VALUING ECOSYSTEMS AND NATURAL CAPITAL FOR THE COOK ISLANDS
NATIONAL BIODIVERSITY STRATEGY ACTION PLAN REVIEW

Nick Conner and John Madden

Report to the Cook Islands National Environment Service on behalf of Te Ipukarea Society, Avarua, Cook Islands

June 2017
EXECUTIVE SUMMARY

The United Nations Development Programme Global Environment Facility has approved a Biodiversity Enabling Activities project for the Cook Islands to revise and update the existing Cook Islands National Biodiversity Strategy Action Plan (NBSAP). The project has three components:

(1) A stocktake of current biodiversity planning, with national biodiversity targets to be developed in response to the CBD Aichi Targets;
(2) Revising and updating the NBSAP to fully integrate new aspects of the CBD strategic plan, such as mainstreaming and anchoring the implementation of the plan in national development frameworks, valuing ecosystem services, and promoting ecosystem-based adaptation and resilience; and
(3) Strengthening national frameworks for resource mobilisation, convention reporting and exchange mechanisms (see http://procurement.gov.ck/wp-content/uploads/2015/05/TOR-NBSAP-Project-Coordinator.pdf)

This report is concerned with component 2. It identifies the economic values that Cook Islanders obtain from the use of local ecosystems and ecosystem services, what mechanisms are available to fund and finance NBSAP actions to protect these ecosystems and associated habitats and species, and how information on the economic value of these ecosystems and ecosystem services can be better incorporated in government decisions affecting the natural environment (see Appendix 4).

This report addresses these actions by:
- estimating different economic values associated with Cook Islands ecosystems and associated ecosystem services (Sections 2-5);
- discussing ways in which the economic values of Cook Islands natural assets (natural capital) can be incorporated into government development planning and policies; (Section 6);
- discussing funding and financing options for priority NBSAP actions to conserve key components of Cook Islands ecosystems and associated ecosystem services (Sections 7 and 8); and
- suggesting some broad requirements and specific actions that should be addressed to help create a suitable economic and institutional context for the implementation of NBSAP activities (Section 9).

The report identifies the key types of ecosystem services providing economic benefits to the Cook Islands as:
- carbon capture and climate modification from forests, wetlands, and saltmarsh (regulating and maintenance ecosystem services);
- catchment management from forests, rivers and wetlands (regulating and maintenance services);
- coastal protection from coastal forests, and reefs (regulating and maintenance services);
- tourism and recreation relating to coasts and reefs (provisioning services);
- wild and cultivated foods and medicines for subsistence and commercial use, from freshwater and marine environments, forests, wetlands and reefs (provisioning services);
- fuel, furniture, and building materials from forests, estuaries, foreshores, rocky beaches, and coral reefs (provisioning services); and
- handicrafts and artefacts (provisioning and cultural services).

Section 5 of the report discusses the use of a total economic valuation (TEV) framework to estimate the direct use, indirect use and non-use values of activities associated with the use of these ecosystem services. Direct use values relate to provisioning services, indirect values to regulating and maintenance services, and non-use values to cultural services.

Direct use values are estimated as $NZ1.9 billion (80% of total economic value), indirect use values are estimated as $NZ377 million (16% of total economic value), and non-use values have been estimated as $NZ96 million (4% of total economic value). Although broad brush figures, these estimates provide a comparison of the relative importance of different types of economic value and the activities which contribute to these values, as shown in see Figure (i).

Tourism dominates the economic benefits derived from the ecosystems and associated ecosystem services of the Cook Islands. This is apparent, given that over 82% of visitors to the Cook Islands travel for a holiday, 5% for a wedding and 2% for a honeymoon. Visitor surveys have shown that the most appealing elements of the Cook Islands experience are the friendly and helpful local people and traditional culture (49%), beautiful and clean natural environment (48%), the peacefulness and relaxing atmosphere of the islands (28%), and the tourist attractions and activities on offer (22%). These responses highlight the critical importance of the natural environment of the Cook Islands to the tourism sector. Overall, direct use values are higher than the indirect values and non-use values associated with Cook Island ecosystems and associated services.

Figure (i): Breakdown of TEV by benefit
Sections 7 and 8 of the report considers funding and financing measures that have been used to support conservation programmes, and suggests some measures that could be considered for NBSAP activities. Several measures are based on the conclusion in Section 5 that the major impacts affecting Cook Islands ecosystems and ecosystem services relate to: poor catchment management, poor water and wastewater management, loss of habitat, and other ridge to ocean-related impacts from tourism. It is suggested that the tourism sector should be the main source of funding for conservation activities to remediate the environmental damage directly and indirectly attributable to its activities.

Suggested mechanisms include:
- levies on commercial users/ beneficiaries of ecosystems e.g. tour operators/ diving establishments, in lieu of their producing and implementing a monitored environmental management plan for their operations;
- fines/ penalties for environmental damage, enforced by the Environment Service.
- resort managers/ operators to fund specific conservation programmes carried out the Environment Service or NGOs, or paid into a trust fund dedicated to environmental restoration;
- various types of government subsidised loans to developers and NGOs;
- infrastructure bonds payable by new developers/operators;
- developer payments to a trust to protect/ restore ecosystems and ecosystem services they use in their activities;
- developers being required to meet new higher standards for wastewater management, and provide monitored environmental management plans; subject to non-compliance penalties.

The final section of the report (Section 9) suggests some broad areas for attention, and recommends some specific actions that should be considered to support NBSAP activities and more general conservation programs in the Cook Islands, such as those relating to the Marae Moana marine protected area. Areas for attention include:
- the need for policy makers and businesses to recognise the Cook Island economy’s fundamental dependence on healthy ecosystems and associated ecosystem services;
- the need to incorporate environmental values in the Cook Island System of National accounts through the development of an environmental-economic accounting framework;
- the need for integrated planning and catchment management using a ridge to ocean planning framework extending out to the Marae Moana marine protected area.

Specific short-term and longer-term actions include:
- a visitor survey to assess the willingness of tourists to contribute to a Cook Island conservation programme fund;
- a study to be commissioned by the Environment Service and Tourism Cook Islands to estimate the price elasticity of demand for tourism, and thus the potential impact of tourism numbers, should operators pass the cost of a proposed environmental levy on to customers;
- an economic and financial feasibility study to be carried for introduction of a conservation trust fund based on revenue obtained from levies etc. on tourist operators and developers;
• a land use account for Rarotonga to be produced as a prelude to developing a land use master plan to guide residential and tourism resort development to appropriate locations with low environmental impacts;
• research to assess the capacity of the Cook Island’s finite natural capital to continue to provide ecosystem services, so that planners and policy makers can better control development, and implement appropriate policies and programs for sustainable resources use;
• planners and policy makers to implement a ridge to ocean approach to catchment management to help identify activities, locations or ecosystems which may have a key positive or negative influence on downstream environmental and economic values. Targeted interventions at such points, whether habitat restoration programs, regulations, or economic (market-based) instruments for sustainable management, such as payments for ecosystem services, may be a cost-effective way of achieving positive upstream and downstream environmental outcomes.
CONTENTS

1 INTRODUCTION: THE ROLE OF ECONOMIC VALUATION IN THE COOK ISLANDS NBSAP ................................................................. 8

2 ECOSYSTEMS AND ECOSYSTEM SERVICES IN GENERAL ........................................ 9
  2.1 Explanation and Typology ................................................................................. 9
  2.1.1 Provisioning services .................................................................................. 9
  2.1.2 Regulating and maintenance ...................................................................... 9
  2.1.3 Cultural and social ...................................................................................... 9

3 ECOSYSTEM SERVICES IN THE COOK ISLANDS ............................................ 10

4 ASSESSING THE ECONOMIC VALUE OF ECOSYSTEM SERVICES ................. 13
  4.1 Introduction to valuation .................................................................................. 13
  4.2 Valuation approaches - Total Economic Value framework ............................ 13
  4.3 Valuation techniques ...................................................................................... 15

5 ECONOMIC VALUES ASSOCIATED WITH Cook Islands ECOSYSTEMS AND BIODIVERSITY .............................................................. 18
  5.1 Concepts of discounting and Net Present Value (NPV) .................................. 18
  5.1.1 Discounting and Net Present Value .............................................................. 18
  5.2 Direct use values .............................................................................................. 19
  5.2.1 Agriculture .................................................................................................. 19
  5.2.2 Harvesting for flowers and medicines ........................................................ 20
  5.2.3 Fishing ......................................................................................................... 20
  5.2.5 Forest Products - firewood and local craft ................................................. 22
  5.2.6 Tourism ....................................................................................................... 22
  5.3 INDIRECT USE VALUES ................................................................................. 24
  5.3.1 Urban water catchment protection: local water supply ............................... 24
  5.3.2 Landscape protection: including sediment capture: flooding and erosion .... 26
  5.3.3 Gas Regulation ............................................................................................ 26
  5.4 Non-use values ................................................................................................. 27
  5.4.1 National ....................................................................................................... 27
  5.4.2 International ................................................................................................ 28
  5.5 Total economic value of Cook Islands ecosystems .......................................... 28

6 USING ECONOMIC VALUATION INFORMATION IN COOK ISLAND ECONOMIC PLANNING, POLICIES AND PROGRAMS ......................... 31
  6.1 Applications in economic analysis ................................................................... 31
  6.2 Applications in environmental-economic accounting ...................................... 32
1 INTRODUCTION: THE ROLE OF ECONOMIC VALUATION IN THE COOK ISLANDS NBSAP

The Cook Islands has been Party to the Convention on Biological Diversity (CBD) since 20 April 1993. The new United Nations Convention on Biological Diversity (CBD) Strategic Plan, adopted at CoP-10 in 2010 in Nagoya, clearly addresses the need for updating National Biodiversity Strategies and Action Plans (NBSAP), stating in Target 17 that “By 2015, each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan”.

The Global Environment Facility (GEF) has recently approved a Biodiversity Enabling Activities project for the Cook Islands which is supported by the United Nations Development Programme (UNDP). The project objective is:

“To integrate Cook Islands’ obligations under the Convention on Biological Diversity (CBD) into its national development and sectoral planning frameworks through a renewed and participative ‘biodiversity planning’ and strategizing process, in a manner that is in line with the global guidance in the CBD’s Strategic Plan for 2011 – 2020”.

The Biodiversity Enabling Activities project will build on the status and achievements of Cook Islands with respect to biodiversity planning and reporting by revising and updating the existing NBSAP. This ‘new generation’ of NBSAP will help set a national standard of excellence by creating a national road map for achieving the Aichi Targets. Special emphasis will be placed on anchoring the NBSAP into Cook Islands’ development frameworks.

This will be done by mainstreaming biodiversity into development plans, incorporating protected area networks and sustainable production systems into ecosystem-based climate adaptation and resilience plans, and creating sustainable finance for biodiversity conservation through the full valuation of key ecosystem services. This process will include consideration of the biodiversity-economy nexus for the Cook Islands.

The project will achieve its objective through the implementation of three components, whose activities are thoroughly described in the GEF approved proposal. They are:

1. A participative stocktaking exercise on biodiversity planning takes place and national biodiversity targets are developed in response to the global Aichi Targets;
2. The NBSAP is revised/updated and it fully integrates new aspects of the CBD strategic plan, such as mainstreaming and anchoring the implementation of the plan into national development frameworks, valuing ecosystem services and promoting ecosystem-based adaptation and resilience; and
3. National frameworks for resource mobilization, Convention reporting and exchange mechanisms are strengthened.

This report aims to contribute to this process by:
• identifying different economic values associated with Cook Islands ecosystems and associated ecosystem services;

1 This point particularly relates to Aichi Target 2: “By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems” https://www.cbd.int/sp/targets/rationale/target-2/
• estimating economic values for the benefits communities derive from their interactions with the Cook Islands natural environment and ecosystems;
• discussing funding and financing options for priority actions to conserve key components of Cook Islands ecosystems;
• discussing ways in which the economic values of Cook Islands natural assets (natural capital) can be incorporated into government development planning and policies; and
• suggesting some broad requirements and specific actions that should be addressed to help create a suitable economic and institutional context for the implementation of NBSAP activities.

2 ECOSYSTEMS AND ECOSYSTEM SERVICES IN GENERAL

2.1 Explanation and Typology

Humans derive economic, social, psychological and spiritual value from the active and passive use of various aspects of ecosystems and their components (i.e. ecosystem services). According to Haines-Young and Potschin (2011), ecosystem services can be classified as follows.

2.1.1 Provisioning services

Provisioning services include all material and energetic outputs from ecosystems; they are tangible things that can be exchanged or traded, as well as consumed or used directly by people in manufacture. Three major Classes of Services are recognised:

• nutrition includes all ecosystem outputs that are used directly or indirectly for as foodstuffs (including potable water);
• materials (both biotic and abiotic) that are used in the manufacture of goods;
• biotic and abiotic renewable energy sources.

2.1.2 Regulating and maintenance

Regulating and maintenance services include all the ways in which ecosystems control or modify biotic or abiotic parameters that define the environment of people, i.e. all aspects of the 'ambient' environment; these are ecosystem outputs that are not consumed but affect the performance of individuals, communities and populations and their activities. Four major classes of Services are recognised i.e.:

• regulation and remediation of wastes, arising naturally or from human action;
• flow regulation, which covers all kinds of flows in solid, liquid or gaseous mediums;
• regulation of physical environment, including climate at global and local scales;
• regulation of biotic environment, including habitat regulation and maintenance, through such phenomena as pest and disease regulation, and the nursery functions that habitats have in the support of provisioning services etc.

2.1.3 Cultural and social

Cultural and social services include all non-material ecosystem outputs that have symbolic, cultural or intellectual significance. Two major classes of services are recognised:

• symbolic services;
• intellectual and experiential services.
It should be noted that these ecosystem services are purely human-focused and thus have ‘anthropocentric’ value. Numerous authors have considered non-human values associated with ecosystem services (i.e. intrinsic, or non-anthropocentric values), for example, IPBES (2015) and Turner et al. (2003). Anthropocentric values relate to human use of entities, whether such use involves direct, indirect or ‘non-use’ of these entities (see Section 4 below). Non-anthropocentric types of value reflect the idea that entities have value independent of human use, i.e. they have value in their own right, unrelated to human needs. An example is the contribution of biodiversity to continued life on earth, whether including humans or not. Appendix 1 provides a comprehensive typology of these different values and benefits.2

This report considers economic i.e. anthropocentric dimensions of ecosystems and ecosystem services, relating to provisioning and maintenance and regulating services (Table 1 gives some examples of provisioning and maintenance and regulating ecosystem services associated with tropical coastal ecosystems). The report does not consider cultural and social ecosystem services.

3 ECOSYSTEM SERVICES IN THE COOK ISLANDS

Healthy ecosystems and their associated ecosystem services are fundamental components of the main economic activities of the Cook Islands. Most of the Cook Island’s major industries i.e. tourism, fisheries, pearl farming and agriculture depend on healthy ecosystems and associated ecosystem services to survive.

Three broad categories of ecosystems can be identified for the Cook Islands, depending on location such as high volcanic island, atoll, raised coral i.e.:
- upland cloud forest, makatea and lowland forests, grasslands and scrublands;
- floodplains, rivers, wetlands and water bodies including freshwater marshes and swamps; permanent freshwater lakes; a tidal salt marsh and mountain streams; and
- estuaries and coastal areas including saltmarsh, foreshore vegetation, near shore reefs, offshore reefs, and open waters.

2 It is important to distinguish ‘values’ from ‘benefits’. Values represent particular characteristics or attributes attributed to entities. ‘Benefits’ are defined in this paper as the advantageous outcomes of the human use of entities that have been attributed with value, where human use can be active or passive, consumptive or non-consumptive, direct or indirect. Benefits represent the additional wellbeing obtained from using an entity.
### Table 1: Examples of ecosystem goods and services associated with tropical coastal ecosystems

<table>
<thead>
<tr>
<th>Ecosystem types</th>
<th>GR</th>
<th>CR</th>
<th>DR</th>
<th>WR</th>
<th>WS</th>
<th>EC</th>
<th>SF</th>
<th>NC</th>
<th>WT</th>
<th>P</th>
<th>BC</th>
<th>H</th>
<th>FP</th>
<th>RM</th>
<th>GN</th>
<th>REC</th>
<th>CUL</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open scrub lands</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Sandy shores</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Coral reefs</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mangroves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Seagrass beds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Coastal shelf</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Estuaries</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Swamp-flood plain</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

- **GR** - Gas regulation
- **CR** - Climate regulation
- **DR** - Disturbance regulation
- **WR** - Water regulation
- **WS** - Water supply
- **EC** - Erosion control
- **SF** - Soil formation
- **NC** - Nutrient cycling
- **WT** - Waste treatment
- **P** - Pollination
- **BC** - Biological control
- **H** - Habitat/refugia
- **FP** - Food production
- **RM** - Raw materials
- **GN** - Genetic resources
- **REC** - Recreation
- **CUL** - Cultural
- **SP** - Storm protection

Source: Adapted from Martinez et al (2007: 261) and the ecosystem service classification used in the Millennium Ecosystem Assessment (2005).

Some examples of different types of ecosystems and associated services in the Cook Islands, using the above classification (Haines and Potchin, 2011) are shown in Table 2.

**Table 2: Examples of Ecosystem services in the Cook Islands**

<table>
<thead>
<tr>
<th>Ecosystem type</th>
<th>Main Types of service</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud forests</td>
<td>Water catchment and filtration,</td>
<td>Biodiversity protection</td>
</tr>
<tr>
<td></td>
<td>Regulation and maintenance,</td>
<td></td>
</tr>
<tr>
<td>Upland grasslands</td>
<td>Regulating and maintenance,</td>
<td>Agriculture</td>
</tr>
<tr>
<td></td>
<td>provisioning</td>
<td></td>
</tr>
<tr>
<td>Upland forest</td>
<td>Regulating and Maintenance,</td>
<td>Erosion protection, catchment protection, wild food supply</td>
</tr>
<tr>
<td></td>
<td>Provisioning</td>
<td></td>
</tr>
<tr>
<td>Midland grasslands and forests (Makatea)</td>
<td>Provisioning</td>
<td>Agriculture,</td>
</tr>
<tr>
<td>Coastal flats and lowland forests</td>
<td>Provisioning</td>
<td>Medicinal, food plants, building materials, handicrafts and artefacts,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>timber supply</td>
</tr>
<tr>
<td>Floodplains, wetlands and water bodies</td>
<td>Regulating and Maintenance,</td>
<td>water, resource management functions, wild food and fibre supply</td>
</tr>
<tr>
<td></td>
<td>Provisioning</td>
<td>water transport, suitable soils for food production, domestic taro</td>
</tr>
<tr>
<td></td>
<td></td>
<td>production, handcraft</td>
</tr>
<tr>
<td>Estuaries</td>
<td>Regulating and Maintenance,</td>
<td>Sediment capture, flushing</td>
</tr>
<tr>
<td></td>
<td>Provisioning</td>
<td></td>
</tr>
<tr>
<td>Sandy shores</td>
<td>Regulating and Maintenance,</td>
<td>Tourism development, recreation, aggregate mining, copra, coconut</td>
</tr>
<tr>
<td></td>
<td>Provisioning</td>
<td>products</td>
</tr>
<tr>
<td>Rocky shores</td>
<td>Regulating and Maintenance,</td>
<td>quarrying, shellfish, food supply</td>
</tr>
<tr>
<td></td>
<td>Provisioning</td>
<td></td>
</tr>
<tr>
<td>Taro swamps, saltmarsh</td>
<td>Regulating and Maintenance,</td>
<td>Carbon sequestration, nursery, building material, storm surge reduction</td>
</tr>
<tr>
<td></td>
<td>Provisioning</td>
<td></td>
</tr>
<tr>
<td>Algal beds</td>
<td>Regulating and Maintenance,</td>
<td>Carbon sequestration nursery</td>
</tr>
<tr>
<td></td>
<td>Provisioning</td>
<td></td>
</tr>
<tr>
<td>Near shore and reefs</td>
<td>Provisioning</td>
<td>Artisanal fishing, Tourism, Building materials, Pearls, shellfish,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>aquaculture</td>
</tr>
<tr>
<td>Offshore reefs</td>
<td>Regulating and Maintenance,</td>
<td>Storm surge protection, tourism, fishing, pearls</td>
</tr>
<tr>
<td></td>
<td>Provisioning</td>
<td></td>
</tr>
<tr>
<td>Open waters</td>
<td>Provisioning</td>
<td>Fishing, carbon sequestration</td>
</tr>
</tbody>
</table>

From the above, we can see that the key types of ecosystem services providing economic benefits to the Cook Islands are:

* carbon capture (‘sequestration’) and climate modification (forests, wetlands, saltmarsh) (regulating and maintenance)
* catchment management, (forests rivers, wetlands) (regulating and maintenance);
• coastal protection (coastal forests, reefs) *(regulating and maintenance)*;
• tourism and recreation (coasts, reefs) *(provisioning)*;
• wild and cultivated foods and medicine (subsistence and commercial);
• freshwater and marine environments, (wetlands, reefs) *(provisioning)*;
• fuel, furniture, and building materials (forests, estuaries, foreshore land, rocky beaches, coral reefs) *(provisioning)*;
• handicrafts and artefacts (provisioning and cultural).

The following section considers the different types of economic values associated with these ecosystem services, and discusses valuation techniques that can be used to estimate different values. Some estimates are given in Section 5.

4 ASSESSING THE ECONOMIC VALUE OF ECOSYSTEM SERVICES

4.1 Introduction to valuation

This report focuses on the economic (i.e. anthropocentric) values which humans attach to ecosystem services. Economic values differ between individuals and communities, businesses and the national economy. Assessing the economic value of ecosystem services for individuals and communities uses concepts from microeconomics. Microeconomics focuses on prices, outputs, and income distribution in markets through supply and demand, where individuals and businesses seek to use their scarce resources of land, labour, capital, and other assets in ways that will maximise the return on their investment to maximise their ‘utility’ or ‘welfare’.

Estimating the value of ecosystem services to businesses and the economy involves macroeconomic concepts. Macroeconomics considers economies as a whole, and uses models that explain the relationship between parties, using indicators such as national income, output, consumption, unemployment, inflation, savings, investment, international trade and international finance. Section 5 of this report uses microeconomic concepts, whereas Section 6.2 relates to the Cook Islands economy as a whole, and uses macroeconomic concepts.

The next section of the report considers methodologies that can be used to explore economic values associated with provisioning, regulating and maintenance services for Cook Islands ecosystem services.

4.2 Valuation approaches - Total Economic Value framework

Economists assume that in microeconomic theory, goods will be allocated efficiently through the interaction of supply and demand in markets. In practice, numerous economic, physical, institutional, cultural and other factors distort this interaction and prevent this efficient allocation. One key area in which markets fail to allocate resources efficiently is in the case of goods and services which for various reasons have no market price, or have prices which do not reflect the actual impacts on environmental quality and human health caused by their production and use. Environmental and resource economists are interested in finding ways in which goods and services without proper prices (‘unpriced goods’) can be valued so they can be traded in markets.
The ‘Total Economic Value’ framework described below is one attempt to define the different types of value of goods and services associated with the natural environment which commonly do not have specific market prices.

Under the Total Economic Value (TEV) classification, values associated with human use of the natural environment are typically separated into ‘direct use values’, ‘indirect use values’ and ‘non-use values’, as shown in Figure 1 below. Direct use values relate to provisioning services, indirect values to regulating and maintenance services, and non-use values to cultural services.

4.2.1.1 Direct use values
According to the classification in Figure 1, goods and services that are used directly for consumption, as opposed to being inputs into production processes where they are transformed into other products, are regarded as having direct use values. Uses of these goods and services can be extractive or non-extractive. Examples of goods and services with direct (extractive) use values include forest products, fisheries, crops and livestock, bushmeat, genetic material and medical plants. Examples of non-extractive direct use values include nature-based recreational experiences, research, and education (see Figure 1).

4.2.1.2 Indirect use values
This category of values concerns functions and services enjoyed indirectly, with these goods and services generally providing an input into another activity which has economic value. Examples of indirect use values include shoreline and storm protection, climate regulation, crop pollination, flood mitigation, mangrove habitats acting as nurseries for commercially valuable fish species, carbon sequestration, and sediment and nutrient capture.

4.2.1.3 Non-use values
Non-use values are rather harder to define, and even distinguish as different values. Types of non-use values include the following:

- **Option value**: the concept behind this type of value relates to the potential future ability to use a resource even though it is not currently used, and where the likelihood of future use is very low. Future use may include future use by existing individuals and future generations. One example of an option value is the value to coastal communities in parts of the Pacific from creation of ra‘ui areas (for example temporary no-take coastal zones to allow fish stocks to recover from overfishing)³.
- **Bequest value**: the value attributed to maintaining something for the benefit of future generations, for example the value to indigenous communities of knowing a cultural landscape is protected so that future generations can maintain cultural traditions associated with the land (such as a marae).
- **Existence value**: the value attributed to the satisfaction individuals get from knowing certain things exist for economic, moral, ethical or other reasons, for example, the value obtained from knowing that a rare species or ecosystem is being protected in its own right (such as the protection of whales in international whale sanctuaries).

TEV has become a popular approach (e.g. TEEB, 2016) to estimate the ‘total’ economic value of an ecosystem or particular environment. However, ideally, value estimates should not simply be summed to produce a ‘total’ value without several caveats being noted, including the following:

³ Arguably, in many cases, option value may be a type of deferred use value, rather than a non-use value.
(i). total economic value is not comprehensive, as it does not address biophysical functions and goods and services that have not yet been identified as having value;
(ii). there is potential for double-counting between direct use, indirect use and non-use values;
(iv). conceptually different valuation methods are used to estimate direct use and non-use values;
(v). values estimates are static\(^4\).

TEV-related estimates can be used as a starting point for estimating the overall contribution of an entity at a single point in time. However, for the purposes of economic valuation, it is more important to estimate the 'marginal' (i.e. incremental) changes to these values due to a new policy or activity, compared with continuing with the pre-existing situation i.e. the difference in value between the two situations, not the total value.

### 4.3 Valuation techniques

As noted above, provisioning services relate to ‘direct use’ values, regulating and maintenance services relate to ‘indirect use’ values, and cultural services relate to ‘non-use’ values.

Several different techniques can be used to estimate the direct, indirect and non-use values of ecosystem services considered in this report such, as market-based techniques, revealed preference techniques, stated preference techniques; and benefit transfer. These techniques and their uses are shown in Table 3.

\(^4\) (see Turner et al. 2003, pp 498-500).
**Figure 1: Total economic value framework**

Total Economic Value

- **Use Values**
  - **Direct Use Values**
    - Market Based: Agricultural crop harvesting, Hunting, Medicinal, Fishing, Forestry, Firewood, Tourism (opportunity)
    - Non-Market: Swimming, Cultural, visitation, Research, Education, Amenity
  - **Indirect Use Values**
    - Habitat and biodiversity maintenance, Disturbance regulation, Fish stock protection, Gas regulation, Erosion control, Water quality

- **Non-use Values**
  - **Option Values**
    - Future uses, Nature documentaries and books, Tourism
  - **Bequest Values**
    - Altruism between generation equity
  - **Existence Values**
    - Satisfaction that the SPA exists and is protected

*Source: Adapted from Adapted from Young (1992), p. 23
* includes option, vicarious and quasi-option values
### Table 3: Valuation Techniques

<table>
<thead>
<tr>
<th>Valuation Technique</th>
<th>Approach</th>
<th>Relevant type of economic value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market-based techniques; use sale/ purchase price of entity concerned, or its substitutes, to indicate individuals’ valuation of entity in question</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimate market price</td>
<td>Use the actual sale/ purchase price of environmental goods &amp; services</td>
<td>Direct use</td>
</tr>
<tr>
<td><strong>Estimate Contribution to Production</strong></td>
<td>Use to identify the actual value of environmental goods &amp; services used as input to production &amp; of goods and services</td>
<td>Direct use</td>
</tr>
<tr>
<td><strong>Estimate avoided costs of replacement or damage avoidance</strong></td>
<td>Used to estimate the costs of alternative sources of services normally provided by natural environments or costs and benefits of protecting environmental goods and services</td>
<td>Direct use</td>
</tr>
<tr>
<td><strong>Revealed preference techniques; observe individuals’ expenditure behaviour as proxy for individuals’ valuation of entity in question</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use Hedonic Pricing</td>
<td>Used to reveal the preferences of individuals for certain attributes of an entity, based on their behaviour</td>
<td>Indirect use, non-use</td>
</tr>
<tr>
<td><strong>Travel Cost Method</strong></td>
<td>Used to estimate the value of benefits people obtain from recreational experiences in natural environments esp. protected areas</td>
<td>Direct use, indirect use, non-use</td>
</tr>
<tr>
<td><strong>Stated preference techniques: use surveys to elicit information on individuals’ willingness to pay for entity in question, as proxy for individuals’ valuation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingent Valuation</td>
<td>Used to determine individual’s hypothetical valuation of environmental goods and services through surveys</td>
<td>non-use</td>
</tr>
<tr>
<td><strong>Choice Modelling</strong></td>
<td>Used to determine individual’s hypothetical valuation of specific environmental attributes using surveys based on choosing different combinations of an entity’s attributes</td>
<td>non-use</td>
</tr>
<tr>
<td><strong>Benefit(s) transfer</strong>: Use when specific information not available for the situation in question from above valuation approaches</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Process of taking information about economic values (benefits and/ or costs) from one situation & applying it to another situation | Reliability depends on similarity between characteristics of the two situations re:  
- their physical characteristics  
- the institutional setting  
- the policy environments  
- their stages of economic development &  
- supply & demand conditions. | Direct use indirect use and non-use values |
5 ECONOMIC VALUES ASSOCIATED WITH COOK ISLANDS ECOSYSTEMS AND BIODIVERSITY

Based on the categorisation of economic values under the TEV framework described in Section 4.2, this section of the report discusses and estimates the direct, indirect and non-use values associated with Cook Islands ecosystem services.

Table 4 shows the main groups who benefit from the direct, indirect and non-use values of Cook Island provisioning, and regulating and maintenance services.

**Table 4: User groups of ecosystem services in the Cook Islands**

<table>
<thead>
<tr>
<th>User groups</th>
<th>Main types of service</th>
</tr>
</thead>
<tbody>
<tr>
<td>People of the Cook Islands</td>
<td>Catchment management (forests rivers, wetlands) (regulating and maintenance)</td>
</tr>
<tr>
<td></td>
<td>Agriculture, fishing wild and cultivated foods and medicine</td>
</tr>
<tr>
<td></td>
<td>(subsistence and commercial) (freshwater and marine environments, forests, wetlands, reefs) (provisioning)</td>
</tr>
<tr>
<td></td>
<td>fuel, furniture, and building materials (forests, estuaries, sandy beaches, rocky beaches, coral reefs) (provisioning)</td>
</tr>
<tr>
<td></td>
<td>Handicrafts and artefacts (provisioning and cultural)</td>
</tr>
<tr>
<td></td>
<td>Coastal protection (foreshore vegetation, reefs) (regulating and maintenance)</td>
</tr>
<tr>
<td>International: visitors to the Cook Islands</td>
<td>Tourism and recreation (forests, coasts, reefs) (provisioning)</td>
</tr>
<tr>
<td></td>
<td>Visitors also directly benefit from water and food provisioning</td>
</tr>
<tr>
<td>International: - Rest of the world</td>
<td>Carbon sequestration (forests, foreshore vegetation and marine algae, wetlands) (regulating and maintenance)</td>
</tr>
</tbody>
</table>

5.1 Concepts of discounting and Net Present Value (NPV)

The figures discussed in the section below are reported as discounted net benefits over 30 years.

5.1.1 Discounting and Net Present Value

The costs and revenues associated with the use of natural assets such as ecosystems are spread over time. Even in the absence of inflation, a dollar is worth more today than at some time in the future, because we would rather obtain the benefits we get from spending our money now that waiting to get the same benefits at some time in the future. Thus, the opportunity cost of deferring our spending is the foregone benefits would have received today. A discount rate is used in the valuation of assets to take account of this time preference.

This study reports figures in NZ$ 2016 on a net present value (NPV) basis, An NPV is obtained by estimating the revenue stream from the use of the ecosystem service in question over 30 years, applying a discount rate of 2.65% to this figure to provide a present value, (PV), and then subtracting a figure from this present value to represent the estimated costs associated with obtaining this revenue. The resultant net figure represents the NPV.

A variety of other real discount rates have been used as a sensitivity test, including a 4%, rate, as previously used by the World Bank in its economic analyses of environmental

---

projects. The estimates given below are expressed as the NPV of market prices (revenue received) and as economic values (consumer or producer surplus).

5.2 Direct use values

Direct use values include the use of ecosystem services for activities such as tourism and natural resource harvesting. The direct use values and beneficiaries of such activities are detailed in the following section as well as data sources and assumptions.

5.2.1 Agriculture

Agriculture has been decreasing as a proportion of the economy, and export markets have been lost over time. The contribution of the agricultural sector to the CKI’s GDP is reported to be 2%.

According to the 2011 agricultural census, 1,275 households (55%) declared to be active in agriculture either as subsistence-type agriculture (67.5%) or primarily geared to sales (32.5%). Over 45% of total households declared keeping livestock either for subsistence use (68.6%) or for sale (31.4%).

Households use these resources for both domestic subsistence consumption and for some cash income. Most of the agricultural activity is part-time on small plots less than 0.8 hectares. Values for households are shown in Tables 5 and 6.

**Table 5: Agricultural revenue and producer surplus - cropping**

<table>
<thead>
<tr>
<th>Hectares</th>
<th>Revenue</th>
<th>Producer Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree crops</td>
<td>356</td>
<td>$6,298,000</td>
</tr>
<tr>
<td>Root Crops</td>
<td>109</td>
<td>$5,852,000</td>
</tr>
<tr>
<td>Vegetables</td>
<td>29</td>
<td>$12,150,000</td>
</tr>
<tr>
<td>Total</td>
<td>494</td>
<td>$24,300,000</td>
</tr>
</tbody>
</table>

**Table 6: Agricultural revenue and producer surplus - livestock**

<table>
<thead>
<tr>
<th>Number</th>
<th>Revenue</th>
<th>Producer Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork</td>
<td>34,000</td>
<td>$1,319,000</td>
</tr>
<tr>
<td>Poultry</td>
<td>4,400</td>
<td>$21,000</td>
</tr>
<tr>
<td>Eggs</td>
<td>577,500</td>
<td>$144,000</td>
</tr>
<tr>
<td>Goats</td>
<td>14,400</td>
<td>$646,000</td>
</tr>
<tr>
<td>Cattle</td>
<td>240</td>
<td>$14,400</td>
</tr>
<tr>
<td>Total</td>
<td>52,900</td>
<td>$2,535,000</td>
</tr>
</tbody>
</table>

---

6 See glossary for definition.
The annual revenue obtained from farming is approximately $1,790 per household. This assumes total agricultural revenue of $26.84 million and 4,372 households. The figure would be higher for households that focus on agricultural production.

The annual producer surplus results in a Net Present Value (NPV) of $110.12 million over 30 years from agricultural production.

5.2.2 Harvesting for flowers and medicines

Landowners harvest flowers and other plants for their own use. This includes collecting plants for their medicinal properties.

The forest areas provide a source of biological materials and products used by local residents for medicinal purposes. Treatments are provided for illnesses including headache, rheumatism, muscle pain and illnesses such as ciguatera.

The direct medical benefit of these medicines is not fully known. Other studies have calculated the value of botanical medicines in a rainforest region of Madagascar, the Makira Protected Area. The project involved surveys and a substitution method that combined replacement costs and choice modelling (see Table 2). The estimated benefit was $5–7.00 per individual per year. It is assumed that medicines used by the population that are sourced from the forest substitute $5 of expenditure on average per year.

Across the entire population this results in a benefit of $75,000 per year which is $1.4 million in NPV terms.

5.2.3 Fishing

5.2.3.1 Commercial

The Cook Islands off-shore fisheries industry has recently grown, and is the second largest contributor to the economy after tourism in the Cook Islands.

The fisheries comprise longline, purse seine and artisanal fisheries, with the main species caught in these fisheries being albacore tuna, skipjack tuna, yellowfin tuna and bigeye tuna (see Table 7).\textsuperscript{11}

Some small-scale or artisanal fishing, including game fishing charters, occurs in the reef areas and ocean within a short distance for the local food markets including at restaurants.

5.2.3.2 Household fishing

Fishing activities are also undertaken by just over one third of households (38%). This represents 1,660 households. For the estimates shown in Table 7, it is assumed that this catch substitutes $120 of fish per year per household, which is around $200,000 per year of subsistence fishing value.

*Table 7: Fishing annual revenue and producer surplus*

<table>
<thead>
<tr>
<th></th>
<th>Tonnes</th>
<th>Price ($ per tonne)</th>
<th>Revenue</th>
<th>Producer Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Fishing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{11} Annual Report 2015.
The annual revenue obtained from fishing is approximately $58.83 per year.

These annual figures represent a Net Present Value (NPV) for fishing of $248.0 million over 30 years.

5.2.4. Pearls and Trochus

Cook Islands pearls are sold on both domestic and international markets.

The value of pearl exports had been increasing in the past, and by 2000, pearl exports peaked, earning a total of $18.4 million and making the industry one of the major contributors to GDP at the time. However, since then, the value of Cook Islands pearl exports has been declining, dropping from $18.4 million in 2000 to $1.6 million in 2005.

The value of exports has dropped further from $1.57 million in 2010 to $0.14 million in 2013, before improving to $0.36 million in 2014. However, exports in 2015 fell to $0.16 million. For the first half of 2016, exports of pearls totalled $0.22 million, indicating that the industry has rebounded somewhat (see Table 8).\(^\text{12}\)

It is difficult to quantify the size of the domestic market. However, it has been suggested that sales in the domestic market are increasing as a proportion as prices are higher and opportunities for transformation into jewellery are available.

### Table 8: Pearl revenue and producer surplus

<table>
<thead>
<tr>
<th></th>
<th>Export Value</th>
<th>Export Share</th>
<th>Domestic Value</th>
<th>Revenue</th>
<th>Producer Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>$1,570,000</td>
<td>60%</td>
<td>$1,047,000</td>
<td>$2,617,000</td>
<td>$523,000</td>
</tr>
<tr>
<td>2013</td>
<td>$140,000</td>
<td>50%</td>
<td>$140,000</td>
<td>$280,000</td>
<td>$56,000</td>
</tr>
<tr>
<td>2014</td>
<td>$360,000</td>
<td>40%</td>
<td>$540,000</td>
<td>$900,000</td>
<td>$180,000</td>
</tr>
<tr>
<td>2016</td>
<td>$440,000</td>
<td>30%</td>
<td>$1,027,000</td>
<td>$1,467,000</td>
<td>$293,000</td>
</tr>
<tr>
<td>Average</td>
<td>$627,500</td>
<td></td>
<td>$688,500</td>
<td>$1,316,000</td>
<td>$263,000</td>
</tr>
</tbody>
</table>

Other industries include one based on Trochus which is used to make items such as pearl buttons and jewellery, some of which are exported to Italy. There is a quota system for Trochus, which limits size and take, and the industry is mainly located in Aitutaki.

---

The Trochus harvest may provide an income of over $80,000 over a two-week period. The harvest occurs on average about every three years. It was reported that an average of $1,000 per family was obtained for approximately one week of hard work, collecting, boiling, and cleaning the shells\textsuperscript{13}. The meat is also used for food.

It is estimated that the producer surplus for Trochus is around $25,000 per year.

The annual revenue obtained from pearl farming is approximately $263,000 per year. These annual figures represent a Net Present Value (NPV) for Pearls and Trochus of $5.4 million over 30 years.

5.2.5 Forest Products - firewood and local craft

Forestry in the Cook Islands is for carried out for conservation, local cottage-type industry use, such as handicrafts, firewood, and land management in areas prone to erosion adjacent to rivers, streams and foreshores. There is no commercial harvest. Apart from 1,110 hectares of planted forests, the rest is natural forest, comprising several tropical species.

There is some use of firewood for outdoor cooking, especially when using traditional ground ovens, which where wood is used is a substitute for other sources of energy. Most cooking is carried out using electricity. It is assumed that 25% of households use firewood and substitute $50 of other energy sources.

Crafts from forest products are sold in local markets. Tourism surveys estimate that the average visitor spends $97 on shopping (not including food, transport and accommodation). If we assume that each visitor spends $5 on locally made products, then they are a significant source of revenue (Table 9).

\textbf{Table 9: Firewood and craft – annual revenue and producer surplus}

<table>
<thead>
<tr>
<th></th>
<th>Cost per household</th>
<th>Cost per visitor</th>
<th>Households and visitors</th>
<th>Revenue</th>
<th>Producer Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>$50.00</td>
<td>$5.00</td>
<td>1,093</td>
<td>$55,000</td>
<td>$55,000</td>
</tr>
<tr>
<td>Crafts</td>
<td>$5.00</td>
<td>$50.00</td>
<td>107,595</td>
<td>$538,000</td>
<td>$269,000</td>
</tr>
</tbody>
</table>

Firewood and crafts sourced from local forests are valued at around $300,000 a year or $6.64 million in NPV terms over 30 years.

5.2.6 Tourism

Tourism is the largest economic activity in the Cook Islands, accounting for around 65 per cent of the economy in 2015/16\textsuperscript{14}. The Cook Islands experienced record tourism arrival numbers almost every year from 2001 to 2013/14 (Figure 2). New Zealand remains by far the largest market, with a market share of total arrivals of 66 per cent in 2015/16, with Australia having a smaller, but significant share of 17 per cent.

\textsuperscript{13} Cook Islands News (2012) Rarotonga trochus potential highlighted Thursday April 19, 2012.

\textsuperscript{14} 2017_Cook-Islands_Half-Year-Economic-and-Fiscal-Update, p. 47.
Figure 2: Visitation figures 2005 to 2015

It is estimated that visitors to the Cook Islands who are drawn by the environment represent around 86% of total visitors (Table 10). Other categories of visitors included Business, Employment, Conferences, Visiting Friends or Relatives and Other.

Table 10: Visitor numbers for vacation and honeymoons

<table>
<thead>
<tr>
<th></th>
<th>Total Visitors</th>
<th>Vacation and Honeymoon</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>120,774</td>
<td>101,995</td>
<td>84%</td>
</tr>
<tr>
<td>2014</td>
<td>121,458</td>
<td>104,522</td>
<td>86%</td>
</tr>
<tr>
<td>2015</td>
<td>125,130</td>
<td>107,595</td>
<td>86%</td>
</tr>
</tbody>
</table>

The average stay of vacation visitors is estimated at approximately 9 days. In 2016/17 the average expenditure prior to arrival was $2,050 (on airfares and accommodation). The average daily expenditure after arrival was $152 per day, or $1,317 per person per trip.

The combined expenditure per person is around $3,350 per trip. For 2016, when over 107,000 people arrived in the Cook Islands for a vacation or honeymoon, this represented revenues of around $373 million per year (see Table 11).

Table 11: Tourism annual revenue and producer surplus (2016)

<table>
<thead>
<tr>
<th>Expenditure pre-arrival</th>
<th>Expenditure post arrival</th>
<th>Total Expenditure per trip</th>
<th>Total Revenue</th>
<th>Producer Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2,050</td>
<td>$1,317</td>
<td>$3,367</td>
<td>$373,780,000</td>
<td>$74,756,000</td>
</tr>
</tbody>
</table>

The state of the environment will have a direct effect on this value. Over 90% of visitors stated that they participated in water-based activities such as, Beaches (97%) and Swimming (92%) while 82% participated in sightseeing on land.

In an exit visitor survey, 48% of visitors said that the most appealing aspects of the Cook Islands was the ‘Environment, cleanliness & weather’. There have been instances of beach
closure at Aitutaki for around a week, and there are warnings on certain areas for swimming due to irritations. These types of events are likely to have a direct negative effect on the value placed on the natural environment by visitors.

It is interesting to note that while paid activities are important to the wider visitor experience, most revenue is generated by accommodation and restaurants/bars expenditure, representing 66% of expenditure post arrival.

### Table 11: Activities annual revenue and producer surplus (2016)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Average revenue</th>
<th>Revenue</th>
<th>Producer Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diving (lagoon and reef)</td>
<td>$130</td>
<td>$260,000</td>
<td>$65,000</td>
</tr>
<tr>
<td>Trekking (Forest)</td>
<td>$70</td>
<td>$280,000</td>
<td>$140,000</td>
</tr>
<tr>
<td>Cruising (lagoon)</td>
<td>$80</td>
<td>$864,000</td>
<td>$216,000</td>
</tr>
<tr>
<td>Rec Fishing (marine and lagoon)</td>
<td>$220</td>
<td>$1,056,000</td>
<td>$270,000</td>
</tr>
<tr>
<td>Kayak and Snorkelling</td>
<td>$20</td>
<td>$1,557,000</td>
<td>$389,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>$4,017,000</td>
<td>$1,080,000</td>
</tr>
</tbody>
</table>

The producer surplus estimate for tourism of $73.68 million per year, represents a Net Present Value (NPV) of $1.51 billion over 30 years.

The producer surplus estimate for tourism activities based on the natural environment of $1.08 million per year, represents a Net Present Value (NPV) of $14.2 million over 30 years (see Table 11).

### 5.3 INDIRECT USE VALUES

Indirect use values include ecological functions such as water quality protection, coastal protection, habitats for species, and carbon capture ('sequestration').

#### 5.3.1 Urban water catchment protection: local water supply

The watersheds of the Cook Islands provide residents and visitors with a wide range of environmental services, such as the supply of drinking water, natural filtration of freshwater runoff, recreational opportunities and scenery.

The forested areas play a direct role in the provision of fresh water. Changes in land use and land cover will have impacts on both water quality and yield.

#### 5.3.1.1 Water supply

Water supply is provided by a public supply system, with some houses in Rarotonga and the outer islands encouraged to install rainwater tanks. A ring main around the island of Rarotonga supplies most of the population with a reticulated water supply. The island’s water is sourced from 12 intakes, drawing water from spring and surface water sources in the inland valleys. Apart from coarse gravel filters, there is no treatment of the raw water.

Water quality has several aspects. Common water quality issues which impact the downstream environment and human uses include: turbidity and dissolved oxygen levels, in-
stream nitrogen and phosphorus concentrations, and faecal matter content. The main water quality problem for the Cook Islands is the risk of contamination from human disturbance.

The forest also protects the lagoons from runoff. A study of tropical forests in Malaysia highlighted the role that virgin forests play in reducing sediment (turbidity) in discharges from a watershed (Vincent, 2012). This study found that water treatment costs were lower when the proportion of the watershed under virgin forest was higher.

An economic valuation of the costs of watershed degradation on Rarotonga was undertaken in 2005 (Hajkowicz and Okotai, 2005). The three largest estimated costs related to healthcare and illness costs, costs of using alternative supplies, and lost tourism income. The study examined a range of pollution types on Rarotonga, including soil erosion and stream sedimentation, herbicide, pesticide and fertiliser run-off and livestock/animal waste.

The study examined the cost savings and avoidance of damage from improved catchment management to estimate economic value. The estimate of the impact per household of avoiding impacts was $2,900 in 2002 (Table 12).

Table 12: Watershed annual benefits

<table>
<thead>
<tr>
<th>2002 Estimate per household</th>
<th>Avoided cost ($2016)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water provision</td>
<td>$2,509</td>
<td>$14,656,386 Downstream household water filters, Upstream public water filters, use of bottled water, loss of fish stocks in lagoon, water pipe upgrades and lost tourism income</td>
</tr>
<tr>
<td>Health</td>
<td>$391</td>
<td>$2,284,437 Healthcare and illness costs (diarrhoea, gastroenteritis, dengue fever &amp; fish poisoning)</td>
</tr>
<tr>
<td>Total</td>
<td>$16,940,824</td>
<td></td>
</tr>
</tbody>
</table>

The estimated costs were $16.9 million per year. Avoidance of the costs of watershed degradation in Rarotonga is worth in $348 million in NPV terms over 30 years.

The above discussion highlights the potential damage that may result from clearance of vegetation and construction on sloping lands, which may result in increased soil runoff from and impacts on water offtakes.

5.3.1.2 Wastewater disposal

All properties (domestic, commercial, industrial and agricultural) have some type of onsite wastewater servicing system. On Rarotonga and Aitutaki, these are mostly septic tanks discharging to soakage pits, with some commercial operators having secondary treatment systems.

At this stage, there is little testing done that explicitly and consistently measures the effects of nutrient flows into the lagoon surrounding the islands, particularly for Rarotonga and Aitutaki, where the pressure from visitors is highest. If pressure on the lagoon as an effluent sink became too high, then it may be necessary to commission a wastewater treatment plant. Costings of such a plant are difficult. However annual costs alone may be in the order of $0.5 million per year for a small wastewater treatment plant. These potential avoided costs are not included in the TEV.
5.3.2 Landscape protection: including sediment capture: flooding and erosion

Landscapes provide storm protection and regulation of flood damage. The coral reefs provide protection of the shoreline from erosion. Forests and trees also play a role in protection from storms, including protection of infrastructure and life.

Tropical storms are the principal cause of major floods. On average, 1.6 tropical cyclones affect the Cook Islands Southern Group per year.

Extreme weather events can cause damage to coastal zone infrastructure such as roads, utilities and buildings, and to coral reefs from wave damage and erosion. Other impacts include:

- damage to vessels, machinery;
- potable water pollution;
- damage to agricultural infrastructure and crops;
- casualties, habitat, food loss;
- injury during and increased disease risk following, stress & social disruption
- damages to critical infrastructure, relocation of people, pollution, disruption of education and social services, affecting already vulnerable groups such as the disabled, youth, and women.

In 1997 Tropical Cyclone Martin cyclone caused 19 deaths on one island. There are several studies that examine the costs of cyclones in the South Pacific. Estimates are difficult to transfer. The major costs have been associated with loss of life and damage to infrastructure from flooding.

If it is assumed a cyclone can cause on average $1.5 million of damages (including loss of life and infrastructure costs), a small change in the percentage of damage that is reduced by the effect of current coral reef and forest can be used to estimate the avoided costs of a protected reef and forest. For this estimate, we have conservatively assumed that if natural assets were degraded, costs would increase by 10% (Table 13).

Table 13: Disaster protection - annual

<table>
<thead>
<tr>
<th>Average damage costs per cyclone</th>
<th>Occurrence</th>
<th>Marginal effect</th>
<th>Avoided costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,500,000</td>
<td>1.6 per year</td>
<td>10%</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

This level of protection is valued at $4.92 million in NPV terms over 30 years.

5.3.3 Gas Regulation

Forests are becoming increasingly valued for their ability to absorb and store atmospheric carbon (i.e. carbon sequestration). The forests of the Cook Islands influence CO₂ levels in the atmosphere.

Primary forests are the most bio-diverse and carbon-dense form of forest and contain carbon in living forest biomass. The mean carbon stock for forests amounts to 175 tonnes CO₂ extracted/ha

\[\text{15 Carbon Partnership Ltd. (2011) Fiji National Forest Carbon Stock Assessment Version 1.}\]
Using the current EU allowance contract prices of $8.90 per tonne\textsuperscript{16}, the carbon stored in the forests of the Cook Islands can be valued at $25.26 million in NPV terms. That is, $8.90 multiplied by 175 tonnes across a forest area of 17,060 ha.

5.4 Non-use values

The Cook Islands’ population (including those who reside overseas) and non-Cook Islanders may place a value on conservation of the Cook Islands environment; even people who may never visit the Islands. These values may include the option to visit in the future, or existence values as discussed earlier (see Section 4.1). These non-use values for the environment are measured through survey-based approaches, and can be significant. Biodiversity is a major contributor to the economy through the provision of many ecosystem goods and services, as discussed in Section 3. The non-use values of biodiversity and the landscape are outlined in Figure 1.

Biodiversity and landscape values are not traded in the market place and so do not have an obvious price or commercial value. However, they may be valued by a process known as ‘benefit transfer’ which operates by transferring values in some way from existing valuation studies to a different situation. The values can be transferred as a single value, or as the results of several studies combined to produce a pooled estimate.

It is recognised that the robustness of the benefit transfer depends largely on the quality of results for the study sites, and the presence of similar conditions at both the study site and the original location assessed. The criteria used for this benefit transfer are:

- the study and policy site should be similar; and
- the socioeconomic characteristics and preferences of the population should be similar.

For the purposes of this report, values have been estimated on the basis of a review of relevant international research.

5.4.1 National

A study of Samoan natural resources estimated values related to terrestrial reserves. and provides the best estimate for forest areas of the Cook Islands because of their similar characteristics.\textsuperscript{17} The researchers found that the values of the eco-tourism/ recreational services of a local forest reserve were six times higher for international visitors than for domestic visitors. The researchers estimated the economic values of the ecological functions of the natural (in this case indirect and non-use values) forest at $2.76 per person per annum for all Samoan forests. The research included a survey in which respondents were asked to identify their maximum willingness to pay per annum for conservation trust fund to manage forest resources for current generations and their children.

The estimate for Samoa was converted to NZ dollars by converting the figure to dollars per hectare per person, and then adjusting the figures to today’s dollars by taking account of inflation between 2001 and 2017. This figure was then extrapolated to the current estimate of the total population of the Cook Islands (though it may be valid to include those living in Australia and New Zealand). The estimated annual non-use value for the resident Cook Islanders is valued at $19,950 per year. N.B. this estimate based on a benefit transfer from other studies.

\textsuperscript{16} EU Allowance contract price 09/03/17 and a Euro / $NZ exchange rate of 1.70.

There are estimates of marine natural resources from America Samoa which placed a value on marine resources of around $210 per person per year. Combining these two analyses, the Cook Islander non-use value is estimated to be $0.41 million in NPV terms for forest ecosystems and $3.15 million per year for marine resources, which is $64.64 million in NPV terms\(^\text{18}\).

5.4.2 International

The Cook Islands are highly valued for conservation, as evidenced by the declaration of the Marae Moana marine protected area. The marine protected area is a multiple-use area where zones will be drawn up for specific activities. The Marae Moana protected area is the second largest of its kind in the world with an area of 2 million square kilometres of ocean.

Pearce (2007) reviewed a wide variety of studies. He estimated that their findings equated to a willingness to pay of $US25 per ha/year if estimated as an annualised fund across the developed world.

Pearce’s estimated value of $US 25/ha/year in 2007 was adjusted to 2016 figures, allowing for inflation. This implies a global WTP of around $42/ha/year for preservation. We have used this figure as an indication of the value placed on forested areas in the Cook Islands. The estimated non-use value from the international community is $0.60 million per annum. This represents a NPV of $12.34 million for forests.

For marine areas, we have used adjusted the non-use estimates for America Samoa for households in Australia and New Zealand. The estimated non-use value from the international community is $0.90 million per annum. This represents a conservative NPV of $18.89 million for the protection of the lagoon and ocean areas of the Cook Islands.

5.5 Total economic value of Cook Islands ecosystems

The total economic value of Cook Island ecosystems is made up of direct use, indirect use and non-use values, as follows. Direct use values are estimated as $1.9 billion (80% of TEV), indirect use values are estimated as $377 million (16% of TEV), and non-use values have been estimated as $96 million (4% of TEV) (Table 14) and Figure 3.

It should be noted that the figures presented in this study are ‘broad brush’ estimates. More accurate measurement of the different types of economic value dependent on the natural resources of the Cook Islands would require extensive on-ground interviews and surveys. However, the above estimates provide an appropriate indicator of the different components of total economic value and the relative importance of contributors to this value. This comparison can guide further investigation and policy development.

Table 14 provides a summary of economic benefits provided by the natural environments of the Cook Islands, the valuation method used, and the estimates obtained.

Tourism dominates the economic benefits that are derived from the natural environments of the Cook Islands. This is apparent given that over 82% of visitors to the Cook Islands travel for a holiday, 5% for a wedding and 2% for a honeymoon. When surveyed, visitors stated the most appealing elements of the Cook Islands experience are the friendly and helpful local people and traditional culture (49%), the beautiful and clean natural environment

(48%), the peacefulness and relaxing atmosphere of the islands (28%), and the tourist attractions and activities on offer (22%). These responses highlight the critical importance of the natural environments of the Cook Islands to the tourism sector.

Table 14: Economic benefits of goods and services provided

<table>
<thead>
<tr>
<th>Goods &amp; services</th>
<th>Use</th>
<th>Type of value</th>
<th>Economic Valuation Techniques</th>
<th>Estimate ($ million)</th>
<th>Percent age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>Direct Use</td>
<td>Producer surplus</td>
<td>Market Price</td>
<td>110.1</td>
<td>4.6%</td>
</tr>
<tr>
<td>Flowers &amp; Medicines</td>
<td>Direct use</td>
<td>Producer surplus</td>
<td>Substitution</td>
<td>1.5</td>
<td>0.1%</td>
</tr>
<tr>
<td>Forest Products</td>
<td>Direct Use</td>
<td>Producer surplus</td>
<td>Market price</td>
<td>6.6</td>
<td>0.3%</td>
</tr>
<tr>
<td>Fisheries</td>
<td>Direct Use</td>
<td>Producer surplus</td>
<td>Market Price</td>
<td>248.0</td>
<td>10.5%</td>
</tr>
<tr>
<td>Pearls and Trochus</td>
<td>Direct Use</td>
<td>Producer surplus</td>
<td>Market Price</td>
<td>5.4</td>
<td>0.2%</td>
</tr>
<tr>
<td>Tourism</td>
<td>Direct Use</td>
<td>Consumer surplus</td>
<td>Market price</td>
<td>1,511.7</td>
<td>63.7%</td>
</tr>
<tr>
<td>Tourism activities</td>
<td>Direct Use</td>
<td>Consumer surplus</td>
<td>Market price</td>
<td>14.2</td>
<td>0.6%</td>
</tr>
<tr>
<td>Catchment Protection</td>
<td>Indirect Use</td>
<td>Consumer surplus</td>
<td>Avoided costs</td>
<td>347.6</td>
<td>14.7%</td>
</tr>
<tr>
<td>Landscape</td>
<td>Indirect Use</td>
<td>Producer Surplus</td>
<td>Avoided costs</td>
<td>4.9</td>
<td>0.2%</td>
</tr>
<tr>
<td>Gas Regulation</td>
<td>Indirect Use</td>
<td>Producer Surplus</td>
<td>Market price</td>
<td>25.3</td>
<td>1.1%</td>
</tr>
<tr>
<td>National non-use value</td>
<td>Non-use</td>
<td>Consumer surplus</td>
<td>Benefit transfer</td>
<td>65.1</td>
<td>2.7%</td>
</tr>
<tr>
<td>International non-use value</td>
<td>Non-use</td>
<td>Consumer surplus</td>
<td>Benefit transfer</td>
<td>31.2</td>
<td>1.3%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>2,371.6</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The total economic value of Cook Islands ecosystem services is estimated at $2.4 billion. As noted above, TEV-related estimates can be used as a starting point for estimating the overall contribution of an entity at a single point in time. For policy purposes, it will be important to estimate the 'marginal' (i.e. incremental) changes to these values due to a new policy or activity, compared with continuing with the pre-existing situation i.e. the difference in value between the two situations.

---

20 Values are estimated in 2013 NZ dollars on a PV basis over 30 years at a discount rate of 2.65% as used in Garnaut (2008).
Figure 3: Breakdown of TEV by benefit

The aggregate direct values are large compared to the indirect benefits of ecosystem services and the non-use values attributed to conservation of the Cook Islands (see Table 15).

Table 15: Net Present Value for Total Economic Value by type of benefit ($ million)

<table>
<thead>
<tr>
<th>Type of value</th>
<th>Estimate ($)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct use</td>
<td>1,898</td>
<td>80%</td>
</tr>
<tr>
<td>Indirect use</td>
<td>378</td>
<td>16%</td>
</tr>
<tr>
<td>Non-use</td>
<td>96</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,372</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
6 USING ECONOMIC VALUATION INFORMATION IN COOK ISLAND ECONOMIC PLANNING, POLICIES AND PROGRAMS

As noted in Section 5, ecosystem services contribute significantly to the economic and social wellbeing of the Cook Island community, as well contributing to the economic activity of the Cook Island economy. The type of information provided in Section 5 can contribute to better-informed decision making about the use of Cook Islands natural resources in at least two major ways:

(i). in economic analyses of the direct and indirect socio-economic impacts on individuals, businesses, government and the community from proposed development projects, policies or other legislative interventions affecting the Cook Island environment

(ii). as part of an expanded System of National Accounts to show the relationships between economic development and degradation of Cook Island natural assets. These two applications are discussed below.

6.1 Applications in economic analysis

Economic analyses of legislative changes and proposed development projects, such as roads and tourist developments, have commonly omitted information on their potential direct and indirect impacts on the natural environment, due to a lack of information on the economic value of the environmental resources affected. Thus, planning decisions are being made with an incomplete understanding of the full economic impacts of the project. The information in Section 5 above, and other estimates of the value of environmental resources, can help to inform decision-making and planning, by providing estimates of the environmental values that would be affected by the proposed development, legislation etc.

Government agencies wishing to understand the economic impact of individual projects, policies or programmes can use a social cost-benefit analysis framework to identify the full range of direct, indirect and non-use values associated with a project etc. expressed as direct and indirect costs and benefits accruing directly and indirectly to individuals, businesses, government and the wider community from the proposed activity, compared to the activity not occurring. The difference between the ecosystem service values under the ‘with’ and ‘without’ project scenarios can help project planners and managers assess the net economic benefits to the community from different policies and programs at the individual project scale.

A social cost benefit analysis considers the streams of direct and indirect costs and benefits accruing to individuals, businesses government and the wider community over the life of a project. The total stream of project costs is subtracted from the total stream of project benefits, and are converted to today’s dollars through discounting to give a net present value for the project. For the proposed project to be assessed as being in the community’s interests, it will need to at least have a positive net present value and a benefit: cost ratio greater than one. The net present values and benefit: cost ratios of different projects can be compared with a base case of ‘without the project happening’ and with each other, to assess which option provides the greater net economic benefit to the community. Numerous guides are available for parties wishing to carry out such types of cost-benefit analysis, especially Lal and Holland (2010).

---

21 See Glossary
6.2 Applications in environmental-economic accounting

6.2.1 Current basis for economic planning: The Cook Islands System of National Accounts

A mentioned above, the natural assets (natural capital) of the Cook Islands are used by businesses to produce goods and services, as part of the functioning of the Cook Islands economy. Assets such as financial, produced, human, social and natural capital flow between businesses, financial institutions, households, governments and markets, in the form of cash, credit, labour, wages, taxes and goods and services, and constitute imports into, and exports from, the Cook Islands economy to the ‘rest of the world’.

Data on the flows of raw materials, processed goods, services, finance, labour and other assets between these economic sectors can be used to show linkages and dependencies between different sectors of an economy. Understanding these economic relationships can help economic planners and analysts to estimate the economic impact of new developments such as roads, tourism developments, or agricultural projects, on their economies. The economic impact of these new developments may be reflected in changes to pre-existing flows of employment, finance, household income, imports and exports.

For example, a study of tourism development in Palau tracked the economic impacts of recent increases in mass tourism on the Palau economy (Barr et al., 2016). The study noted that the structure of the Palau economy, with a heavy dependence on imports and low domestic ownership of tourism-related assets, meant that the net benefit of mass tourism to the economy was estimated to be relatively low, especially compared to niche market tourism. The situation for Palau is very similar to many Small Island Developing States (including the Cook Islands), with relatively low levels of diversity in the structure of their economies. Findings such as this can help economic planners develop economic strategies that are appropriate to the structure and available assets of their economies.

Assets (stocks) and flows are currently recorded in the Cook Islands System of National accounts (SNA), via a range of indicators such as Gross National Product (GNP), Gross Domestic Product (GDP) household income, imports exports, employment levels and other indicators. The Cook Islands SNA records economic transactions for:

- agriculture
- fishing and pearl harvesting
- mining and manufacturing, electricity and water supply
- construction, wholesale and retail trade
- restaurants and accommodation
- transport storage and communication
- financial and business services
- community, social and personal services
- public administration
- education and health services,
- ownership of dwellings.  

Currently, the Cook island SNA does not report separately on ‘tourism’ as this activity does not constitute a single economic sector in the national accounts, but is composed of elements of other sectors such as ‘restaurants and accommodation’, ‘community and personal services’, wholesale and retail’ and others.

22 Excluding certain banking services.
In addition, the SNA does not record levels and changes in levels of natural assets (natural capital) such as forests, water resources, and fisheries, so statisticians and planners are not able to see the relationship between levels of environmental assets, and flows of environmental goods and services to other sectors, or the impact of economic activity in different sectors on levels of natural capital and flows of capital (as ecosystem services).

6.2.2 Using the System of Environmental–Economic Accounting Framework (SEEA) for incorporating ecosystem services in economic planning

Statisticians and economic planners are now increasingly looking at ways to add information about natural capital to their SNA information by using the UN System of Environmental–Economic Accounting (SEEA) framework. SEEA uses standard economic accounting principles to record changes in the stocks and flows of natural assets so that changes in this natural capital can be tracked against changes in financial, produced and human capital. A number of developing countries are now using SEEA to understand the relationship between economic development and loss of natural capital and associated ecosystem services, and to identify the need for ‘reinvestment’ in their natural capital base if it is to continue to provide the ecosystem goods and services upon which their economy depends.

A SEEA framework could be a valuable approach that economic and financial planners could use to better understand the need to maintain stocks of healthy ecosystems, so that ecosystem services can continue to flow to the production activities and consumption activities. Declining quantity and quality of natural capital will lead to reduced economic activity and consequent loss of financial, produced, human and social capital, and loss of economic and social wellbeing for Cook Islanders.

Adopting an SEEA approach is also one way in which countries can meet Aichi Target 2 under the CBD, which notes that:

“By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.”24 (see Appendix 3).

6.2.2.1 Creating different types of environmental-economic accounts

As noted above, ecosystem services contribute directly and indirectly to numerous economic sectors and economic activities in the Cook Islands economy, but this contribution is not explicitly shown in the SNA. Creating specific accounts for natural resources, ecosystem services and other environmental assets, and then comparing these accounts with economic information derived from the SNA, is a promising way of showing the linkages between ecosystems and economic activity in the Cook Islands economy. Figure 4 gives an example of how comparing information from economic and environmental accounts can be used to show the association between economic activity and environmental pressure.

---

23 SEEA can also be used in monitoring and reporting on the effectiveness of regulations, policies and programs intended to increase levels of natural capital.
24 See https://www.cbd.int/sp/targets/rationale/target-2/
Figure 4 shows that while Australia's economic production, as measured by Gross Value Added (GVA) in chain volume terms, rose 73% over the period 1996-97 to 2013-14; over the same period, indicators of environmental pressure related to the production of waste, energy consumption and greenhouse gas (GHG) emissions all increased, while water consumption fell. Waste production rose 163%, energy consumption increased 31% and GHG emissions increased 20%.

Water consumption in Australia fell by 16% from 1996-97. However, the increase in water availability over the most recent years, due to higher rainfall, has supported a rise in water consumption (an increase of 40% between 2010-11 and 2013-14).25

Another example from Australia showing the links between economic activity and environmental/ ecosystem services is given at Figure 5.

---

Figure 5: Importance of environmental services for different economic sectors

Experimental estimates of the use of environmental services by consumers in the Australian economy give a value at $28.5b (excluding capital formation) in 2010-11, an increase of 10% from 2009-10 ($25.9b). Australian industry consumed 75% (or $21.4b) of total environmental services in 2010-11, up from 74% (or $19.2b) in 2009-10.

The largest industry consumers of environmental services were construction ($3.9b in 2010-11, up 7% from $3.6b in 2009-10) and electricity, gas, water supply, drainage and sewerage and waste ($3.4b in 2010-11, up 11% from $3.1b in 2009-10). Consumption of environmental services by households and general government increased by 8% between 2009-10 and 2010-11, from $6.6b to $7.1b.\footnote{Source: Australian Bureau of Statistics (2016).}

6.3 Relevance to the Cook Islands

The above discussion notes that an environmental-economic accounting approach can be a highly useful tool for environmental agencies, as it can provide evidence for decision makers about the importance of conserving and investing in natural capital. In the case of the Cook Islands, environmental-economic accounting can provide a framework for showing the impacts of economic development on Cook Islands natural capital, and monitoring evaluating and reporting on the performance of NBSAP actions. The SEEA central framework mentioned above contains four main types of accounts: stock accounts, flow accounts, ecosystem asset and condition accounts, and ecosystem service accounts (Figure 6).

The most appropriate accounts to start with for environmental management, including NBSAP purposes, are likely to be a land use account and a perhaps a tourism-ecosystem services satellite account (see Section 9.4.4).
**Figure 6: Different types of environmental-economic accounts**

SEEA expands the SNA by showing changes in a range of natural assets using information from different types of accounts:

- **Environmental asset accounts** record stocks of environmental goods (water, timber, soil, land, native vegetation, etc.).
  - **Potential metrics & data sources:** e.g. ha wetlands, tonnes soil C, MI water
    - From: ABS, ENSO, ABARES

- **Environmental flow accounts** record amounts of material flow through the economy by unit time (water, timber, energy, nutrients etc.).
  - **Potential metrics & data sources:** e.g. MI/sec, M³ timber/p.a., tonnes CH₄ p.a.
    - From: survey data, ABS, primary & secondary data records

- **Environmental extent & condition accounts** record capacity of ecosystems to continue providing benefit to society, assessed through changes in indicators over time.
  - **Potential metrics & data sources:** e.g. eMAR, soil erosion under low groundcover
    - From: EBVs (indicators derived from eMAR), Primary & secondary data records & BAM outputs
    - Accounting for Nature indicators (econds) (in NSW from EMAR data)
    - Water quality indicators

- **Ecosystem services flow accounts** record actual benefits people obtain from ecosystems by unit time (food, wood, water filtration, C sequestration, tourism).
  - **Potential metrics & data sources:** e.g. $/ha, t CO₂ removed, PA visitors p.a.
    - From: ABS, agencies, primary sources
7 FUNDING AND FINANCING CONSERVATION ACTIVITIES

This section of the report identifies some ways in which nations, especially SIDS have considered funding and financing a range of conservation activities.

It is first necessary to distinguish ‘funding’ from ‘financing’. Funding concerns ‘where the money is coming from’; financing is more specific; it concerns what instruments can be used to allocate the funds, once their source has been identified.

Regarding potential funding and financing issues for NBSAP and other Cook Islands environmental management initiatives, it is important for policy makers to clarify the objectives they wish to achieve in environmental management policies and programs, and to ensure that NBSAP and other actions are considered as part of broader environmental management and economic development strategies. Different funding and financing options will be relevant to different policy objectives.

For example, are NBSAP objectives concerned with preventing loss of particular species or plant communities because of economic activities such as resort development, agricultural expansion, and using reef materials for construction? Are major objectives related to the impact of invasive species, on endemic species, or changes in intensity of use of wild resources due to increasing demand for certain species from export markets (e.g. black pearls, sea cucumber)? Are key objectives related to establishing and managing formal conservation reserves or to private conservation programmes (e.g. via payment for environmental services schemes)? It is expected that NBSAP objectives will include several of the above.

A key issue in identifying suitable funding and financing approaches is the need to distinguish between approaches which aim to penalise/ discourage activities which cause negative environmental impacts and those which provide incentives for additional conservation actions directly, or via raising revenue that can subsequently be spent on ameliorating damage or implementing new conservation activities. The point here is to recognise that reducing environmental damage through regulations and/ or incentive programmes can help to achieve conservation improvements as well as measures which aim to raise new funds to pay for activities to remediate damage or promote new conservation activities.

7.1 Internal and external sources of funds

Some principal funding options for conservation activities including external and internal and private and public, funding sources are noted below.

External sources of funds:

- Multilateral Donors
- The Global Environment Facility
- The Green Climate Fund
- Treaty and Technical Organisations
- Bilateral Donors (World Bank Group, Global Green Grants Fund)
- International NGOs (e.g. Conservational International, The Nature Conservancy)
- Philanthropic Foundations (e.g. Gordon and Betty Moore Foundation, Rockefeller Foundation, Macarthur Foundation)
- Corporations and Individuals
- Memberships
- Bioprospecting
Mainly internal sources of funds:
- Self-funding by private sector beneficiaries and other stakeholders
- Levies, taxes and penalties on users/beneficiaries (user pays, beneficiary pays, polluter pays)
- developer contributions
- local donor/philanthropic programs
- generating commercial revenue streams
- tax increment financing
- property lease-back arrangements
- local government funding from targeted rates and charges
- local government funding from broad-based revenue
- national government funding.

7.2 Financing mechanisms for allocating funding and collecting payments

The following list outlines several different methods (financing mechanisms) that can be used to allocate funds to recipients, or collect payments from parties responsible for environmental damage.

Financing mechanisms for allocating funding and collecting payments:
- Government loans, subsidised loans
- Performance bonds
- Offset schemes
- Reverse mortgages
- Municipal and infrastructure bonds
- Government facilitation of private sector finance
- Borrowings from national government to local government
- Stewardship payments, payments for ecosystem service provision and management.

As shown in Appendix 2, different funding and financing measures are subject to a range of factors including institutional, political, social and managerial factors which may affect their success. Based on anecdotal experience, these factors can include institutional failure such as failure to allocate funds ostensibly collected for environmental conservation to that purpose (i.e. funds not being ‘hypothecated’ 27), failure to focus on causes of environmental damage rather than the effects of such causes, and political lobbying by special interest groups to neutralise the introduction of fees, charges etc. which they perceive to be contrary to their financial interests (see Lal and Holland 2010).

27 See Glossary
8 FUNDING AND FINANCING COOK ISLANDS NBSAP ACTIVITIES

Apart from identifying generic types of funding and financing mechanisms for Cook Islands NBSAP actions, it will be necessary to address which mechanisms may be best suited to the different conservation actions identified in the NBSAP, and whether efficiencies can be achieved by supporting actions that can achieve multiple desired outcomes.

The findings of the economic analysis in this report indicate that the greatest threats to the economic value of Cook Islands ecosystem services relate to the impact of tourism development and the quality of related infrastructure on Cook Islands ecosystems (see Section 5). These types of threat apply to a range of ecosystems and services. Arguably, measures to reduce these threats and improve ecosystems from ridge to reef (or ridge to ocean) not only remove direct impacts on flora and fauna, but also remove one category of pressure that is reducing the natural regenerative capacity of ecosystems to recover from more intractable stressors such as climate change, expansion of alien species, and overharvesting.

Some relevant approaches which could potentially reduce impacts on ecosystem condition, and support habitat and species conservation activities under NBSAP actions, could include the following.

Source of funds
- Levies, taxes and penalties on users/ beneficiaries (user pays, beneficiary pays, polluter pays) to be held in a trust fund for disbursement
- Developer contributions paid directly to conservation programs or to a trust fund for disbursement

Source of finance
- Government subsidised loans to NGOs for conservation programs
- Infrastructure bonds payable by developers
- Developer payments to a trust for community land holders /managers for ecosystem service provision and management.

8.1 Some Possible measures for funding and financing NBSAP activities

In general terms, it is important that any funding and financing mechanisms being developed to support NBSAP actions should meet the following criteria:

- the mechanisms should be relatively straightforward to implement and monitor;
- they should be transparent, with no opportunities for accidental or intentional abuse;
- they should not create perverse incentives and unintended negative outcomes;
- they should fit with the Cook Islands institutional and social contexts, and not negatively affect customs and social structures relating to an individual’s social status or authority;
- they should be relevant to the Cook Islands economy, and not involve redistribution of income, or changes to Cook Islands economic structures.

Several specific mechanisms are suggested below. These measures are based on the conclusion in Section 5 that the major impacts affecting Cook Islands ecosystems and ecosystem services relate to: poor catchment management, poor water and wastewater management, loss of habitat, and other ridge-to-reef related impacts from tourism. It is suggested that, being the main generator of negative externalities from its activities, the
tourism sector should be the main source of funding for conservation activities to remediate the environments damaged by its activities.

Existing developments and operations:

- Levies on commercial users/ beneficiaries of ecosystems e.g. tour operators/ diving establishments, in lieu of them producing and implementing a monitored environmental management plan for their operations.
- Fines/ penalties for environmental damage enforced by the Environment Service, with naming and shaming, and payments hypothecated for environmental restoration.
- Resorts/ operators to fund specific conservation programmes carried out the Environment Service or NGOs, or paid into a trust fund (see Box 1 above) hypothecated for environmental restoration.
- Government subsidised loans or other mechanisms for developers to upgrade wastewater treatment facilities, and for environmental restoration programmes, or implementation of agreed environmental management plans.
- Government loans, subsidised loans available to NGOs for conservation programmes to remediate environmental damage where the party directly responsible for the damage cannot be identified.

New developments:

- Infrastructure bonds payable by new developers/ operators, and returned to payees after a fixed period of demonstrated compliance with an environmental management plan.
- Developer payments to a trust for community land holders /managers for ecosystem service provision and management.
- Developers required to meet new higher standards for wastewater management and provide monitored environmental management plans; subject to non-compliance penalties.

The ability of developers/ operators to absorb the cost of bonds, levies or payments for ecosystem services into their costs of production, or to pass on these costs to their customers without reducing demand, will in part depend on the price elasticity of demand for the services being provided. A separate study will be needed to estimate the willingness of tourists to pay prices for tourist goods and services which reflect the private and social costs incurred in their provision (see Section 9.4.2).

The Cook Islands Government has previously considered approaches that could be used to fund conservation activities. According to Levett and McNally (2003), in 1994, the Government introduced an environment departure tax (as part of a general departure tax) to be deposited in an Environment Protection Fund. Although the revenue from the tax went into general revenue, it was, in theory, earmarked for activities to conserve and protect the natural environment. To be effective this sort of tax would need to be ring fenced so that it could not be diverted away from its intended purpose to alternative Government priorities. This is a type of direct use charge funding

---

28 See Glossary
This fund represents an example of a national funded programme with external donor support. The above departure tax and trust fund are examples of funding mechanisms, i.e. they are concerned with ‘where the money is coming from’ rather than what measures can be used to distribute it to finance conservation activities. The 2002 Cook Islands Biodiversity Strategy and Action Plan also proposed a biodiversity Trust fund to finance NBSAP measures, as shown in Box 1.

**Box 1: Theme H: Financial Resources and Mechanisms for Biodiversity Strategic Goal H:**

Secure long-term financial sustainability for all biodiversity related activities and programmes.

Action: Establish a Biodiversity Trust Fund to support the wide range of activities required to conserve Cook Islands biodiversity in an integrated and equitable manner. Background information: The National Workshop recognised that there is a wide range of activities required to maintain local biodiversity. It was concerned that there should be a financial mechanism to ensure equitable funding to facilitate the required programmes, especially those not having a high public profile.

The Workshop concluded that the Trust Fund would consist of a board representing the different communities, traditional leaders and the main Government bodies involved with biodiversity. Because the Government is one of the main beneficiaries of local biodiversity it was concluded that Government should provide the core funding for the Trust Fund, supported where possible by overseas donors. The Trust would table annual reports with audited accounts to Parliament, and make these reports available for wider distribution. The secretariat for the Trust could be provided by the Environment Service, although the Trust would have the power to change this arrangement if it wished.

Source: Cook Islands Government (2002).

A 2011 review of progress in meeting Goal H above noted that the lack of progress in establishing the above Biodiversity Trust Fund, and the governments' failure to hypothecate monies raised under the Departure Tax to conservation measures, indicated that the government was not committed to this type of funding initiative (see Table 16).

**Table 16: Review of progress towards goal H of the Financial Resource and Mechanisms theme of the Cook Islands NBSAP**

<table>
<thead>
<tr>
<th>Theme H. Financial resources and mechanisms for biodiversity</th>
<th>Actions</th>
<th>Outcomes</th>
<th>Indicators</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure long-term financial sustainability for all biodiversity related activities and programmes.</td>
<td>Establish a Biodiversity Trust Fund to support the wide range of activities required to conserve Cook Islands biodiversity in an integrated and equitable manner</td>
<td>No progress. The EPF which could have been used for this purpose, with some legislative and administrative change has been discontinued</td>
<td>“Trust fund established” would be the indicator</td>
<td>The Departure Tax Amendment Act 2008 resulted in finance allocated to conservation being redistributed to other spending streams: an indication which suggests that Government is not committed to establish funding mechanism of this nature</td>
</tr>
</tbody>
</table>

Source: National Environment Service (2011)
Despite the apparent lack of support from the Cook Island Government since 2008 for a conservation trust fund supported by government funding and potential overseas donors, under certain conditions, a conservation trust fund using revenue from the initiatives discussed above may be an appropriate way of holding and disbursing funds for NBSAP programmes. Bladon et al. (2014) suggest preconditions, factors for success, and lessons learnt for conservation trust funds that should be considered in designing and operating conservation trust funds (see Box 2); these factors would be relevant to a NBSAP trust fund.

**BOX 2: Some preconditions, factors for success, and lessons learnt for conservation trust funds (CTFs)**

Preconditions for the creation of CTFs:
- a group of diverse stakeholders with a common vision willing to come together
- a demand for funds from capable implementing organisations
- the existence or possibility of quickly establishing a basic legal and financial framework
- government buy-in.

Factors for success:
- *A feasibility study:* Before beginning the process of creating a CTF, a feasibility analysis is imperative to consider both the funding needs and the urgency of the threat to biodiversity, to establish whether a CTF is the most appropriate mechanism.
- *Diversified systems of financing.* Diverse sources of finance are critical for financial sustainability, they also ensure the mobilisation of sufficient resources and protect against over-reliance on a single source of funding, and on donor support.
- *Strategic and financial planning.* Successful resource mobilisation should be based upon a comprehensive strategic and financial plan.
- *Strategic partnerships.* A CTF should nurture relationships with a variety of stakeholders – national and international policy-makers, organisations capable of assisting with capacity building, grantees, NGOs, other CTFs and institutions with financial expertise.
- *Political support* Although independence is desirable, it is also essential to establish and maintain government links.
- *Financial expertise.* A CTF is first and foremost a financial instrument and ideally the governing body of the fund should have financial experience, and there should be at least one board member with expertise in the fields of finance, business or economics. External assistance is also essential; either through a specialised financial advisory committee or through partners
- *Reporting, monitoring and evaluation.* The need for reporting, monitoring and evaluation should be considered at an early stage and incorporated into the strategic and financial planning. Reporting is essential for transparency; annual reports should be publicly available and financial records should be made available to donors. Regular internal reporting by staff is required for the board to make informed decisions.

Lessons learnt:
- The feasibility of a CTF should always be assessed before embarking on its creation.
- A CTF should have a clear focus, and it should be a priority to identify whether the initiative or activities it is intended to fund will actually have a conservation impact. It does not matter how successful a CTF is in financial terms unless it is funding activities which are based on sound science and its outcomes are rigorously assessed.
- Its governance should be diverse and participatory, and a balance must be struck between autonomy and political support; a CTF is unlikely to get off the ground or achieve permanence without high-level political buy-in.
- Strategic partnerships with organisations or individuals which can provide mentorship, technical assistance and financial advice are essential.
- A diverse system of financing is critical; CTFs need to be creative in terms of resource mobilisation and move away from reliance on donor support to utilise new opportunities which place more of the onus on the users of ecosystem services (Bladon et al, 2014).
9 NEXT STEPS

Some potential steps to progress the information discussed in this report are considered below.

9.1 Need for policy makers and businesses to recognise the Cook Island’s economic dependence on ecosystem services

The Cook Islands economy depends on natural capital and associated ecosystem services for economic activity. Ecosystem services provide direct inputs into many economic activities in the Cook Islands economy, such as tourism, agriculture, fishing, pearl harvesting, water supply and treatment services, and building materials. Ecosystem services also provide indirect inputs in the form of coastal erosion protection, from coral reefs and coastal vegetation, water flow management from wetlands, and soil erosion protection from vegetation cover.

Although there is potential for stocks of ecosystems to be replenished through natural processes, the increasing rate of consumption of these stocks will overtake the rate of regeneration in the near future. Further, the by-products of production and consumption of ecosystems and services such as land clearing, water pollution from coastal development, poor wastewater treatment, and loss of habitat, also cause environmental impacts which reduce the quality of the ecosystems and services used. As with other forms of capital such as financial capital or built capital, stocks need to be replenished if they are to continue to flow to production and consumption, and pressures on stocks from e.g. pollution need to be reduced if economic activity is to be sustained.

If Cook Islands policy makers and businesses do not act to replenish these stocks through investments such as conservation measures (including NBSAP actions), regulation, and reduction of the impacts of their operations, levels of natural capital will run down to the point that they can no longer provide the quality and quality of ecosystem services as before, and economic activity will suffer.

Thus, a key step in the conservation of Cook Islands biodiversity will be for policy makers and businesses to recognise that the economic and social wellbeing of the Cook island community and economy, depend on Cook island biodiversity, and that investment in natural capital is necessary to enable this economic wellbeing and economic activity to continue. Several steps can follow from this, as below.

9.2 Need to incorporate environmental values in SNA through SEEA

Discussions with officers in the Cook Islands Statistical Office suggest officers are generally interested in the development of environmental-economic accounts under the SEEA framework, as well as development of a tourism satellite account (as recently produced in Fiji.) Progress is limited by shortage of resources. However, it is understood that Statistics NZ already provides training and certification in the use of economic statistics for national accounting purposes for staff of the Cook Islands Statistics Bureau. Although Statistics NZ are not currently providing training in SEEA, staff have suggested that Statistics NZ may be establishing a training fund in 2017 which could be used to support new statistics training initiatives in the Pacific. Capacity building in the use of SEEA as an extension of the Cook Islands SNA may be a suitable topic for financial support from this fund.

Should resources become available, initial accounts for development could be a land use account, and perhaps a tourism satellite account which explicitly included information on natural capital.
Funding, technical assistance and advice are also available from international bodies. For example, the World Bank WAVES partnership (Wealth Accounting and the Valuation of Ecosystem Services) is working with national governments in numerous countries to support their environmental-their economic accounting initiatives.\textsuperscript{29} The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) is also promoting SEEA in the Oceania region, and is understood to be assisting Palau to develop an ocean environmental-economic account. ESCAP officers have recently been collaborating with the Fiji Statistics Bureau to produce a tourism satellite Account for Fiji, as mentioned above. The United Nations Environment Programme has also produced a guidance manual on valuation and accounting of ecosystem services for Small Island Developing States as part of their Valuation and Accounting of Natural Capital for Green Economy (VANTAGE) programme (UNEP, 2014).

There is an internationally recognised body of expertise in the development and application of SEEA to economic and environmental management in Australia that the Cook Islands government could call on if it is interested in developing its own SEEA.

At a more basic level, it is possible to implement some building blocks for developing accounts. Data is collected for environmental initiatives carried out under the NBSAP and other programs for monitoring and reporting purposes over the life of program. Such monitoring and reporting is generally based on establishing a starting point (baseline) which provides a measure of the amount, or level, of an asset at a specific point (e.g. a specific date) in a standardised metric. Metrics may include e.g. hectares of wetlands, tonnes of soil carbon, population of an endangered species for a stock account, or megalitres/second, cubic metres of timber/year, tonnes of methane/year for a flow account (see Figure 6). Changes in the levels etc. of the asset in question are tracked in the same metric over time from the baseline.

This approach is entirely compatible with an environmental-economic accounting framework which also uses the baseline-tracked-change-over-time approach. If environmental monitoring and reporting data can be recorded in tables which show baseline and time series records, this information can subsequently be compared with economic data from the SNA, which uses the same recording framework.

Basic comparison of trends in environmental assets of interest (e.g. area of wetlands) and changes in economic activity (e.g. tourism development), can provide useful information for planners and programme managers on the potential impacts of particular economic development strategies on natural; capital, and other assets. This basic stock and flow account information can be incorporated in more comprehensive environmental-economic accounts at a later date, should government resources be made available.

\textbf{9.3 Need for integrated planning and catchment management}

Discussion with government officials have indicated that, although officials recognise the need for action on environmental issues which can compromise ecological quality, such actions are limited by a lack of resources.

However, one relatively cost-effective starting point for addressing these impacts could be a requirement for all government agencies to commit to more integrated planning approaches, rather than individual portfolio responses to particular environmental impacts. Integrated approaches which address the direct and indirect linkages between the environment and the

\textsuperscript{29} https://www.wavespartnership.org
Cook Island economy are likely to have greater success than individual interventions focusing on one specific problem, such as eutrophication of lagoon waters.

For example, ecosystem services related to high quality water resources make a major contribution to Cook Islands economic activity. High quality water resources are important for tourist beaches, swimming and diving experiences, as well as for marine pearl harvesting, agriculture and horticulture, fishing, and domestic and commercial potable water supply. However poor catchment management and wastewater management compromise the environmental quality tourists expect from their experience.

A ridge to ocean approach to catchment management may provide a useful way of highlighting the upstream and downstream connections between ecosystems, ecosystem services, economic activity and environmental damage. Such an approach can help to identify particular activities, locations or ecosystems in the ridge to ocean continuum which may have a key positive or negative influence on downstream environmental and economic values. A ridge to ocean approach can also be one way in which issues relating to the management of the Marae Moana marine protected area can be considered in a wider framework of terrestrial and coastal ecosystem management. For example, the environmental quality of the marine protected area can easily be compromised if attention is not paid to upstream impacts of land clearing, water pollution, unplanned tourism development, and if responses to environmental damage are only addressed in a piecemeal, rather than integrated fashion.

9.4 Specific actions

The above discussion suggests several specific actions.

9.4.1 Visitor willingness to contribute to conservation programme fund

A visitor survey to assess the willingness of tourists to contribute small amounts to a Cook Island conservation programmes fund may reveal a potential source of ongoing funding for specific, well-defined projects.

9.4.2 Study of the price elasticity of demand for Cook Island tourism

Above sections of the report have highlighted the importance of ecosystem services to the Cook Islands economy, the need for integrated planning and catchment management to address water resource management issues, and the suggestion that tourism operators and developers should contribute to a fund for catchment management actions. The report suggest that the Environment Service and Tourism Cook Islands commission a study to estimate the price elasticity of demand for tourism, and thus the potential impact on tourism numbers, should operators pass on the cost of a levy to customers. The study will provide guidance on the charge that can be levied on operators without any decline in demand.

(In this regard, it may be worth considering the potential advantages of a pacific-wide levy on tourists which applied to all PICTs equally, to avoid a situation where nations offering similar visitor experiences competed on the basis of lower visitor levies).

Amounts received from the above levies should be paid into a dedicated fund hypothecated to payments to reduce the environmental impacts associated with tourism operations. In economic terms, such a charge is defensible, as currently operators are not paying the economic costs of their operations, and gaining private benefits, while imposing public costs on the community in the form of the environmental impacts of their operations.)
9.4.3 Feasibility study of a conservation trust fund

A study should be carried out to assess the economic and financial feasibility of a conservation trust fund based on revenue obtained from levies etc. on tourist operators and developers, as described in Section 8.1, taking account of the findings of the study proposed in 9.4.2.

9.4.4 Production of a land use account

A land use account for Rarotonga should be produced as a prelude to developing a land use master plan to guide residential and tourism resort development to more appropriate locations with lower environmental impacts.

9.4.5 Carrying capacity study

As noted in Section 3, Cook Islands natural capital is used via ecosystem services to provide economic and social wellbeing.

Planners and policy makers need to know the capacity of the Cook Island’s finite natural capital to continue to provide ecosystem services, so that limits can be placed on development, and appreciate policies and programs put in place to use resources sustainably. The report suggests that there would be much value from an assessment of the natural (and social) tourism ‘carrying capacity’ of the Cook Islands natural environment.

9.4.6 Ridge to ocean assessment

A ridge to ocean approach to catchment management, which includes the Marae Moana marine protected area, may be a useful way of illustrating the upstream and downstream connections between ecosystems, ecosystem services, economic activity and environmental damage. Such an approach can help to identify specific activities, locations or ecosystems in the ridge to reef continuum which may have a key positive or negative influence on downstream environmental and economic values. Targeted interventions at such points, whether in the form of habitat restoration programs, regulations, or economic (market-based) instruments for sustainable management, such as payments for ecosystem services, may be a cost-effective way of achieving positive upstream and downstream environmental outcomes.

The above discussion has suggested several steps and specific actions that could encourage the integration of environmental values in economic development strategies and plans. Some steps and actions may be appropriate in their own right, some more effective in combination with others.

It is beyond the scope of this study to provide an assessment of the relative social, economic and environmental benefits of different steps and actions. This task should take place once policy makers and planners have decided whether they wish to undertake the type of steps and actions suggested above, what objectives they wish to achieve, and what resources will be committed to these activities. Once this information is available, specific options for achieving these actions should be developed. The appropriate technique for assessing the relative costs and benefits of these options for the Cook Island Community, and their impacts on different stakeholders is to produce a Social Cost Benefit analysis (CBA) (see Glossary). The CBA will use information on market values as well as non-market values derived from various sources (including travel cost studies), to derive estimates of the net economic benefits of specific options (net economic benefits may be negative or positive, depending on whether total discounted costs exceed total discounted benefits) (see Section
5.1.1). The net economic benefits of the different options can then be ranked according to their respective cost-benefit ratios and net present value (see Glossary).

10 CONCLUSIONS

This report has demonstrated the key role that ecosystems and ecosystem services play in the economic and social wellbeing of Cook Islanders. The continuing existence of healthy terrestrial and marine ecosystems is essential to the continuation of tourism activities, which are the main contributor to the Cook Islands economy. However, there is a danger that the stocks of the Cook Islands' natural assets are being used up faster that the can naturally regenerate, and that tourism activities are imposing additional stress on the capacity of these assets to withstand a range of environmental pressures such as pollution, overfishing and climate change.

As with other assets, such as financial capital and physical infrastructure, stocks need to be replenished if they are to continue to be available as inputs for economic and social activities. Actions are needed to reinvest/ rebuild the stocks of Cook Island natural assets, and to reduce the pressures on these assets that limit their natural capacity for regeneration.

As well as the specific actions to remediate and conserve Cook Islands biodiversity considered in the NBSAP review, this report identifies several other areas for action. One key area of attention is catchment management, particularly relating to wastewater management for resorts and other tourist operations.

It is understood that the government has commissioned preliminary investigations into the technical feasibility of a deep-water sewage outfall, to discharge screened effluent. It is suggested that an integrated programme of social and economic measures will also be needed to address current and likely impacts on terrestrial and marine biodiversity. These initiatives may include: education programmes for tourists to encourage more environmentally appropriate behaviours (especially in near shore/ reef environments); creating opportunities for greater private sector involvement in conservation (such as sponsoring specific conservation programmes); and implementation of economic instruments, including levies and charges, to incentivise resort managers and developers to take more responsibility for their impacts on the natural environment.

Economic and social initiatives that can help reduce the biophysical stress on Cook Island terrestrial and marine ecosystems, particularly impacts associated with poorly managed tourism developments, will help to create more favourable conditions for implementing the conservation actions proposed under the NBSAP, and reduce the costs required for their successful implementation.
REFERENCES


Carbon Partnership Ltd. For SPC/GIZ Regional Programme - Coping with Climate Change in the Pacific Island Region and the Fiji Forestry Department


GLOSSARY

Cost–benefit analysis (CBA).
CBA is a form of economic appraisal used to estimate changes to the economic wellbeing of individual stakeholders and the wider community. A CBA is used to estimate and compare the costs and benefits of implementing a proposed project or management activity with the costs and benefits of a ‘base case’ representing a continuation of current conditions under which the proposed project/ policy is not implemented.

Benefit cost ratios (BCR)
Benefit cost ratios (BCRs) are one of the indicators used in cost benefit analysis to assess the economic impact of a particular project. A BCR<1 indicates that the costs outweigh the benefits. A BCR>1, indicates that the benefits of a project outweigh the costs and it is therefore viable.

Economic Value
The market price paid for a good or service is not its economic value as:
- Goods and services not provided in competitive markets are implicitly assumed to have zero value.
- People may be willing to pay more than the market price for a good. The amount that people are willing to pay above what they actually pay is the correct measure of the value of a good or service to consumers (i.e. consumer surplus) (see diagram below). Similarly, producers would be willing to accept some minimum price for the goods they provide. If they can sell their goods at a higher price than the minimum price, they receive a benefit from the sale (i.e. producer surplus) (see diagram below). The sum of consumer and producer surplus (less any costs) represents the economic value of the good.
Hypothecation

Hypothecated taxes, levies etc., are those whose revenue is designated to be spent on a specific programme or use. There are many examples of hypothecated instruments including TV licence fees, road tolls or certain national insurance contributions. In each case, the individual paying the tax knows exactly what the government will spend their money on.

http://www.who.int/healthsystems/topics/financing/healthreport/51Hypothecation.pdf

Net present value (NPV)

NPV is the sum of the stream of discounted costs subtracted from the sum of the stream of discounted benefits over the chosen time period. NPV is calculated as follows.

- First, discount the costs and benefits in future years
- The discounted benefits of the project in year i are equal to Bi/(1+d)i
- The discounted costs of the project in year i are equal to Ci/(1+d)i
- Sum both the discounted benefits and the discounted costs over all years (0 through n)
- Subtract the sum of the discounted costs from the sum of the discounted benefits:
  \[ \sum (B_i/(1+d)^i) - \sum (C_i/(1+d)^i) \text{ summed over } i = 0 \text{ to } n \]

Where

- \( n+1 \) = the number of years over which benefits and costs are analysed
- \( B_i \) = the benefits of the project in year i, i=0 to n
- \( C_i \) = the costs of the project in year i
- \( d \) = the discount rate

http://bca.transportationeconomics.org/types-of-measures/net-present-value

Price Elasticity of demand

Price elasticity of demand refers to the effect of changes in the price of a good, and the consequential demand for that good. If an increase in the price charged for a good /service leads to a proportional or less that proportional decline in demand, then demand is price elastic. If an increase in one unit of price leads to a reduction of demand by more than one unit, then demand is inelastic in response to price.
### APPENDIX 1: THE COMMON INTERNATIONAL CLASSIFICATION OF ECOSYSTEM SERVICES (PROVISIONING SERVICES)

<table>
<thead>
<tr>
<th>Section</th>
<th>Division</th>
<th>Class</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisioning</td>
<td>Cultivated crops</td>
<td>Cereals (e.g. wheat, rice, barley), vegetables, fruits etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perished animals and their</td>
<td>Meat, dairy products (milk, cheese, yoghurt), honey etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>outputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wild plants, algae and their</td>
<td>Wild berries, fruits, mushrooms, water cress, edibles (alcohol or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>outputs</td>
<td>sample)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wild animals and their</td>
<td>Game, freshwater fish (trout, etc.), marine fish (sardine, etc.) and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>outputs</td>
<td>shellfish (e.g. crustaceans, molluscs), as well as eggs, young</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>harvested from wild populations; includes commercial and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>subsistence fishing and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plants and algae from in situ</td>
<td>In situ aquaculture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>aquaculture</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface water for drinking</td>
<td>Collected precipitation, abstracted surface water from rivers, lakes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>and other open water bodies for drinking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ground water for drinking</td>
<td>Freshwater abstracted from (non-fossil) groundwater layers or via</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ground water desalination for drinking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fibres and other materials</td>
<td>Fibres, wood, timber, flowers, skin, bones, sponges and other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>from plants, algae and</td>
<td>products, which are not further processed; material for production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>animals for direct use or</td>
<td>e.g. industrial products such as cellulose for paper, cotton for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>processing</td>
<td>clothes, packaging material, chemicals extracted or synthesized from</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>algae, plants and animals such as tannins, rubber, fibres, oils,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>resins, and medicines (e.g. cholesterol from shark's liver), dyes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>and colours, ambergris (from sperm whale used in perfumery);</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>includes consumptive ornamental uses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Materials from plants, algae</td>
<td>Plant, algae and animal material (e.g. grass) for fodder and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and animals for agricultural</td>
<td>fertilizer in agriculture and aquaculture;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Genetic materials from all</td>
<td>Genetic material (DNA) from wild plants, algae and animals for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>taxa</td>
<td>biotechnological and pharmaceutical processes e.g. medicines,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>fermentation, biotechnological, bio-prospecting activities e.g. wild</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>species used in breeding programme etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface water for non-drinking</td>
<td>Collected precipitation, abstracted surface water from rivers, lakes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>purposes</td>
<td>and other open water bodies for domestic use (washing, cleaning and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>other non-drinking use), irrigation, livestock consumption,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>industrial use (consumption and cooking) etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ground water for non-drinking</td>
<td>Freshwater abstracted from (non-fossil) groundwater layers or via</td>
<td></td>
</tr>
<tr>
<td></td>
<td>purposes</td>
<td>ground water desalination for domestic use (washing, cleaning and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>other non-drinking use), irrigation, livestock consumption,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>industrial use (consumption and cooking) etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy</td>
<td>Wood fuel, oil, energy plants, crops and algae for burning and energy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plant-based resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animal-based resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animal-based energy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contd.
## APPENDIX 1 CONTD.: THE COMMON INTERNATIONAL CLASSIFICATION OF ECOSYSTEM SERVICES (REGULATION AND MAINTENANCE SERVICES)

<table>
<thead>
<tr>
<th>Section</th>
<th>Division</th>
<th>Class</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulation &amp; Maintenance</strong></td>
<td>Medication of microorganisms, algae, plants, and animals</td>
<td>Biochemical and biological modification of waste materials (e.g., biodegradation, biodecomposition, biologization)</td>
<td>Biochemical and biological modification of waste materials (e.g., biodegradation, biodecomposition, biologization) of water, sediments, and other materials.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fertilization or regeneration of nutrients by microorganisms, algae, plants, and animals</td>
<td>Biological fertilization or regeneration of nutrients by microorganisms, algae, plants, and animals (e.g., nitrification, denitrification)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plant or animal species, plants, and animals</td>
<td>Biological fertilization or regeneration of nutrients by microorganisms, algae, plants, and animals (e.g., nitrification, denitrification)</td>
</tr>
<tr>
<td></td>
<td>Medication of fish</td>
<td>Mass stabilization and control of fish populations</td>
<td>Containment and management of fish populations (e.g., fish barriers, fish exclusion)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hydrological cycle and water storage, manipulation</td>
<td>Capability of modifying the natural hydrological cycle and water storage (e.g., water retention, flood control)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flood protection, water retention</td>
<td>Flood protection, water retention (e.g., flood control, water retention)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sedimentation and erosion control</td>
<td>Sedimentation and erosion control (e.g., sediment stabilization, erosion control)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vegetation and reclamation</td>
<td>Vegetation and reclamation (e.g., reforestation, vegetation management)</td>
</tr>
<tr>
<td><strong>Maintenance of physical, chemical, biological conditions</strong></td>
<td></td>
<td>Overall control and maintenance</td>
<td>Overall control and maintenance (e.g., maintenance of physical, chemical, and biological conditions)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance of physical, chemical, and biological conditions</td>
<td>Maintenance of physical, chemical, and biological conditions (e.g., temperature, pH, nutrient levels, water quality)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decomposition and nutrient cycling</td>
<td>Decomposition and nutrient cycling (e.g., decomposition, nutrient cycling)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chemical composition and water quality</td>
<td>Chemical composition and water quality (e.g., chemical composition, water quality)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Global climate regulation, land use, and water quality regulation</td>
<td>Global climate regulation, land use, and water quality regulation (e.g., greenhouse gas emissions, land use, water quality)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine and coastal climate regulation</td>
<td>Marine and coastal climate regulation (e.g., climate regulation, marine and coastal climate regulation)</td>
</tr>
</tbody>
</table>

---

53
# APPENDIX 1 CONTD.: THE COMMON INTERNATIONAL CLASSIFICATION OF ECOSYSTEM SERVICES (CULTURAL SERVICES)

<table>
<thead>
<tr>
<th>Section</th>
<th>Division</th>
<th>Class</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural</td>
<td>Physical and intellectual interactions with biota, ecosystems, and land-/seascapes [environmental settings]</td>
<td>Experiential use of plants, animals and land-/seascapes in different environmental settings</td>
<td>In-situ whale and bird watching, snorkelling, diving etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Physical use of land-/seascapes in different environmental settings</td>
<td>Walking, hiking, climbing, boating, leisure fishing (angling) and leisure hunting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scientific</td>
<td>Subject matter for research both on location and via other media</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Educational</td>
<td>Subject matter of education both on location and via other media</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heritage, cultural</td>
<td>Historic records, cultural heritage e.g. preserved in water bodies and soils</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Entertainment</td>
<td>Ex-situ viewing/experience of natural world through different media</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aesthetic</td>
<td>Sense of place, artistic representations of nature</td>
</tr>
<tr>
<td>Spiritual, symbolic and other interactions with biota, ecosystems, and land-/seascapes [environmental settings]</td>
<td>Symbolic</td>
<td>Emblematic plants and animals e.g. national symbols such as American eagle, British rose, Welsh daffodil</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sacred and/or religious</td>
<td>Spiritual, ritual identity e.g. ‘dream paths’ of native Australians, holy places; sacred plants and animals and their parts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Existence</td>
<td>Enjoyment provided by wild species, wilderness, ecosystems, land-/seascapes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bequest</td>
<td>Willingness to preserve plants, animals, ecosystems, land-/seascapes for the experience and use of future generations; moral/ethical perspective or belief</td>
</tr>
</tbody>
</table>

Source: adapted from Haines-Young and Potschin, 2011
## APPENDIX 2: ADVANTAGES AND DISADVANTAGES OF SOME FUNDING AND FINANCING APPROACHES

<table>
<thead>
<tr>
<th>SOURCE OR MECHANISM</th>
<th>DEFINITION</th>
<th>WHO CAN USE IT</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
</table>
| Government appropriations | Funds appropriated in national budgets for protected area management agency | National protected area agencies | ■ Regular, recurrent income  
■ Maximum compatibility with national environmental priorities | ■ Usually inadequate to needs  
■ Funds sometimes not available in timely fashion or when needed  
■ Complex budgeting and accounting rules |
| Taxes, levies, surcharges   | Fees and levies imposed on certain classes of activities, sales or purchases | Government prerogative to impose and collect; proceeds may be earmarked for annual use, trust funds, etc. | ■ Regular, recurrent income, use generally unrestricted  
■ Can capture economic benefits from resource uses (tourism, water consumption, mining, oil and gas, hunting/fishing, boating, tourism, etc.) | ■ Can result in promotion of inappropriate activities as a means to capture income  
■ May require special authorizing legislation  
■ May generate controversy, especially among constituencies to be taxed (requires public education on advantages and purposes of levy) |
| User fees                  | Charge for visitation, usually “per person” or “per vehicle”; may include such variations as seasonal or annual passes, charges to tour firms bringing escorted groups | The entity with jurisdiction over a protected area can collect fees itself or designate another party to do so on its behalf, depending on applicable law | ■ Regular, recurrent income, use generally unrestricted  
■ Embodies “user pays” principle  
■ Can be used to regulate access, control overuse, manage visitation flow among protected areas  
■ Easy to implement in areas with limited number of access points | ■ Not appropriate for little-visited areas (projected revenue should exceed cost of collection)  
■ Potential equity issues (can be addressed by lowering fees for national/local residents, scheduling one free day per week)  
■ Introducing fees for areas that previously were free can generate controversy (requires local outreach and education before implementation) |
<table>
<thead>
<tr>
<th>SOURCE OR MECHANISM</th>
<th>DEFINITION</th>
<th>WHO CAN USE IT</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leases and concessions</td>
<td>Legally binding agreements between the entity with authority over the protected area and private organizations or entrepreneurs, who market goods and services related to the protected area and return some share of the profits, or a flat fee</td>
<td>Protected area agencies, private reserves, NGOs, businesses</td>
<td>- An effective mechanism to provide services with little up-front investment by the protected area. - Concessionaire incurs the risks associated with potential non-profitability - Concessionnaires bring marketing and business skills to the table - Fees management agency to focus on resource protection - Provides opportunities for local entrepreneurs</td>
<td>- Concessionaires operate for profit motive, may not share values of protected area and need to be carefully monitored - Estimation of fees is complex and difficult; need to ensure healthy and safe service at reasonable price to visitor; fair return to both protected area and entrepreneur. - Not appropriate for little-visited areas.</td>
</tr>
<tr>
<td>Sale of goods and services</td>
<td>Gift and souvenir shops, sale of items such as maps and guides, fee-for-service tours, anchorage, mooring, equipment rental, camp or picnic space rental, entry to exhibits, etc.</td>
<td>Parks agencies, NGOs, concessionaires</td>
<td>- Goods and services can do double duty as sources of income and visitor education, promotion - Generally does not require additional legal authorization; easy to keep proceeds within area</td>
<td>- Initial investment required for production of inventory of goods, recruitment of providers of services - Goods and services should be limited to those related to protected area purposes - Potential for competition with other local providers of goods and services</td>
</tr>
<tr>
<td>Cause-related marketing</td>
<td>Sale of mostly intangible items (membership, “adopt an Acre,” voluntary add-ons to hotel and restaurant bills, etc.) whose primary value is the purchaser’s knowledge of having helped conservation</td>
<td>Most often used by NGOs</td>
<td>- Combines promotion, education, and fundraising - In some cases contributions may be tax-deductible - Markets can be easily identified (park visitors, NGO members, etc.) - Involves local business community in protection</td>
<td>- Many areas have no built-in market, must develop visitor logs, etc. - Requires fairly sophisticated understanding of marketing and what will sell, or an experimental approach</td>
</tr>
<tr>
<td>SOURCE OR MECHANISM</td>
<td>DEFINITION</td>
<td>WHO CAN USE IT</td>
<td>ADVANTAGES</td>
<td>DISADVANTAGES</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Biodiversity prospecting                   | Contracts in which a pharmaceutical company or other entrepreneur secures rights to genetic resources (plant materials collected and processed for analysis) in return for cash payments and/or royalties on any medicines/products that may be developed | Generally government or parastatal agencies, sometimes private research institutions with consent of appropriate government agencies | ▪ Up-front cost is minimal  
▪ Opportunity to train and employ local researchers in collection and initial processing | ▪ Speculative enterprise, impossible to know potential financial return up front  
▪ Requires skilled legal representation for contracts |
| Debt for nature swaps                      | Transactions involving the forgiveness or buy-back of foreign debt in return for commitments to conservation (usually local-currency payments into a conservation project or fund) | Key actors include national government (Ministry of Finance); country or commercial bank to whom the debt is owed; intermediary organization that raises funds to purchase discounted debt (in commercial swaps); national beneficiary entity (often a parks trust fund) To participate, the country must have a significant amount of commercial or bilateral debt in arrears. | ▪ Reduction of national debt, substituting local-currency payments to national fund or bonds for hard-currency debt service  
▪ Donor increases conservation investment by buying debt notes below face value and redeeming them at full value  
▪ Net transfer of funds to conservation purposes  
▪ Can help to capitalize national protected areas trust funds | ▪ Potentially controversial due to debt legitimacy issues  
▪ Valuable only when debt is deeply discounted or creditor is willing to write off  
▪ Requires policy authorization and full participation of national government |
| Global environment facility                | A funding mechanism that supports activities under the Biodiversity and Climate Change conventions, implemented by World Bank, UNDP, and UNEP | Governments and NGOs | ▪ Source of new money for conservation planning and implementation | ▪ Restricted to areas of global significance and to the incremental costs of their protection  
▪ Application procedures can be time-consuming and cumbersome  
▪ Generally not applicable to ongoing or recurrent costs |
<table>
<thead>
<tr>
<th>SOURCE OR MECHANISM</th>
<th>DEFINITION</th>
<th>WHO CAN USE IT</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral donors</td>
<td>Aid agencies of developed countries, e.g., USAID, JICA, GTZ, etc.</td>
<td>Most aid in government-to-government but there are significant opportunities for funding of NGO activities</td>
<td>Significant source of revenue, particularly for start-up and public involvement aspects of protected area management</td>
<td>Funds will be restricted to specific uses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Generally not a source for recurrent costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Long application procedures and complex reporting requirements</td>
</tr>
<tr>
<td>Philanthropic foundations</td>
<td>Grant-giving organizations</td>
<td>Generally available only to nonprofit organizations</td>
<td>Can be a significant source of revenue for specific project activities or start-up of new programs</td>
<td>Not a source of recurrent funding</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intense competition for limited funding often leads to significant investment of effort in proposals with low-to-medium chance of funding</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Language may be an issue (most foundations accept proposals only in their own language)</td>
</tr>
<tr>
<td>Corporations</td>
<td>Sponsorship or other types of voluntary payments by companies</td>
<td>Parks agencies, NGOs</td>
<td>Generally a means of raising both national and international support for facilities or management</td>
<td>Often corporations desiring to be sponsors are those with whom the protected area may not wish to be associated (resource exploitation sector)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Corporate donors’ expectations often can be met with simple acknowledgment placards</td>
<td>What corporate sponsors get in return needs to be carefully limited before donations are solicited and accepted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Means to link companies that benefit from protected areas to supporting them (tourism, hospitality industries)</td>
<td></td>
</tr>
<tr>
<td>Individual donations</td>
<td>Gifts by individuals through a variety of mechanisms—direct gifts, memberships, wills and bequests, etc.</td>
<td>Generally NGOs but sometimes protected areas agencies</td>
<td>Potential donors come to you and only need to be asked</td>
<td>Requires insight into potential givers and what motivates them</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No cumbersome application process</td>
<td>Some gifts, especially bequests, may take years to cultivate and eventually realize</td>
</tr>
</tbody>
</table>
APPENDIX 3: CONVENTION ON BIOLOGICAL DIVERSITY: AICHI TARGET 2

Target 2 - By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Technical Rationale: …Including the values of biodiversity in national and local development and poverty reduction strategies and planning processes and into nation accounting, as appropriate, and reporting systems, places biodiversity into the same decision framework as other goods and services, and would help give it greater visibility amongst policy-makers and contribute to the “mainstreaming” of biodiversity issues in decision-making processes. Implementation: Integrating the values of biodiversity into national and local development and poverty reduction strategies and planning processes as well as into national accounting, as appropriate and reporting systems will require Parties to appropriately value biodiversity and increase coordination among government ministries and levels of government. Given different national circumstances, this integration may require capacity building as well as developing flexible approaches. Efforts to improve the valuation of biodiversity should include tools and methods that recognize social and cultural values, in addition to economic values, and should be conducted in ways that encourage the sustainable use of biodiversity at all levels. Tools to assess the values of biodiversity are now being made more widely available, including the Convention’s work on economic, trade and incentive measures, as well as through the Economics of Ecosystems and Biodiversity (TEEB) study, and the UN System of Economic and Environmental Accounting (SEEA). The World Bank’s experience in integrating natural capital (e.g., forests) into national accounts could be further developed and built upon to incorporate the value of biodiversity and ecosystem services…

Indicators and baseline information: Possible indicators for this target include: the number of countries with biophysical inventories of biodiversity and ecosystem services; the number of countries with national accounts reflecting the state of biodiversity and ecosystem services and, if appropriate, stocks and flows of natural capital; the number of countries with poverty reduction strategies and national development plans which incorporate biodiversity; and the number of companies (or their market share) with policies for biodiversity-friendly practices.

Milestones:
Possible milestones for this target include:

By 2012, work on biophysical inventories of biodiversity and associated ecosystem services is initiated and, by 2014, a work programme for reflecting biodiversity and ecosystem values in national accounts is developed;
By 2014, the opportunities derived from the conservation and sustainable use of biodiversity, and the fair and equitable sharing of benefits arising from the use of genetic resources, are integrated into Poverty Reduction Strategy Papers (PRSPs) and other national development plans, and are routinely included in environmental impact assessment, strategic environmental assessment and spatial planning;
By 2018, the most important aspects of biodiversity and ecosystem services are reflected in national statistics. https://www.cbd.int/sp/targets/rationale/target-2/
APPENDIX 4: DRAFT TERMS OF REFERENCE FOR THE COOK ISLANDS NBSAP ECONOMIC COMPONENT

Terms of reference

1. Identify and assess the full range of values of key ecosystem services in the Cook Islands based on existing local, national, regional and global studies on the value of ecosystems and biodiversity, including: the valuation of protected areas.

2. Identify the implications of these services for different stakeholder groups within the country.

3. Where possible, quantify, the economic value of key ecosystem services, including the value of the ecosystem service in contributing to climate resilience, adaptation and mitigation; reducing poverty, and sustaining livelihoods.

4. Where appropriate, assist in identifying potential means of capturing the economic value of targeted ecosystem services, including through policies such as payments for ecosystem services and other positive incentives.

5. Liaise with biodiversity managers to identify priority biodiversity investment needs and opportunities based on the NBSAP.

6. Identify and consider internal sources of finance for action in the NBSAP including i) the national budget cycle and the allocation to public administrations (ministries), ii) the budget of local governments, iii) national funds to support local development, and iv) fiscal and economic instruments.

7. Identify and consider external sources of finance for actions in the NBSAP including i) bilateral sources, ii) multilateral sources, iii) regional development banks, iv) international foundations and non-governmental organisations (NGOs).

8. Identify and consider innovative sources of finance for actions in the NBSAP, especially fiscal measures related to: i) tourism and infrastructure development (to encourage the mainstreaming of biodiversity into tourism operations), and ii) bank loans for investment projects, in the context of the NBSAP Integrated Financing Action Plan, summarising concrete activities required to mobilise biodiversity finance for the 10-year period of the implementation of the NBSAP.