severity of violations and sanctions.

This study was interested in understanding if the ASFR co-management rules enable the households to appropriately punish the users of the forest resources who violate the

operational or collective choice rules for the ASFR co-management arrangement. All the interviewees from both the piloting and non-piloting communities recognised that communities are not allowed to punish the users of the forest resources who violate the rules for management of the forest, but that households can, and do, report the incidents to the government.

Cox et al. (2010) argue that for graduated sanctions to succeed there must be a strictly implemented, graduated penalty structure. Ghate & Nagendra (2005) also argue that when sanctions are strictly enforced, they prevent the spread of 'free-riding' behaviour, thereby instilling a sense of trust in the community. It is essential to provide conditions that facilitate a sense of justice and fair play in the participants by ensuring that all individuals who break the rules will be sanctioned irrespective of their position in the community. The study found that in the piloting communities, the regulations of the CFA and the DIFAAFA do not allow a member to be sent to court unless they have received three warnings from the village advisory committee. Despite the recognition by the communities that they are not supposed to punish the users of the forest resources who violate the rules, the person may suffer a beating as part of that community level process if reported to the village advisory committee. And only if they still persist in offending are they referred to the authorities. One household in the piloting communities explained the process for sanctioning the violators of the rules in the piloting communities, as follows:

> *…we warn the person, we take the person to the DIFAAFA[village advisory committee], he is warned, the person is warned three times, that what you are doing is not wanted, this is what you are supposed to do, then the person is left to go and warned not to repeat the same mistake, if the person is caught again he is reminded: 'What did we tell you on the other day?' So then if it is found that this person doesn't hear what he is being told, then the village elders may beat up the person just a little, and then the person is told to go back home and told that don't repeat the same mistake. If the person repeats the same mistake the third time then it means that it is very hard for this person to hear. So this will force the village/DIFAAFA to send this person to jail to serve a sentence such that once the sentence is over, the person can say whether he has changed or not (HC130)*

The study found that the KFS can, on the advice of the village advisory committee after investigation sack corrupt government forest guards:

> *We can sack somebody, there is one person in this January who was sacked from employment here, the person has been removed from*

here, he had worked here for six, eight or ten years in this place he had friends, he would tell them that at this time, go and cut the trees, then I will bring a vehicle, some people have been sacked, others have been arrested, others have been transferred when the forest guard does that, the committee[village advisory committee] members here investigates until they are sure, then they write a letter, they take it to the forest management station, then they come here to investigate and within no minute you see somebody arrested (KHI107)

However, one household informant who is a community leader stated that punishment has not been introduced in the communities, explained a somewhat different process that one can take in sanctioning the violator of the rules. The householder calls the violator of the rules and explains the consequences of breaking the rules and the reasons for the rules. If the violator is persistent, the householder then reports the violator to forest management (KFS). As the household informant explained it:

We have not introduced punishment, but there are those steps me as a leader I can take, I can call you if I have caught you with the trees and then I try to explain you the importance of the forest, but if that is your behaviour, every time you sneak into the forest to destroy/steal, now, there will be a time that I will say that I have tried, to advise you, but it looks like that you have decided, once it reaches that level, then I will report the person to the forest management [central government] (KHI06)

From the discussion it occurred as though this would mean that this approach might just be the approach taken by the village leader, but not an approach taken by every householder. But it emerged that just like other households (KHI107) the leader reports the violator to the forest management if he or she persists.

Another household informant also reported that households had powers to punish the offenders or violators of the rules for using forest resources when co-management was started. The communities had the powers to hear small cases but, currently, the punishment of the offenders is entirely with the KFS, because the communities do not have *Locus Standi* that gives them the powers to take the violators to court or prosecute them (KH102).

One reason which households gave as to why it is not possible for them to punish the violators of co-management rules is that they fear being injured by some of the violators, who they consider are dangerous, but the forest guards have guns which the violators are believed to fear:

No, you cannot punish anybody, you cannot see somebody and follow him or her just like that you have got to report the person, to the forest guard. Some of the people are very dangerous if you follow them and they may cut you with a panga [machete] because they are thieves. You have to report them to the forest guards because they have the tools that people fear here (HC121)

If you arrest somebody and cuts you with a knife if you move forward, what rules can you say allowed you to do that? So you will find that you have no authority that allowed you to do that (KHI01)

6.7.1 Are the graduated sanctions working?

To further understand these rule the respondents were asked to explain how well their punishment system functions. The graduated sanctions were seen as effective by ten out of fourteen household respondents to this question. However, the others felt the lack of transparency of the outcomes and continued violations by some people, even after punishment, showed that the rules were ineffective. Other households seemed unaware of any punishment except those provided by the government. In the non-piloting communities, the households leave the violators of the rules, because they believed that they cannot punish them as it is not their responsibility.

In summary, graduated sanctions have been established in piloting communities and are based on repetition and severity of offence. However, the higher level sanctions remain with the government, not the village or community committees. The sanctions appear to be provided even-handedly with even a corrupt government forest guard being fired once reported to the government by the village advisory committee and it is confirmed that it is true they are violating the rules for the co-management. However, sanctioning some law breakers is hard as they are considered dangerous and may harm the would-be law enforcers. Despite reportedly having the graduated sanctions in place, it was apparent that not all people were aware of them or their operation, or what happened to people once they were reported to the central government. They largely rely on the discretion of the central government or the government officer who receives reports or the station forest guard who is on duty.

However, in the non-piloting communities there is no structure for sanctioning the violators of rules. It is, therefore, fair to conclude that co-management has been significantly implemented in accordance with this design principle in piloting communities, but not in the non-piloting communities.

6.8   Conflict resolution mechanism

The requirement for conflict resolution mechanisms is the sixth of Ostrom's (1990) principles and states that systems with low-cost conflict resolution mechanisms are more likely to survive than those without. Conflict over an exhaustible resource is inevitable in CPR management, necessitating the presence of legitimate mechanisms for conflict resolution to maintain collective action (Cox et al. 2010). They further argue that when conflict resolution mechanisms are not available or accessible, successful CPR management appears to be difficult. This study was interested in understanding if the ASFR co-management arrangements provided participating households with an accessible process for resolution of conflicts among the forest resources users or between forest resources users and the government officials. The study found that conflict resolution mechanisms have started to develop in the piloting communities, but not in the non-piloting communities. For example, out of the 28 respondents, 25 of them pointed out that there is a village advisory committee that is responsible for conflict resolution between the various resources users and their officials (e.g. forest guards). However, when issues prove too tough to handle for these village advisory committees they are taken forward to the government. The piloting community respondents reported:

> *Yes, we have old men [village advisory committee] here who have been appointed who discuss such issues. If the villager is in conflict with the forester, then they discuss all those issues here but when it is very difficult and defeated to handle the matter that is when they call the management from Gede (HC121)*

> *There is that community committee, because the forest is here in this village no. If you are in conflict, you may go to that committee and you discuss and you finish the issue …If the issue is big, then you will be taken forward, but we have the conflict resolution here in the village and we have people to be consulted in that committee (HC118)*

> *Yes, sometime if there is a problem, there is a committee of elders in the village that is consulted which is under the DIFAAFA, so that the committee is told and then they will see which way to go, they can try and solve the problem (HC112)*

One of the householders, however, clarified that if one is not an association member, the conflict is solved administratively. The informant explained:

> *We have two ways, if you are an association member your problems will pass through the association, and those who are not association*

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*members, their problems will be solved through the administration,
that is if there is a problem but in most case we try to solve our
problems through the association [DIFAAFA] (KHI01)*

If the conflict is between officials, then the organizations organize meetings and a resolution is sought. In some instances if the conflict is serious the central government is involved:

*If it is conflict with officials we talk it in the meeting, I have told you
we quarrel and agree... there has been some serious conflicts before
to the extent that we invite people from the headquarters ...., I
remember two occasions where we have had senior people from KFS,
from KWS coming, and also from us they come and try to listen to
what we are saying and some of those things have resulted to some
officers being transferred to other areas when they listen and hear the
problem is this officer and it's not a must that he works here because
KFS is all over the country so he can be moved to a place where these
arrangement does not exist because he is not able to cope or he looks
down at non-governmental organizations and here it won't work
(KOI05)*

This acceptance of an initial role for communities in resolving conflicts was well recognized among the organizational informants. As one organizational informant commented:

*If there is a crisis people must come together, you see like, okay you
find a certain section of the forest will be prone to destruction all the
time. Definitely, people in the village, elders, and community
members will be called upon to sit down and say what the problem is
so that there is formal participation. They have some barazas [village
meetings] they link up to the relevant ministries (KOI06)*

Some household interviewees who collect fuel wood reported that there are enough resources for everyone who has a permit and as they are common pool resource there is no conflict:

*One cannot be in conflict so easily, in the forest there is no log that
has somebody's name, and everybody goes to the forest and collects
her fuel wood if you have a permit (HC111)*

Similarly, a butterfly farmer noted that having a permit made it hard for conflicts to occur with the forest guards: 'No, it is very hard to be in conflict because you are the same; you do a similar job' (HC135). The farmer also noted that a conflict can be resolved by members of the butterfly user group.

While in the non-piloting communities, the majority of the respondents reported that if there are conflicts over forest resource use, they are either solved by the chief or relevant forest station foresters. For instance, if the conflict is between the community members and the

forest officials, the solutions are sought from the forester. However, if the conflict is among the community members the conflict is solved by the chief. In some cases those in conflict can talk amongst themselves and solve their conflicts:

> *We resolve the conflicts here at home, but if the conflict is between the forest official/guard we go to the forester (HC220)*

> *The chief is the one who resolves conflict here or you can go to the forester (HC221)*

> *If they are in conflict we sometimes can talk about the issue ourselves (HC216)*

Some conflicts in non-piloting communities are handled by the court:

> *If the forest guards will be patrolling, if they see maybe somebody entering to the forest once they arrest the person, I don't know where the issue ends but I assume it ends in court, because they do arrest very many people here (HC222)*

6.8.1 Do the conflict resolution processes work?

Despite local people being aware of the local conflict resolution mechanisms, one of the households commented that conflict resolution in the villages is not as active as in the past (HC102). An organization informant expanded on this argument by saying that initially the conflict resolution mechanism they used had worked well. The informant said that this was so because they used to speak directly to those in conflict over resources and requested them to change their behaviour. However, the government realised that the activities were criminal. Therefore, if people are in conflict they are now taken straight to court (KOI04).

In summary, the piloting communities had several provisions for conflict resolution. First, the village advisory committee usually resolves smaller conflicts related to forest resource use. Second, more complicated conflicts are forwarded to the government for resolution. Third, the communities have local assemblies if there are serious constant conflicts on resources uses in the communities and link up with the relevant government ministries. Fourth, non-association [DIFAAFA] members' conflicts are resolved administratively. Conflicts between co-management officials are resolved through meetings. The findings suggest that the ASFR co-management conflict resolution mechanisms have been largely, but not completely, established in the piloting communities. The communities do not have full control of conflict resolution as they have to rely on the government for tough conflicts.

In the non-piloting communities, community members resolve their conflicts through first, the chief and or relevant forest officer. For instance, conflicts between community members and the forest officials are resolved through the relevant forester while conflicts among the community members are resolved by the chief. Second, in some cases those in conflict can talk among themselves and solve their conflicts. Third, other conflicts are resolved by the court. These findings suggest that the non-piloting communities have not established any community related conflict resolution processes for issues over the use of forest resources. Therefore, community conflict resolution mechanisms are largely absent in the non-piloting communities.

6.9 Official recognition of rights

This principle stipulates that the external government agencies do not challenge the right of the local users to create their own institutions. Devolution of power inherently requires at least some recognition that communities can organise to manage resources. This study set out to understand whether the government or the highest authority in the ASFR recognises the rights of the households in the co-management arrangement to devise their own rules and undertake administrative duties. The study found that the rule of official recognition has been partly realised in the piloting communities and but not in the non-piloting communities. For example, out of 26 household respondents, 18 of them felt that the government may recognize their rights to devise the rules for the co-management arrangement. They felt that if the households hold a meeting and write what rules they want to devise and forward them to the government then they thought the government would accept the rules (HC101). One of the household respondents reported that the government could accept the rules devised by the communities because when the rules being used in the current co-management were being developed, the government officers that introduced the various projects to the villages worked with the communities until the rules for accessing the projects were complete (HC103). This shows that the communities have not had an independent opportunity to devise their own rules, even though from the discussion it seems they do, but they have not taken it as the government seems willing to engage with the communities on the establishment of the rules for the co-management arrangement.

Another householder commented that the community is worried about why the government has not already signed the agreement, especially as the community takes care of the forest resources. The respondent concluded that if the government signs an agreement with the

community, then the community can say that the government recognises them in devising the rules for co-management (HC112). This contrasts with the views of one organizational informant that it has been agreed that communities have a right to devise the rules for co-management because when meetings are held the communities' are asked what they want to do. For example, how they intended to punish the people who violate the co-management rules for forest use, and then all the communities' proposals are taken into account and their suggestions are supposed to be included in the forest management agreement which is supposed to stipulate how the rules are to be handled then these become laws that are enforceable. However, once the communities sign an agreement with the forest management, the rules can become law (KOI04). Finally, other households said that they thought that the Kenya Forest Service is aware that the communities are helping them in the management of the resources and has therefore, recognized their rights to devise the rules (HC115).

In contrast, some households in the piloting communities were categorical that the government cannot recognize their rights to devise rules for the co-management arrangement. They understood that it would take a long time for the government to recognise them in devising the rules for co-management because the process involved in reaching that level is enormous, slow and involves so many steps (HC111). For example, some of the households noted that the piloting communities had requested the Director of Forest some 17 years ago to sign an agreement to allow them to do the co-management trials but the communities have not received any feedback (HC125). They took this as indicative of how hesitant the government is in devolving power to the communities

Another household informant clearly demonstrated how the government cannot accept the rules devised by the communities by explaining that if the co-management rules are devised by communities, they have to go through the director of Kenya Forest Services office which decides the rules to be included in the management of the forest before the communities are allowed to use them (HC104). They expressed concern that the government seemed unprepared to delegate such decisions to lower offices to hasten the process.

Another household felt that the communities did not really devise their own rules but were guided by the forest management and the communities are told what to do. Therefore, if the communities make the rules under the guidance of the forest management when they write letters for help making reference to the rules, the management then can accept their requests and is more likely to act on the complaints even against their own forest guards (HKI07).

Similarly, organizational informants of the institutions operating in the co-management reported:

> *You see, when they are making the rules they have to be guided they don't just make them when they are alone we must participate in a session of making the rules and then we give them the guidelines so that they don't do or come up with rules that will destroy the forest (KOI01)*

> *Without involving the Ministries that are relevant, they cannot, yeah … All rules are worked together, they need to work with consultation with key relevant Ministries, but at the village level, then you have like a group that is dealing with certain activities they have their own rules of operation and this rules maybe be interlinked for the betterment of managing the resource, but not saying, 'Now listen here, this are our rules and its final (KOI06)*

All the non-piloting communities pointed out that the authorities do not recognize their rights to devise their own rules. The households felt that, forest management is "above" them and that the forest managers would not accept rules devised by their communities. Furthermore, the households identified that they neither own nor protect the forest and consequently the central government cannot recognise the rules devised by them (HC204, HC201).

From this discussion, one can conclude that even though the households feel that the government can recognise their efforts in formulating the rules for co-management it has not happened completely and even if it does it will have been a long, slow process. However, the government still legally holds the responsibility for making the rules for the communities. The communities' rules cannot be accepted by the government until the government sees the rules and agrees on which rules to retain and which ones to strike off. This shows that in the piloting and non-piloting communities, the authority to devise their own rules for the management of the forest is challenged by external authorities. Even though piloting communities formulate their rules they have to be guided by and approved by the government. In short, the communities do not have the autonomy to establish their own rules for managing the forest. Therefore, the rule of minimum recognition rights for the communities to devise their own rules has developed to some extent in the piloting communities as the government accepts involving the communities in the formation of the rules but in non-piloting communities the communities have not had a chance to participate in making the rules.

In summary, however, it is prudent to argue that even though the households feel that they may not be recognized in devising their own rules, in fact, there is recognition of the rights of the households in the co-management arrangement to devise their own rules in the sense that if there wasn't, recognition, then there would be no co-management written into the forestry legislation and no co-management arrangements at all – the fact that there is, an indication of government's acceptance that there is potential for communities to self-organise sufficiently to form a co-management arrangement confirms the recognition of the households to devise their own rules. The only challenge is that this rule has not been well-set in the co-management approach in a way that flexibly allows the local communities to create their rules.

6.10 Nested enterprises

This principle states that in successful systems, governance activities are organized in multiple layers of nested enterprises. That nesting may occur either between user groups and the larger governmental jurisdiction, or between user groups themselves (Cox et al. 2010). The communities were not asked to answer the eight principles because it was anticipated that this would emerge from the field interviews. In the piloting communities, nesting has started to develop; each community participating in co-management has its own structure and nested hierarchical relationships (as discussed in section 5.2). In non-piloting communities the nesting structures have not yet been established as the communities depend on the government's structures.

6.11 Summary of the extent to which ASFR co-management can be characterized as devolved collaborative governance

The second objective of this study was to evaluate the extent to which governance arrangements for governing the ASFR co-management can be characterized as devolved collaborative governance. The study used Ostrom's (1990) common pool resources design principles as an evaluative framework in understanding the extent to which the governance arrangement for the ASFR can be characterised as devolved collaborative governance by comparing co-management in the piloting communities and non-piloting communities. The analysis indicates that in the piloting communities all of Ostrom's (1990) design principles are present to some extent in the ASFR co-management arrangement (Table 6.3). In the non-piloting communities, only three design principles have been partially established namely; congruence between appropriation and provision rules and local conditions and part two of Ostrom's first design principle clearly defined boundaries of users of forest resources.

Table 6.3   Summary of Ostrom (1990) design principles as they appear at ASFR

	Design Principle	Piloting communities	Non-piloting communities
1	Clearly defined boundaries		
	(a) of resources	Partially, yes	No
	(b) of users	Partially, yes	Partially yes
2	Congruence		
	(a) Between appropriation rules and local conditions	Partially, yes	Partially, yes
	(b) Between provision rules and local conditions	Partially, yes	Partially, yes
3	Collective choice arrangements	Partially, yes	No
4	Monitoring	Partially, yes	No
5	Graduated sanctions	Significantly established, yes	No
6	Conflict-resolution mechanisms	Partially, yes	No
7	Minimal recognition of rights to organize	Partially, yes	No
8	Nested enterprises	Partially, yes	No

Overall, it can be concluded that the rules used for the management and use of forest resources are more developed in the piloting communities relative to the non-piloting communities. Nonetheless, the findings in this chapter also demonstrate that the governance of the ASFR co-management has not been fully devolved to the communities since the formal co-management agreement has not been signed off.

Chapter 7
An evaluation of the current ASFR co-management institutional arrangements with their associated livelihood outcomes

7.1 Introduction

Chapters 5 and 6 have examined the current institutional arrangements of the ASFR co-management regime to determine the extent they are able to be characterized as devolved collaborative governance. The aim of this chapter is to evaluate these arrangements from the perspective of whether they result in a more sustainable livelihood for those communities piloting co-management than for non-piloting communities. Although the conclusion was that co-management has not been formally achieved, the extent of devolved collaborative governance in piloting communities was sufficient to describe it as essentially a *de facto*, if not *de jure*, co-management regime. This *de facto* co-management arrangement is a deliberate strategy contributing to improving the sustainability of the livelihood outcomes of the community while also achieving conservation of the forest. If the consequences of using co-management in this way are that the community livelihood assets are increased or are made more resilient, then one can say that the co-management approach has strengthened the livelihood outcomes of the piloting communities.

Therefore, this chapter presents the results of using indicators identified in the modified sustainable livelihood framework in chapter 3 to evaluate the co-management arrangements in terms of their contribution to strengthening the livelihood outcomes of these forest-dependent communities. To achieve this objective, this chapter, is divided into five sections. The next section examines how the livelihoods assets or capital stocks of households have improved as a result of the co-management arrangement. Section 7.3 deals with the extent the community vulnerability has reduced due to the co-management arrangement. In section 7.4 the extent to which the community socio-economic well-beings (income levels, poverty levels, food security levels and sustainable use of the forest resources) can be attributed to be outcomes of the ASFR co-management arrangement are discussed. The chapter concludes with a summary of the results.

7.2 Community livelihood assets or capital stock

The aim of this section is to understand how the livelihood assets (or capital stocks) of the piloting communities have improved as a result of the co-management arrangement. The

following areas are covered: the assets that households have managed to accumulate as a result of the co-management arrangement, livelihood assets acquired by households involved in particular projects, reasons for changes in the value of these assets, predictability of changes to the assets, distributional differences in the acquisition of livelihood assets and the extent to which the value of the assets has improved as a result of the co-management arrangement.

7.2.1 The assets that households have managed to accumulate

As discussed in chapter 3, the Sustainable Livelihood Approach is generally considered to have five categories of assets or capital, namely: human, financial, social, physical and natural. The following subsections address the findings of the research in relation to each of these categories.

7.2.1.1 *Human capital*

'Human capital' highlights the importance of labour, health, education, and skills as assets on which to draw in achieving livelihood outcomes. Labour is a vital asset for households, but labour alone cannot sustain livelihoods. When enhanced through education, training, and additional skills development, it becomes a more effective tool for poor households to gain improved livelihoods (Boli, 2005). The development and maintenance of human capital assets as a result of the co-management arrangement was found to be a significant indicator of the regime's impact. For example, the increased financial capital gained through the various co-management income-generating activities in piloting communities, and forest related activities in non-piloting communities, has enabled households both in the piloting and non-piloting communities to build human capital through payment of school fees, meeting of their hospital fees, purchase of food, improvement of education and better health and purchase of nice clothes for households. Households' and organizational interviewees explained these by saying:

> *So many parents are now taking their children to school, something*
> *that never used to happen before (KOI01)*

> *I know people who have educated their children using butterfly*
> *income, through to secondary level (KH05)*

However, this study found that the piloting communities have acquired additional human capital compared to the non-piloting communities. These additional assets include: attainment of skills for doing various co-management projects such as butterfly farming, bee

keeping and planting of *Casuarina equisetifolia* trees (HC103). They have also acquired knowledge regarding rules for managing the forest as a result of the co-management arrangement (HC125).

Some organisational informants believe that their organizations have helped households to improve their overall capacity, through various development ideas and their general life (KOI03). For instance, one of the organizational informants commented that households have better business knowledge relevant to business skills:

> *Definitely, even, now they are enlightened in terms of business management, they have been trained, that's enlightenment because this is a whole business, that they are doing and if they are not able to have some kind of skills in entrepreneurship? How are they going to budget? How are they going to run it? They are enlightened (KOI06)*

Households also confirmed that the skills they have acquired from training for various projects (e.g. tree planting and butterfly farming) is a major factor that has led to the improvement in the quality of their human capital. According to these households, the training has been helpful in understanding the importance of the forest resources and how to undertake the various income generating activities:

> *Because we have been trained … we did not have those skills, for example, of planting our own trees and how to plant them, education on butterflies farming. In the past we really didn't know where to start, we didn't know how to manage the forest in the past, because if we did not start the management of this forest, I don't know where we would be by now. We may not be getting rainfall here, but once we were trained what the importance of the forest is, then everybody woke up and knew that it is good to take care of the forest so that we can get its benefits (HC101)*

> *I can say that I have seen this change because in the past I didn't have any training, because whatever you do, you must have knowhow, so the time I got all this kinds of training, this has made me open my eyes a lot. Right now I can borrow anything from anywhere and I am given, for example, money and credit on goods because I now have my skills that I can use and get money straight away (HC103)*

It can be concluded that the piloting communities' households were able to acquire skills from various training developed through the special co-management projects that improved their overall capacity in their general life, and business skills, and also in understanding governance concepts and the conservation value of the forest.

7.2.1.2 Financial capital

Scoones (1998) points out that financial assets include, cash, credit/debts, savings and other economic assets including basic infrastructure and production equipment which, he argues, are essential to the pursuit of a livelihood strategy. It was apparent from the study that piloting communities had acquired more financial assets compared to the non-piloting households. For example, the study found that the piloting households have acquired increased savings which, in turn, have enabled them to purchase land and production livestock (e.g. cows and goats) (KOI06). In addition to these capital stocks, the communities piloting co-management have managed to purchase turkeys and hens, are able to access loans and do small businesses like selling food (HC136) and have joined on 'merry go round' groups [a village saving scheme] (KOI04). One household interviewee explained this by reporting that:

> *Communities [piloting] have also bank accounts where they are able
> to get money and they save and they take loans, what they have done
> is that they make their savings, they have been able to start a
> catering. In the past it was difficult because if I requested for help or
> loan from somebody will say 'where will you get the money from?'
> But right now, because they know that I am a butterfly farmer and
> they see me with a container of honey, they will loan me. I have got
> friends. In the past they used to say that even if I loan her where she
> will get the money to return [it] (HC101)*

Similarly, one household informant mentioned that it is possible for the people to get credit from where they sell particular products:

> *… credit facilities, sure, because, for example people who are in
> Kipepeo [butterflies] farming, bee keeping, yes, can get credit from
> the market place (HKI02)*

Even though the households piloting co-management have been introduced to new income generating projects, not all of the households are ready to join such initiatives (KOI04).

A majority of households in the non-piloting communities reported that they have not managed to acquire financial assets as a result of the forest related activities that they are involved in:

> *I have not gotten anything from that farming that I can say can help
> me, because I only plant food, I cannot say that I have harvested too
> much food, which I sold and bought something, not yet (HC231)*

I don't think I am fine; I am trying to chase my friends I am too far behind (HC217)

I don't have any assets (HC207)

The things that I have managed to buy this time truly speaking on my side, I don't have enough to eat and can say that I am full, but saying that I have bought something that I can mention, for now, I don't have but I have a goal that sometimes in the future I will be able to do so (HC209)

Nonetheless, a few of the households in the non-piloting communities reported that they have managed to purchase cows, goats and hens as a result of their forest related activities:

As a result of my money, I have managed to buy a goat and a cow (HC202)

I have a goat, hen, yes, such that if my children in school say that this is what I want, you have something to sell (HC214)

7.2.1.3   Social capital

Social capital is a mutual relationship within, and among, households and communities. This relationship is based on trust and reciprocity, memberships of more formalised groups, and networks and connectedness (either socially vertical or horizontal) that increase people's ability to work together and expands their access to wider institutions (such as political or civil societies). More individually, the concept of social capital draws attention to family networks, kinship, and close friends that the household will depend on in times of crisis. By and large, this relationship can be seen as an investment in their future livelihoods (Boli, 2005; DFID, 1999; Ellis, 2000).

It was clear from the qualitative interviews that the piloting communities had acquired more social capital than the non-piloting communities. In both the piloting and non-piloting communities, the study found that most of the households have friends on whom they can trust and who can help them when they have problems (HC103, HC201), but in the piloting communities explicit reference was made to income from friends who had co-management projects rather than simply to friends who had made savings from forest related activities, as was the case for the non-piloting communities (e.g. HC144, HC203).

In addition, co-management piloting households reported that the co-management arrangement has helped them to be known by many people through being active members in the co-management activities (HC109). Their networks had been extended. Household

informants also reported that the ASFR's co-management has become a model that has attracted many visitors who now go to the piloting communities to learn about co-management activities:

> *KEFRI has done research on co-management here, it is successful and we are proud of it. We are a role model here, may be because we receive many visitors. We take a hand in learning [teaching?] co-management activities here (HKI02)*

Finally, one of the organizational informants explained that through the projects, the communities have formed various user groups, for example, the butterflies farming user group. According to this informant, these user groups provide support for the poor people by helping them to pay school fees for their children and as well support the families living with HIV and AIDs (KOI04).

It can be concluded that the piloting communities have accumulated more social capital compared to non-piloting communities. For instance, non-piloting communities have only established friends whom they can trust and who can help them when they have problems and for the payment of dowry. Whereas in the piloting communities they have additional external linkages and the new internal groups to whom they can turn to when faced with problems.

7.2.1.4 *Physical capital*

Goods for sale, roads, and pipe lines are the most important forms of physical capital. Produce goods are made to generate income. For example, sewing machines are used to produce cloth to sell, and refrigerators can be used for commercial purposes. These assets can be converted into other assets (e.g. capital stocks) and sold to safeguard poor households' livelihoods. Among physical assets, shelter and buildings, roads, electricity, water supply and sanitation, and access to information are most important. For example roads shorten distances and enable market access to poor households. Electricity also plays an important part in rural areas, for its presence determines the locations of manufacturing industries that may provide labour and income to the poor. Furthermore, avoidance of illness and disease in rural areas can be achieved through provision of clean drinking water and sanitation. Shelter is also necessary for protecting humans (Boli, 2005; DFID, 1999).

The study findings suggested that households in the piloting communities have acquired more physical assets than the non-piloting communities. The physical capitals that were found to

have been built by both the piloting and non-piloting communities were primarily houses (HC131) (Plate 7.1) and piped water (HC102, HC109).

Plate 7.1   Typical Giriama house acquired by a non-piloting household

Also, as a result of the co-management arrangement, an electric fence (Plate 7.2) has been put up around the entire forest to prevent elephants destroying crops for all the communities living adjacent to the forest (HC137). This fence is an example of an instance when the co-management agreement has directly benefited both the piloting and non-piloting communities and enabled cost savings for the non-piloting households earlier than might otherwise have been the case. Some of the households reported:

> *The elephants used to come here, they used to come here every morning and evening, then this means that you will never harvest your cassava, but because of the electric fence, everybody is happy, we can plant maize here. The elephants used to eat all this [maize] (HK107)*

> *… this time when you plant you can harvest because of the live fence. In the past when the elephants used to pass here they will destroy all the trees, but nowadays the elephants never come out of the forest now our great challenge is the rain (HC128)*

Plate 7.2   Electric fence around ASFR

Furthermore, the study found that the piloting communities have managed to build extra physical assets. For instance, household and organizational informants reported that through donor funding linked to the co-management agreement they have managed to build community schools (e.g. Dida, Kahingoni and Kafitsoni primary schools) and equip them with desks (HC138) and (KOI04). KWS was frequently mentioned as a source of government funding in constructing and equipping these schools (KOI04). KWS was also identified as involved in helping the communities to educate their children (HC134). Some households have managed to buy bicycles as a means of affordable transport as a result of the savings from the co-management activities (HC138). Interviews with the household informants also revealed that some households piloting co-management have managed to replace the grass thatched roofs on their houses with iron sheets because of funds earned from the co-management projects. Finally, one of the household informants explained that, due to the co-management agreement, donors have helped them to drill a water borehole at Kafitsoni (KHI107).

However, in both the piloting and non-piloting communities, physical assets such as roads have not been developed or sealed despite their value for use by tourists (Plates 7.3, 7.4 and 7.5) and them becoming impassable during the rainy season.

Plate 7.3   Un-sealed main road connecting Dida from Kilifi to Ganze

Plate 7.4   Un-sealed road that connects Malindi and Tsavo East

Plate 7.5   Tourists stop at the side of the road of the study villages to view village

It is worth noting, and will be discussed in more detail below, that not all benefits from projects accrued equally to those involved. For instance, one of the household interviewees (HC110) was of the opinion that even though the value of the household livelihood assets had improved, those people who joined the projects earlier managed to improve their livelihood asset values better, they were able to build better houses than those who joined the projects later. Currently, the projects are not doing well because of the lack of market demand for the projects' produce. Generally, it can be concluded that co-management, especially through project revenues and enhanced access to donor funding, resulted in the piloting communities accumulating more and better quality physical capital than the non-piloting communities.

7.2.1.5 Natural capital

Natural capital, comprising land, water, and environmental resources (sometimes referred to as environmental assets) is an essential asset for the survival of poor households (Ellis, 2000; Scoones, 1998). In both the piloting and non-piloting communities, households have managed to enhance their natural capital, however, the quality and quantity of natural capital in the piloting communities have increased compared to the non-piloting communities because of the income generating activities (e.g. butterfly farming, bee keeping, and *Casuarina equisetifolia* trees planting). The most frequently reported artificially introduced natural capital by households in the piloting communities was *Casuarina equisetifolia* trees (HC128, KOI04). A few households reported that through this *Casuarina equisetifolia* the quality of the land has improved through soil conservation in the communities (HC137). Also, as already demonstrated in chapter 5, the growing of butterflies and keeping of bees on farm land has improved the quantity of butterfly stocks by no longer placing as much demand on the natural stocks of these capital (i.e. by substituting farmed butterflies for catching wild butterflies).

Whereas in both the piloting and non-piloting communities, the natural assets that households have managed to accumulate include planting of coconut trees and fruits like mangoes and bananas, which households reported they feed on during the drought season and which, from observation, are also sold (Plate 7.6). One household from the non-piloting communities summed up this finding:

> *To help ourselves here then, we depend on fruits here from our farms down there mangoes or if there is cassava, bananas they help us even now we are surviving on mangoes. We eat mangoes during the day and in the evening we get a bucket of flour and we cook. But if the mangoes are finished, that is all, but God is good we can go and collect those pieces of cassava at Kakuyuni and you get them and buy and eat and then you survive like that (HC203)*

Plate 7.6   Village women selling bananas and mangoes

Furthermore, a significant number of respondents (26 out of 36) reported that the quality and quantity of the ASFR natural capital (e.g. trees and wild life) has improved over time in the piloting communities as a result of the co-management arrangement (KO102, KHI02). One factor that has led to the improvement of the quality of the ASFR's natural capital, as identified by households and organizational informants is the change of the communities' perception towards the forest resources. In the past, the communities used to see the forest as wood, but now they see the forest in terms of tourism, butterfly farming, and as a foundation of their normal farming through the rainfall which they may not receive without the forest (KOI02).

The introduction of co-management has also led to the regeneration of the tree vegetation cover, because the communities started to establish some tree lots on their farms thus easing the pressure on the forest. Further, the informants identified that in some parts where co-management has not been introduced, like Jilore, forest destruction is still high (KHIO2). One household informant explained that the wildlife in the ASFR has increased because the communities entered into the forest and removed the wildlife traps placed by poachers. The communities have also held meetings with the hunters and educated them on the dangers of eating game meat and the importance of conserving the forest (KH104).

While, in the non-piloting communities, all household respondents revealed that the quality or quantity of the ASFR's natural capital has reduced as a result of poaching of the forest resources by forest management and the communities (Plates 7.7 and 7.8). For instance, referring to the ASFR's natural capital, one non-piloting community household commented:

> *There is nothing there [forest], there is nothing now. It has been*
> *destroyed. It is now like a play field. It is not any more a forest. There*
> *is nothing inside that forest. The only trees that you can see are the*
> *ones they have planted recently, but there is nothing inside that forest.*
> *They have stolen and replaced them with the ones they have planted,*
> *but the old trees are all gone. If you go to some sections of this forest,*
> *you can walk without getting anything touching you. They have made*
> *the forest to disappear. It is like somebody clearing land for*
> *cultivation (HC201)*

The non-piloting communities believe that lack of involvement in the co-management of the forest is a major cause for the destruction of the forest trees (HC213 and HC202).

Organizational informants confirmed that the quality and quantity of the ASFR's natural capital have increased in the piloting communities and considered this was because the

communities have been involved by the government in the management of the forest resources (KOI03).

Plate 7.7   Degraded forest area

Plate 7.8   Theft route over the fence

7.2.2 Predictability of livelihood outcomes

Households were asked to explain if the improvement of their livelihood outcomes is predictable. The study wanted to understand if households had a greater predictability of future returns through having invested in assets to enable them to recover more quickly in bad times, (or have diversified sources of income, food and shelter etc.). The study was not able to substantially establish if it was possible for the piloting households to predict the changes in their livelihood outcomes. For instance, even though in the piloting communities, seven out of 11 respondents who answered this question were positive that the changes of their livelihood outcomes were more predictable, they were however not able to give more substantive evidence. Most of the respondents based their ability to predict the changes of their livelihood outcomes on their past livelihood outcomes and that, since the past changes

had produced better outcomes, they expected that they will achieve better outcomes in the future (HC107 and HC103). One of the households keeping bees was of the opinion that one can better predict the changes of the livelihood outcome because, for example, the duration taken before one harvests honey is well-known, therefore, one can use it as a basis to predict the livelihood outcomes that flow from the honey harvest (HC137). Another household that keeps bees indicated that the livelihood outcomes have changed because of the attainment of the bee keeping knowledge, thus they can produce better quality honey:

> *Yes the life is on improving, because if we didn't know about the bee hives we have already know about them, secondly we have got education, we have been trained on how to keep bees, how to harvest them, can you see things like those ones, the different types of bee hives that can produce good honey, so we know which is the best bee hive, where to trap the bees, that is the kind of education that we have learnt on how to keep the bees (HC125)*

While in the non-piloting communities all the households were of the opinion that these changes are not predictable. The households in the non-piloting communities, explained that the changes for the non-predictability of their livelihood outcome is that their asset base kept reducing on a daily basis and sometimes they do not know what lies ahead of them:

> *It is like they are getting less and less; everything is unpredictable, because you can get and say that if this continues, then I am going to do very well and then, sometimes this goes down instantly and you then start at the beginning (HC214)*

> *They are not predictable because I sometimes can get more income sometimes less; sometimes I have sometimes I don't even have a penny but sometimes, if I find somebody to buy my coconuts that day I can say, I see I have money, I may have that money now the next day I don't have, because of the demand for various house hold uses (HC220)*

However, there were some four out of 11 respondents from piloting communities who pointed out that the livelihood outcome changes are not predictable because households sometimes lack markets for their produce from the income generating activities, such as the butterflies. Lack of markets for income generating activities was also identified by one of the organizational informants as a challenge facing households in improving their livelihood outcomes, because it affects their income base (KOI01). The households reported:

> *Sometimes the projects hang, you cannot predict what will happen tomorrow, for example if it is butterflies, it is something that we get*

markets unexpectedly, such that when you take your butterflies for
sale you can get lots of money, per month even twenty thousand, some
other times you can find up to three months there are no markets, so
you cannot predict, it is hard you cannot predict (HC109)

Now, right now, we don't have the markets you can take the
butterflies pupae and it is returned, but in the past, the butterflies
farming was able to improve the livelihoods of people here (HC111)

Finally, one of the bee keeping households reported that the changes in the livelihood's outcomes were not predictable because sometimes they are not able to harvest honey which is a source of income for them. The respondents explained:

It is quite challenging to get honey, sometimes you may be hoping to
get honey, and then you don't get it, so you have to see the honey
itself and then you say that you have money (HC101)

From this discussion, even though the households seem to argue that it is possible to predict the changes of their livelihood outcomes, there is not much evidence that supports this argument. However, that none of those in the non-piloting communities felt that they had predictable livelihood outcomes compared to the feeling of predictability felt by the majority of the piloting community interviewees, indicates that there is at least greater confidence in their future livelihoods among the co-management community households.

7.2.3 Distributional differences

The households in both the piloting and non-piloting communities were further asked to explain how the livelihood assets differ between different social groups in the communities. The study demonstrated that the livelihood assets among different social groups depends on individual efforts, whether poor, rich or middle class. A substantial number of households in the piloting communities explained that the richer people have more opportunities to improve their livelihood assets because they write the funding proposals, they are the ones who receive the donors (HC137), they are more informed than the middle and low level income earners (HC134), and have the financial resources for doing the projects. For example, they have the ability to purchase the equipment for doing the income generating activities (e.g. water storage tanks), thus they are able to access water during the drought season to irrigate their tree seedlings (HC130). Another view was held by some households that those in the middle level households have more access to livelihood assets as a result of the co-management arrangement. As one household in the piloting communities put it:

*Okay, those who have benefitted most are those in the middle level,
the reason being the very poor down there, even the ability to buy one
hive, even if it is the log beehive is very hard. They cannot as I have
already told you if it is logs, you have to buy the logs yourself. It is
not that there is a given organization or donor who will buy you the
hives and bring to you (HC125)*

In contrast, some of households in the piloting communities thought that the poor had more

opportunities to improve their livelihood assets. These households reported that when the

income generating projects were introduced, the poor were the ones who were involved and

the rich never took part in the projects. Some of these households commented:

*Those who have benefitted, they are there when we are in groups we
see them. Those who are dealing with these projects are the poor, this
is the ones who were involved in these projects, but the rich did not
take these projects seriously, but the poor are the ones who have
persisted with the projects (HC101)*

*A project cannot be done by the rich; the project was brought to help
the poor and those adjacent to the forest (HC135)*

Others also believe that the poor have had more access to livelihoods assets as a result of co-

management arrangements because the rich people are unlikely to involve themselves in low

status activities:

*Those whose lives have improved are those who are very poor,
because you cannot see a rich person chasing a butterfly, the poor
are the ones who are holding this projects very well (HC102)*

Others reflected that the poor households were the ones who benefitted the most from new

livelihood opportunities as a result of the co-management arrangement because they are the

ones who do not have any source of income and most of those people who were trained on

the projects are the poor:

*The people who were very poor are the ones who benefitted a lot,
because they did not know where to get any income, they used to
depend on farming only, we were trained about this project as well, in
this project most of them were those who were very poor (HC111)*

Finally, one household informant reported that the access to the livelihood assets does not

depend on class, but on the individual's effort:

*It is better now, when people cultivate their land and the electric
fence is here, it is better nowadays. We are able to eat bananas, in the
past the elephants used to eat everything. Here the projects that have*

helped people; the pepper farming, the butterflies farming, bee keeping and Casuarina equisetifolia trees. People have benefited a lot but it will depend on your effort. We cannot say the poor, middle class or the upper class no. You will be told that the land is yours and the effort is yours, look for a place where you can plant Casuarina equisetifolia trees, blue gums, and maize and the other things that you can plant (KHI07)

In the case of the non-piloting communities' the study found that households that have employment have more assets and are doing better than those that are not in employment. Further, for one to survive or live well it depends on the individual's skills and capacity to search for a source of livelihood. According to the households those in employment are able to access loans which have helped them to acquire more assets. Those households with their children in employment have also more access to livelihood assets than those who do not:

If I can say those that I am seeing right now, those who at least have property are those working in the government or doing work on other sectors, but generally when I look across, people don't have good life, these are people who survive per day, they look at the forest, the first day the second day etc., because sometimes it depends on your skills, or that capacity that an individual has (HC223)

We are not the same, because we have others who are in front of us, those who are, for example, working in the forest and those working elsewhere, but us we have nothing that we are waiting for, but they are better, because when it is at the end of the month, they go for pay, it is even better when they go for loan, they are able to pay, but me who doesn't have employment if I go for loan what will I pay it with? (HC224)

They are those ones who are employed, there are other people who have been employed, others their children are working and they are able to bring money home (HC213)

However, there were some household interviewees in the non-piloting communities who felt that there was not much difference among the community members in terms of access to livelihood assets. These households felt that sometimes, for example, those in business or industry may make losses in their businesses:

Let me say in the village people are moderate, there is no rich person there is no poor person, people in this village with business doesn't mean that they are rich, as you know sometimes the business is beneficial sometimes it is not, so I cannot say that there are rich people here (HC220)

Here at home I can see we are all the same; life has not improved we are still very low, I can't see anybody who is better than the other (HC228)

It can be concluded that in the piloting communities, even though the projects were introduced to improve the livelihoods of the poor, the rich and middle level income earners are benefitting. However, from the above discussions and my observations during my field work, the poor had acquired more livelihood opportunities from the co-management than the middle and rich income earners. But the study found that, the rich and middle level income earners have more potential for accessing the incomes from the projects introduced by co-management because they have more resources that can facilitate the exploitation of the projects. Whereas, in the non-piloting communities, the study confirmed that employed households have more assets even though there might not be much difference between those employed and those doing their own business. However, overall, it became apparent that access to livelihood assets depends on individual efforts and preparedness to learn, try new ideas and persist, whether poor, rich or middle class.

7.2.4 The extent of improvement in livelihoods assets

The major aim of this section was to examine how the livelihood assets or capital stocks of households have improved as a result of the co-management arrangement. The chapter has already discussed the livelihood assets for both the piloting and non-piloting communities. At the end of interviews with households on the livelihood assets that they have acquired in both the piloting and non-piloting communities, they were asked an overall question to explain the 'extent' they felt the value of those livelihood assets had improved. For the piloting households the question focused on the improvement in their livelihoods as a result of the co-management arrangement activities (e.g. butterfly farming, bee keeping, *Casurina eqisetifolia* trees), while for the non-piloting communities the focus was on the extent of improvement of their livelihood assets in the past 17 years (when the co-management has been operational in the piloting communities). The interviewees had been in the communities sufficiently long to be able to answer the questions on the changes over the 17 years period either through experience or through accumulated knowledge from being part of the community. The underlying assumption was that there would have been change in the communities' livelihood assets over time that could not be attributed to co-management. The intent in such an approach was to gain a qualitative sense of the difference made by co-management by

treating the non-co-management communities as a form of control against which to measure the co-management communities.

There was virtually unanimous agreement from the household respondents in the piloting communities that their livelihood assets have improved as a result of co-management arrangement activities. Whereas in the non-piloting communities all the households that answered this question were of the opinion that in the past, it was easier to acquire livelihood assets than presently. This shows how difficult it is for the non-piloting communities to accumulate capital assets. They commented:

> *It was in the past because in the past even if you got one thousand [Kshs] it was a lot of money, but now, you can get one thousand but it is like one hundred, when you go to pay for your children, if you buy flour, like three bags, one thousand is over, it has become very tight (HC224)*

> *There are problems because the goods are becoming expensive and it is hard to find work, (HC213)*

> *…, as you know things have changed, in the past years it was better but these years ahead of us, because it is hard to get work to do (HC233)*

> *In the past they [assets] were many but now they have reduced because of drought (HC202)*

This lack of accumulation of livelihood assets in the non-piloting communities' is attributed to the rise in prices for goods and services which has made it hard for the communities to afford more livelihood assets (HC213).

Following the unanimous agreement from the household respondents in the piloting communities that their livelihood assets have improved, it was prudent to gain a more detailed sense of the extent to which co-management had affected their livelihood assets. Thus, some form of retrospectively applicable measure was required. Consequently, for the livelihood assets and other statistical data reported in the following sections of this chapter, the following approach was applied:

1) The piloting households were asked to estimate their value of the livelihood-relevant assets (e.g. natural, human, social, financial and physical) before the introduction of co-management that depended on forest related activities. They then were asked to estimate the value of their current livelihood assets that are dependent on co-

management (e.g. butterfly farming, bee keeping, and *Casuarina equisetifolia* trees). A scale of 0-100 percent was used. Households were asked to state within this scale where the extent of their livelihood fell. 'Percentage' was not used in a strict mathematical fashion, but as a colloquial expression that would be relatively easy for respondents to identify with. Zero percent meant that the livelihood assets have not improved at all and 100 percent means that household assets have improved very substantially (but when the approach is applied to poverty, zero percent means the households' were less poor, but 100 percent means that the households were very poor).

2) The same approach was taken with the non-piloting households (that is, the value of their livelihood assets related to the forest activities in the past before the introduction of co-management and their current livelihood assets that are dependent on the forest activities).

3) From the qualitative discussions it emerged that the livelihood assets varied in both the piloting and non-piloting communities (e.g. some households reported that the particular livelihood asset was 10 percent, others 20 percent, etc.). Response data was grouped into 10 percent intervals to allow ease of interpretation and comparison of the extent to which the values of the livelihood assets of the piloting communities and non-piloting communities had changed.

4) To understand the extent the livelihood assets of the co-management households had improved, 50 percent was selected for the interpretation and judgement of the improvement of the livelihood asset of households, being the midpoint of the 0-100 percentage scale, it was easy to use to compare the number of households livelihood assets had improved above that point as a result of the co-management and those whose that had not. Selecting such a measuring point has been demonstrated as a useful method for conducting this type of comparison (Coudouel, Hentschel, & Wodon, 2002; Fields, 1994; Lanjouw & Ravallion, 1996; Mackenbach & Kunst, 1997).

5) For qualitative data one looks at the extent to which the data set has [does not have] a selected value (Cooper & Shore, 2010). In this study, the total number of the piloting communities' households who were below the selected reference value were summed

for comparison with the total above the selected reference value. The aim was to know how many households, for instance, were able to obtain less than half of their livelihood assets and how many households were able to obtain more than that before the introduction of the co-management arrangement. A similar process was done for the non-piloting communities. The difference between the two was noted. This process was repeated for both piloting and non-piloting communities after the introduction of co-management and differences were noted again. The comparison between the differences of the piloting and non-piloting households before co-management and, then, after the introduction of co-management is taken as indicative of the extent to which co-management can strengthen the livelihoods of forest-dependent communities. The guiding question for the piloting communities was, 'with the introduction of co-management did piloting communities' households move from rating their access to livelihood assets as less than half of what they expected, to more than half, or vice-versa, as a result of the co-management related activities?' In the case of non-piloting communities the question guiding the research was whether the 17 years that co-management has been in existence in the piloting communities, had seen the non-piloting communities' livelihood assets improve more than the piloting communities as a result of their forest related activities. In essence the non-piloting communities were the control against which to assess the effect of co-management, but they could not be a completely independent control because the co-management arrangement had affected them in various ways (as noted previously). If there were more households reporting that their livelihood assets rating improved from below the midpoint (50 percent) in the piloting communities than in the non-piloting communities then the conclusion was that co-management has improved the various relevant outcomes (e.g.-income, poverty, food security and sustainability of the forest). The extent of the difference can be said to be a measure of the advantage gained through co-management.

In measuring the households' livelihood assets, the study was interested in the extent the households felt their livelihoods assets had improved (Brown, Stephens, Ouma, Murithi, & Barrett, 2006). Following the above process, the study found that (Figure 7.1) 100 percent of the households in the piloting communities obtained less than half of their livelihood assets before the establishment of co-management (all the interviewed households reported that they obtained less than 40 percent). But when asked to explain the 'extent' they felt the value of

their livelihood assets had improved with the introduction of co-management about 90 percent of the households reported that now they can obtain more than half of their livelihood assets. This clearly indicates that the piloting communities' households' livelihood assets had improved significantly since the introduction of co-management.
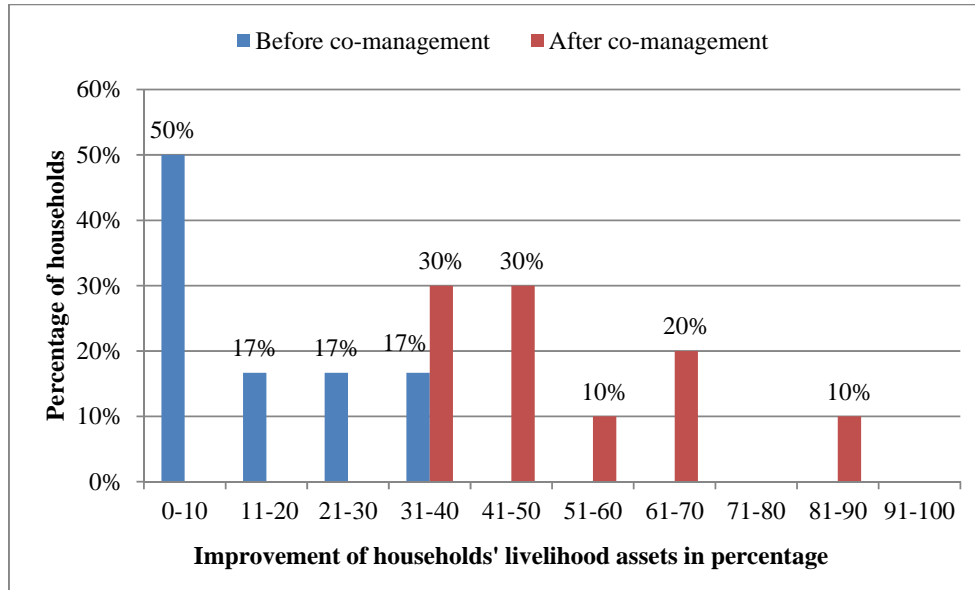
Figure 7.1 **Piloting householders' assessments of the percentage improvement in their livelihood assets as a result of the co-management activities**

The non-piloting communities simply reported that it is harder for them to currently generate livelihood assets than in the past. Consequently, it appears highly probable that the livelihood assets of the non-piloting communities have not increased as a result of the forest related activities that they have been engaged in over the last 17 years and, in fact, have almost certainly decreased. This suggests also that had the co-management arrangement not been introduced then the value of livelihood outcomes for the piloting communities would also have decreased, although it appears that they may have started from a relatively higher level of livelihood asset value than did the non-piloting communities.

These findings were further supported by qualitative interviews with all organizational informants. These interviews found that the value of the household livelihood assets in the piloting communities had increased compared to non-piloting communities (KOI01). For instance one organizational informant pointed out that the piloting communities' households' only obtained about 20 percent of their livelihood assets before the establishment of co-management, but had now improved to around 60-70 percent (KOI04).

It is clear that co-management has significantly improved the livelihood assets of the forest-dependent communities both in an absolute sense and relative to the communities not in the arrangement. Therefore, it is fair to conclude that co-management approaches have the potential for substantially increasing the extent households' can obtain livelihood assets.

7.3   Vulnerability

The aim of this section is to examine the extent to which co-management has lessened the vulnerability of the communities that are dependent on the ASFR. The vulnerability context includes shocks, trends and seasonality. Vulnerability is a consequence of the nature of an event (stock market crash, drought) and the level of risk (probability) of that event occurring, coupled with the characteristics of the community at risk that may amplify or mitigate the effects of the hazard. For instance, a diversified food source means a community might be less vulnerable to a one-in-50 year drought (event) than a community that is dependent on a single food source (that may be particularly susceptible to drought). The factors that make up the vulnerability context are important because they directly impact upon peoples' asset status and the options that are open to them in pursuit of beneficial livelihood outcomes (DFID, 1999). In order to understand how the communities have lessened their vulnerability as a result of the co-management arrangement, the respondents were asked to explain the following: the events that they fear in a typical year, the changes that they thought were of most concern to them, the significance of these changes, how the co-management arrangement helps them to cope with these changes, their coping mechanism and, finally, the extent to which co-management has helped them to cope with their vulnerability.

7.3.1   The most feared events

To understand the extent to which the households have lessened their vulnerability situation as a result of co-management, households were initially asked to explain the events in a year that they fear the most. Households reported that they fear drought, hunger, floods, wildlife attacks, and unemployment. In the piloting communities the majority (about 72 percent) of the household respondents fear drought (Figure 7.5). One household interviewee reported:

> *The hard time during the year for the forest-adjacent communities is during the drought season. During this time there are so many problems of all sorts, because in our farms there isn't any food, in the forest the wild life don't have enough. So there will be those wildlife animal conflicts .… Also those small things that people will harvest, they aren't there, so during the drought time it is very difficult for the community here (KHI01)*

The months of December to April are known as the drought season and they fear droughts because they are not able to get vegetables from their farms due to the dry season (HC101), their trees dry up, and bees and the butterflies are not available (HC106). During the drought season the communities are not able to harvest anything from their farms (HC118), for example, maize or cassava, because the crops dry up (HC130) (Plate 7.9). There is also no money during this time because these crops are the main sources of income for the households, thus, leading to increased poaching of forest trees (HC133). Four out of five organizational informants also expected that the communities would most fear drought because their crops dry up and they experience fire outbreaks.

Plate 7.9   Maize dried by drought

Whereas in the non-piloting communities, the majority (50 percent) of the households fear hunger most. A household from the non-piloting communities clearly emphasized this point:

> *Here we are mostly disturbed by hunger only …. the only problem we*
> *have here is hunger, in general, the only problem we have here is*
> *hunger that is our major problem here (HC203)*

This fear of hunger was closely associated with drought and the difficulty of getting anything to eat during the drought season (HC215):

> *If there isn't any rainfall you will find that there is a lot of hunger*
> *here, people sleep hungry, people eat mangoes only sometimes if you*
> *are lucky you can buy a bucket of maize flour which also is very hard*
> *to find because there are no jobs (HC239)*
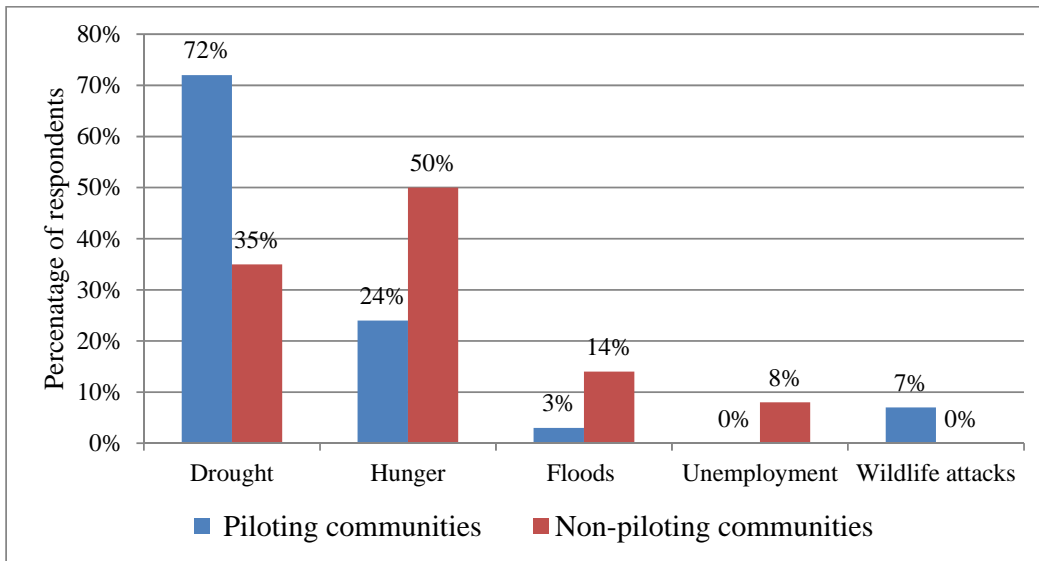
Figure 7.2   Events respondents fear most in both the piloting and the non-piloting communities

It was interesting to note that hunger was the second most feared event, by about 24 percent of the respondents in the piloting communities, and drought, by about 35 percent of the respondents in the non-piloting communities. The piloting communities' households noted that there is a lot of hunger from March to September if their harvest is not good due to drought (HC110, HC106 and HC213). The hunger is made worse by the disappearance of some of the cash producing products (e.g. butterflies) due to drought (HC119, KHI07). Floods (Figure 7.2) were also found to be one of the events households fear in the both piloting (3 percent) and the non-piloting (14 percent) communities. For example the 1997/98 El Nino rains that caused heavy flooding (HC132). This is because they destroy their crops (HC116, HC23). About seven percent of the households in the piloting communities also fear wildlife attacks. One of the households explained that they fear baboons and monkeys that sneak from the forest and destroy their crops (HC101). Another household pointed out that they fear elephants once they break through the Tsavo Game reserve and attack the communities' crops (HC133). About eight percent of the households in the non-piloting communities feared unemployment. The wildlife/human conflicts increase particularly because when there is drought it is hard to find water in the villages and some community members go to the forest to fetch water from the water pools that have been deliberately left for the elephants (Plate 7.11).

Plate 7.10   Water pool at the edge of the forest deliberately left for elephants

In addition to hunger and drought, the piloting communities fear heavy rainfall because it leads to the increase of malaria outbreaks in the communities (HC117). Finally, the organizational informants explained that the KFS, created in February 2007 to replace the Forest Department, might affect the current management operation of the forest:

> *KFS is a recent institution, and when it was established it has brought in... those are new changes which have affected our way of operation, so we are concerned and may be apprehensive of new changes within individual institutions (KOI03)*

7.3.2 Coping with vulnerability

The study was interested to know how co-management has helped the communities cope when faced with adverse events. In other words, whether co-management had made them less vulnerable to the things they feared. The main coping strategies in both piloting and non-piloting communities is to look for labouring work in the villages, while a few others do 'charcoal burning' (burning wood to create charcoal) (Plate 7.12). A household in the non-piloting communities who does labouring work in the villages during this time explained:

> *I just clear bushes for people or dig for them so that I can get my livelihood or somebody comes and tells me that I want you to come and assist me in doing something on my farm, I want you to help me in carrying some luggage, for example the bananas and then they give me something small to survive on (HC212)*

Plate 7.11 **Charcoal burning is a coping mechanism in piloting and non-piloting communities**

One household from the non-piloting communities reported that during this time they get relief food from the government (HC201). Although there is government relief food some felt that the relief food was never enough, therefore, they have to work hard to supplement it (HC208).

The study also found that in the non-piloting communities some women depend on begging for help from the tourists during the drought season, which sometimes coincides with the tourists' season on the Malindi Tsavo East Road (Plate 7.13).

Plate 7.12 **Women with children beg from tourists**

It was interesting, however, to find that households and organizational informants do not recognize that the co-management arrangement has already contributed to their ability to cope with the adverse trends and events by providing households with alternative means of income. The informants indicated this by saying:

*There is no support, this co-management of ours doesn't have
resources which they can use to help may be if the support is based
on a proposal that has been done then it is possible but the issue that
a co-management can help, the forest-adjacent communities during
the drought season or during the times of difficulties there isn't
(KHI01)*

*No, you must involve yourself in the projects, so that you can get
money, but you will not hear the co-management saying that come
and take this money, You depend on yourself, if you had planted trees
in your farm, if somebody comes wanting the trees (the blue
gums/Casurina) you sell and get money, even they can fill a full lorry
and go (HKI07)*

In addition, detailed interviews with all the households involved in the various co-
management projects also confirmed that despite support from the co-management of the
forest there is no relaxation of rules in a drought season to allow them to collect forest
resources:

*They are not concerned, you struggle alone. Even going to the forest
to split firewood you must have a licence which cost one hundred for
a month, you have to renew the licence monthly and you can only
collect the dried firewood. If you collect the green/fresh ones you are
arrested (DHC105)*

*This co-management does not have anything to help you during this
time (DHC107)*

Furthermore, all the organizational informants reported that they do not offer any help to the
communities to cope with vulnerable situations because they do not have the capacity
(KO105). However, one of the organizational informants explained that the government uses
this opportunity, when the communities are vulnerable, to have some of its projects done.
For example, the government used relief food when it was erecting the electric fence around
the forest to get labour to erect the fence (KOI01).

7.3.3 Co-management and vulnerability

The aim of this section was to understand whether co-management approaches can help
communities dependent on the forests for their livelihoods to lessen their vulnerability
situations when faced with adverse changes (e.g. drought, floods, hunger and wildlife attacks,
(Coudouel et al., 2002). The preceding sections have already discussed the vulnerability
context for both the piloting and the non-piloting communities. Households in both piloting
and non-piloting communities, therefore, were asked at the end of their interviews to explain,

the overall extent to which their vulnerability context had reduced. For both the piloting and non-piloting communities, the focus was the extent to which the co-management arrangement has helped them to reduce their vulnerability in situations of heightened vulnerability (e.g. drought, floods and hunger) as a result of its activities (e.g. the income generating activities) before and after the establishment of the co-management arrangement. For the non-piloting communities, the proportion of forest related activities 17 years ago (before co-management) and the current ability to cope was compared (see the process in section 7.2.4). It was revealed (Figure 7.3) that in the piloting communities the majority of the households (about 70 percent) expressed the view that their confidence in their ability to cope with a highly vulnerable situation (e.g. a drought) was below the midpoint, on a scale where 100 percent meant completely confident in their ability before the introduction of the co-management arrangement (thus were vulnerable). By comparison, in the non-piloting communities the study showed that 17 years ago about 57 percent of the households considered they fell below the midpoint. It was evident that more households in the piloting communities reported they were more vulnerable before the introduction of co-management compared to the non-piloting communities. This is an interesting contrast with the earlier suggestion that the piloting communities were better able to improve their livelihoods than were the non-piloting communities before the co-management agreement began.
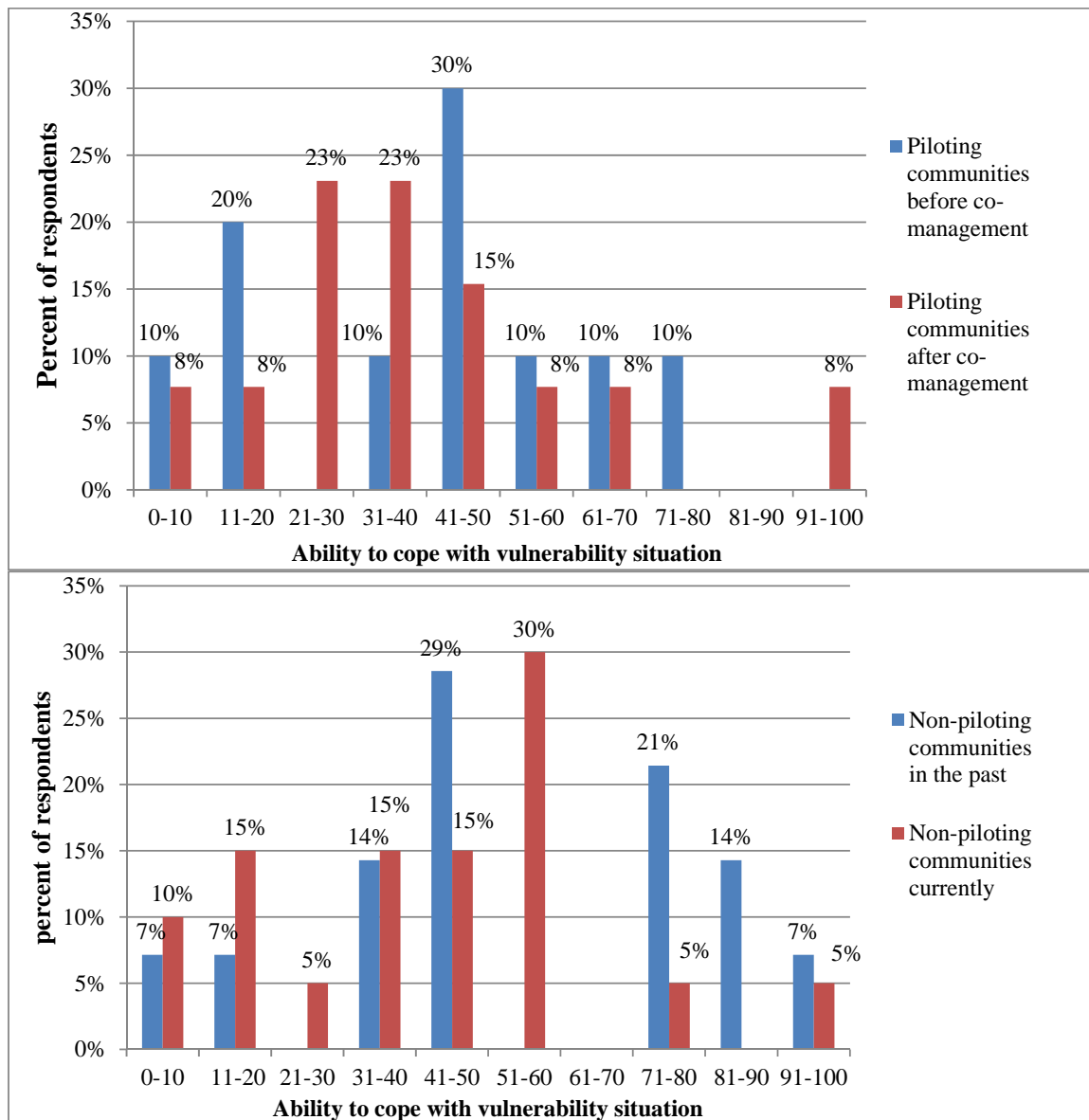
Figure 7.3   Piloting and non-piloting householders'ability to cope with vulnerability

With the introduction of co-management in the piloting communities, the number of those communities' households who fell below the midpoint when faced with high vulnerability situations increased to 77 percent (from 70 percent). This shows that even with the introduction of co-management, the piloting communities perceived that they had become more vulnerable than previously. However, those recording very limited ability to cope (below 20% on the scale) almost halved (30% to 16%). In other words, those who perceived themselves as most vulnerable decreased presumably as a result of the co-management projects. This was reinforced by a comparison of the most vulnerable (below 20%) of the

non-piloting communities in the same period which, almost doubled in number (14% to 25%).

Moreover, at the other end of the scale, where people feel confident in their ability to cope, the non-piloting communities had suffered a significant drop in their confidence (from 42% to only 10% above the 70 percent point on the scale). Whereas some 8 percent of those in piloting communities had become completely confident in their ability to cope, relatively few of those communities remained as optimistic (24% above the midpoint) as those in non-piloting communities (40%).

Overall, from the above discussion, while there were some significant signs that co-management may help the communities to cope with adverse situations, generally, in both the piloting and non-piloting communities, the study shows that more people became vulnerable. It can be concluded that there is no evidence that co-management improves the perceived ability of the piloting households to handle their vulnerable situations better than the non-piloting communities and, consequently, there may be no significant relationship between co-management and a reduction of vulnerability. The possible exceptions may be at the most and least vulnerable ends of the scale.

7.4   Socio-economic well-being and co-management

The third question for evaluating the institutional design of the governance of ASFR in terms of strengthening livelihood outcomes for the forest-dependent communities was to ascertain the extent to which a community's socio-economic well-being (defined in terms of income, poverty, food security and sustainability of the forest) is an outcome of the co-management arrangement. For all these issues it was important to investigate what was the situation before co-management and after co-management (see section 7.2.4) (DFID, 1999). Current literature argues that co-management can improve livelihood outcomes of forest-dependent communities involved in co-management arrangements as well as enhance the management of forest resources (Brown et al., 2007; Pagdee et al., 2006). This study has already established links between co-management activities and socio-economic well-being, but the extent to which co-management has improved the socio-economic well-being of the forest-dependent communities of the ASFR was also part of the overall objective.

7.4.1 Income

In piloting communities, before the establishment of co-management, most households (about 93 percent) reported that they earned less than half of the income they wanted, to meet their livelihood goals, through forest related activities (Figure 7.4). In the non-piloting communities, before the establishment of co-management, 57 percent of the households earned less than half of their desired income as a result of the forest related activities. Thus, more households in the piloting communities reported that their income earnings from forest related activities were insufficient to meet their livelihood goals than in the non-piloting communities.
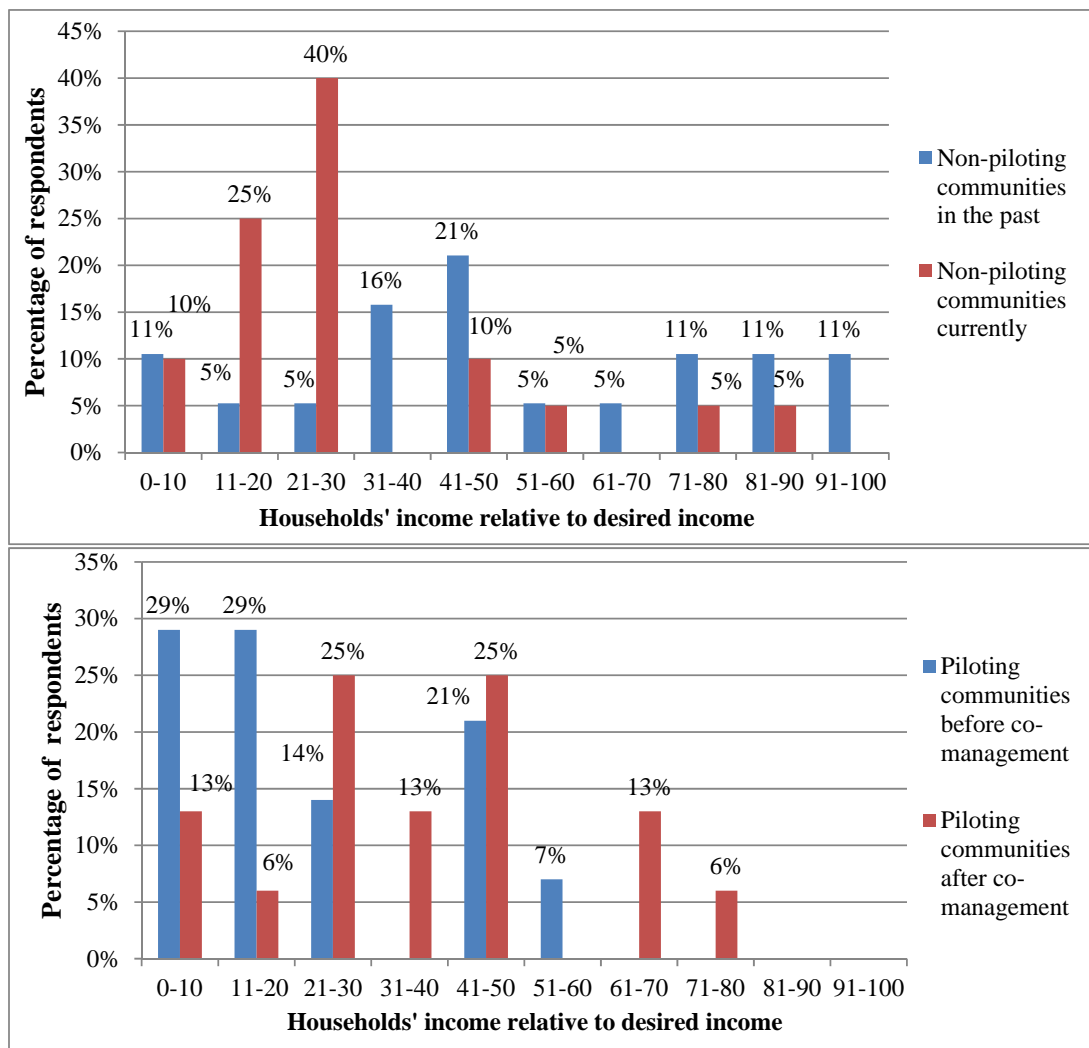
Figure 7.4   Piloting and non-piloting householders' assessments of their income earnings as a result of the co-management and forest related activities, respectively

With the introduction of co-management in the piloting communities, about 82 percent of the households (compared with the previous 93%) earned less than half of their desired incomes as a result of the co-management arrangement activities. This shows that co-management may have enabled some piloting households to improve their income. Certainly those who were earning less than a third of their desired income significantly decreased (72% down to 44%). In other words, there was a dramatic improvement in their incomes because the interviews indicated that costs had increased as had also their livelihood goals.

Whereas, currently, in the non-piloting communities the study found that about 86 percent of the households are able to earn less than half of their desired incomes. This shows that the non-piloting communities' income levels have declined significantly as a result of the forest related activities as more households earned less than half of their incomes when compared to the past. Thus, the study revealed that the income earning levels of the non-piloting communities declined while there were some improvements in the levels of income earnings in the piloting communities. In the past, 31 percent of the non-piloting communities were earning less than the desired income. This has increased to 75 percent. This seems to be due to an increase in both costs and desired goals rather than a drop in income.

In summary, as a result of co-management the gap between the income households earned and their desired income levels has narrowed and this is in stark contrast to the situation for the communities not involved in co-management.

7.4.2 Poverty

The study also sought to determine the extent the communities' poverty levels were an outcome of the co-management arrangement activities (Figure 7.5). The households were asked to compare their poverty levels before and after the establishment of the co-management arrangement. To be able to measure households' poverty levels those households who reported that their poverty level was below 50 percent were considered as "less poor" while those who reported their poverty level to be above 50 percent were considered as poor (see Coudouel et al., 2002; Fields, 1994; Lanjouw & Ravallion, 1996). When the qualitative data was subjected to the selected midpoint, it was found that before the establishment of co-management, about 73 percent of the household's piloting co-management were poor compared with 71 percent of the households in the non-piloting communities.
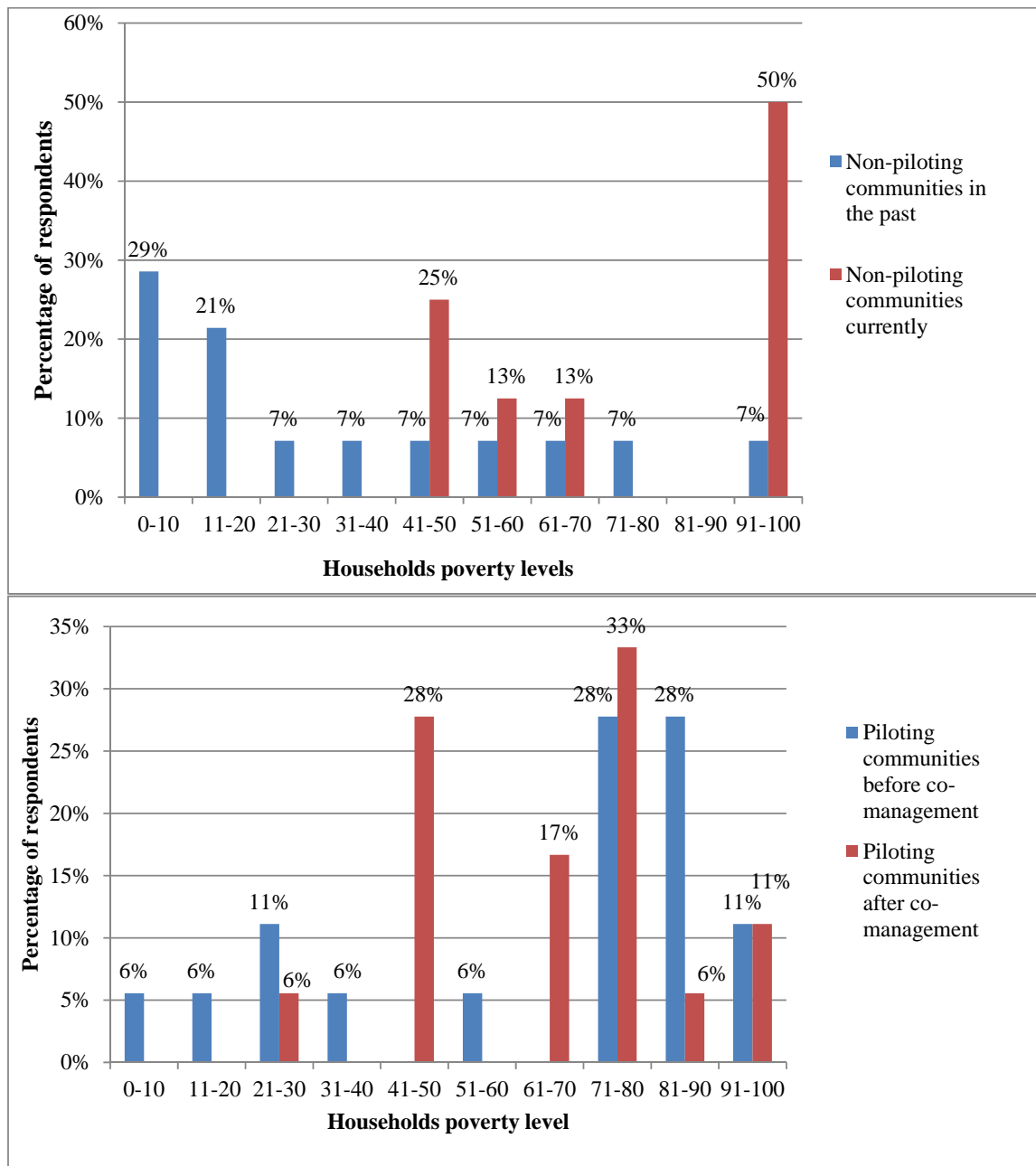
Figure 7.5 Piloting and non-piloting householders' assessments of their level of poverty as a result of co-management and forest related activities, respectively

After the introduction of co-management about 67 percent of the households in the piloting communities reported that their poverty levels were above the selected mid-point. This shows a small (6%) decrease in the co-management piloting households reporting poverty. In contrast, the non-piloting households reported a 3% increase in the numbers of households who were poor.

Two reasons were given by key informants as to why the piloting communities' poverty levels had reduced: First, due to the introduction of the co-management projects (e.g. planting of *Casuarina equisetifolia* trees, butterflies and bees). According to one key informant, in the past, households' poverty levels were almost at 100 percent but due to the co-management arrangement it had reduced to about 40 percent (HK107). Another estimated poverty had reduced from 80 percent to about 60-70 percent (KOI01). These appear to be over estimations based on the above data but do support the trend. Secondly, the construction of the electric fence around the forest has reduced destruction of households' crops by the elephants (HK107).

While respondents in the non-piloting communities gave the reasons for the increase of the state of their poverty as due to the inability to earn income, drought and unimproved farming. They commented:

> *It is now because in the past we did not have many problems but now even farming has lots of problem. Now if forces you to struggle so that you can get some money. So if you get some money you go using it for your children, if you have not got, then you will stay without eating (HC213)*

> *My poverty is increasing; farming doesn't have anything because of the drought (HC215)*

> *We have not seen any better changes up to now. The poverty has remained like that. Income has been remaining the same way. Farming has remained the same. So there is nothing that I can say that we have gotten here that is better (HC231)*

Thus, it can be concluded from the above discussion that, co-management has the potential to decrease the level of poverty for households dependent on the forest for their livelihoods. The study suggested that there is a linkage between reduction of the household poverty levels and co-management activities and co-management arrangement activities have the potential to reduce households' poverty level.

7.4.3 More sustainable use of natural resources

Households were asked to compare their natural resources use management levels (e.g. trees and wildlife) in the past, before the establishment of the co-management and after the establishment of the co-management (Figure 7.6). The aim was to understand the extent to

which the sustainability of the natural resources use of the ASFR is an outcome of the co-management arrangement.

In the piloting communities (Figure 7.6), before the establishment of co-management, the majority of the households in the piloting (about 93%) and the non-piloting (71%) communities reported that their ability to sustainably manage their natural resources was below the midpoint. This shows that the ability of the households to sustainably use the forest resources was lower in the piloting communities compared to the non-piloting communities.
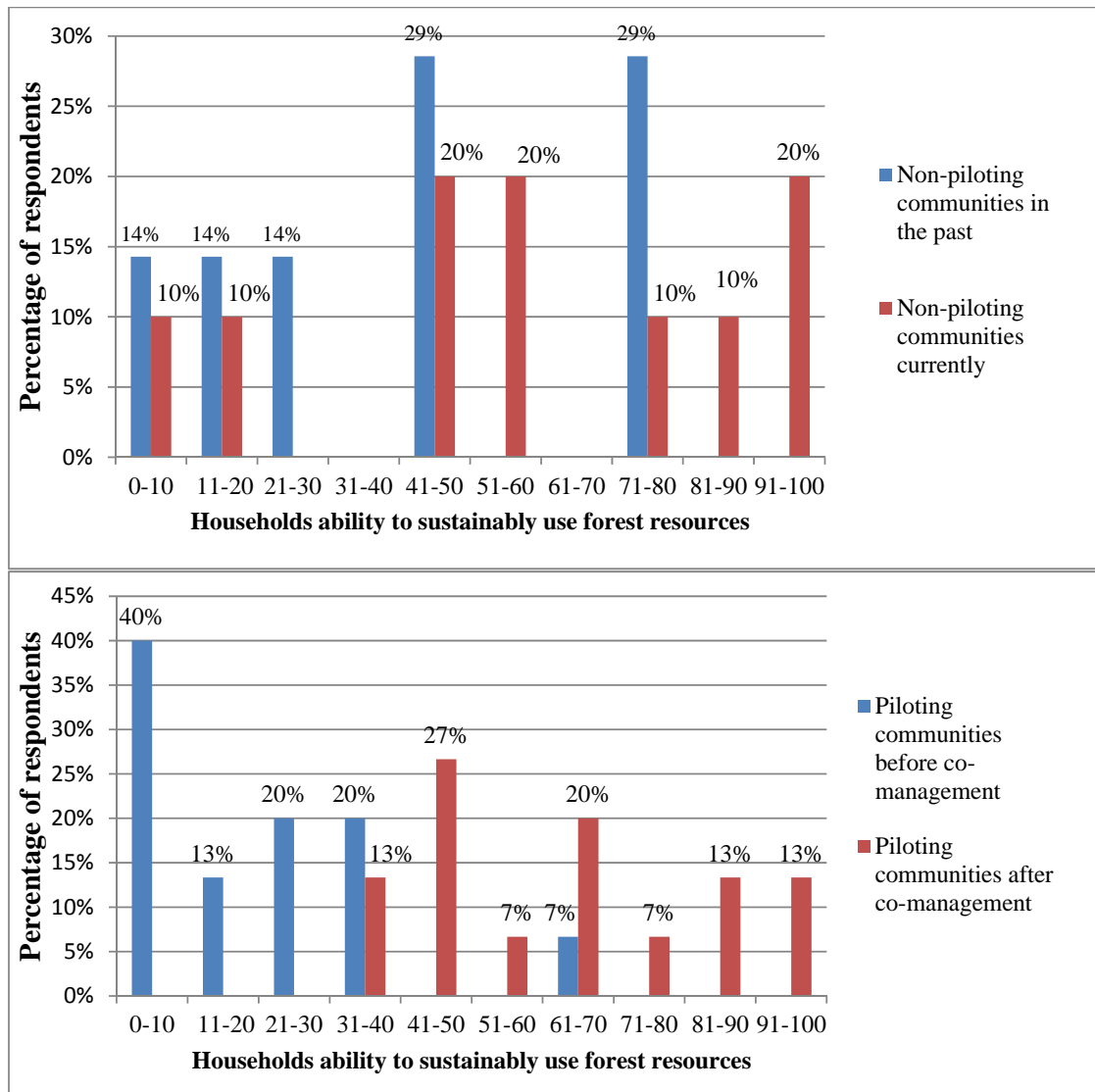
Figure 7.6 **Piloting and non-piloting householders' assessments of their ability to sustainably use the natural resources (forest resources) as aresult of the co-management arrangement and forest related activities, respectively**

As the graphs clearly show, although both communities recorded only 40 percent of the households considered that their ability to sustainably manage the resources after co-management was low, there are quite different distributions in the responses.

Consequently, these graphs were arbitrarily divided into three categories. Any score below 30 percent on the scale was considered to indicate a poor ability to sustainably manage the forest resources. Any score above 60 percent was considered good and any score between 30 and 60 percent was considered mediocre.

In the piloting communities, subsequent to co-management all respondents considered they were managing at least at a mediocre (47% of respondents) or good (53% of respondents) standard (compared to 20 % and 7 %, respectively before co-management). There is clearly a significant shift from 73 percent in the low category before co-management to none in that category after co-management, and this trend is continued in the mediocre and good categories. In the non-piloting communities there was a more even spread: low 20 percent (42% past), mediocre 40 percent (29%), and good 40 percent (29%). This again suggests an overall, but less substantial, improvement in the ability of the households to sustainably manage the forest resources.

These results can be interpreted in different ways. There may have been genuine improvement in both communities ability to sustainably manage their resources. This could be associated to ongoing community level discussions (e.g. through the chiefs' community meetings) on how to manage the forest in both sets of communities. The more substantive improvement in the piloting communities would be due to the training in co-management. Alternatively, it could be argued that both set of communities would like to think that their knowledge and ability has improved over the last two decades when, in fact, there may have been very little change. However, the nature of the shifts, especially in the low category, suggests that either the training or the greater empowerment through co-management has made a more substantive improvement for the piloting communities.

7.4.4 Food security

Households were asked to compare their food intakes before and after the establishment of the co-management arrangement to understand the extent to which co-management activities have helped to improve their resilience to food insecurity in order to understand if there is any relationship between co-management and food security (Figure7.7) (see Migotto, Davis,

Caretto, & Beegle, 2006). The study found that in the piloting communities, before the establishment of co-management, most households (about 63 percent) were able to secure less than half of their food intakes from the forest related activities. Whereas, in the non-piloting communities, before the establishment of co-management, about 49 percent of the households reported that their ability to secure their food intakes was less than half from forest related activities. Thus, more households in the piloting communities reported that they were insecure food wise than the non-piloting communities.
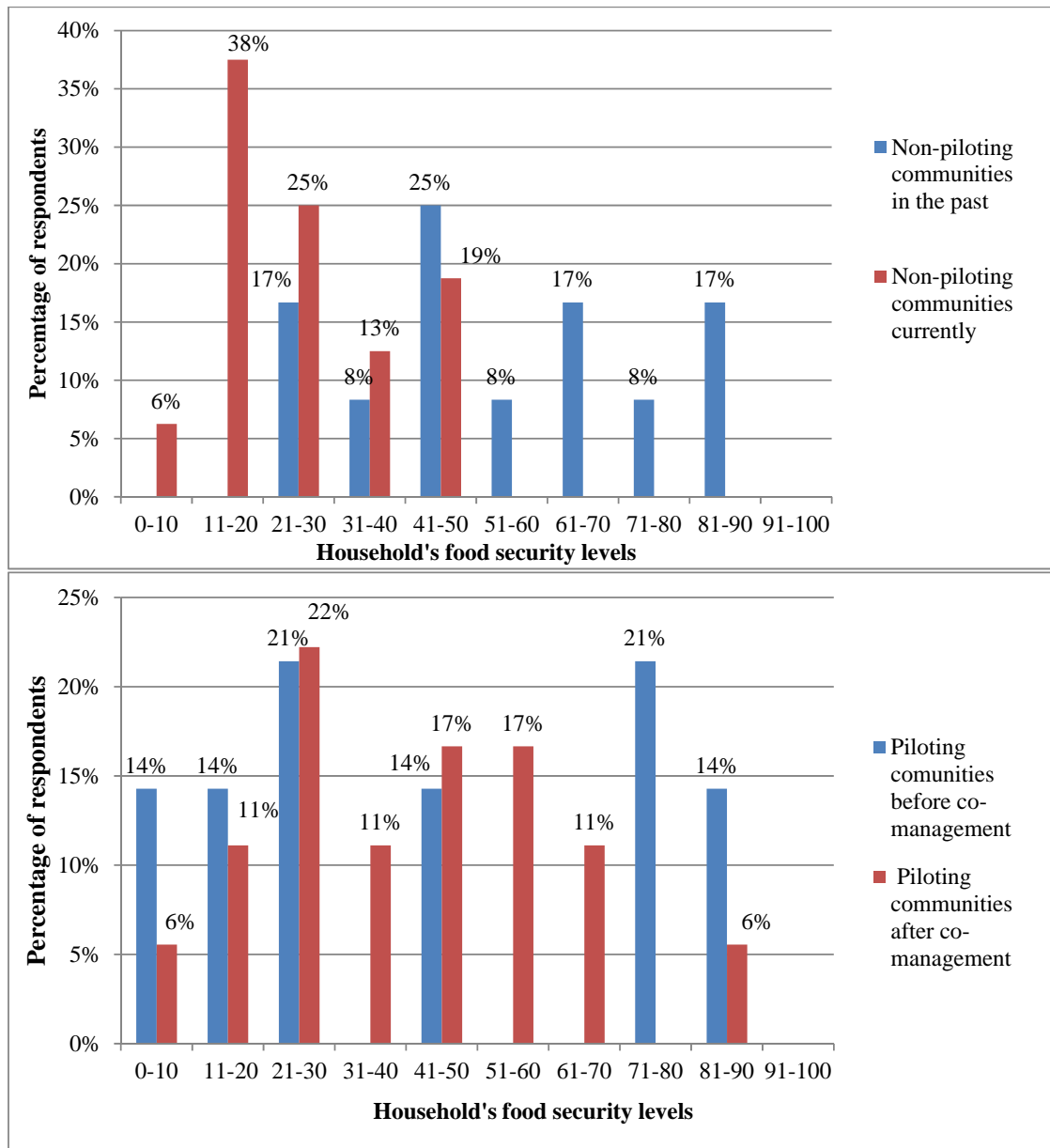
Figure 7.7   Piloting and non-piloting householders' assessments of their food security as a result of co-management arrangement and forest related activities, respectively

With the introduction of co-management in the piloting communities, there was virtually no change in the number (35% down to 34%) of households reporting they could secure at least 50 percent of their food intakes from forest related activities. At the lower levels of food security there had been an improvement in the situation for the piloting communities.

In the non-piloting communities currently, 44 percent fell in the 0-20% range (i.e. are highly insecure) and none of the households were able to achieve more than 50 percent of their food intakes as a result of forest related activities (compared to the past when 50% could secure at least half of their food intakes). This finding shows that about half of the households became insecure food wise as a result of the forest related activities that they were engaged in.

It can be concluded that co-management approaches have the potential for improving households' food security and that there is a significant relationship between food security and the co-management approach.

7.4.5 The overall extent of the households' socio-economic well-being outcomes

Households were asked to explain the extent to which their overall socio-economic well-being outcomes (poverty, income, food security and sustainability of the forest) had improved as a result of the co-management arrangement. One household informant summed the extent of the socio-economic well-being of the households in piloting communities as follows:

> *As you know the main problem is that these projects have very short life spans. You will find that those groups that are organized or are working together, some are on, but I can say that there are many who have benefitted from the civic education, which has changed their lives, also some have also taken the issue of tree planting on their farms, some have succeeded, because they have planted trees, sold and they have changed their lives, this are for those people who have accepted to take up the advices and follow them very well, they have changed. I can say that as per the extent, for example, if somebody was getting Khs. 50000 a year and he plants the trees and may be gets Kshs.100,000, don't you see that this is a person that has changed? I can say that those people who are serious and have taken this environmental issues serious they have had their lives changed; I can say that they have changed between 30, 40 and 50 percent as per the way the livelihoods changes were (KHI01)*

Moreover some of the non-piloting households explained the extent there socio-economic well-being has improved as follows:

I can say that I am not a rich or a poor person; I am at the middle (50 percent) I support myself (HC222)

Yes it has improved because if you look at this, there is knowledge where I started is not where I am, am about 75 percent (HC223)

When the overall socio-economic well-being was further subjected to the midpoint (50 percent) for comparison, the study demonstrated that in the piloting communities, about 74 percent of the households reported that their socio-economic well-being was below the midpoint even after the introduction of the co-management arrangement. While in the non-piloting communities the results showed that about 70 percent of the households' socio-economic well-being was below the mid-point. Although the difference is negligible one would have expected this figure to be reversed. This suggests that more households in the piloting communities' consider their socio-economic well-being to be at a lower level than they desire than do the non-piloting communities.
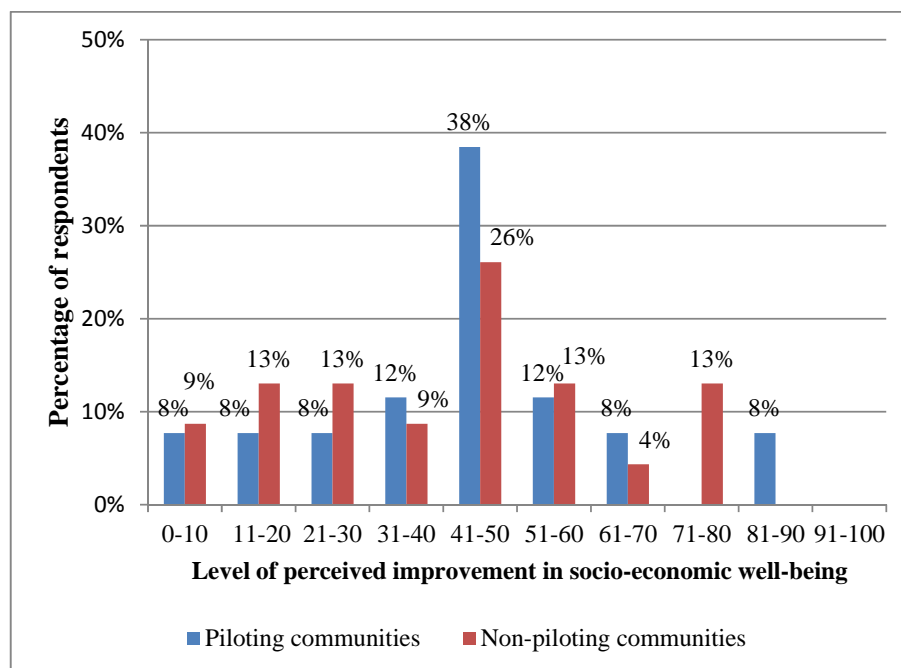
Figure 7.8   **Piloting and non-piloting householders' assessments of their overall socio-economic well-being as a result of co-management and forest related activities, respectively**

7.5   Chapter summary

This chapter has evaluated the current institutions of the ASFR in terms of strengthening the livelihood outcomes of the piloting and non-piloting communities. Households piloting co-management have more potential to access more livelihood assets compared to the non-piloting communities. The vulnerability events of most concern in both the piloting and non-piloting communities are drought and hunger. Even though there was no evidence that co-

management arrangements may lessen the vulnerability of households dependent on the forest for their livelihoods, the qualitative interviews showed that there may be a possibility. It was interesting to note from the study that the piloting communities' households do not recognize that co-management has provided them with alternative sources of income that help them to cope when faced with the heightened vulnerability events. The results also suggested that co-management approaches have the potential to improve socio-economic well-being (poverty, income, food security) and enhance more sustainable use of natural resources of the poor forest-dependent communities. However, when households were asked to explain the overall extent the co-management has improved their socio-economic well-being the results indicated that more households about 74 percent were below the average in attaining the (socio-economic well-being) in the piloting communities compared to about 70 percent in the non-piloting communities. Although the difference is negligible one would have expected this figure to be reversed. This finding suggested that more households in the piloting communities' considered their socio-economic well-being to be at a lower level than they desire in the case of the non-piloting communities. In other words, the aspirations of those in the piloting communities may be higher than those in the non-piloting communities.

Chapter 8

Discussion

8.1 Introduction

Chapters 5, 6 and 7 reported the findings of this study. These chapters were organised around three research objectives: (1) to examine the current institutional arrangement for governance of the ASFR, (2) to evaluate the extent to which the governance arrangements can be characterised as devolved collaborative governance, and (3) to evaluate the design of the current institutions of the ASFR governance in terms of strengthening the livelihoods of its poor forest-dependent communities. This chapter discusses these findings, drawing particular attention to lessons learned from case studies of the communities piloting co-management and the set of communities not involved in piloting co-management to gain insights from linking the two theoretical concepts – the co-management and sustainable livelihood approaches. To achieve these objectives this chapter is divided into seven sections. Section 8.2 identifies the extent to which the ASFR co-management arrangements have been characterized as devolved collaborative governance. The strengths of the co-management regime's institutions are discussed in section 8.3. In section 8.4 the degree to which the Ostrom design principles have been met in the ASFR is discussed. In the next, section 8.5, a discussion on an evaluation of the design of the current ASFR co-management institutional arrangements and their associated livelihood outcomes is presented. The theoretical implication of the results is discussed in section 8.6 and, finally a summary of all the chapter discussions is provided in section 8.7.

8.2 The ASFR co-management arrangements - devolved collaborative governance?

This study was intended to test the argument that well-designed co-management arrangements strengthen the livelihood outcomes of poor forest-dependent communities. To achieve this, the study sought first to understand the extent to which the ASFR governance arrangements can be characterised as devolved collaborative governance and then evaluate the design of the current ASFR's governance arrangement's potential to strengthen the livelihood outcomes of the poor forest-dependent communities. The findings on the extent to which the ASFR can be characterized as devolved governance are discussed below.

8.2.1   An incomplete co-management structure

It became apparent in the research that the co-management regime, seventeen years after it was initiated, is still in a pilot phase and only being applied to a small set of communities in part of the ASFR. The co-management regime structure comprises a nested 'hierarchy' of the ASFMT, CFAs, VDFCCs and forest resources user groups. The composition and roles of each of these largely determine the extent to which the regime can be considered a good example of co-management. The ASFMT comprises a core team of central government bureaucrats, donors (NGOs) and community representatives that provides the heart of the funding mechanisms for the agreement. The ASFMT operates on a memorandum of understanding signed between the government agencies. Donors and central government have channelled funding into the piloting communities through this joint forum. However, while this is where the financial power-sharing occurs, the ASFMT has a responsibility for the entire Reserve, to ensure there is an appropriate match between forest management and the communities. The next tier of the institutional structure is the community forest association, which coordinates brokers and links the VDFCCs with the ASFMT. The DIFAAFA is the CFA chosen as the pilot for fully implementing co-management arrangements. It combines government agency representatives with representatives elected from the VDFCCs. These VDFCCs include representatives from the village elders and elected representatives from forest user groups, but no government agency representatives. Membership of the user groups is through self-selection by the forest users' resident within five kilometres of the Reserve. There is need for a well-designed criterion for selecting the forest resources user groups in order to identify the poor members of the communities that depend on the forest resources for their livelihoods and ensure they are beneficiaries.

8.2.2   Limited devolution of governance powers to the communities

The governance arrangement has the dual goals of the conservation of the ASFR and the establishment of ways that can help the communities to obtain sustainable livelihoods from the forest's resources. The co-management regime appears to provide a clear structure for collaborative decision-making in the areas covered by the piloting communities and rules related to the allocation and use of the forest resources have and are being developed. However, the analysis of the institutional arrangements indicates that there is limited devolvement of governance powers by the government to either the piloting or non-piloting communities in the management of the forest resources. Even though the ASFMT operational

guidelines have given the communities a chance to participate in the co-management arrangement (see section 5.3) they have limited powers to make decisions about the use of the forest resources. If the ASFMT is not prepared to advance matters then the community has no avenue other than to make a direct approach to the central government politicians as the co-management agreement has yet to be formally signed by the communities to provide full legitimacy to the emerging structures and rules. The communities that have participated in piloting co-management have done so for nearly 17 years, but they have been waiting throughout for the formalization of the co-management arrangement to allow them to have some defined, *de jure* control of the forest resources. Consequently, the power remains with the government:

> *This forest, truly speaking, on the side of the community, they haven't got permission that allows them to manage it. Most of the management of the forest is on the side of the government. The government is the one holding the biggest share. The government is the one with most of the authority (HC132)*

This finding is important to the sustainability of the resources in the sense that under this condition it is likely that the communities support will be wane and they may withdraw from co-management, because they have very little control over the use of the forest resources, and they may continue to engage in poaching (see Mapedza, 2006). This situation has parallels in the cases reported by (Chuenpagdee & Jentoft, 2007) and (Mason et al., 2010). If the experience from those studies is repeated at ASFR and progress is not made on such issues, particularly formalizing the agreements, then the community members may come to see co-management as a failure.

This may result in the gains made through co-management being placed in jeopardy. From the discussions with the households, the formal signing of the ASFR co-management agreement is necessary to provide legitimacy and continuity of community cooperation. It is, therefore, not just the *de facto* operation of the co-management arrangement but the *de jure* recognition that is seen as necessary for the longevity of the collaborative arrangements. The reason for the community enthusiasm, however, appears to be more about providing greater certainty of supply of funds for activities that are currently voluntary (e.g. voluntary village rangers).

8.2.3 Unclear co-management objectives

The study revealed that even after the piloting households have spent years in co-management the households are not clear on its purpose. The ASFR co-management partners have not been able to gain the communities' understanding of the issues to be addressed, or what must be achieved and the purpose of co-management or the main direction of, for example, the income generating activities. Households, generally, do not consider the issues of biodiversity sustainability as important to them. This is perhaps due to their lack of involvement in the design of the various projects and understanding of the overall impact of their activities on the forest. The households are not going to recognise or internalise the co-management/project problems as these projects were introduced by the co-management partners and the donors rather than being promoted authentically from the communities. Additionally, there was no evidence of action plans to extend the co-management approach to other communities.

8.2.4 Corruption in accessing forest products

Comments from the interviewees frequently demonstrated that despite the co-management regime, corruption in accessing the forest resources exists at ASFR. For example, due to limited permits for access to trees of sufficient quality to use for building and timber, the households feel that they are left with no alternative but to corrupt the forest management or the forest guards to access these resources illegally. Households in the piloting and non-piloting communities bribe Government forest guards to let them access the trees and to release them if they are caught stealing. The cost of purchasing building trees (vertical or cross poles for constructing houses in the villages) or permits is very high relative to the cost of a bribe. Consequently, the poaching of the trees is likely to be most common among those who do not have the cash to bribe – the poor.

8.2.5 A significant new challenge

The study revealed that donor funding no longer exists to support the extension of co-management to those communities who depend on some forest resources, or even to support the activities of the communities that have already been introduced to co-management. This is a common problem in implementing co-management and Shackleton et al., (2002) warn that unhealthy reliance on these external funds can result in the collapse of initiatives when funders withdraw. Until the co-management activities gain sufficient returns to be self-sustaining they may fail and their failure could lead to cynicism over the benefits of these

new activities – especially if they have raised expectations or led to a decline in the activities that used to support these households. For example, there are no incentives for the village advisory committee and the village forest guards who are a major component of the co-management arrangement. There are no funds to support the various co-management-related activities, such as implementation, coordination, monitoring and enforcement of the rules. This indicates that co-management approaches may work much better if those households given responsibilities are provided with financial and other support throughout the entire stage of devolution to the community if it is to succeed. Without this funding, then there is a likelihood that the implementation activities, and also the new income generating activities will fail. This would threaten the co-management arrangement. As Emtage (2004) explains, for community organisations to be sustainable, they need to be assured of dependable incomes to finance their activities and sustain community interest. Without funding of the ASFR's co-management, households may not find it desirable to continue investing their time and money in the arrangement or in diversifying into potential income generating activities which are not proving profitable (e.g. aloe vera farming).

8.2.6 Limited property rights

A property right is the exclusive authority to control how a resource is used, whether that resource is owned by government or by individuals (Larson et al., 2010; Schlager & Ostrom, 1992). Even though the households adjacent to the forest recognize that they have the rights as forest-adjacent communities to access the forest resources, the communities do not have full legal ownership rights to use the resources, nor do the communities control the allocation of those rights (the permits) or have the knowledge to optimize use and ensure conservation of the resources. Additionally, both the piloting and non-piloting households do not have secure and permanent resource use rights – the permits are temporary and lack flexibility – but the piloting communities consider they are more secure than do the non-piloting communities.

Therefore, an important and interesting question that arises is what adverse impact has these limited property rights had on the ASFR project outcomes? The research found that without legally supported property rights, a substantial number of the non-piloting communities compared to the piloting communities have no responsibility to enforce their claim over the resources against outsiders. This may be associated with the fact that the non-piloting communities have not been involved in the co-management arrangement but since the

piloting communities are involved in the co-management, they hope that the government may grant them the ownership rights. Therefore, it may be difficult for the ASFR co-management to sustain the initiatives if the government does not provide clear ownership and enforcement of the property rights because communities may see the resources as the government's, and, therefore, may expect the government to do the maintenance.

Also, the government regulations used by the communities to access the forest resources were considered to be insufficient by the households accessing resources from the forest through the co-management approach, thus making it difficult to sustain the forest resources use as some households steal the resources from the forest. Therefore, local control of the ASFR is necessary in maintaining the resources. But the involvement of the households in co-management has had a significant impact in the management of the forest resources as more households in the piloting communities compared to the non-piloting communities have developed a desire to conserve the forest resources.

However, it is also important to point out that the study also revealed that the government is committed to provide property rights to both the piloting and non-piloting communities. For instance the co-management communities are involved in the rule setting processes and this has provided them with greater confidence in the outcomes and a higher level of preparedness to report violations in accessing forest resources. Furthermore, the assigning of some rights to the piloting communities (collecting fuel wood, butterflies and leaves to feed the butterflies, herbs and the bees) and the non-piloting communities, (grazing their livestock in the forest during the planting seasons and collecting fuel wood) demonstrates that the government is prepared to allow greater property rights to those in the agreement than those not in it.

8.2.7 Limited interaction

The study found that in the piloting communities the level of interaction between the stakeholders is limited, other than when there is conflict between the organizational officials and a resolution is being sought. The central government is only involved in such meetings if the conflict is serious. This may make it difficult for the effective governance of the forest and improvements in the livelihoods of the forest-dependent communities. Successful governance of forests and delivery of sustainable livelihoods is easier to achieve when stakeholders maintain frequent interaction and work together as a team (Jentoft, 2000).

In summary, the ASFR governance arrangements may not be characterized as devolved collaborative governance. The main reasons for this are that the ASFR co-management has: (1) limited devolution of governance powers to the communities; (2) limited interaction of the co-management partners and the co-management piloting communities; (3) limited donor funding to support the extension of co-management to these communities which depend on some forest resources, or even to support the activities of the communities that have already been introduced to co-management; (4) a corrupt system in accessing forest products; (5) unclear co-management objectives; (6) an incomplete co-management structure and; (7) limited property rights.

8.3   Strengths of the co-management regime

The preceding sections have shown that the ASFR has some weaknesses; this section focuses on the identification of the strengths of the co-management regime. To begin with, through the co-management arrangement, some of the effects of the ASFR co-management have resulted in benefits to the non-piloting communities. Due to the co-management arrangement, some rules initiated to address co-management communities issues have also started to be applied in the non-piloting communities, for instance the matching of appropriation and provision rules and local conditions.

The piloting communities also seem to have developed more faith in the co-management system compared to the non-piloting communities, which seem to have no faith in such approaches and the majority of them would not report the violators of forest management rules. This suggests that the interactions that have resulted from the co-management regime mean that those in the piloting communities have a greater degree of understanding and trust in the authorities.

Due to the benefits associated with the co-management arrangement such as the income generating activities (e.g. bee keeping, butterfly farming etc.) households in both the piloting and non-piloting households also have a desire for involvement in the co-management institutional arrangements. So, even though the village user groups have not been fully activated the community members recognize them.

The co-management arrangement has also linked different types of organizations (KWS, NMK, KEFRI, KFS, donors and communities) that have roles in the management of the ASFR. This kind of arrangement may improve the decision making in the ASFR by making it

easier and faster, for instance, if the co-management partners organize and hold regular meetings together.

The study also revealed that, the co-management arrangement partners have different capacities that complement one another. For instance, the KFS manages forests, including protection of wildlife, the KWS is involved in the management and conservation of wildlife, the KEFRI conducts research on various forest management issues and advises the partners, the donors provide the funds for the co-management and the communities provide the local resources management skills.

In summary, the ASFR has received benefits which include: (1) some rules initiated to address co-management issues in piloting communities are being applied in non-piloting communities, (e.g. the matching of appropriation and provision rules and local conditions); (2) piloting communities have developed more faith in the co-management system compared to non-piloting communities; (3) the protection of the forest resources from damage through the introduction of the income generating activities which are providing alternative livelihoods to the communities dependent on the forest; (4) a linkage of different types of organizations (KWS, NMK, KEFRI, KFS), donors and communities which has enabled these partners to benefit from their various capacities.

8.4 The degree to which the Ostrom design principles have been met by the ASFR

The study used Ostrom's (1990) design principle as a theoretical framework to analyse the ASFR co-management structure in order to determine the extent to which they can be termed as devolved governance. It is, therefore, important to further understand the degree to which the Ostrom (1990) design principles criterion has been met in the ASFR. The ASFR boundaries for resource users have not been adequately defined in the sense of who may become a member of a user group. Anybody who wishes to join a particular user group in the piloting communities can join at will irrespective of whether one is poor, rich or non-resident. The rules do not clearly stipulate who should be a member and who should be excluded neither, do the rules state how to exclude non-members from participating in the co-management decision-making or user group processes, as the resource use boundaries have not been tightened in a way that only households within five kilometre radius should collect resources from the forest or participate in the co-management arrangement. Rules for exclusion of members should be designed locally and clearly communicated to members of

the communities and management committee concerned as well as the neighbouring communities and forests resources management committees. In the ASFR, the lack of any *de jure* legitimacy of locally made forest rules means that even non-forest-adjacent communities can have the right to access the forest resources by virtue of payment of a permit fee since neither the households nor the forest guards have the powers to stop the intruders if they have a permit for collecting particular resources. According to Ostrom (1990), the rules setting the households' resource use boundaries need to be formulated by the households themselves and understood by both the co-management and non-co-management communities and spell out clearly who are included in the extraction of the forest resources, which forest resources and the boundaries to where they can access them. Without such rules, it may be hard to sustain the use of the forest resources in the ASFR.

The key indicators of the existence of local rule making include; existence of local enforcement systems, compliance, patrolling, guarding against unauthorized use, fines, and sanctions for dealing with offenders (Singh et al., 2011). But from the study, households were not able to clearly identify the collective choice arrangement rules even though they have been established to some extent at ASFR (e.g. sanctioning rules, resources use boundaries, monitoring rules etc.). Communities must understand or have appropriate beliefs about what actions are necessary for sustainable resource use of the forest resources. They must also have sufficient information available to them to allow for the creation of effective management regulations. The government also needs to recognize the efforts of the communities in formulating the rules for the co-management arrangement.

Likewise, the forest resource use boundaries have not been fully activated even though the zoning of places for the extraction of various forest resources has been completed. There is a need to establish rules that can guide the setting of these resource boundaries in order to match rights of use (e.g. amount, quality, location and timing) to the sustainability parameters (e.g. reproduction rate, migration) of the resources. To be enforceable these rules need to be tailored towards the sustainable use of the resources held within the specific boundaries.

There also appears to be inadequate congruence between appropriation rules and local conditions in terms of equity in the ASFR. There is no clear proportionality in terms of distribution of resource use or harvest costs to the community members at ASFR. It is hard for the piloting communities to understand if rules relating to appropriation of forest resources relate to local conditions. This is not so much a lack of opportunity to be engaged

in rule-making as it is a lack of consideration of the necessary requirements of those rules – the need to set clear boundaries and clear rules relating directly to the sustainability of the resource. For example, the basis for collecting only fallen trees for fuel wood and households restrictions in terms of equipment to use for harvesting (e.g. an axe or machete) are examples of reasonably well understood and justifiable rules. But the limit to one head load per day able to be collected from anywhere, when the number of permits able to be issued is not constrained, defies explanation in terms of how it will ensure sustainability of the resources. This is especially so when faced with increasing forest-adjacent populations. In addition, the remaining resources used (e.g. bee keeping, herbal medicine collection and butterfly collection) are addressed primarily through the practice of the resource users rather than rules. This kind of resource use arrangement may lead to the unstainable use of the forest resources, especially if the number of users is not limited in some way.

The enforcement, monitoring and sanctioning of the co-management rules by the communities is very important for the success of the co-management of the ASFR, however, ASFR's enforcement; monitoring and sanctioning rules are feeble. One of the intentions behind developing local monitoring systems is to promote and facilitate participatory/decentralized management of resources (Garcia & Lescuyer, 2008). The development and implementation of local monitoring systems opens up a forum where the community can discuss options and objectives on how to sustainably use natural resources. This could raise environmental awareness and induce the local population to modify their practices and make them more sustainable. Participatory monitoring also offers the local population the opportunity to interact and collaborate with government bodies and administrative officials in charge of natural resources management. Unfortunately the monitoring of the asset/stock base at the ASFR to see what state they are in so that decisions can be made as to what kind of rules are needed for sustainability, has not been developed. Without proper designing of the resources base monitoring system in the ASFR it may be difficult to enhance participatory monitoring where every stakeholder will take responsibility in monitoring the state of the resources (Dietz et al., 2003).

Another intention behind developing local monitoring systems is to promote and facilitate monitoring of compliance with rules. As noted in the findings, the monitoring of the ASFR activities to see if the households are complying with the rules found that there is confusion over who the illegal activities should be reported to. For instance, some households report the

violators of the rules for co-management to the government forest guards, others to the village advisory committee and others to the village forest guards. Furthermore, reporting of the violators of the rules is done carefully so that the violators do not know who gave the reports because of fear of possible attacks by the violators if they know who reported them. In addition, the community forest guards are voluntarily monitoring the violators of the rules for the co-management arrangement. If the community forest guards are not paid it may be difficult for them to be accountable to the co-management arrangement and this may affect the condition of the forest.

According to Pomeroy et al., (2001), community sanctions for example social pressure is generally considered very important and can be useful in making the households or communities increase their compliance. Although the enforcement of the rules in the ASFR in both the piloting and non-piloting communities are mainly done by the KFS, there is a system of graduated community sanctions in the co-management communities (see section 6.7), but when the government deals with recalcitrant offenders it is not always clearly communicated to the communities leading to some households to feel that there is little support from government in their attempt to enforce the sanctioning rules. In addition, some of the households feel that it is illegal to monitor the violators especially when there is no formal, legal backing for doing so due to the fact that the co-management agreement has not been formalized.

The sharing of responsibility in guarding a common resource is considered likely to lead to high enforcement of the co-management rules (Singh et al., 2011). The vigorous, fair and sustained law enforcement of co-management rules requires the participation of all the partners in ASFR's co-management area. Some households in the piloting communities do not report violators of the rules for the co-management even though they see them because they believed it is not their responsibility, but that of the community forest guards.

The village forest guards have no power to arrest violators of the rules of the co-management arrangement. They have to rely on the government forest guards. The KFS and community forest guards conduct forest patrols together. Once the patrols are finished, the KFS forest guards report the situation to their forest management station while the community forest guards report to the village advisory committee who takes responsibility of arresting the violators of the rules for the co-management arrangement and punishing them. This is perhaps justifiable as the village representatives, forest guards and some households are not

able to carry out the forest protection initiatives without fear of revenge. In other cases, however, there appeared to be a simple reluctance to report illegal activity for a variety of reasons (see section 6.6). Regardless of the reason, without appropriate enforcement, the sanctions and fines for dealing with the offenders are of little use and the success of co-management is severely compromised.

Even though the ASFR enforcement efforts need to be strengthened there is potential for a system where the government deals with those offenders outside the co-management area and with recalcitrant offenders, while the communities deal with the insiders. This would require good communication between the enforcement units and the resources user groups in the ASFR, but the ground work appears to have been laid. Such an approach is unlikely to become a reality until the ASFR co-management arrangement and, consequently, the rules have been formally approved by the central government and the feedback mechanism to inform people of the fate of the recalcitrant offenders and outsiders has been better developed. Despite these constraints the ASFR's co-management sanctioning approaches to violators of the rules for the co-management appeared to have been more significantly evident than other Ostrom principles.

Methods to resolve conflicts between government agencies and the community differ a little between the co-management and non-co-management communities. Even though the ASFR co-management arrangement has established a village committee for conflict resolution, when conflict issues prove tough to handle by this village advisory committee they are taken forward to the government. There is also a lack of clear guidelines on conflict resolution for various conflicts and the consequences that may emerge from such conflicts.

In summary, notwithstanding the weaknesses in the degree to which the Ostrom design principles have been met in the ASFR, taking into account the scale of the area managed and the methods by which individual villager forest users are linked through elected representatives to the ASFMT, the design appears to reflect the requirements of Ostrom's (1990) design principles for sustainable collaborative governance institutions for the piloting communities (Table 6.3). The difficulties being more the degree to which the various design principles have been met. But for these institutions to be stronger in order to achieve sustainable management of the forest resources, a number of things need to be addressed: (1) formalise the co-management agreement; (2) clearly define who can use the forest resources;

(3) engage the community in monitoring the state of the forest, and; (4) establish rigorous enforcement of compliance with the rules for managing the forest.

8.5 An evaluation of the design of the current ASFR co-management institutional arrangements and their associated livelihood outcomes

The preceding sections have discussed the institutional design for the ASFR by drawing on results of objectives 1 and 2. The review of the literature in chapter 2 has shown that there is a need to link co-management institutions with their livelihood outcomes. To link co-management and livelihood outcomes for the ASFR forest-dependent communities, this section evaluates the current design of the ASFR co-management institutions ability to strengthen the livelihoods outcomes of the poor forest-dependent communities.

8.5.1 The relationship between co-management and sustainable livelihoods

Although a full co-management agreement has not been finalised, the level of collaborative governance comes close to a co-management arrangement in the piloting communities. However there are a number of questions that arise from the ASFR co-management arrangement. For instance households reported that (in section 5.2.) the lack of formalization of the co-management is a key weakness of the co-management arrangement. In this regard, the key questions that arise from this argument are that: (1) does it really matter that the co-management has not been formalised – if so in what aspects does it matter? and; (2) How significant are these in terms of contributing to sustainable livelihood outcomes? If it is working then does this indicate that the need for formal recognition is not as important as Ostrom proposes, or does the fact that the government agencies actually operating in the area have largely implemented the co-management arrangement in the piloting communities mean that there is a *de facto* recognition of the rights of the community to self-organise and so Ostrom's principle is largely met?

The ASFR co-management regime should be able to some degree share power and allow joint decision-making about the ASFR's resources. Formal recognition of the ASFR households will provide them with the impetus needed in the sustainable management of the forest resources (Armitage et al., 2007; Berkes, 2009). Thus, the study found that the co-management has been recognized since the government has already written the forestry legislation (the 2005 Forest Act) which has explicitly given the communities powers to formulate CFAs to join in the forest management partnerships with the various Kenyan government agencies (KFS, NMK, KWS and KEFFRI) and NGOs. Also, currently, the

government of Kenya has embraced the devolution of governance in all its governance sectors through the promulgation of the 2008 constitution. It is fair to argue that the devolution of power is at the core of the current government regime and that it is a matter of time before the powers are fully devolved to the communities that are reliant on the forest for their livelihoods. What is lacking at the co-management is the formal signing of an agreement between the government and the communities.

Moreover, it is important to recognize that the full formalization of the co-management is important for the households dependent on the forest in order to achieve sustainable livelihood outcomes. For example, even though in both piloting and non-piloting communities' forest destruction exists, those communities which have been exposed to the co-management arrangement have toned down their forest destruction behaviours. This may be associated with the fact that the piloting communities households have more government recognition than the non-piloting communities since they are directly involved in the co-management arrangement which has allowed them to access more livelihoods opportunities compared to non-piloting communities, through the on-farm tree planting, butterfly farming, and bee keeping (which supplements their other sources of income). Therefore the full formalization of the co-management and formal recognition of the communities in the ASFR co-management area may lead to more sustainable livelihoods to the communities through the co-management linked sources of livelihoods, and conservation of the forest resources may be enhanced. These findings confirm Ostrom's (1990) argument that for co-management of common pool resources to work there must be a *de facto* recognition of the rights of the community to self-organise.

However, by households not recognizing the contribution that co-management has made to providing them with greater income sources and opportunities to cope with periods of great vulnerability is somewhat surprising and perhaps reflects the lack of investment of the additional income in reducing their vulnerability.This finding also reinforces the fact that households, in most cases, are interested of their immediate gains without linking them with other socio-economic well-being outcomes.There is also no recognition of the increased vulnerability that such failures may lead to when the householders come to depend on the income from the co-management derived assets, especially those that are susceptible to shocks (e.g. butterfly farming) due to lack of markets and drought.

Nonetheless, clear communication of the role of co-management to the communities dependent on the forest for their livelihood is important for the sustanable use of the forest resources. It was found that communities piloting co-management did not recognize the role of the co-management arrangement in ecological conservation through the programmes introduced to them (e.g. bee keeping, herbal medicine collection and fuel wood collection) which are meant to enhance their livelihoods as well as help in the conservation of the forest resources. Thus, the study revealed that the householders are mainly focused on what they can get for their short term needs rather than on the sustainability of the resources on which their livelihood depends. Unless the ASMT finds a way to clearly communicate to the communities as they access their livelihoods that conservation of the forest is part of the co-management regime programme, the effect of the regime in achieving sustainability of the forest resources and households livelihoods remains in doubt. This highlights the importance of ensuring that the overall state of a resource, like the ASFR, is a crucial component in making co-management work to sustain a natural resource.

The other questions that arise are that it seems that much from the benefit of the co-management agreement have been the income generating projects that have been supported by donors because of the co-management agreement. If there was no co-management agreement, but donors still funded such new income generating projects (for whatever reason), would most of the benefits reported in this study still occur? Is it fair to try to separate these new income generating projects from the co-management regime? Based on the results of this research the ASFR's co-management arrangement has provided a means for communities to get donor funding and projects and, as such, can be seen as an effective strategy employed to help achieve livelihood goals for these piloting communities. The co-management has also brought various government agencies to the relationship, while the local households have brought their support for management rules that conserve the forest in accordance with the co-management rules. Furthermore, the donor cannot operate without the various government agencies and the communities. The communities in both the piloting and non-piloting communities have illustrated that they want to be part of the co-management regime. The construction of the fence around the forest also illustrates that it is not possible to separate the new income generating projects from the co-management regime. For instance the control of elephants from destroying the communities' crops as a result of the electric fence around the forest which is an outcome of the co-management arrangement clearly demonstrates that without the co-management the new income generating activities would be

destroyed by elephants, thus affect the household's livelihoods. Thus, the projects are the integral part of the co-management arrangement even though they have been provided to the communities without an agreement.

In summary, at this juncture, it is important to note that the ASFR co-management arrangement main aim is to conserve the forest from overuse by the communities living adjacent to it but, to achieve the conservation it has provided these communities with new income generating activities (butterfly farming, herbal medicine, fuel wood collection, bee keeping and on-farm forestry) to provide them with some livelihoods as a strategy to conserve the ASFR's resources.

8.5.2 Livelihoods assets created by co-management

There have been negative experiences with co-management. Compromised co-management efforts, that intend to offer marginal changes while largely maintaining status quo are more likely to result in compromised outcomes (Mapedza, 2006). Thus, the rigour and insight employed in this study that places co-management as a strategy within the SLF and then use that context to generate a modified evaluative framework for ASFR, was expected to show how the ASFR co-management has contributed to the community's livelihoods sustainability. This is often left implicit (Baumann, 2000; Pagdee et al., 2006) or as a presumed outcome (Jumbe & Angelsen, 2007) of sustaining a resource base. The intention of this study is to make these assumptions explicit so that a wider range of possible benefits from co-management can be explicitly considered when introducing the approach. Moreover, such an approach will also mean that evaluative studies are done better – the criteria will be more relevant and holistic than many past evaluations (Tanvir et al., 2007a, 2007b).

The piloting communities' households were asked to explain the livelihood assets they had created as a result of the co-management activities and for the non-piloting communities as a result of the forest related activities. The above discussion/issue notwithstanding, the evaluation of the ASFR management arrangements found that co-management has a potential to increase the extent to which households' can access their livelihood assets substantially. The study decisively revealed that piloting communities have improved their financial assets as a result of the co-management projects compared to the non-piloting communities forest related activities. The financial assets that both the piloting and non-piloting communities have managed to acquire are livestock (for example, cows, and goats) and land from their savings. But in addition to these capital stocks, the communities piloting co-management

have managed to purchase turkeys and hens and are able to access loans more readily due to the co-management income generating activities. In addition, through incomes earned from the income generating activities, the communities' human capital has been developed, households are able to pay school fees, meet their hospital fees and purchase of food and clothes, which has resulted in higher quality of life, for the households piloting co-management.

The co-management arrangement has also increased trust and social capital, for example the formation of more co-management groups and social links or networks (Pomeroy et al., 2001). The study demonstrated that the ASFR has created both internal networks (e.g. the formation of various user groups, for example, the butterfly farming, bee keeping, aloe vera, on-farm forestry user groups among others) and external networks (e.g. visitors from outside the co-management communities have come to study about co-management). However, the study suggests that it is possible for communities to establish some social networks even without a co-management arrangement. For instance, in both the piloting and non-piloting communities households have managed to build social networks including; the payment of pride price/dowry, and the establishment of friendships of trust as result of their income sources. It is prudent, therefore, to point out that some social networks such as payment of dowry or pride price and formation of friendships that one can trust, are mainly inherent within most communities, and may not necessarily be created by co-management arrangements as they are almost automatic in most of the community settings.

Moreover, the study demonstrated that co-management approaches have a potential for strengthening natural assets of forest-dependent communities. For example, despite the evidence on forest destruction in both the piloting and non-piloting communities there was more poaching of forest resources in non-piloting communities compared to the piloting communities. The quality and quantity of the forest resources (e.g. trees) has improved in the piloting communities compared to the non-piloting communities because households have changed their perception toward the forest and are more ready to protect it. This change of perception is attributed to the co-management income generating activities the piloting communities are involved in (e.g. butterflies, bees, herbs and or on-farm tree planting) which provides them with alternative sources of livelihoods. The majority of the households involved in co-management have also increased their ability in forestry management due to the co-management arrangement compared to the non-piloting communities. This increase in

ability to management of the forest resources by the piloting communities may be associated with co-management trainings on forest resources management (e.g. on-farm tree planting).

Further, the co-management arrangement was found to have the potential to improve the physical assets of poor community households dependent on the forest for their livelihoods. The piloting communities have accumulated additional physical assets (e.g. by roofing their houses with iron sheets, contracting toilets and buying bicycles as a cheap means of transport) due to the incomes earned from the co-management income generating activities. Also, due to the co-management, donors have helped the households in building schools in piloting communities.

This finding suggests that in areas where co-management approaches are established some physical assets automatically emerge, for example, establishment of schools as a way of building human capital, construction of roads for transport, building of improved houses and installation of water, among other physical assets related to the improvement of the livelihood of the communities involved in co-management. However, it may not be possible through co-management to build high cost livelihood assets such as sealed roads. This may be associated with the fact that the government has the responsibility for constructing some livelihood assets to the communities, like roads, which are very costly to build. What co-management does is to ensure that communities get the basics they need for their daily life survival.

Also, although the electric fence would have been built at some stage around the ASFR, a crucial community buy-in factor in getting it established was the co-management agreement. So although no progress has been made on extending the co-management agreement to other communities living adjacent to the forest, it has had some benefit for them. For example, protecting their crops from the elephants means that the households' food vulnerability has been reduced.

However, the study found that the richer people also participate in co-management activities to strengthen their livelihoods and may end up doing well and acquire more assets compared to the poor in the co-management approaches; since they are more informed, can write donor funding proposals, receive the donors and are able to purchase the equipment for doing the income generating activities, even though, in the case of the ASFR the poor had acquired more livelihood opportunities from the co-management than the middle and rich income earners because they were more involved in the co-management income generating activities.

In the non-piloting communities, employed households are able to access more assets than those not employed. But there was little difference in the access to assets between those employed and those doing business as the business may make losses.

Notwithstanding the above benefits linked to the ASFR, it has had consequences, as donors have lost interest in the area as funds have dried up, perhaps making it difficult to extend the scheme to other communities. It has raised the expectations of the outcomes of those communities piloting co-management as to the amount of new assets they might expect. The new income generating activities may have resulted in increased vulnerabilities if the benefits they have brought (and associated expectations) turn out to be short-lived due to market saturation or to failures in global markets.

8.5.3 Vulnerability and co-management

While there were some significant signs that co-management may reduce the vulnerability of communities, generally in both the piloting and non-piloting communities, there was little evidence that co-management may improve their resilience to situations of heightened vulnerability. For example, the ASFMT has introduced some income generating activities to improve the socio-economic well-being of the forest-dependent communities piloting the co-management approach, but it is not clear how long the income generating activities can survive. The activities appear as though they may not be sustainable because they produce low and unpredictable incomes due in part to the lack of reliable markets. For example, the butterfly farmers' inability to predict the market means that sometimes there may be more butterflies in the market than the demand, making the farmers unable to sell their butterflies. Some income generating activities, like the aloe vera, have not gotten a market yet. This has demotivated a number of farmers in this user group. Even though the lack of markets for the income generating activities may be seen as a norm of market demand and supply, this failure of the income generating activities is likely to lead to some households withdrawing from participating in the co-management arrangement and engaging in activities that may give them income, however little (e.g. village labour work), in order to get their livelihood. But the real issue is that the ASFR co-management approach has not established mechanisms that can help the households when they are faced with this new type of vulnerable situation – a situation created by the very projects that are intended to improve their economic well-being.

Another interesting finding from this study is that most of the households in the piloting communities (about 72 percent) fear drought while the majority (about 50 percent) in non-

piloting communities fear hunger. This difference seems to reflect the importance the households piloting co-management have placed on the income generating activities introduced by the ASFR co-management arrangement. The piloting communities' households confirmed that when drought strikes it affects their income generating activities (e.g. trees nurseries, bees and the butterflies) which, in turn, impacts on their sources of livelihood, whereas the majority of the households not involved in co-management fear hunger because it affects them directly as they do not have alternative sources of livelihoods. This finding confirms that the ASFR co-management activities, to a large extent, shield households from the vulnerability situations by providing them with a source of their livelihood.

Another issue that emerged in the study is that sometimes households go to sleep hungry due to lack of food, because of drought which destroys their crops. This lack of food to eat leads to increased poaching of forest trees, in both the piloting and non-piloting communities, to sell and buy food. Even though the co-management piloting households are more secure food wise than the non-piloting communities because they are able to access more livelihood assets as a result of co-management activities, there is need for co-management approaches to factor the vulnerability situation elements in their institutional arrangement to help the households when they are vulnerable from the onset of the projects, for example, the introduction of drought resistant income generating activities to help the communities during the drought season. This may play an important role in lessening the vulnerability situation of the poor forest-dependent communities, thus enhancing the conservation of the forest resources through improved livelihoods (Baumann, 2000; Brown et al., 2007; Pagdee et al., 2006).

Drought also pushes households into fighting over scarce water with the local wildlife (e.g. elephants) thus making them more vulnerable. However, the piloting communities have received support for the installation of piped water and drilled boreholes due to the co-management arrangement. This has helped the communities to reduce their water related vulnerability situations to some extent. It is apparent from the discussions that co-management approaches may reduce the vulnerability context to households by providing them with some physical assets like piped water and drilling of boreholes. For example a co-management donor has dug a borehole at Kafitsoni to provide the communities with water during the dry season. This finding questions the DFID (1999), which argues that the vulnerability context is the part of the framework that lies furthest outside people's control,

both in the short or medium term and on an individual or small group basis and that there is little that can be done to alter it directly. It is, therefore, fair to argue that co-management approaches have a potential for reducing the vulnerability of households by devising mechanisms for dealing with vulnerability situations such as (drought, hunger, wildlife conflicts etc.) through provision of physical facilities such as piped water.

8.5.4 The extent to which the community's well-being is an outcome of the co-management arrangement

The last question in evaluating ASFR co-management arrangement institutional arrangements was to examine the extent to which the community socio-economic well-being (income, poverty, food security and sustainability of the forest) are outcomes of the co-management arrangement. The study found that co-management approaches have a potential for improving income, poverty, food security, and sustainability of use of forest resources. Even though when households were asked to state their overall improvement of the socio-economic well-beings (income poverty, income, food security and sustainability of the forest) as a result of the co-management activities for the piloting communities and forest related activities for the non-piloting communities, the study indicated that it was not clear whether co-management can improve the households socio-economic well-being (poverty, income, food security and sustainability of the forest). This finding suggested that more households in the piloting communities' have developed higher expectations with regard to their socio-economic well-being than the non-piloting communities. The finding may also give an indication that the development impact of the co-management arrangement was small but nevertheless significant to families struggling to make ends meet in a very poor area.

8.6 From theory to practice

Ostrom (1990) has argued that her design principles were not meant to be a blueprint, but despite this, both Ostrom (1990) and others (Ashutosh & Tadao, 2001; Quinn et al., 2007) have found them to be very useful as pointers to why co-management and other collaborative arrangements have or have not been successful. The point here is that for two decades the common pool resources scholars have been debating about this. What is needed now is for the scholars of the commons to take these lessons and develop a set of guidelines – blueprints for different settings. This research suggests that such a step would be useful. For example the ASFR has attempted to implement the co-management separately from SLF, but the reality is that the co-management fundamentally has impacted on the sustainability of the

households' livelihoods and a set of guidelines about how to design mechanisms to achieve sustainable livelihoods are needed. For instance, the designing of resources use permits, market systems, making sure that the monitoring of the state of the forest is clearly linked back to the outcomes of decisions made through co-management and that allowance is made for some flexibility when people's survival depends on access to resources like waterholes in the forest are some of the crucial issues that need to be addressed when designing the guidelines. So this guideline should be able to link the co-management intervention – the establishment of co-management – to a more holistic understanding of the implications. The emphasis on the design of the guidelines then should be the development of such guidelines, their application and testing – this will mean that researchers will need to move beyond simply theoretical debates over co-management, to action research methodologies involving actual intervention in a real world situation in order to implement, monitor and evaluate the design guidelines. Such projects will require dedicated multiyear, multi-location research programmes.

8.7   Chapter summary

 The study aimed to find the answer to the big question of the extent to which forest co-management can strengthen livelihoods of the poor forest-dependent communities. To answer this question, three objectives were proposed: (1) to examine the current institutional arrangement for governance of ASFR; (2) to evaluate the extent to which the governance arrangements can be characterised as devolved collaborative governance, and; (3) to evaluate the design of the current institutions under the ASFR's governance in terms of strengthening the livelihoods of its poor forest-dependent communities. The first two objectives were meant to understand the extent to which the ASFR can be characterised as devolved collaborative governance in order to lay the ground for evaluating the extent to which the ASFR institutional design has delivered livelihood outcomes to the poor forest-dependent communities.

The result related to the extent to which the institutional arrangement for ASFR can be characterised as devolved collaborative governance show that ASFR has not been fully devolved as collaborative governance. The reasons for this are that the ASFR co-management has: (1) limited devolution of governance powers to the communities; (2) limited interaction among the co-management partners; (3) limited donor funding to support the activities of the communities that have already been introduced to co-management; (4) a corrupt system in

accessing forest products; (5) unclear co-management objectives for the co-management; (6) an incomplete co-management structure and; (7) limited property rights.

The study however found that the Ostrom (1990) principles are relevant in designing common pool resources institutions. However, the only challenge in the ASFR is the degree to which they have been achieved.

The results related to the evaluation of the extent to which the current institutions of ASFR's governance have strengthened the livelihoods of its poor forest-dependent communities indicate three things: First, that co-management arrangement activities have a potential for improving the livelihoods assets or capital stock (natural, human, social, financial and physical capital) for the poor communities dependent on the forest for their livelihoods. Second, co-management arrangement activities have potential for improving the socio-economic well-beings (poverty, income, food security, and sustainability of the forest management) and can lessen vulnerability. Third, a well-designed co-management regime may strengthen the livelihoods of the poor forest-dependent communities and make them more sustainable.

Finally, the study suggests that there is need for on-going evaluation of co-management arrangements such as the ASFR. From such evaluations it is possible to reach some conclusions regarding interventions or improvements to the current implementation of the co-management agreements that could be applied to the existing co-management communities and could be worked into the extension of the ASFR's co-management arrangements to other communities that have not been involved in the co-management arrangement.

Chapter 9
Conclusion

9.1 Introduction

The previous chapter has discussed the findings of the study based on the research objectives. The main purpose of this chapter is to draw conclusions from the findings highlighted in Chapter 8. In addition, based on the discussion, this chapter outlines key issues for on-going evaluation for the ASFR's co-management institutions, identifies the theoretical contributions of the study, puts forward some thoughts for future research and gives the last comments of the thesis.

9.2 Conclusion about forestry co-management arrangements and sustainable livelihood outcomes

The intention of this study was to understand the extent to which the ASFR's co-management has strengthened the livelihoods of poor forest-dependent communities. The research hypothesized that a well-designed devolved collaborative regime, such as co-management, will strengthen the livelihoods of the poor forest-dependent communities. The ASFR reputedly had a co-management regime and was therefore chosen as a case study. Consequently, the study was based on three research objectives which have already been discussed in chapter 8, namely: (1) to examine the current institutional arrangement for governance of ASFR; (2) to evaluate the extent to which the governance arrangements can be characterised as devolved collaborative governance, and; (3) to evaluate the design of the current institutions of the ASFR's governance in terms of strengthening the livelihoods of its poor forest-dependent communities.

A comparative approach involving two sets of communities that are dependent on the Arabuko-Sokoke Forest Reserve (ASFR) was used. Three communities that are piloting co-management in Dida's Kilifi District and four non-piloting communities in Mongotini's Malindi district were chosen for comparison. Document analysis, interviews, a survey and participant observation were the methods employed to gather data. The research was based on a literature review from which a modified sustainable framework was developed to evaluate the ASFR regime. This framework involved using Ostrom's (1990) institutional design principles as the lens through which to examine the transforming structures and processes in Carney's (1999) frequently used sustainable livelihoods framework. These principles

provided the parameters or indicators for evaluating the institutional arrangements of ASFR as devolved collaborative governance.

It is concluded in this thesis that, first, the institutional arrangement for the ASFR co-management are inadequately established and cannot be characterized as devolved collaborative governance because they: provide unclear objectives to the households, are invested with corrupt practices, allow limited community interaction with the central government, have limited funding to support the extension of the co-management to the rest of the forest-adjacent communities, have provided limited property rights to households dependent on the forest for their livelihoods; and they have made it difficult for both the piloting and non-piloting communities to have enough power or authority and responsibility to fully participate in the management of forest resources. Without the adequate devolution of the co-management arrangement, communities' accountability and enforcement are significantly weakened leading to undermining of the agreement.

However, despite the fact that the co-management arrangement governance has not been adequately devolved it has resulted to a variety of benefits: (1) some rules initiated to address co-management issues in piloting communities are also being applied in the non-piloting communities, (e.g. the matching of appropriation and provision rules and local conditions); (2) the piloting communities have developed more faith in the co-management system compared to the non-piloting communities; (3) the protection of the forest resources from damage through the introduction of the income generating activities which are providing alternative livelihoods to the communities dependent on the forest, and; (4) a linkage of different types of organizations (KWS, NMK, KEFRI, KFS), donors and communities which has enabled these partners to benefit from their various capabilities. This finding suggests that a co-management arrangement may provide viable institutions for managing forest resources if well-established.

Second, this study examined the larger issue of, *to what extent does co-management strengthen the livelihoods of forest-dependent communities?* It is notable that despite the failure to fully implement the co-management approach at the ASFR, its partial implementation does reveal some significant differences between the communities piloting co-management and those that are not. Thus, co-management arrangement can strengthen the livelihoods of households dependent on the forest. This study's findings have also, generally, confirmed the relevance of Ostrom's (1990) design principles in co-management of forests.

The preceding evaluation of the ASFR's governing institutions in the piloting and non-piloting communities, using Ostrom's design principles as a theoretical framework for analysis indicate that in communities piloting co-management their institutions are becoming relatively superior compared to non-piloting communities. Further in the communities piloting co-management their livelihood outcomes are in conformity to their institutional superiority. For example the study showed that there is more potential for co-management in improving livelihoods assets and livelihood outcomes (improved income, reduced poverty, improved natural resources management, improved food security and to some extent reduced vulnerability context) of the poor communities dependent on the forest for their livelihoods.

Further, the result confirms the hypothesis that well-designed co-management arrangements may strengthen the livelihood outcomes of the poor forest-dependent communities. For example, the study found that Ostrom's (1990) design principles are inadequately established in the ASFR and results confirms that despite the institutions being inadequately designed in the communities piloting co-management, their livelihood assets and social economic well-being were higher than non-piloting communities. This indicates that if a co-management arrangement is well-established using Ostrom (1990) design principles, it can be able to deliver better livelihood outcomes to the poor forest-dependent communities. In other words, the better the establishment of Ostrom's (1990) design principles in common pool resources management, the more the livelihood outcomes they may be able to deliver to the communities dependent on the forest resources for their survival.

The findings, however, point toward the following limitations. These limitations may be used to expand Ostrom's (1990) design principles in order to meet community forestry co-management aspirations. The common pool resources theories need to provide clear guidance to communities and development agencies to aid them in crafting institutions that can succeed in using co-management approaches. Ostrom's (1990) design principles can only be used as a framework for designing of the institutions for common pool resources and she is quite clear that it should not be seen as a cook book or blueprint. But after two decades of research these principles appear robust and, indeed, the research presented here suggests that had more attention been paid to the design principles the co-management regime would be delivering even better outcomes. That there was no clear formula for formulating consistent and well harmonized co-management rules in the ASFR means it has not reached its potential. This suggests that there is a need to formulate detailed guidelines for implementing

each design principle to enhance the probability that co-management approaches will succeed. These will guide communities, governments and development agencies when implementing each of Ostrom's (1990) principles for the management of common pool resources such as forests. These guidelines may also make it easier for common pool resources scholars when evaluating the livelihood outcomes of the poor forest-dependent communities involved in collaborative governance of common pool resources.

9.3   On-going implementation of the ASFR co-management approach

The current evaluation of the ASFR co-management arrangement is important for the successful management of the forest and enhancement of better delivery of livelihood outcomes to the forest-dependent households. The ASFR co-management arrangement has started to organise its activities into multiple nested layers. The co-management has helped the households in piloting communities to establish various user groups (e.g. bee keeping, butterfly farming, aloe vera, on-farm tree planting and herbal medicine). If these groups and forest conservation rules are handled well, the qualities of the forest resources will be enhanced and, thus, the communities' livelihoods assets improved. This can be introduced to the other communities living adjacent to the forest that are not already involved in the co-management arrangement. The non-piloting communities have the desire to be involved in the co-management arrangement, but are frustrated at the lack of progress in extending co-management beyond the initial pilot communities. There are good opportunities for the government agencies, NGOs and donors to strengthen the co-management arrangements. In particular, for the ASFR co-management to be fully successful a number of issues need to be addressed:

Proper establishment of co-management institutional arrangements: The ASFR co-management needs to factor in the Ostrom (1990) design principles in the establishment of its institutional arrangements. The study found that the Ostrom's (1990) principles are emerging in the ASFR, but they have not been established in a way that can make the ASFR co-management institutions robust and long lasting in the delivery of the livelihood outcomes of the poor forest-dependent communities.

Devolution of governance to the communities: For co-management arrangements to succeed there is a need for governments to continue to devolve governance of the forest resources to the poor, forest-dependent communities. This will allow their full participation in the management and decision making regarding those forest resources. This research supports the

findings of others (e.g. Larson, Cronkleton, Barry, & Pacheco, 2008) that full participation may help these communities to improve the control and use of these resources. The government should also be able to grant ownership rights to the communities depending on the forest for their livelihood. These rights could include clearly defined mechanisms and structures for using the resources to ensure conservation and the means of enforcement and use rights. If ownership rights are granted, the communities have more chances of protecting forest resources.

Legalizing co-management: As demonstrated by the results in both the piloting and non-piloting communities, there is no binding agreement between the communities adjacent to the forest which depend on the forest for their livelihoods, and the central government to allow them to fully participate in the management and use of the forest resources. This lack of agreement has put the communities on hold as they wait for the agreement. To enable proper decision making and strengthening of the co-management arrangement the nested layers of the co-management arrangement need to be legal, codes of conducts established, clear constitutions made and officially endorsed terms of reference made by all the stakeholders in the co-management arrangement made. These structures should then have local representatives dedicated to implement them, who should receive full support from the government, NGOs and all other stakeholders in the co-management arrangement, through incentives and salaries to make them more committed in implementing the structures.

Establishment of clear co-management objectives: For the ASFR co-management to succeed there is need for governments to establish their objectives clearly and make them known to the communities and NGOs. This will make the various stakeholders to be specific on what should be achieved by co-management from the outset, and will also help clarify the role and the future of new income generating activities. All the stakeholders need to be involved in the design of the co-management objectives and they should be able to know the importance of establishing a co-management arrangement. This is expected to make all the stakeholders of the co-management work more positively towards its success.

Establishment of co-management for the entire forest: For the government to succeed in the sustainable management of the forest, it must be able to involve the entire communities living adjacent to the forest in the co-management arrangement. This will help all the communities to understand the benefits that can be sourced from the forest and engage in its management as they derive some benefits from it.

Adequate involvement of communities in the enforcement of co-management rules: The government must involve the communities adequately in the enforcement of the co-management rules. The enforcement should include adequate sharing of responsibilities in the enforcement of the rules between the government forest guards and the community forest guards and all entire partners in the co-management arrangement. The rules for the co-management arrangement should be simple to understand and easy to enforce, and with low costs. The rules should allow easy communication between the enforcement units and the resource users. The local rule enforcement mechanism should be strong and provide enough rule enforcement powers to the communities. The village advisory committees should be able to enforce the rules without depending on the government. Sanctions to the rules breakers should be sufficient for dealing with the offenders and should deter them from subsequent rule breaking. If the rule enforcement is adequate, then the ASFR co-management communities are expected to experience greater commitment to complying with the rules.

Adequate benefit sharing: The government should devise ways of adequately sharing benefits with the communities. This is expected to improve more community participation in the management of the forest products as the communities will be accessing substantial benefits. The communities also may feel that the forest belongs to them. It will also reduce corruption as the members of the communities will know that they can access benefits from the forest any time they need them. This will only happen if they appreciate the limits to those resources that have been made more difficult with the departure of donors. The opportunity to be involved in extending co-management beyond the piloting communities may well attract donors back to the project. The research reported here could assist in demonstrating the value of such an extension.

Provision of adequate safety for community members threatened with misuse of the forest: The rules established by the villages, should be able to provide legal support to the community members threatened with the misuse of their resources. The community members and entire stakeholders should be able to execute the rules and regulations of the co-management without fear of being harmed by the violators of co-management rules. The communities' representatives should have full government protection in their execution of the rules for sustainable forest management.

Establishment of clear individual household boundaries: The communities should have clear and easy to understand boundaries for both members and non-members. The rules

should be able to stipulate who should be included and who should be excluded in accessing the forest resources. The study found that anybody within a five kilometre radius has the right to access the forest resources. This should be made clear to all households that are allowed to access the forest resources and should be circulated to both members and non-members of the co-management arrangement, including the neighbours to co-management communities, to stop non-co-management members from intruding, particularly those households outside the five kilometre radius. This may help in monitoring the users of the forest resources. It may also help to create strong groups in the co-management arrangement. For instance those to be involved in the co-management arrangement should be able to meet the requirements for the co-management arrangement. The communities should be able to liaise with the government agencies and supporting agencies, like the donors, and make them aware of the boundaries for extraction or use of the forest resources.

Designing of long term income generating activities: To improve the communities' incomes and make the income sustainable, the ASFMT must involve the local communities in the design of income generating activities that are long term and reliable. For example, the income generating activities should be drought resistant. These income generating activities must also have ready markets and must be able to provide sufficient income to attract more households to participate in the management of the forest, as well as prevent them from destroying the forest resources. The income generating activities should be self-supporting by the end of the funding. This is necessary if co-management approaches have to continue to avoid overreliance on donor funding. The income generated from the projects, should be sufficient for the continuous implementation, coordination, monitoring and enforcement of the rules for the co-management.

9.4   Theoretical contributions of the study

There are several contributions from this study: first, there is no evidence of studies so far that evaluate the extent that Ostrom's (1990) design principles can strengthen the livelihood outcomes to the poor forest-dependent communities in a co-management arrangement. Most studies have dwelt on how co-management approaches can sustain forest resources depended upon by the poor forest communities and/or the impacts of co-management approaches to the livelihoods of poor forest-dependent communities, but none have linked co-management institutions and livelihood outcomes to understand the extent to which the common pool resources institutions have delivered livelihood outcomes to poor forest-dependent

communities. The novel aspect of this research has been to specifically incorporate Ostrom's (1990) design principles within the sustainable livelihood framework to evaluate a development programme. The research has demonstrated that this can be done and has provided insights into how to evaluate co-management institutional change strategies. The framework can be used for future studies in showing these linkages. Secondly, the study has provided information on a new case study on co-management that has not been studied before. Thirdly, it has contributed to the potential of co-management approaches to strengthen the livelihood outcomes for the poor, rural forest-dependent communities, by taking the ASFR as a case study, of the modified sustainable livelihood framework for evaluating the sustainability of co-management approaches of common pool resources such as forests and evaluating the resultant livelihood outcomes. Finally, the study has contributed in determining the relevance of Ostrom's (1990) design principles in co-management of forests and provides evidence in support of advancing and refining the design principles as a blue print.

9.5 Some suggestions for future research

The results of this study indicate that there continues to be a need for more studies under different co-management arrangements to test Ostrom's (1990) principles. In particular, there is a need for revisiting previous studies that showed that the Ostrom (1990) design principles were successful, but to measure the success in terms of the sustainable livelihood framework to understand the extent to which the institutions in these collaborative governance arrangements have managed to deliver livelihoods to the forest-dependent communities.

There is also need for similar studies as this one in other collaborative governance arrangements of natural resources to understand the extent to which well-devolved collaborative governance institutions are delivering livelihood outcomes to the communities dependent on those natural resources. Such reviews could be used as a basis to refine Ostrom's principles into more specific guidelines applicable to specific resource contexts – effectively creating the blueprints that Ostrom sought to avoid. This would be helpful to governments, communities and NGOs when designing common pool resources management systems.

Finally, regardless of whether the co-management is extended to other parts of the forest, there is scope for follow-up evaluations of the communities explored in this research to establish a longitudinal study of the effects of the co-management approach. The loss of

donors and the decisions yet to be made within the co-management communities provide interesting threats and opportunities to explore how the co-management regime responds and whether its response strengthens the resilience of the communities' livelihoods. Such research would become even more significant and could be expanded to include all the forest communities if, and when, the co-management approach moves beyond the pilot stage to extend across the rest of the ASFR.

9.6   Final thoughts

The field of common pool resources management has evolved considerably since the arguments of Hardin (1968) on the tragedy of the commons. Ostrom's (1990) studies on the design of the institutional arrangements for common pool resources, and the eight design principles for common pool resources marked a significant step forward. The design principles have received criticisms from many scholars (Agrawal, 2001, 2002; Ambika & Ganesh 2005; Cox, Arnold, et al., 2010), including Ostrom herself (Ostrom, 2001). Yet a number of studies also indicate that the use of Ostrom's (1990) design principles to design common pool resource management systems does result in stable and long lasting institutional arrangements (Ashutosh & Tadao, 2001; Kris & Kristen, 2004). Thus, Ostrom's (1990) design principles have been widely applied in designing co-management approaches around the world (Ambika & Ganesh 2005; Ashutosh & Tadao, 2001). However, to date, the guidelines for designing each of these principles do not exist. Furthermore, some scholars have argued that co-management of natural resources will improve the livelihood outcomes of the poor forest-dependent communities (Baumann, 2000; Pagdee et al., 2006). Nonetheless, this argument has been met with contradictions (see Be´ne' & Neiland, 2004; Edmunds & Wollenberg, 2003; Jentoft, 2000; Jumbe & Angelsen, 2007; Sayer, 2005; Tole, 2010). Most of the studies have either studied co-management institutions or livelihood outcomes without showing linkages among them (see Ambika & Ganesh 2005; Ashutosh & Tadao, 2001). The concern of this study, therefore, was to link co-management approaches with sustainable livelihood outcomes.

To this end, it is fair to argue that this thesis has contributed to the continued development of the design of common pool resources institutions and sustainable livelihood outcomes. This thesis has clearly demonstrated that a combination of Ostrom's (1990) design principles and the DFID's (1999) sustainable livelihood framework provides a valuable tool for evaluating

the extent to which co-management institutional arrangements have strengthened the livelihoods of forest-dependent communities (see Figure. 3.2).

Furthermore, my own interests in the establishment of common pool resources rules remain relatively simple: irrespective of academic debates on the discourse of the design of common pool resources institutional arrangements as guided by Ostrom's (1990) design principles, communities are still faced with the challenge of guidelines for designing co-management arrangements for common pool resources such as forests. To support these communities to achieve sustainable livelihoods there is a need for the common pool resources scholars to now move beyond evaluating and debating Ostrom's (1990) principles and, instead, develop and test practical guidelines for implementing the principles.

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Appendix A

In-depth semi-structured questions

ARABUKO-SOKOKE FOREST-DEPENDENT COMMUNITIES

Date of interview:…………………..Village:…………………………No............

These semi-structured questions will be administered to heads of those households that are dependent on Arabuko-Sokoke forest.

General information
1. How many people live in this household?

Number of household member(s)	Male	Female
Number of adults		
Number of children		
others		

2. What is your tribal affiliation?

3. a) How long have you lived in this village?

   b) If you have moved from elsewhere what was your place of birth?

   c) What attracted you to this village, if you moved?

   Forest Dependence
   The questions in this section will seek to get information on the degree of household dependence.

4. What are the main sources of income for your household? Please elaborate?

5. a) To what degree does your household depend on forest resources both in kind and cash from Arabuko-Sokoke Forest Reserve? Please elaborate?

   b) What kind of forest resources do you depend on from the forest for your everyday livelihood needs?

   c) What kind of forest resources do you depend from the forest for certain periods of the year? Please explain?

   d) Please can you explain any other ways in which you depend on the forest resources, other than those mentioned above?

6. Do you have to obtain a permit to access each of the resources you use from the forest? If 'yes', how? If 'not', why not?

7. Is there a limit as to how much resources you can collect/harvest/use? Please explain?

8. How often do you access the forest for each of these resources?

9. How long have members of your household relied on the forest resources?

10. How do the households ensure that the forest resource base is maintained for continuous future supplies?

11. How important are the forest resources for your household? Please explain.

    Forest co-management arrangements
    This section seeks information from the households dependent on the Arabuko-Sokoke Forest Reserve on the rules applied in accessing the forest resources.

12. What tenure arrangements are in place for accessing the above mentioned resources? For example, traditional laws/Government regulations?

13. What are the rights of ownership and use of the forest resources by the communities dependent on the forest?

14. Can you please explain how the forest is managed?

15. How do you participate in the management of the forest resources?

16. Why did your household decide to participate in the management of the Arabuko-Sokoke Forest Reserve?

17. Have you heard of the term co-management arrangement for Arabuko-Sokoke forest?

18. How would you describe what the co-management arrangement is?

19. Are there rules governing the use of the forest in the co-management arrangement? Please explain these rules? If there are no rules, please explain how the forest is governed?

20. a) Do these rules have clearly defined boundaries about which households in the village can access and use the forest resources? If 'yes', please explain? If 'not', why not?

    b) How well do these rules function? If 'not' why not?

21. a) Do the rules restrict your household in terms of time, place, technology and the quantity (units) or quality of product you can harvest? If 'yes', please explain how? If 'not', why not?

    b) How well do these rules function? If 'not' why not?

    c) Are these restrictions by the rules related to your household conditions? If 'yes', how? If 'not' why not?

22. a) Do the rules allow your household to participate in changing the rules for the co-management arrangement? If "yes', Please explain? If 'not', why not?

    b) How well do these rules function? If 'not' why not?

23. a) Do these rules enable your household to monitor the behaviour of users of the forest resources in the village? If 'yes', how? If 'not', why not?

    b) How well do these rules function? If 'not', why not?

24. a) Do the rules enable your household to punish the users of the forest resources who violate rules for the co-management arrangement? If 'yes', please explain? If not, why not?

    b) How well do these rules function? If 'not' why not?

25. a) Do the rules enable your household to participate in resolving conflicts among forest resources users or between forest resources users and their officials? If 'yes', please explain? If 'not', why not?

    b) How well does this function?

26. a) Does the Government (highest authority) recognize the rights of households in the co-management arrangement to devise their own rules?
    b). How well do these rules function? If 'not' why not?

27. a) Do the various stakeholders such as the NGOs, the government etc. in the co-management arrangement stick to the co-management rules? If 'yes', how? If not why not?
    b) Does any stakeholder try to enforce the co-management rules? What happens if they do?

28. Overall, how effective are the co-management rules?

29. Are there any threats that your think are facing the co-management arrangement? If yes which ones? If not, why?

30. a) How could the management of the forest be improved?

    b) Has anybody made these suggestions?

    c) Did anybody act on them? If 'not' why not?

    Forest bounty
    This section seeks information on the quality or quantity of the forest resources of the Arabuko-Sokoke Forest Reserve?

31. a) Has the quality or quantity of the forest resources changed over the years? If 'yes' how? If 'not', why not?

b) What do you think are the main reasons for this?

c) How has the co-management rules contributed to the above reasons?

Vulnerability context, livelihood assets and livelihood outcomes as a result of the ASAFR co-management arrangements

This section seeks information on how a household's vulnerability context has improved as a result of the co-management arrangement. It also seeks information on the extent to which the households have improved their livelihood assets and outcomes due to the co-management arrangement.

32. Vulnerability context
   a) What changes during the year do the forest-dependent communities fear? For example, drought, floods and death of household head. Please explain why?

   b) Are there any other changes that you are particularly concern with? If 'yes', please explain? If not, why not?

   c) Please can you explain how the significance of these changes has varied among the forest-dependent communities over time?

   d) How is the co-management arrangement helping the communities to cope with these changes?

   e) How did the communities cope before the establishment of the co-management arrangement?

   f) To what extent can you say has the current co-management helped the communities dependent on the forest resources to cope with changes?

33. Livelihoods assets
   a) What kind of asset base has your household been able to build-up as a result of the co-management arrangement? (For example, skills, knowledge, health, networks, groups, rules, relationships of trust, reciprocity, infrastructure, savings, credit facilities, soil). Please explain?

   b) How has the value of these assets changed over time?

   c) What are the causes for these changes?

   d) Are these changes predictable?

   e) How does the access to these livelihood assets differ between different social groups in the community?

   f) To what extent has the access of these livelihoods assets by your household improved as a result of the Arabuko-Sokoke co-management arrangement? If not, why not?

33. Livelihood Outcomes
    a) What was the social-economic well-being of your household prior to the establishment of the co-management arrangement?

    b) How have these socio-economic well-beings in your household changed over time?

    c) How can the socio-economic well-being be improved?

    d) Can you please explain the extent to which these socio-economic well-being has improved as a result of the co-management arrangement?

Appendix B

In-depth semi-structured informants questions

ARABUKO-SOKOKE CO-MANAGEMENT STUDY

These semi-structure questions will be administered to key informants from non-governmental organizations, key communities members and the government departments involved in the co-management arrangement.

General co-management information
This section seeks general information on the co-management arrangement
1. Name:...
2. Sex: Male.. Female..
3. Education level:..
4. How long have you lived here?...
5. How many years have you been involved in the forest activities? Please explain?

6. What is the approximate number of inhabitants of the forest-dependent communities?

7. What is your role in the community?

8. What were the main objectives/goals for the establishment of the Arabuko-Sokoke Forest Reserve co-management project?

9. How consistent are the project co-management goals with the community livelihoods needs?

10. To what extent do the communities and other parties agree to these forest management goals?

11. a) Are there any groups you would say depend on the forest? If 'yes,' can you explain the nature of their dependence on the forest?

   b) How much resources do they depend from the forest?

   c) To what degree do they depend on these resources?

   d) Please can you explain the resources they depend on during particular times of the year?

   e) Why does this happen?

   f) Do the communities harvest resources from any part of the forest? If not, which particular parts are accessible?

Current co-management arrangement
This section is about the rules governing the Arabuko-Sokoke Forest Reserve co-management arrangement

12. Before the co-management system how was the forest managed?

13. How does the current co-management arrangement make the forest management different? If 'not,' why not?

14. a) Describe the process for the development of the co-management project?
    b) How was the process determined?

15. How does the co-management arrangement work?

16. a) Who are the parties involved in the co-management arrangement?

    b) Please can you explain the roles of the people or groups who are party to the co-management arrangement?

17. Who are the people or organizations whose support is particularly critical for the co-management arrangement to work?

18. Are there any villages or groups of people doing particularly well in terms of their basic needs in the area?

19. Are they involved in the co-management arrangement?

20. Are there groups who are doing well who are not involved in the co-management arrangement? Please explain?

21. Are there any groups involved in the co-management doing badly? Please explain?

22. a) Are communities dependent on the forest participating in development and implementation of the co-management rules?

    b). What are their reasons or motives for participation?

23. a) Are there rules governing the use of the forest in the co-management arrangement? Please explain these rules? If there are no rules, please explain how the forest is governed?

    c) Which rules do you think are good ones? Why?

    d) Which ones are not so good? Why?

24. a) Do these rules have clearly defined boundaries for communities dependent on the forest to access the forest resources? If 'yes', please explain? If 'not', why not?

    b). How well do these rules function? If 'not', why not?

25. a) Do the rules restrict the forest-dependent communities in terms of time, place, technology and the quantity (units) or quality of product they can harvest? If 'yes', please explain how? If 'not', why not?
    b) How well do these rules function? If 'not', why not?

    c) Are these restrictions by the rules related to the communities dependent on the forest conditions? If 'yes', how? If 'not', why not?

26. a) Do the rules allow the forest-dependent communities to participate in the changing of the co-management arrangement rules? If "yes', Please explain? If 'not', why not?

    b) How well do these rules function? If 'not', why not?

27. a) Do these rules enable the forest-dependent communities to monitor the behaviour of users of the forest resources in the communities? If 'yes', how? If 'not', why not?

    b) How well do these rules function? If 'not', why not?

28. a) Do the rules enable the forest-dependent communities to punish the users of the forest resources who violate the rules for the co-management arrangement? If 'yes', please explain? If not, why not?

    b) How well do these rules function? If 'not', why not?

29. a) Do these forest-dependent communities participate in resolving conflicts among forest resources users or between forest resources users and their officials? If 'yes', please explain? If 'not', why not?

    b) How well do these situation function? If 'not' why not?

30. Do all the parties to the co-management agreement think that the communities have a right to devise their own rules for managing the forest's resources? If' yes' how? If 'no', which ones do not recognise these rights?

31. a). Do the various stakeholders such as the NGOs, the government etc. in the co-management arrangement stick to the co-management rules? If 'yes', how? If not, why not?

    b). Does any stakeholder try to enforce the co-management rules? What happens if they do?

32. Overall, how effective are the co-management rules?

33. Are there any threats that your think are facing the co-management arrangement governance? If 'yes', which ones, If 'not', why?

34. How could the management of the forest be improved?

Quality and quantity of forest resources

This section seeks information on the quality or quantity of the forest resources of the
Arabuko-Sokoke Forest Reserve

35. The bounty of the resources from the forest ASFR

   a) Has the quality or quantity of the forest resources changed over the years? If 'yes'
   how? If 'not', why not?

   b) What do you think are the main reasons for this?

   c) How has the co-management rules contributed to the above reasons

**Vulnerability context, livelihood assets and livelihood outcomes as a result of the
ASAFR co-management arrangements**

The three sections below seek information from the key informants on how the
household's vulnerability context has changed as a result of the co-management
arrangement. It also seeks information on the extent to which the households have
improved their livelihood assets and out comes situation due to the ASFR co-management
arrangement.

36. Vulnerability context
a) What changes during the year do the forest-dependent communities fear? For
   example, drought, floods or death of household head. Please explain why?
b) Are there any other changes that you are particularly concern with? If 'yes', please
   explain? If not, why not?

   c) Please can you explain how the significance of these changes has varied among the
   forest-dependent communities over time?

   d) How is the co-management arrangement helping the communities to cope with these
   changes?

   e) How did the communities cope before the establishment of the co-management
   arrangement?

   f) To what extent can you say has the current co-management helped the communities
   dependent on the forest resources to cope with changes?

37. Livelihood assets
a) What kind of asset base have the communities been able to build-up as a result of the
   co-management arrangement?

   b) How has the value of these assets changed over time? (For example, material and
   non-material assets)

   c) What are the causes for these changes?

d) How does the access to these livelihood assets differ between different social groups in the community?

e) To what extent has the access of these livelihoods assets by the forest-dependent communities improved as a result of the Arabuko-Sokoke co-management arrangement? If 'not', why not?

38.   Livelihood outcomes
a) What was the social-economic well-being status of the forest-dependent communities prior to the establishment of the co-management arrangement?

b) How has the socio-economic well-being state of the forest-dependent changed overtime?

c) How can the socio-economic well-being be improved?

d) Can you please explain the extent to which socio-economic well-being has improved as a result of the co-management arrangement?

Appendix C

In-depth semi-structured individual household detailed questions

ARABUKO-SOKOKE CO-MANAGEMENT STUDY

Household case study No...

This questionnaire will be administered to heads of households which are dependent on the Arabuko-Sokoke forest products.

Household information
1. Household Size…………………...
2. Tick the right household details in the table below (to be done by the researcher)

Name of HH Members start with Name of HH head	Sex	Relation to HH head	Marital status	Age	Education	Can read and write	Occupation
1							
2							
3							

---

[1]Sex: 1= Male, 2= Female

[2]**Relation to HH head**: 01=HH head self 02-wife, 03= husband, 04-son 05=daughter, 06=Father 07=mother, 08=brother, 09=sister, 10=Grandfather, 12= grandfather, 13=Nephew 12= 0ther specify

[3]**Marital Status:** 1=Unmarried, 2=Married, 3=Widow/Widower, 4=Divorced, 5=Separated

[4]**Age:** 1=11-20 Year, 2=21-30, 3=31-40, 4=41-50, 5= 51-60, 6=61-70, 7=71 And Above

[5]**Education:** 00=No Class, 01-Class One, 02=Class 2, 03=Class Three, 04 Class Four So On 66=No Formal Education 68= Adult Education

[6]**Can Read/Write:** 1=Yes, 2=No

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3. How often do different members of your household (including yourself) access the forest products? Please explain?

4. What do your household members access from the forest?

5. Do you have to go to the forest to get these products? If not please explain how you get them?

6. Are you allowed to collect the products from any parts of the forest? If not why not?

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7. Can you get by without any of these products you get from the forest? Which ones?

8. How long can you survive without each of the mentioned forest products?

9. What do you use instead if you miss the above mentioned products?

10. Which products do you use for subsistence? Please can you quantify this in monetary terms?

11. Which products do you obtain for sale? Please can you quantify this in monetary terms?

12. Is this amount enough for your household needs? If not, how do you supplement the deficits?

13. How much money do you spend in collecting the products for example, collection permit fees, and labour?

14. Do you experience any difficulties collecting each of the above products from the forest? Please elaborate?

15. Is it clear who is allowed to use which forest products?

16. How is it decided on which household are allowed to use which products?

17. How were these rules decided?

18. Which times of the year do you need more of particular forest products? Please explain?

19. Does this coincide with the times when you are allowed to access the forest products? If 'not' how do you deal with this situation?

20. How flexible has the forest co-management arrangement been to you during this time to enable you access the products?

21. Please list basic assets that you have been able to build-up as a result of the income from the sale of the forest product? For example, education, health, housing credit facilities, savings, bank deposits, networks, group rules, relationships of trust, and reciprocity).

22. Please explain how far your household's socio-economic well-being has changed as a result of accessing of the forest products?

Appendix D

Results of survey questionnaire

Improvement of households livelihood assets

Range			Piloting communities Before co-management: n=6		Piloting communities after co-management: n=10	
0-10	3		(50%)		0	(0%)
11-20	1		(17%)		0	(0%)
21-40	1		(17%)		0	(0%)
31-40	1		(17%)		3	(30%)
41-50	0		(0%)		3	(30%)
51-60	0		(0%)		1	(10%)
61-70	0		(0%)		2	(20%)
71-80	0		(0%)		0	(0%)
81-90	0		(0%)		1	(10%)
91-100	0		(0%)			(0%)

Income

Range	Piloting communities before co-management: n=14	Piloting communities after co-management: n=16	Non-piloting communities in the past: n=19	Non-piloting communities currently: n=20
0-10	4 (29%)	2 (13%)	2 (11%)	2(10%)
11-20	4 (29%)	1 (6%)	1 (5%)	5(25%)
21-30	2 (14%)	4 (25%)	1 (5%)	8(40%)
31-40	0 (0%)	2 (13%)	3 (16%)	0(0%)
41-50	3 (21%)	4 (25%)	4 (21%)	2(10%)
51-60	1 (7%)	0 (0%)	1 (5%)	1(5%)
61-70	0 (0%)	2 (13%)	1 (5%)	0(0%)
71-80	0 (0%)	1 (6%)	2 (11%)	1(5%)
81-90	0 (0%)	0 (0%)	2 (11%)	1(5%)
91-100	0 (0%)	0 (0%)	2 (11%)	0(0%)

Food security

Range	Piloting communities before co-management: n=14	Piloting communities after co-management: n=18	Non-piloting communities in the past: n=12	Non-piloting communities currently: n=16
0-0	2(14%)	1(6%)	0(0%)	1(6%)
11-20	2(14%)	2(11%)	0(0%)	6(38%)
21-30	3(21%)	4(22%)	2(17%)	4(25%)
31-40	0(0%)	2(11%)	1(8%)	2(13%)
41-50	(214%)	3(17%)	3(25%)	3(19%)
51-60	0(0%)	3(17%)	1(8%)	0(0%)
61-70	0(0%)	2(11%)	2(17%)	0(0%)
71-80	3(21%)	0(0%)	1(8%)	0(0%)
81-90	2(14%)	1(6%)	2(17%)	0(0%)
91-100	0(0%)	0(0%)		

Poverty levels

Range	Piloting communities before co-management: n=18	Piloting communities after co-management: n=18	Non-piloting communities in the past: n=14	Non-piloting communities currently: n=14
0-0	1(6%)	0(0%)	4(29%)	0(0%)
11-20	1(6%)	0(0%)	3(21%)	0(0%)
21-30	2(11%)	1(6%)	1(7%)	0(0%)
31-40	0(6%)	0(0%)	1(7%)	0(0%)
41-50	0(0%)	5(28%)	1(7%)	4(25%)
51-60	1(6%)	0(0%)	1(7%)	2(13%)
61-70	0(0%)	3(17%)	1(7%)	2(13%)
71-80	5(28%)	6(33%)	1(7%)	0(0%)
81-90	5(28%)	1(6%)	0(0%)	0(0%)
91-100	2(11%)	1(11%)	1(7%)	8(50%)

Natural resources management

Range	Piloting communities before co-management: n=15	Piloting communities after co-management: n=15	Non-piloting communities in the past: n=7	Non-piloting communities currently n=10
0-10	6(40%)	0(0%)	1(14%)	1(10%)
11-20	2(13%)	0(0%)	1(14%)	1(10%)
21-30	3(20%)	0(0%)	1(14%)	0(0%)
31-40	3(20%)	*2(13%)*	0(0%)	0(0%)
41-50	0(0%)	4(27%)	2(29%)	2(20%)
51-60	0(0%)	1(7%)	0(0%)	2(20%)
61-70	1(7%)	3(20%)	0(0%)	0(0%)
71-80	0(0%)	1(7%)	2(29%)	1(10%)
81-90	0(0%)	2(13%)	0(0%)	1(10%)
91-100	0(0%)	15(13%)	0(0%)	2(20%)

Vulnerability

Range	Piloting communities before co-management: n=10	Piloting communities after co-management : n=13	Non-piloting communities in the past, n=14	Non-piloting communities currently: n=14
0-10	1(10%)	1(8%)	1(7%)	2(10%)
11-20	2(20%)	1(8%)	1(7%)	3(15%)
21-30	0(0%)	3(23%)	0(0%)	1(5%)
31-40	1(10%)	3(23%)	2(14%)	3(15%)
41-50	3(30%)	2(15%)	4(29%)	3(15%)
51-60	1(10%)	1(8%)	0(0%)	6(30%)
61-70	1(10%)	1(8%)	0(0%)	0(0%)
71-80	1(10%)	0(0%)	3(21%)	1(5%)
81-90	0(0%)	0(0%)	2(14%)	0(0%)
91-100	0(0%)	1(8%)	1(7%)	1(5%)

**Extent of the households
social economic well-being**

Range	Piloting communities n=26	Non-piloting communities n=23
0-10	2(8%)	2 (9%)
11-20	2(8%)	3(13%)
21-30	2(8%)	3(13%)
31-40	3(12%)	2(9%)
41-50	10(38%)	6(26%)
51-60	3(12%)	3(13%)
61-70	2(8%)	1(4%)
71-80	0(0%)	3(13%)
81-90	2(8%)	0(0%)
91-100	0(0%)	0(0%)

Events of the year feared most by households

Event	Piloting	Non-piloting
Drought	72%	35%
Hunger	24%	50%
Floods	3%	14%
Unemployment	0%	8%
Wildlife	7%	0%