

TOURISM AND ECOSYSTEM SERVICES IN NEW ZEALAND

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ABSTRACT: Tourism is an important and growing economic activity in New Zealand. While promotional activities highlight New Zealand's biodiversity and 'clean green' image under a 100% pure brand, relatively little is known of its draw on ecosystem functions and services. Preliminary analyses of the sector's eco-efficiency highlight both the complexity of the sector and its relatively-polluting nature. Tourism is, however, a two-edged sword in that it also provides an economic initiative for the designation and management of protected natural areas. Given the size, activity volumes and growth trajectory of the sector, non-market and resource-use and efficiency evidence to support tourism policy and planning is now urgently required.

Key words: clean green image, co-efficiency, recreation, tourism.

NATURE OF ECOSYSTEM SERVICES AND THEIR RELATIONSHIPS TO TOURISM

New Zealand's biophysical resources and functions (including indigenous biodiversity), wherever they are found – from the mountains to the sea – are the cornerstone of the New Zealand tourism 'product'. The tourism sector depends on the biophysical environment and ecosystem functions for land (accommodation, roads), water, energy inputs, minerals, biodiversity, and a whole host of ecosystem services such as climate and greenhouse gas regulation and soil formation. Together, the biophysical environment and ecosystem functions provide numerous direct and indirect inputs into the tourism sector. As well as providing the 'raw resources' for tourism, the biophysical environment also draws resources across different scales from global (atmosphere, weather) to national (biodiversity) to local (land, water). Clearly, if these resources or ecosystems services are depleted or degraded over time, the ecological sustainability of the tourism sector is threatened. Physical carrying capacity may limit many natural assets such as national parks (Whinam & Chilcott 1999), or local constraints could affect the sustainability of excessive tourism growth in a locality (Gössling 2001). Thus tourism needs to be integrated with, and planned alongside, other resource use activities.

As discussed elsewhere in this volume, there are various representations of ecosystem services – which have at their core the numerous relationships between natural capital, ecosystem functions and human well-being (which in turn can be distinguished as human benefits (often monetised) and human values) (RSNZ 2011). The model of ecosystems and human well-being advocated in the '*Millennium Ecosystem Assessment*' (MEA 2005) distinguishes various components of ecosystem services, which support provisioning, regulating and direct cultural services. Recreation (assuming its formal association with travel and overnight stays – which comprise 'tourism') is specifically mentioned alongside other 'nonmaterial benefits ... through opportunities for spiritual enrichment, cognitive development, reflection, and aesthetic experiences' (p. 29). In keeping with other frameworks, the MEA framework indicates strong, medium and weak links to 'constituents of well-being': security, basic material for the good life, health and good social relations, which have their culmination in 'freedom of choice and action', that is, the 'opportunity to be of value to achieve what an individual values doing and being' (MEA 2005, p. 29). The importance of a service to human well-being can be described by many different indicators, including environmental safety (provision of clean water, risk mitigation and so on), economic security (income and employment), health

(both physical and psychological), and social components (cultural identity, social networks, and so on).

Even in their simplest forms descriptions of ecosystem services and their human benefits provide overt links to the role and functions of leisure, recreation and tourism in the life of New Zealanders. These three human spheres of activity are commonly linked and are argued to fulfil the same set of basic human social, psychological and physiological needs (Moore et al. 1995). In New Zealand, as well as in countries without large mineral resources, tourism is often the major source of foreign exchange (WTTC 1999). The MEA (2005, p. 470) concurs with a World Trade Organization assessment (WTO 1998) that in such places the contribution of 'nature-based' tourism is nearly equal to the contributions of other productive sectors that draw more directly on ecosystem services, such as agriculture, forestry fisheries, and the provision of water. The MEA also notes the increasing growth in visitation to countries with high biodiversity (MEA 2005, p. 17.3).

Many ecosystems are publicly manifest as important social/cultural places where people can come for rest, relaxation, refreshment, recreation and exercise (and physical and mental challenge). For example, in New Zealand, as elsewhere, cultural resources and cultural landscapes are subject to different histories and interpretations, with Tongariro National Park being only one of twenty-three World Heritage Areas designated under both natural and cultural criteria. Through aesthetic qualities and an extraordinary variety of landscapes, natural and cultural environments provide many opportunities for the 'nature based' activities that are at the core of the New Zealand tourism sector's 'product offering'.

In a broader cultural context, Belich and Wevers (2008), reporting for the Ministry of Social Development, identify 'the environment' as third of six core elements in their list of New Zealand cultural iconographies. Elsewhere 'sport' (MSD 2010) is considered a New Zealand touchstone – as might also be the 'the active/sporting country', the 'shaky isles', or Tourism New Zealand's brand '100% pure'.

The above introductory comments provide a first indication of the complexity of describing, let alone measuring, the contribution of ecosystem services to tourism production and consumption. At the outset, it is important to recognise that ecosystem services are provided across all landscapes and catchments. There might be a common tendency to think of 'nature' (and embedded ecosystem services) as occurring largely in protected natural areas. Others in this book will argue the significance of ecosystem services to agricultural production, forestry and other (primary) productive

sectors. Important here is the recognition that although the great majority of New Zealanders live in urban centres, recreation (and tourism) takes place in marine, estuarine, urban, rural as well as natural landscapes. Similarly the majority of tourist nights are spent on a 'golden route' of 10 well-known 'destinations' (see Becken and Simmons 2008), and for these tourists the New Zealand experience is very much one of a series of scenic/aesthetic corridors (Forer 2005). Thus while urban centres might be seen to make larger draws on ecosystem services, an important social counter-balance is the numerous trips radiating from such centres to enjoy recreation in various 'natural' environments.

SCOPE AND CHARACTERISTICS OF TOURISM IN NEW ZEALAND

Tourism is regarded as a key component of the New Zealand economy and culture. For the year ended March 2012 international tourist arrivals (2.6 million) revealed a slight increase (4.1%) over previous years (in spite of the reported demand-dampening effects of the Global Financial Crisis, and high New Zealand dollar). The tourism sector overall contributed NZ\$6.2 billion, or 3.3%, to GDP (Statistics NZ 2012). Interestingly international tourism expenditure increased 1.6% to NZ\$9.6 billion and contributed 15.4% to New Zealand's total exports of goods and services. In terms of its contribution to the New Zealand economy, a commonly stated comparison is that tourism generates a very similar contribution to the dairy sector, vying with it for first place in foreign exchange earnings.

An equally important but often overlooked measure of tourism activity is domestic tourism, which contributes NZ\$13.8 million (up 3.0% in 2012) internal expenditure, compared with NZ\$9.6 million expenditure from international visitors. Thus the major activity base of the tourism sector is New Zealanders travelling within their own country – and is often reported as 60–65% of total activity (person-days) measures.

Commonly recognised economic benefits of tourism are its labour intensity (a significant contributor to its yield profile) and the regional spread of expenditure (Lincoln University, 2007). The indirect value added of industries supporting tourism generated an additional NZ\$9.7 billion from the sector, or 5.2% of GDP, while the tourism industry directly employed 119 800 full-time equivalents (FTEs) (or 6.2% of total employment in New Zealand) (Statistics NZ 2012). A final note in the tourism accounts is the fact that international tourists generated NZ\$1.3 billion in goods and services tax (GST) revenue, which has long been advocated as a source of funding for support of the 'clean green' image, and support of public assets such as the conservation estate.

In terms of visitor activities that draw 'directly' on identifiable natural resources (and their embedded ecosystem services) some 70% of all international and 22% of domestic trips are reported as containing "nature-based" activities (MED 2009). In 2008, 2.0 million tourists took part in nature-based activities, producing 11.1 million nature-based trips (as one tourist can take multiple trips during a year) (Table 1). Walking and trekking, land-based sightseeing and visiting scenic natural attractions were the most popular activities for international visitors during their stay. MED (2009) further reports that the overall trend has been one of steadily increasing participation from 2004 to 2007 but with a drop in 2008 mainly by international tourists.

Following the 2007 "State of the Environment Report" (MfE, 2007) and given the long-standing focus on nature-based

activities in New Zealand, as early as 2001 the Ministry for the Environment attempted to measure the value of the 'clean green image' to the New Zealand economy (MfE 2001). For the tourism sector the Ministry reported that tourist purchasing behaviour (as measured by change in length of stay) would vary by country of visitor origin. Under worsened environmental perceptions, overseas tourists in New Zealand would alter their stay by an average of, for example:

- Australia 48% reduction
- Japan 79% reduction
- Korea 77% reduction.

The annual loss to New Zealand from the five tourist markets covered in the survey would be between NZ\$530 million and NZ\$938 million (depending on whether lost wages and GST effects are taken into account).

HOW DO ECOSYSTEM SERVICES SUPPORT TOURISM PRODUCTION AND CONSUMPTION?

A hallmark of tourism analyses is complexity. Tourism, unlike 'conventional' industries such as agriculture or manufacturing – which are classified according to the goods and services they produce, is defined by the characteristics of the customer(s) demanding tourism products. Tourism products can cut across standard industry definitions, and therefore require a different approach, commonly presented as tourism satellite accounts (Statistics NZ 2012). Tourism as a service sector is a composite of many 'characteristic' and 'related' subsectors. Characteristic tourism industries centre on the core activities of accommodation and various modes of travel. As well as final demand, tourism consumption is also supported by a broad suite of intermediate consumption – often referred to as tourism-'related' sectors – which provide varying forms of support to final tourism products. Importantly, in common with other sectors, tourism experiences are consumed at the sites where they are produced – and these various support activities (e.g. agriculture, viticulture, horticulture, park management) and numerous service activities (e.g. fuel, pharmacies, banks, theatre, local transport) are often unseen in tourism analyses, and are often not included in formal representations by sector agencies. Indeed this complex web of activity first led to the need to define tourism satellite accounts to report tourism as a definable 'sector' within economies (Dwyer et al. 2010).

Patterson and McDonald (2004) have provided the most complete set of environmental accounts for the tourism sector for any global destination. In noting that many studies had previously examined direct local and on-site effects (e.g. PCE 1997) none had integrated indirect or future effects into their analyses. This was achieved by constructing input-output economic-environmental accounts of the tourism sector to allow environmental data to be integrated with data about the economic performance of the sector, and then reporting these as 'environmental accounts'.

Patterson and McDonald (2004) then report 'ecological multipliers' as their core measure of economic performance (production of goods and services per \$ output) in relation to environmental costs (environmental impacts across the life cycle) as a useful measure of the 'eco-efficiency' concept. The authors developed life-cycle analyses (and diagrams) and reported on use of energy/CO₂, and key resources of land and water. Using input-output analysis similar in structure to the tourism satellite account, the ecological multipliers for the domestic tourism sector for 1997/98 were determined to be (per \$million output):

TABLE 1 Top 30 nature-based activities undertaken by international and domestic tourists 2008

International tourists			Domestic tourists		
Activity	Visitors (000s)	Propensity* (%)	Activity	Visitors (000s)	Propensity* (%)
Beaches	858	38.7	Beaches	3 269	7.5
Scenic boat cruise	554	25.0	Fishing	1 533	3.5
Geothermal attractions	500	22.5	Hot pools	982	2.3
Lakes	461	20.8	Bush walk (1/2 hour)	603	1.4
Scenic drive	445	20.0	Scenic drive	582	1.3
Hot pools	382	17.2	Snow sports	376	0.9
Glacier (walk/view)	325	14.7	Surfing	367	0.8
Sightseeing tour (land)	249	11.2	Hunting/shooting	358	0.8
Bush walk (1/2 hour)	248	11.2	Sightseeing tour (land)	352	0.8
Glow worm caves	227	10.2	Trekking/tramping	15	0.7
Bush walk (1/2 day)	225	10.2	Bush walk (1/2 day)	292	0.7
National parks	211	9.5	Canoeing, kayaking, rafting	280	0.6
Trekking/tramp	201	9.0	Lakes	276	0.6
Jet boating	182	8.2	Scenic boat cruise	263	0.6
Water falls	178	8.0	Mountain biking	238	0.5
Seal colony	164	7.4	Scuba diving /snorkelling	193	0.4
Canoeing, kayaking, rafting	147	6.6	National parks	144	0.3
Scenic flight	129	5.8	Waterfalls	142	0.3
Penguins	125	5.6	Jet boating	123	0.3
Fishing	116	5.2	Horse trekking/riding	86	0.2
Dolphin watching /swimming	111	5.0	Water skiing	77	0.2
Snow sports	99	4.5	Scenic train trip	76	0.2
Mountains	90	4.0	Sport climbing	69	0.2
Whale watching	90	4.0	Geothermal attractions	69	0.2
Albatross colony	79	3.6	Caving	69	0.2
Scenic train trip	73	3.3	Glacier (walk/view)	66	0.2
Sky diving	65	2.9	Rivers	56	0.1
Rivers	61	2.7	Mountains	51	0.1
Sailing	42	1.9	Mountain climbing	48	0.1
4WD trips	41	1.9	Sailing	46	0.1

(*) Propensity, or likelihood, is the proportion of all tourists that took part in the activity
Sources: Ministry of Tourism (MOT 2009 and MOT 2010).

4.5 TJ energy (oil equivalents)
9800 m³ water
175 kg BOD
5 kg nitrate
35 kg phosphorus
17 000 m³ water discharges
85 ha land
260 t CO₂

If international travel was included in these multipliers, the energy and emissions multipliers would become much greater. In fact, although not particularly the focus on this chapter, it is noteworthy that the energy and concomitant greenhouse gas intensities of international tourism are greater than for the agricultural sector.

The example of water

In seeking to elaborate the contributions and values of ecosystem services to tourism production and consumption, I use the example of water to draw out the complexity of ecosystem values.

In the first instance water (i.e. water cycling and supply) is seen as the major contribution to ecosystem functions, alongside weathering, decomposition, disease and pest regulation, evolution processes and other functions described elsewhere in this volume. When water exists as waterfalls it can also provide a separate tourist attraction. In New Zealand these at times provide primary attractions (e.g. Sutherland Falls, Huka Falls, Devils Punchbowl, with the former being listed as one of the world's top 10 (tourist) waterfalls (<http://www.world-of-waterfalls.com/top-10-waterfalls.html>)). New Zealand waterfalls are listed at www.waterfalls.co.nz with specific location and walking activities. Notwithstanding this focus, it is safe to assume that many waterfalls are really secondary, or merely en-route attractions, adding to the general set of New Zealand landscape experiences.

In winter, New Zealand market seasonality is buffered to some extent by (the precipitation based) snow-sport season with activity listed as comprising 376 000 domestic (overnight) travellers and close to 100 000 international visitors (Table 1).

Moving water is a powerful shaper of landscapes, which also

adds visual and aesthetic intrigue as well as serving as activity sites, and to a lesser extent destinations in their own right. SPARC (2008) reported freshwater fishing as the fifth-equal most popular activity (19.5 % participation) with approximately 640 000 people participating at least once a year. The water-based activities of canoeing and kayaking are listed as the 16th most popular, with 210 000 participants. New Zealand is well known both internationally and domestically for 'tramping', which ranked 10th at 9.4% participation with 306 000 participants; the more generic 'walking' ranked first with 2.1 million participants. A number of New Zealand cities, Wanganui (the 'river city'), Hamilton (the Waikato River) and Christchurch (the Avon) in particular, have rivers at their heart for the provision of local and touristic amenity and attraction, where they are often a setting or backdrop for many tourist businesses.

Where water impounds as lakes (or is retained as 'reservoirs' such as in hydro lakes), it too becomes a source of recreational and tourism activity, from the relatively passive (e.g. picnicking), to more active (e.g. kayaking, canoeing, water skiing). For example, Lake Karapiro has twice been the location of the world rowing championships, with 70 000 visitors in 2010 (and the subsequent spin-off local economic benefits). Lake Taupo, in the central North Island, and the 'Southern lakes' are tourist destinations in their own right, independent of the ecosystem services they provide. Finally, where rivers enter the sea, estuaries and the ocean itself are also major recreational, domestic and at times international visitor sites of activity.

What the above examples highlight is the significance of just one element of ecosystem function, 'water', and the embedded ecosystem services water provides, and how it has a number of 'contact points' within tourism consumption. What it further demonstrates is that tourism uses may often sit comfortably alongside or within provisioning and regulating ecosystem functions.

Addressing indirect provisions and boundary issues

Patterson and McDonald's (2004) analysis also provides an important insight into these various interdependencies within tourism production and consumption via their analyses of tourism resource life-cycles and eco-efficiency. In this analysis they represent key resource inputs (land, water, energy) in a comparison with 25 sectors of the New Zealand economy (Table 2). They concluded that the performance of the tourism sector was 'generally poor, ranging from the fourth largest impact on the environment to the 12th largest impact (out of 25 sectors), depending on which of the eight indicator variables was used'.

TABLE 2 Eco-efficiencies and direct draw for key environmental indicators

Environmental indicator	Rank (within 25 sectors)	Direct use (%)	Comment
Nitrates (water)	24	48.4	
BOD (water)	21	57.1	
Phosphorus (water)	21	57.7	
Land	18	7.5	Does not include land reserved as protected natural areas, as tourism is not the primary purpose for land protection
CO ₂	17 (*24)	73.6	* Values included addition of international transport components (at that time outside Kyoto agreements)
Energy	17 (*20)	74.1	* Values included addition of international transport components (at that time outside Kyoto agreements)
Water discharges	13	30.2	
Water inputs	11	8.5	

Source: Extracted and calculated from data and analyses provided by Patterson and McDonald (2004).

For example, to return briefly to the discussion of water, the eco-efficiency measures indicate that tourism is a relatively low user of water (as a direct supplier to tourism products) but the water it does use directly is relatively 'polluted' in the sense there were comparatively high levels of pollutants per cubic metre of discharge (Patterson and McDonald, 2004, p. 8).

In attempting to make a full analysis of the tourism sector a key area of debate is where do the boundaries of the tourism sector begin and end? If the agricultural sector, for example, makes a contribution to the economy, albeit largely through exports, it matters little to the individual farmer whether the consumer of the product (and embedded ecosystem services) is in an international market (via formal export) or is an international visitor (who has travelled to New Zealand to consume the product). While this distinction matters little to ecosystem services per se, it is important as soon as one considers the need for effective and efficient allocation of resources to different sectors, and future growth trajectories.

What is important to note is that tourism experiences often sit on a rich bed of ecosystem services, with little forethought to the extent of its draw on natural capital. As a result tourism planning often defaults to simple marketing efforts, with the hidden assumption that the environment on which it depends can simply absorb the associated pressures.

The resource intensity of tourism can be balanced against the argument that well-planned and well-managed tourism has proved one of the most effective tools for long-term conservation of biodiversity, when the right conditions, such as social and physical carrying capacity, management capacity at local level, and clear and monitored links between tourism development and conservation, are present (MEA 2005, p. 470). Globally this is a strong perception of tourism management in New Zealand, with both of the recent national tourism strategies (NZ Tourism Strategy Group, 2005; Ministry of Tourism 2007) highlighting the natural environment and aspects of sustainability. Drawing on 2005 data, Cullen et al. (2007) report that the Department of Conservation is the government department with the greatest expenditure in the tourism sector, at NZ\$83 million (of total recreation, conservation and heritage costs), surpassing tourism promotional activities at NZ\$81 million. Although the phenomenon of protecting 'scenic areas' and special areas for residents and tourists is a long-standing practice, Eagles et al. (2001) note that in many cases it was the increasing arrivals of travellers to special sites that were the impetus for site designation and protection.

CONCLUDING REMARKS

Tourism is a modern event, certainly when viewed in terms of either human or ecological evolution. Since the arrival of the first modern jet-propelled aircraft in 1959, international arrivals to New Zealand have doubled approximately every 10.5 years to reach 2.6 million in 2012. Notwithstanding various external risks (e.g. SARS, volcanic plumes, exchange rate fluctuations) and internal pressures, the sector has proved remarkably resilient across five decades. However, the ecological sciences remind us that no growth is unconstrained and the questions of limits of growth of this sector and its (global) carrying capacity remain in the background, while the sector and its commentators still advocate its benefits. The same factors that fuelled international visitation (i.e. increased mobility, increased health and longevity, greater urbanisation) have also supported the ongoing growth of domestic travel. Today New Zealanders have a well-developed taste for domestic travel – reporting volumetric growth in the recent past slightly ahead of their international counterparts.

These events are a double-edged sword in that they bring many out from their increasingly urbanised environments into biologically rich environments, where the forces of nature may be palpable – although one suspects that to the great majority the concepts of natural capital and ecosystem benefits are neither known nor referenced.

Readers of this chapter will note that tourism, until the recent past, has been seen as a clean sector, but this has recently come under severe questioning, based, in the first instance, on its energy intensity (Becken et al. 2003; Patterson and McDonald 2004; Gössling et al. 2005; Becken 2009, 2011a, b). What has come increasingly into focus, albeit in the last decade, is that tourism activities and experiences are quite resource intensive. Set against this historical and relatively ‘benign’ view of tourism and the scant focus on evidence to inform policy and practice, there are other aspects of tourism production and consumption that make its systematic analysis most difficult (Lincoln University, 2007). Four significant challenges can be highlighted from the narrative above.

First, tourism is a tertiary sector. For some time, at least until the construction of tourism satellite accounts, it was never really seen as a separate ‘sector’ – and in fact still suffers from numerous definitional debates. In terms of analysing ecosystem services it is noted that tourism receives direct inputs from many other sectors, with transport, accommodation, agriculture and viticulture important biologically-based contributors. Second, for comparative analysis, particularly when one has a growth-oriented economic focus, the concept of eco-efficiency and twin question of sector attribution of various inputs becomes a contested arena. Third, as the above analysis has shown, all of tourism’s major resource inputs (save from energy) are via indirect means. This in turn makes the exact ‘draw’ that the tourism sector makes particularly difficult to measure (once attribution rules have been determined).

Finally tourism research, especially of a ‘non-market’ nature, is distinctly under-resourced. This appears especially pressing, given Patterson and McDonald’s (2004) preliminary analyses of the sector’s eco-efficiencies and its contribution to the New Zealand economy. The evidence required to represent the sector accurately – its draw on ecosystem services, conditions and trends – is now well overdue.

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