



# APPLYING AN ECOSYSTEM SERVICES APPROACH TO POLICY DEVELOPMENT

---



**OPPORTUNITIES, BENEFITS AND RECOMMENDED APPROACH FOR WAIKATO REGIONAL COUNCIL**



Prepared by:  
Dylan Gardiner  
GMD Consultants Limited

Beat Huser  
Waikato Regional Council

For:  
Waikato Regional Council  
Private Bag 3038  
Waikato Mail Centre  
HAMILTON 3240

August 2017

Document #: 10284754



# APPLYING AN ECOSYSTEM SERVICES APPROACH TO POLICY DEVELOPMENT

Opportunities, Benefits and Recommended Approach  
for Waikato Regional Council

Dylan Gardiner  
GMD Consultants Ltd

Beat Huser  
Waikato Regional Council

August 2017

## Table of Contents

Acknowledgements.....	3
Executive Summary.....	4
<b>1. INTRODUCTION .....</b>	<b>6</b>
1.1 Purpose and Structure .....	6
1.2 Background .....	6
1.3 The Case for Change .....	10
1.4 What are Ecosystem Services? .....	11
1.5 Understanding Ecosystem Services .....	15
1.6 What is an Ecosystem Services Approach?.....	15
1.7 Ecosystem Services and Sustainable Development.....	16
1.9 Ecosystem services and te ao Māori.....	19
<b>2. POTENTIAL BENEFITS AND OPPORTUNITIES .....</b>	<b>21</b>
2.1 Overview of Potential Benefits and Opportunities.....	21
2.2 Better environmental outcomes.....	22
2.3 Demonstrating value to the Community .....	22
2.4 Enhanced decision making.....	22
2.5 Identifying multiple benefits and managing for optimum outcomes.....	23
2.6 Better understanding of public and private costs and benefits .....	23
2.7 Increasing integration .....	23
2.8 Strategic alignment of interests.....	24
2.9 Enhanced community engagement .....	24
2.10 Increased effectiveness and efficiency of service delivery.....	25
2.11 Natural capital accounting .....	25
<b>3. AN ECOSYSTEM SERVICES APPROACH FOR WAIKATO REGIONAL COUNCIL.....</b>	<b>26</b>
3.1 Overview of Approach .....	26
3.2 Implementation Objective .....	27
3.3 Key Principles of the Approach .....	27
3.4 A Stepped Ecosystem Services Assessment.....	31
3.5 Tiered and Phased Approach .....	37
3.6 Effective implementation of Strategic Direction and Waikato Regional Policy Statement..	37
3.7 Evaluating Progress.....	39
3.8 Valuing Ecosystem Services .....	39
3.9 Regulatory and Non-Regulatory Approaches. ....	40
3.10 Communication and Awareness .....	41

3.11	Pilot Projects .....	43
3.12	Challenges .....	45
3.13	Key Actions.....	46
3.14	Conclusion.....	48
<b>REFERENCES</b>	.....	<b>49</b>

## List of boxes

Box 1: Millennium Ecosystem Assessment (MA, 2005).....	7
Box 2: Waikato Regional Council Strategic Direction .....	9
Box 3: Key Definitions (adapted in part from Millennium Assessment, 2005).....	13
Box 4: The Relationship Between Ecosystem Services and Biodiversity.....	14
Box 5: An Ecosystem Services Approach and Sustainable Management.....	17
Box 6: Te Ao Māori – The Māori World View.....	20
Box 7: The Regional Council’s 15 Priority Ecosystem Services .....	33
Box 8: Scenario modelling: Waikato Integrated Scenario Explorer (WISE) .....	35
Box 9: An Ecosystem Services Approach Case Study – Local Indigenous Biodiversity Strategies (LIBS) ...	44

## List of figures

Figure 1: High-level ecosystem services framework for New Zealand (Hart <i>et al.</i> , 2013).....	14
Figure 2: The dependency of the economy and people’s wellbeing from the environment. ....	17
Figure 3: The process of valuing ecosystem services (adopted from Defra, 2015). ....	19
Figure 4: Proposed ecosystem services approach for Waikato Regional Council. ....	38

## Acknowledgements

In preparing this document, the following people have contributed their ideas to what an ecosystem services approach would look like and mean for Waikato Regional Council. The authors are grateful for their valuable input.

- Tariq Ashraf
- Blair Dickie
- Tutahanga Douglas
- Hilke Giles
- Andrea Julian
- Hannah Jones
- Blair Keenan
- Katherine Luketina
- Sarah Mackay
- Katie Mayes
- Moniqua Nelson-Turley
- Femi Olubode
- Michael Pingram
- Trish Routley
- Alan Saunders
- Urlwyn Trebilco
- Liz Tupuhi
- Matthew Vare
- John Vosper

## Executive Summary

Although the idea of a positive relationship between nature and human wellbeing has been around for centuries, it has attracted increasing attention in recent years under the banner of ecosystem services, particularly since the publication of the Millennium Ecosystem Assessment in 2005 (MA, 2005). In 2008 a global initiative, the Economics of Ecosystems and Biodiversity (TEEB, 2008) was also founded to mainstream the values of biodiversity and ecosystem services into decision-making at all levels and to demonstrate their values for business and the economy.

The importance of ecosystem services for human wellbeing is now well established. In the last ten years there has been a significant increase in scientific papers focusing on ecosystem services (Fisher *et al*, 2009; Defra, 2015), fuelled by the Millennium Ecosystem Assessment, which pointed out the many interrelations between nature and society.

In simple terms, ecosystem services can be defined as the outputs of ecosystems from which people derive benefits. Because they come from nature, the benefits are usually considered to be ‘free’, with the exception generally being those ecosystem services that are part of the market economy, such as food production or timber). However, nature’s outputs depend on a range of complex underlying ecosystem processes and functions that operate across a range of spatial and temporal scales, and which in turn are influenced by the way in which humans manage the land and sea.

From a policy perspective, an ‘ecosystem services approach’ seeks to incorporate into decision-making the value of these benefits provided to people and the economy by the natural world. In theory, greater recognition of the range and amount of benefits that nature provides can help complement or augment existing policies. It can do so by increasing support for management of natural and physical resources, and leading to an improved understanding that society and the economy depend on nature and the socio-economic benefits of ecosystem services and how they can be maintained and possibly even enhanced. In essence, it adds to the richness of information considered by decision makers, and hence improves societal outcomes.

There is no ‘one size fits all’ ecosystem services approach for all of Regional Council business, nor is there likely to be from project to project. The approach recommended in this report is two-tier:

1. A set of key principles to guide all of Council business;
  - Principle 1: An integrated and holistic approach to decision/policy-making and delivery, with the focus on maintaining healthy ecosystems and ecosystem services.
  - Principle 2: As guardians of the Region’s healthy environment, vibrant communities and a strong economy a priority is placed on sustaining the Region’s natural capital, from which all ecosystem services derive.
  - Principle 3: The values of ecosystem services are fully reflected in decision-making, including understanding how that value may change as a result of decisions.
  - Principle 4: Environmental limits for natural resource use and ecosystem service functioning and delivery are considered in the context of sustainable management.
  - Principle 5: Working with and involving others, to understand values and achieve multiple benefits.

- Principle 6: There is adaptive management of natural capital and ecosystem services to respond to changing pressures.
  - Principle 7: The ecosystem services approach should be undertaken at the appropriate spatial and temporal scale.
  - Principle 8: The ecosystem services approach considers all forms of relevant information, including scientific knowledge, local knowledge, Mātauranga Māori, innovations and best practices.
2. A stepped assessment to act as an ecosystem services lens over existing Council processes.
- Step 1: Defining scope and identifying key stakeholders.
  - Step 2: Prioritising ecosystem services
  - Step 3: Identifying condition, trends, constraints/limits and trade-off of ecosystems and associated services.
  - Step 4: Assessing stakeholder framework
  - Step 5: Informed decision making
  - Step 6: Implementation

# 1. INTRODUCTION

## 1.1 Purpose and Structure

The purpose of this report is to provide a discussion of:

- The benefits and opportunities for Waikato Regional Council (**'the Regional Council'**) using an ecosystem services approach to policy development, operational management, decision making, and achieving its strategic direction.
- A high level and principle based approach to applying an ecosystem approach at the Regional Council.

The report is intended as a 'think piece', to encourage further discussion on an ecosystem services approach, and to act as a bridging step between the high level concept of an ecosystem services approach and an action and implementation plan.

The report is set out in three parts, with each part aiming to build and reflect on the content of the previous sections:

### 1. Part 1: Introduction

This section sets out the background and contextual information for taking an ecosystem services approach.

### 2. Part 2: Opportunities and Benefits

This section identifies the key opportunities and benefits that could be expected, and would be desirable, as a result of taking an ecosystem services approach.

### 3. Part 3: An Ecosystem Services Approach for Waikato Regional Council

Based on the opportunities and benefits described in Part 2, the section distils a set of key principles that could underpin an ecosystem services approach at the Regional Council, a stepped ecosystem services assessment, and key actions (or next steps) for working towards an implementation plan.

## 1.2 Background

Since the publication of the Millennium Ecosystem Assessment (see Box 1), there has been an ever-increasing recognition of the multiple benefits from nature to society. The appreciation of the intrinsic values of biodiversity (the diversity of species, ecosystems, habitats, etc.) is now complemented by an understanding of the importance of nature in supporting human and community wellbeing, sustainable development and the economy. In relative terms, this recognition has largely been based in the scientific realm, with numerous studies and papers describing the values and benefits of ecosystems for humans (Defra, 2015; Deutsche Gesellschaft für Internationale Zusammenarbeit, 2012; IEEP and Milieu, 2013; TEEB, 2008).

### Box 1: Millennium Ecosystem Assessment (MA, 2005)

In 2000, the United Nations Secretary-General called for the first comprehensive assessment of the state of the global environment. Involving over 1,300 scientists, their findings provided an appraisal of the state of the world's ecosystems and ecosystem services, and policy options to restore, conserve or enhance ecosystems. Its main findings included:

- Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history. This has contributed to substantial net gains in human wellbeing and economic development but at a growing cost in terms of the degradation of many ecosystem services. Two-thirds of ecosystem services were found to be in decline globally or managed unsustainably.
- The degradation of ecosystem services could grow significantly worse during the first half of this century
- The challenge of reversing the degradation of ecosystems while meeting increasing demands for their services will require significant changes in policies, institutions and practices.

The Millennium Ecosystem Assessment identified a number of steps that governments can take to address environmental degradation. While they are collectively all relevant to the Regional Council to a greater or lesser degree, in relation to policy development and decision making key steps include:

- Making sure the value of all ecosystem services, not just those bought and sold in the market, are taken into account when making decisions.
- Integrating decision-making between different Departments and sectors, as well as international institutions, to ensure that policies are focused on protection of ecosystems.
- Including sound management of ecosystem services in all regional planning decisions and in the poverty reduction strategies being prepared by many developing countries.
- Using all relevant forms of knowledge and information about ecosystems in decision-making, including the knowledge of local and indigenous groups.
- Providing public education on why and how to reduce consumption of threatened ecosystem services.
- Giving people access to information about ecosystems and decisions affecting their services.

While the importance of nature and the benefits it provides is increasingly appreciated now, this has not always been the case. To date many of the benefits of nature are still not understood or taken into account in decision making processes (IEEP and Milieu, 2013).

In more recent times there is an increased recognition by public authorities, private businesses and communities that working with nature can, and should be, an integral element in local, regional and central policy (Defra, 2015). Given that ecosystem services underpin all components of wellbeing, ecosystem services are important for local government. The functions and responsibilities of regional councils closely align with maintenance and enhancement of wider ecosystem services such as water quality and quantity.

There is a simple and clear distinction between how the terms 'ecosystem services' and 'natural capital' should be used. Ecosystem services are the flows of benefits which people gain from natural ecosystems, and natural capital is the stock of natural ecosystems from which these benefits flow. For example, a forest is a component of natural capital, while climate regulation or timber might be the ecosystem service it provides; healthy soil is a component of natural capital, while food or energy production might be the ecosystem services it provides. In summary, natural capital is the stock of resources (ecosystems) that generate ecosystem services.

Despite the importance of natural capital and associated ecosystem services for our resource-based economy, our lifestyle and te ao Māori, New Zealand has been relatively slow to explore these concepts. Following the *2013 Valuing Nature* international conference held in Wellington the Government's Natural Resources Sector group (NRS) (jointly with local government and the Sustainable Business Council) started a project '*Capturing Natural Capital in Decision-Making*' to review the relevance and applicability of an ecosystem services approach for New Zealand. The provisional conclusion of the project was that better coordination and leverage of existing activities is needed, including:

- Promoting research, e.g. through the National Science Challenges<sup>1</sup>, the Conservation and Environment Science Roadmap<sup>2</sup> and the Regional Council Research, Science and Technology Strategy 2016.<sup>3</sup>
- Supporting Statistics NZ in developing and implementing the United Nations System of Environmental-Economic Accounting (SEEA) framework, including its experimental Ecosystem Accounts.<sup>4</sup>
- Incorporating relevant activities in the work programmes of the Natural Resources Sector agencies. Building on this initiative, the Ministry for the Environment recently initiated a work programme around natural capital and ecosystem services (Penny Nelson, pers. comms).

Regional councils, given the lack of guidance, have similarly been slow to adopt ecosystem services into planning and decision-making. For example, only Auckland Council and the Waikato Regional Council have explicitly included ecosystem services in their RPS in objectives, policies or methods.

---

<sup>1</sup> [www.sftichallenge.govt.nz](http://www.sftichallenge.govt.nz)

<sup>2</sup> [www.mfe.govt.nz/about-us/our-policy-and-evidence-focus/conservation-and-environment-science-roadmap](http://www.mfe.govt.nz/about-us/our-policy-and-evidence-focus/conservation-and-environment-science-roadmap)

<sup>3</sup> [www.envirolink.govt.nz/research-strategy/](http://www.envirolink.govt.nz/research-strategy/)

<sup>4</sup> [www.stats.govt.nz/browse\\_for\\_stats/environment/environmental-economic-accounts.aspx](http://www.stats.govt.nz/browse_for_stats/environment/environmental-economic-accounts.aspx)

The Regional Council has recognised these shifts and evolutions of thinking, and several provisions in Regional Council documents now point to the need for ecosystem services to be considered and valued more explicitly across the region. These include:

1. Taking a strong sustainability the Regional Council in its **Strategic Direction 2016-2019** (see Box 2) has adopted a number of long term outcomes, including:

- *The full range of ecosystem types, including land, water and coastal and marine ecosystems, is in a healthy and functional state.*
- *Economic growth ensures natural capital and ecosystem services are maintained.*

The Regional Council has also noted in its Strategic Direction that it seeks to make decisions that provide multiple benefits for the community now and in the future (see Box 2).

2. The **Waikato Regional Policy Statement ('RPS')** contains about 50 references to ecosystem services, including the Regional Council's role in maintaining and enhancing them. Provisions include Objective 3.8<sup>5</sup>:

- *The range of ecosystem services associated with natural resources are recognised and maintained or enhanced to enable their ongoing contribution to regional wellbeing.*

3. The **Waikato Plan**, which provides strategic guidance and advocacy across the four wellbeings in the Waikato Region, includes the above RPS 2016 objective.

Together, the documents and their directions form a strong case for the need to consider how the Regional Council will respond to, and achieve, the outcomes described.

#### Box 2: Waikato Regional Council Strategic Direction<sup>6</sup>

Through its Strategic Direction, Waikato Regional Council aims to achieve a number of long term outcomes over the upcoming decades that contribute to a sustainable future for the Waikato region. The Strategic Direction sets out the Regional Councils overall focus through its vision and mission:

*Vision: The Waikato cares locally, competes globally*

*Mission: Working together to build a Waikato region that has a healthy environment, a strong economy and vibrant communities*

Waikato Regional Council's work aims to achieve a number of long term outcomes over the upcoming decades that contribute to a sustainable future for our region. These outcomes are connected to one another, so success in one area cannot be at the expense of another. As a result, *Waikato Regional Council seeks to make decisions that provide multiple benefits for the community now and in the future.*

<sup>5</sup> [www.waikatoregion.govt.nz/Council/Policy-and-plans/Regional-Policy-Statement/RPS2016/Part-A/3/8/](http://www.waikatoregion.govt.nz/Council/Policy-and-plans/Regional-Policy-Statement/RPS2016/Part-A/3/8/)

<sup>6</sup> [www.waikatoregion.govt.nz/council/about-us/wrc-strategy/](http://www.waikatoregion.govt.nz/council/about-us/wrc-strategy/)

### 1.3 The Case for Change

To implement any change in Council resources or focus the point of difference, as well as the potential for desirable benefits and opportunities to be realised, need to be clearly defined. The potential benefits and opportunities are set out in Part 2 of this report.

By integrating the ecosystem services approach and the decision-making process, ecosystem-based management strategies can be developed. While isolated, the decision-making process considers preferences and human activities without necessarily accounting for the full range of values of nature or the benefits provided by ecosystem services. However, by striving for more sustainable and resilient policies, policy and decision making can be based on an integrative approach toward the issue at hand, identifying and valuing the natural capital of the area, respecting the environment's carrying capacity and reaching long-term and fair benefits (and costs) for all involved.

There are a number of other matters that also support the case for change from 'business as usual' at the Regional Council:

- The current policy framework is starting to respond to the growing discourse on natural resources and associated ecosystem functions and services, and their critical contribution to social, cultural and economic wellbeing. The RPS and strategic direction provide clear and unequivocal requirements for the Regional Council to act.
- Loss and damage to natural resources and associated ecosystems functions and services can (in part) be linked to organisational and resource management policy deficiencies. The status quo approach is not resulting in the sustainable use of our natural capital and associated ecosystem services.
- There is an increasing awareness and 'mainstreaming' of ecosystem services and their importance, both overseas and in New Zealand.
- There is a clear need for a better definition of how social, cultural and economic wellbeing depends on natural capital and ecosystem services.
- There needs to be a better understanding of the relationship between human activity, ecosystems services and human wellbeing, and this understanding needs to inform new types of adaptive management and decision making.
- The Regional Council has a lead role for encouraging and co-ordinating individual, community and inter-organisational actions to achieve more sustainable outcomes. This is reflected in the strategic direction. The Regional Council can play a lead role in promoting and encouraging a cross-organisation approach to managing ecosystem services, to achieve a broad set of organisational objectives.
- The ecosystems approach helps inform the debate about (transformational) land use change and how best to use the Region's resources for multiple benefits.
- To achieve resource management integration environmental policy needs to be better integrated with policy for other 'sectors' such as built environment, transport, energy etc.

- The benefits and opportunities described in Part 2 of this report demonstrate the potential for better environmental outcomes, and greater 'value for money' from the Regional Council's actions. Importantly, there is also the opportunity to manage for multiple benefits e.g. achieving soil erosion, flood control, biodiversity and carbon sequestration benefits all at the same time.
- The existing Regional Council policy framework for ecosystem services and natural capital remains far from optimal. Many policy instruments are still primarily focused on regulating ecosystems from the point of view of specific natural resources - biodiversity, soil or water - rather than addressing the full range of ecosystem services provided. Existing case studies reflect that there are multiple benefits to be achieved from taking an ecosystem services approach, including environmental, social, cultural and economic aspects.
- More broadly, organisations, business and sector groups are 'waking up' to the benefits of natural capital and ecosystem services, acknowledging their economic wellbeing is dependent on the extent and state of the services they provide.<sup>7</sup>

As described by Vare (2016) a new paradigm of integrated land/catchment management based on co-operation and integration (within and across organisations) is required. One that enables the Regional Council to seek out win-win opportunities by collaborating with others and is underpinned by a strong values base (across the four wellbeings: economic, social, cultural and environmental). The new approach enables a shift to discussing maintenance / enhancement / restoration of resources and sustainable use of resources.

Consequently, work is needed to develop a comprehensive policy framework for the sustainable management of natural capital and associated ecosystem services. Effective integration is needed to minimise the damage to ecosystems caused by human/economic activities and maximise the positive contribution of these activities to at least maintain ecosystem services. The integration of ecosystem services into policies can also contribute to achieving wider policy goals and objectives in a sustainable manner.

#### 1.4 What are Ecosystem Services?

As noted by Hart *et al* (2013):

*Given the wide range of understanding regarding what is an "ecosystem" and therefore what are "ecosystem services" WRC staff noted that adopting the appropriate terminology and its meanings for ecosystems services will be critical for the success of adopting or introducing an ecosystem services component to resource management in the Waikato Region.*

Like many concepts in the environmental field, there are multiple definitions of ecosystem services. However, the common denominator is that ecosystem services are the benefits that humans obtain from ecosystems. Ecosystem services are the wide range of valuable benefits that a healthy natural environment provides for people, either directly or indirectly.

---

<sup>7</sup> For New Zealand case studies, see: [www.sbc.org.nz/resources/member-stories/2014/esr](http://www.sbc.org.nz/resources/member-stories/2014/esr)

The benefits range from the essentials for life, including clean air and water, food and fuel, to things that improve our quality of life and wellbeing, such as recreation and beautiful landscapes. But they also include natural processes, such as climate and flood regulation (things that are often taken for granted). The ‘outputs’ (services) depend on a range of complex underlying ecosystem processes and functions that operate across a range of spatial and temporal scales, which in turn are influenced by the way in which humans manage the land and sea (Scottish Natural Heritage, 2009).

There is no single agreed way of describing ecosystem services, but the most widely recognised framework is that provided by the Millennium Ecosystem Assessment (see Box 1), which suggested four broad categories:

1. Provisioning services – the products obtained from ecosystems, including fresh water, food, fibre (e.g. timber, cotton, wood fuel), genetic resources, biochemicals, natural medicines and pharmaceuticals.
2. Regulating services – the benefits obtained from the regulation of natural processes, including air quality regulation, climate regulation, water/flood regulation, erosion regulation, water purification, disease and pest control, pollination, buffering pollution.
3. Cultural services – the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, aesthetic enjoyment.
4. Supporting services – the services that are necessary for the production of all other ecosystem services, including soil formation, photosynthesis, primary production, nutrient cycling and water cycling.

Some of these are well known, for example food, fibre and fuel, in addition to nature’s role in contributing to human enjoyment (e.g. recreation and aesthetic values). Others are known but sometimes overlooked (IEEP and Milieu, 2013), for example the role of nature in the provision and purification of water for human consumption, or the role of nature in cultural identity and spiritual wellbeing. Yet others are less well known and infrequently integrated into decision making, such as nature’s role in regulating local and global climate, crop pollination, pest control, nutrient recycling, mitigating natural hazards, and maintenance of soil and air quality.

The RPS contains a definition of ecosystem services which fits neatly within the description from Millennium Ecosystem Assessment (see Box 3):

*The benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life on Earth.*

**The RPS definition is adopted for the purposes of describing an ecosystem services approach in this report.<sup>8</sup>**

---

<sup>8</sup> There are key reasons for doing so beyond it just being embedded in a regional statutory document. It is clear that across the Regional Council (directorates/staff) there are differences in opinion as to what defines ecosystem services. The differences generally emerge in relation to value and type of ecosystem services provided in the Waikato region rather than the broad definition described in the RPS (e.g., whether ecosystem services includes abiotic factors). There appears to be relatively universal agreement with the definition in the RPS, and therefore it will serve the purpose as a definition for this report. Key actions described later in this report address the matter of different views of what constitute ecosystem services.

Other important definitions for this discussion are set out in Box 3.

**Box 3: Key Definitions (adapted in part from Millennium Assessment, 2005)**

- **Biodiversity.** 'Biological diversity' or 'biodiversity' means the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems (Convention on Biological Diversity 1992). Biodiversity forms an essential part of natural capital (see Box 4).
- **Ecosystem.** An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit. Humans are an integral part of ecosystems. Ecosystems vary enormously in size; a temporary pond in a tree hollow and an ocean basin can both be ecosystems.
- **Natural Capital.** The stocks of natural assets, including, soil, air, water and all living things. It is from this Natural Capital that humans derive a wide range of services (ecosystem services).
- **Ecosystem services** (*for this report, the RPS definition is adopted, refer page 12*). Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefits.
- **Wellbeing.** Human wellbeing has multiple constituents, including basic material for a good life, freedom and choice, health, good social relations, and security. The constituents of wellbeing, as experienced and perceived by people, are situation-dependent, reflecting local geography, culture, and ecological circumstances.
- **Environmental limits.** The point or range of conditions beyond which the benefits derived from a natural resource system are judged unacceptable, insufficient or intolerable. External pressures, such as pollution or over-use, may impact upon natural resource systems and diminish the level or quality of the benefits that they provide. Eventually people may judge that a critical point has been reached, and that the reduction in benefit is no longer acceptable or tolerable (Haines *et al*, 2006).
- **Strong sustainability.** The concept that there are certain functions that the environment performs that cannot be duplicated by humans or human made capital. The ozone layer is one example of an ecosystem service that is crucial for human existence, forms part of natural capital, but is difficult for humans to duplicate (Zhang, Tan and Lu, 2014). As a consequence, any development has to recognise ecological limits, constraints or tipping points (e.g. climate change beyond 1.5-2<sup>0</sup> Celsius). See Figure 2.

The first step when considering an ecosystem services approach is to develop an agreed classification of the stocks and flows, i.e. the natural capitals (natural resources, ecosystem types) and the flow of ecosystem services they provide. Based on international standards, within a New Zealand context, a list of relevant services for New Zealand has been identified by Landcare Research New Zealand Ltd (see Figure 1), which has been used by the Regional Council.

<b>PROVISIONING</b> <i>Products obtained from ecosystems</i>	<b>REGULATING</b> <i>Benefits from regulation of ecosystem processes</i>	<b>CULTURAL</b> <i>Non-material benefits obtained from ecosystems</i>
Biochemical, natural medicines & pharmaceuticals Food & Fibre Freshwater Fuel Genetic Resources Ornamental Resources	Air Quality Maintenance Biological Control Climate Regulation Erosion Control Human Disease Regulation Pollination Storm Protection Water Purification Water Regulation	Aesthetic Values Cultural Heritage Values Cultural Diversity Educational Values Inspiration Knowledge Systems Recreation & Ecotourism Sense of Place Spiritual & Religious Values Social Relations
<b>SUPPORTING</b> <i>Services necessary for the production of all other ecosystem services</i>		
Nutrient & water cycling Primary production Production of atmospheric oxygen		Provisioning of habitat Soil formation & retention

Figure 1: High-level ecosystem services framework for New Zealand (Hart *et al.*, 2013).

#### Box 4: The Relationship Between Ecosystem Services and Biodiversity

The delivery of many ecosystem services requires adequate stocks of well-functioning ecosystems (natural capital). This includes major contributions from biodiversity. Biodiversity is the variety of all life forms; plants, animals, and micro-organisms; their genes and the ecosystem of which they are a part (Queensland Government, 2014). An ecosystem is a natural unit of biodiversity that consists of all plants, animals and micro-organisms (biotic factors) in an area functioning together with all of the physical (abiotic) factors of the environment (Christopherson, 1997).

According to the World Resources Institute (2008) and the Millennium Ecosystem Assessment (2005), biodiversity is not an ecosystem service, but instead is a 'response variable' that is affected by changes in climate, resource availability and disturbance. Biodiversity underpins the supply of ecosystem services such as pollination, pest control, and carbon sequestration. The intrinsic value some people place on biodiversity is captured under the cultural ecosystem service called "ethical values". Biodiversity can therefore be considered a stock of natural capital that provides ecosystem services. However, see Box 6 for the special place of nature for te ao Māori, the Māori world view.

## 1.5 Understanding Ecosystem Services

When integrating nature into decision making, it is vital to understand not only the interconnections that exist between the different components of nature (living and non-living), but those that exist between nature, society and the economy (IEEP and Milieu, 2013). Knowledge and understanding of these connections are essential to the development of effective policy that supports human wellbeing and economic development (see Figure 2).

Policy, planning and operational decisions by the Regional Council can and do shape the region's natural capital and the ecosystem services it provides. These decisions in turn affect the flow of ecosystem services. **Understanding the synergies, dependencies, constraints / limits and trade-offs, between different forms of capitals and associated services as a result of the Regional Council's policies and operations is critical for good and informed planning and decision making.**

An appreciation of the benefits of nature can encourage the Regional Council and wider stakeholders to respond and maintain or enhance ecosystem services via a range of policy tools. The decisions and use of tools will in turn affect natural capital, the economy, communities and individuals. The concept of ecosystem services is therefore helpful because it reminds us that we should not just care about the natural environment for its own sake – its 'intrinsic value' (Defra, 2007). It makes it clear that **our economy, people and communities actually depend on ecosystem services for their health, wellbeing and prosperity.**

As previously described, the definition of ecosystem services is not necessarily universally agreed amongst the Regional Council staff. However, there is a more fundamental issue of ensuring that across all parts of the Regional Council there is an understanding of the basic principle that ecosystem services are the benefits humans derive from nature. It is the recommendation of this report that RPS definition of 'ecosystem services' is the bottom line in terms of people's understanding. This is fundamental and critical to ensuring an ecosystem services approach can be applied as described in Part 3.

## 1.6 What is an Ecosystem Services Approach?

One of the aims of this report is to describe an ecosystem services approach that is targeted to the Regional Council. Before doing so (in Part 3), it is useful to consider some of the key elements of an ecosystem services approach as it has established globally, and how it might apply in broad terms to the Regional Council.

Ecosystem services is a concept designed to force us to acknowledge the different ways in which the environment supports the society and economy, sustainable communities and the everyday lives of individuals, health and wellbeing (Raudsepp-Hearn and Kerr, 2011). **This concept can be used to communicate the importance of the environment in terms that people haven't considered previously**, and can be used to focus research on how best to manage the environment to sustain human wellbeing.

The ecosystem services approach to policy development and decision making has been described as a method, a tool, a delivery mechanism, a framework and a strategy (Scottish Natural Heritage, 2009). It can be any of these things in different contexts, but it is essentially a set of principles to apply to any policy, plan, decision or project that manages the natural environment, whether directly or indirectly.

A commonly-used definition comes from the Convention on Biological Diversity (1992) which defines the ecosystem services approach as:

*“A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, and which recognises that people with their cultural and varied social needs are an integral part of ecosystems.”*

In the context of this report, Defra (2015) also provide a useful definition for an ecosystem services approach:

*“A generic framework for incorporating the holistic consideration of ecosystem services and their value into policy, plan and decision making”.*

Part 3 of this report sets out a high level, principle based, ecosystem services approach for the Regional Council. It concludes with a number of key steps or actions point for possible next steps. These are next steps towards embedding an ecosystems approach at the Regional Council. This is a long term agenda that will also require a number of challenges to be overcome – cultural, political, communication, methodological and scientific, for example.

The ecosystem services approach is intended to help the Regional Council deliver natural environmental outcomes more effectively and more efficiently, and to help make better-informed decisions about how to achieve multiple benefits across economic, environmental and social objectives in pursuit of achieving statutory objectives (e.g. RPS Objective 3.8) and strategic direction outcomes.

## 1.7 Ecosystem Services and Sustainable Development

**An ecosystem approach is about integrating natural resources with social and economic needs and objectives, in a way that maintains the health of ecosystems on which society and the economy depend.** The approach is therefore a way of delivering sustainable development. Or placing this in a Resource Management Act ('RMA') context, a way of helping the Regional Council to administer and achieve sustainable management - the purpose of the RMA (see Box 5 for how the ecosystem services approach adds value to RMA planning).

Our ecosystems, biodiversity and natural resources underpin sustainable development. While maintenance of all capitals (manufactured, financial, social, human, natural) is important for sustainable development, the **maintenance of natural capital is fundamental** – there is no unlimited growth in a world of limited resources. This is generally referred to as 'strong sustainability', see WRC Strategic Direction 2016-2019, Figure 2).

Embedding natural capital and the ecosystem services that flow from it into policy processes and decision-making is therefore essential to improve the future wellbeing and prosperity of our economy and communities. Until recently, environmental sustainability goals were seen as being distinct from and sometimes even as contradicting with socio-economic development goals. In most cases, the development goals were largely driven by economic growth. As human societies continue to transform the biosphere, sustainability—the ability for humans to continue to exist and even thrive on the planet—has emerged as a key challenge for the 21<sup>st</sup> century.



Figure 2: The dependency of the economy and people's wellbeing from the environment.

#### Box 5: An Ecosystem Services Approach and Sustainable Management

The purpose of the RMA is to promote the sustainable management of natural and physical resources. That means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people to provide for their social, economic and cultural wellbeing. A further aspect of sustainable management is avoiding, remedying and mitigating adverse effects, however this is by no means the only requirement (yet is often the focus of resource management planning). Sustainable management also includes an important 'enabling' component.

As Matheson (2013) states *"The purpose of the RMA is sustainable management and this concept, at its core, comprises elements of both social, cultural and economic development and environmental protection. It is about promoting positive effects, as much as it is about avoiding, remedying, mitigating, adverse effects; it is as much about enabling, social, cultural and economic wellbeing, as it is about environmental bottom lines and conservation."*

Sustainable management is the overarching framework for ensuring that policy makers take into account and consider the social, economic and environmental impacts of policies and decisions they make. An ecosystems approach can be thought of as a way of considering the natural environment as part of wider sustainable development considerations. Crucially, it can help policy makers to consider less visible impacts on the natural environment and provide the data needed to compare societal costs to, and benefits from, the natural environment with other costs and benefits. In other words it brings the enabling component of sustainable management into focus.

Several international initiatives, for example UN's Sustainable Development Goals<sup>9</sup>, now recognise that maintaining natural capital and associated ecosystem services is essential for continuing human existence, i.e. sustainable development. However, demands for those services often surpass the capacity of ecosystems to provide them, while a lack of ecological information frequently precludes informed decision-making that involves ecosystem services. Therefore, a major research effort is now being undertaken to quantify, value (monetary and other values), map and manage ecosystem services that inform the impacts and dependency of people and the economy on the environment to progress on a path towards sustainable development.

As described above, an ecosystem approach is achieved through applying a set of key principles (refer to section 3.3 for further details). Various sets of principles have been defined in the literature, but there is a set of commonalities that run through most:

- Taking account of how ecosystems work. This includes a need to consider the broad scale as well as the local; the long term as well as the immediate; taking an integrated systems approach, recognising that change is inevitable; identifying and taking into account environmental limits and constraints (planetary and regional/local boundaries, thresholds and tipping points); using up-to-date scientific information; and applying adaptive management to deal with uncertainty.
- Taking account of the services that ecosystems provide to people, including those that underpin social and economic wellbeing, such as flood and climate regulation, provision for food, fibre or fuel, or for recreation, culture and quality of life.
- Involving the participation of people – those who benefit from the ecosystem services and those involved in managing them (and the natural capital underpinning them) need to be engaged in decisions that affect them. Acknowledging that their knowledge and values attributed to ecosystems will often be critical to success.

Figure 3 below (adapted from Defra, 2015) shows that the actual valuation of changes in ecosystem services can happen only once a range of other data and analysis has taken place. An ecosystem services approach is a process that requires good (and sometimes new) information in order to be effective. It is therefore essential to think about valuation throughout the policy process and not just at the 'option appraisal' stage of policy development (Defra, 2015).

Essentially, the ecosystem approach is about adopting a new way of thinking and working, by:

- Shifting the focus of policy-making and delivery away from looking at natural environment policies in separate 'silos' – e.g. air, water, soil, biodiversity – and towards a more holistic or integrated approach based on whole ecosystems and systems thinking;
- Engaging and involving people to ensure that the values of ecosystem services (monetary and non-monetary, non-use values) are fully reflected in policy and decision-making for the long term benefit.

---

<sup>9</sup> [www.un.org/sustainabledevelopment/sustainable-development-goals/](http://www.un.org/sustainabledevelopment/sustainable-development-goals/)

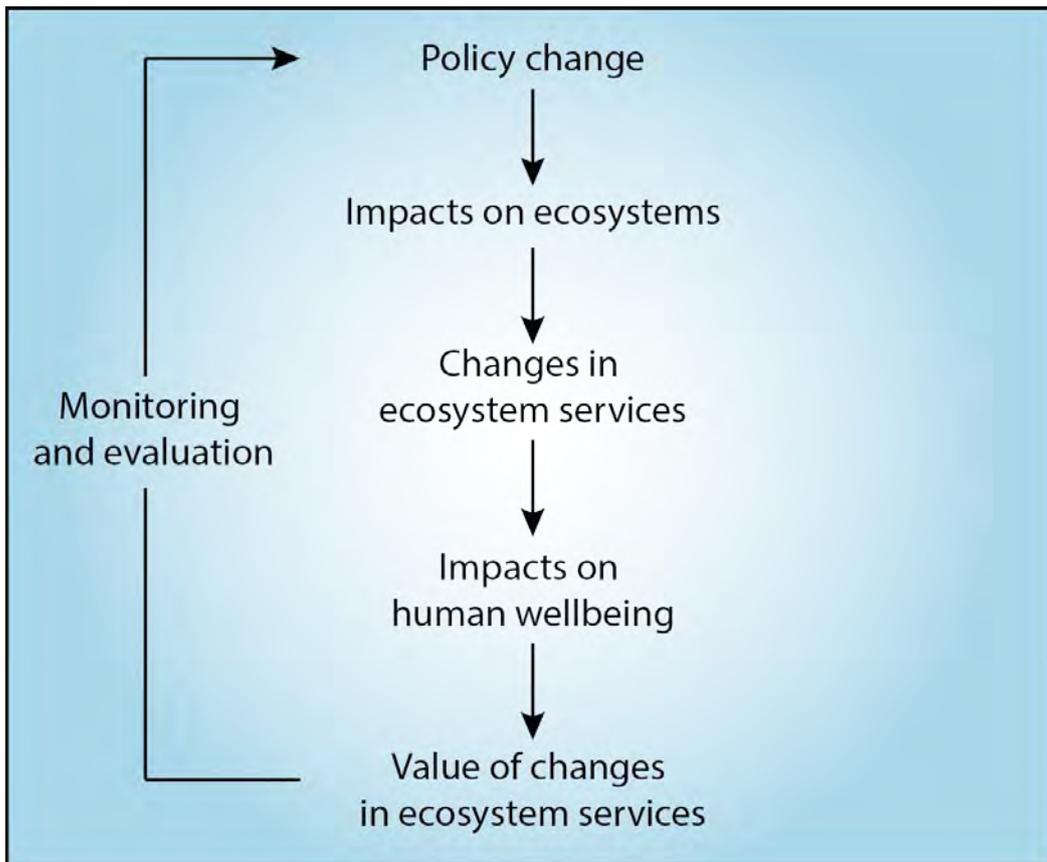


Figure 3: The process of valuing ecosystem services (adopted from Defra, 2015).

## 1.9 Ecosystem services and te ao Māori

An ecosystem services approach generally reflects the way that Māori view and interact with the environment, but te ao Māori also adds its unique dimension to an ecosystem services approach, see Box 6. The challenge for Council is in giving full voice to the Māori world view.

Māori have an intricate, holistic and interconnected relationship with the natural world and its resources, with a rich knowledge base – Mātauranga Māori – developed over thousands of years. There is no single Māori word or translation for ecosystem or ecosystem services, but Mātauranga Māori (Māori knowledge), te reo Māori (Māori language) and whakapapa (ancestral lineage) are used together to unlock the indigenous perspective and understand what an ecosystem is, including its components and functional units. They are all aspects of te ao Māori, the Māori world view. For Māori, as with other indigenous cultures, there are clear links between healthy ecosystems (with greater life-supporting capacity) and people’s cultural and spiritual wellbeing. An ecosystem services framework for Māori must recognise that ‘cultural values’ (different from cultural services) range across material (e.g. provisioning, regulating, supporting) to non-material values (e.g. customary cultural, spiritual, sacred) (Harmsworth and Awatere 2013).

## Box 6: Te Ao Māori – The Māori World View

The Māori world view encapsulates facets of social and cultural life, the natural environment, ancient and contemporary worlds, spirituality and the universe. The very essence of the Māori world view is relationships – not only between people but also between the spiritual world and the natural world. Relationships extend from the deities to hapū, to iwi, to fauna and to flora. Whānau, hapū, iwi and the natural environment are closely interwoven and are supportive pillars of each other. Māori origins, customs and traditions need to be considered and appreciated in their totality, a holistic picture rather than one that is piecemeal and fragmented. Māori have specific cultural values and perspectives through a body of highly specialised knowledge developed over generations. The tikanga (customary lore and practice) derived from this body of knowledge are underpinned by the various tribal kawa (spiritual and natural order) who guide the interaction and moderate the balance between the relationships described above.

The natural world provides identity for Māori. Māori people introduce themselves in relation to their tribal boundaries and their tūrangawaewae, with reference to:

- their mountain
- the lands adjacent to the mountain
- their river and its flow
- the coastline, or for inland tribes, often a large lake.

## 2. POTENTIAL BENEFITS AND OPPORTUNITIES

### 2.1 Overview of Potential Benefits and Opportunities

The ecosystem services approach brings significant opportunities, not least because of its focus on systems, natural capital/resources (stocks), services (flows), integration and long term considerations. Embedding an ecosystems approach in policy and decision-making is anticipated to deliver a number of important benefits for the Regional Council, including:

- More effective delivery of our environmental outcomes;
- Better informed decisions that take full account of environmental, social, cultural and economic impacts, helping to achieve sustainable management;
- Highlights the dependency of people and the economy on adequate natural capital and well-functioning ecosystems;
- Better prioritisation and more efficient use of resources;
- Taking into account long term impacts and opportunities based on ecological processes (e.g. climate regulation);
- More effective communications and greater awareness of the value of the natural environment and ecosystem services for people and the economy;
- Enables better integration of te ao Māori (Māori world view), assisting the Regional Council implement the RPS (which seeks to incorporate Mātauranga Māori into processes and decision making), and establish more effective iwi partnerships for co-management / co-governance;
- Better use of money and other resources;
- Aligning community aspirations (bottom-up) with top-down policy and regulatory priorities;
- Engaging with stakeholders and empowering them to act;
- Promoting the links between environment, economy and communities;
- The achievement of multiple benefits: promoting deliverables and multiple benefit activities for integrated catchment management, e.g. flood risk management, sustainable farming and maintenance/enhancement of biodiversity, among others.
- Highlights the relevance and importance of the Regional Council for the region's sustainable development.

A number of these are explored in more detail below.

## 2.2 Better environmental outcomes

Along with demonstrating value to the community (see below) opportunities to achieve better environmental outcomes is one of two ‘umbrella’ benefits to be derived from taking an ecosystem services approach. The potential benefit of an ecosystem approach is in optimising the benefits of natural capital and associated ecosystem services within environmental limits and strong sustainability. This means promoting human wellbeing without unsustainable loss of natural capital, and ensuring that the natural environment can continue to provide us with essential services and benefits in the long-term. In other words, truly sustainable development (sustainable management).

## 2.3 Demonstrating value to the Community

The ‘added value’ of adopting an ecosystem services approach is the provision of a framework for conceptualising the link between the environment and the ways in which people value and ‘use’ it. Another ‘umbrella’ benefit, this is ultimately a culmination of an ecosystem services approach resulting in enhanced decision making, and more efficient and effective service delivery from the Regional Council as a result of:

- Improved communication with communities, particularly in a language that they understand and can relate to;
- Opportunities to identify options that fit with local priorities and values;
- Improved understanding of where the benefits of ecosystem services lie, and what the trade-offs and/or limits are;
- A more systematic understanding of how changes in the environment affect people and the economy;
- Taking account of social, economic and cultural costs and benefits in decision making;
- Enabling a wider set of values to be incorporated into decision-making;
- And critically, achieving multiple benefits (thus achieving better value for ratepayer money, as well as better environmental / social / cultural / economic outcomes).

## 2.4 Enhanced decision making

Fundamentally, the ecosystem services approach is a decision support framework. The decision making framework would allow a fuller range of costs and benefits to be taken into account during decision making and during processes that evaluate decisions and policies. Applying an ecosystem approach to decision-making will improve delivery of priorities through better management of natural resources, possibly fewer conflicts and unintended consequences. Ideally it will mean that ecosystem services are maintained alongside land use activities and provision of public services. It will help to prioritise resource (natural capital) allocation so that actions that maintain multiple ecosystem services receive a higher priority for resources than those that do not.

An ecosystem services approach can also allow for more progress in understanding the implications of decisions on future generations, which is a core component of sustainable management.

## 2.5 Identifying multiple benefits and managing for optimum outcomes

The need for achieving multiple benefits and thereby better value for money is being pursued across all areas of government, and the work of the Regional Council is no exception (for example it is reflected in the Strategic Direction). To achieve this, resource management can no longer be regarded in terms of single issue or outcome activities. The environment has typically been managed to maximise a single function, perhaps at the expense of others and this has led to environmental degradation, unintended consequences and inefficient value for money. The ecosystem services approach provides a way for breaking down silos and considering multiple objectives simultaneously.

## 2.6 Better understanding of public and private costs and benefits

An ecosystem service approach provides greater understanding of who will reap the benefits and who will endure the costs associated with particular ecosystem services, through identification of values, and identification of who hold those values. Identification of the primary stakeholders for each service may also assist in determining who will support and who will oppose policy directions. More importantly, however, it allows decision makers to consider whether or not particular groups or communities are being fairly or disproportionately harmed or enriched.

## 2.7 Increasing integration

An ecosystem services approach provides opportunities for integration across multiple areas of the Regional Council's business:

- Integration across natural assets (water, land, coast), recognising the inter-connected nature of natural and physical resources (including spatially and temporally);
- Integration across statutes and institutions, recognising that ecosystem services can provide a common focus for achieving the objectives of various resource management groups (e.g. RMA and Land Transport Act);
- Integration across the four wellbeings, with social, cultural and economic values and outcomes considered alongside environmental (e.g. the Regional Council Strategic Direction);
- And importantly for the Regional Council, internal coordination and integration across departments / teams, again by providing a common focus for achieving the objectives of various resource managers.

## 2.8 Strategic alignment of interests

There are many organisations involved in resource management, including the Regional Council, district councils, landcare groups, iwi, smaller landowners, and central government (e.g. Department of Conservation, Ministry for the Environment). The objective of each organisation in terms of resource management tends to be different in focus, especially with respect to private land. Each of these stakeholders has different access to resources, but also different preferred outcomes in terms of natural capital values. This can often lead to fragmentation or even divergence in overall resource management.

Many of these objectives can fit into the framework of ecosystem services delivery compared with individual value approaches. The framework of ecosystem services may be useful in better aligning resources between different resource managers to get more efficient bang for collective buck. By identifying ways in which benefits can be maximised through an ecosystem services approach, the Regional Council may also be able to lead and influence others to do the same.

## 2.9 Enhanced community engagement

As described above, the ‘added value’ of adopting an ecosystem services approach is the provision of a framework for conceptualising the link between the environment and the ways in which people value, ‘use’, impact and depend on it. One of the key benefits of an ecosystem services approach (or more fundamentally ecosystem services) is that it can help make complex and often intangible natural resource matters *relatable* for communities. At its heart ecosystem services is an anthropocentric concept. It is about the services that humans derive from nature. At the same time, an ecosystem services approach recognises the importance of intrinsic values that provide the ‘life-supporting capacity’ for all life forms. Framing resource management in these terms can help people to understand firstly the values they are acquiring from nature, and secondly, how change in that resource / natural capital will affect that value (and therefore their wellbeing).

An ecosystem service approach can also be a dialogue tool in environmental decision-making processes (or any facilitating role that the Regional Council may be involved with). The resolution of many natural resource problems has stalled because they involve groups of users in an adversarial setting, each with legitimate and conflicting demands on finite resources (Royal Society of New Zealand, 2011).

An ecosystem services approach potentially provides a common language, enabling communication between groups with incommensurable viewpoints. It helps different user groups to state their underlying values and how various ecosystem services are connected with those values (see Box 6 ‘te ao Māori’). It potentially also enables the discovery and creation of shared values.

## 2.10 Increased effectiveness and efficiency of service delivery

The emphasis on resource efficient economies provides a clear policy rationale for integrating ecosystem services and natural capital into a range of different Regional Council policies (resource management and corporate). It entails pro-actively finding and encouraging the uptake of opportunities provided by nature-based solutions and innovations. This further provides a basis for the Regional Council developing 'green infrastructure' and nature-based solutions, including with a view to improve the resource efficiency and long-term sustainability of Regional Council service delivery. For example, increasing water efficiency (or better use of water) is considered a future priority, creating opportunities for ecosystem services based water management.

The Regional Councils assets and level of service delivery may be viewed in a different light by the public if the ecosystem services framework was applied. Much recent literature in asset management points to increased use of soft or natural/green infrastructure approaches as an appropriate means of flood attenuation and water quality filtration. For example, Policy 13.2 of the RPS seeks to manage the risks from natural hazards discouraging hard protection structures and promoting the use of alternatives to them, including natural defences.

## 2.11 Natural capital accounting

There is a greater need and opportunity to understand the multiple services that the natural environment provides, and the impacts that projects, plans and policies have on these. Natural resources and associated ecosystem services are Council's main assets it manages for the benefit of the region's people. Council therefore needs to know the quantity and quality, the location and extent, and the threats and vulnerability of these assets. If the Regional Council can better understand ecosystem services, it can utilise them to better effect, including to achieve multiple benefits. The ecosystem services approach provides the impetus and driver for that to occur. If particular ecosystem services are not recognised, they are given no value and are not taken into account in decision making.

Accounting for a broad range of natural resources and associated ecosystem services could contribute to the sustainable management by providing a comprehensive framework for an ongoing assessment of the status of ecosystem services and natural capital. There is opportunity for research work on the integration of natural asset stocks and flows of services, through biophysical and monetary indicators, to help to inform and support the policy development and decision making.

## 3. AN ECOSYSTEM SERVICES APPROACH FOR WAIKATO REGIONAL COUNCIL

### 3.1 Overview of Approach

This section sets out a high level, principle based ecosystem services approach for Waikato Regional Council. The approach is based on a number of synthesised factors, including:

- The principle based ecosystem services approach first outlined by the Millennium Assessment (2005) and further developed by others (including Defra (2007));
- The benefits and opportunities identified for the Regional Council and its regional communities (refer part 2);
- The Regional Council strategic direction (refer Box 2) and directions in statutes, particularly in the RPS, that require a particular course of action from the Regional Council. The approach outlined below could be used as a coherent overall plan to capture and implement all of the ecosystem service policy requirements of the RPS, and building on previous work undertaken by the Regional Council (Hart *et al*, 2013);
- Discussions with Regional Council staff on what an ecosystem services approach might look like. Numerous salient points emerge from the discussions with Regional Council staff to date, including:
  - There is not likely to be any single or unique ecosystem approach for the Regional Council i.e. no one size fits all;
  - Must be values driven;
  - An approach be applied over a wide range of scales;
  - There may be many instances and experiences of applying an ecosystem approach without it ever being referred to in those terms.

In some ways the ecosystem approach described below is not a substantively new thing: many of its principles have long been recognised as important by the Regional Council (e.g. principles of integration, working with others etc.) and many of the tools to apply them are already available. However an ecosystem approach involves a change of mind set to bring these principles together in a holistic and explicit way. It also adds to the *richness* of information that is considered in any given instance. It requires conscious interaction on ecosystem services between all different parts of the Regional Council – economics, social and natural sciences, policy-makers, operational implementation and decision makers.

Its benefits are achieved if an ecosystem approach is applied to all stages of a project, programme or policy, including identification of objectives, options appraisal, planning of actions, implementation, monitoring and review. For example, identification of objectives should consider how the interaction between the ecosystem and human activities led to the need for the project or policy in the first instance. The objectives should address these underlying interactions which will also help define the geographic boundaries and timescale. Option appraisal should consider what effects different options will have on the ecosystem and the services it provides, and on neighbouring ecosystems.

The approach outlined below involves two levels:

1. A set of **key principles to be applied across all of Council business**, at all scales (i.e. from simple report to Council through to significant projects such as regional plan reviews). The principles will underpin Regional Council business, with the ultimate aim being that they become part of the culture of the organisation.
2. A **more detailed, stepped ecosystem services assessment approach to be applied as a *lens* over projects**, ensuring that ecosystem services are an explicit consideration.

### 3.2 Implementation Objective

While the Strategic Direction and RPS both contain objectives / outcomes sought from taking an ecosystem services approach (refer to section 1.2), it is useful to have an objective that relates to implementation and embedding of an ecosystem services approach from an operational / implementation perspective:

*That Waikato Regional Council staff, management and Councillors understand and recognise the links between natural resources and the benefits they provide, consider the trade-offs, constraints / limits and multiple benefits associated with their use (including dependency) and incorporate ecosystem service-related opportunities and risks into policy development, plans and decision making.*

### 3.3 Key Principles of the Approach

Ultimately, the ecosystem services approach described below looks to provide the framework for better planning and decision making. This includes ensuring that firstly, the ecosystem services framework seeks to capture and take into account the full range of services that ecosystems provide; and secondly, where trade-offs between different services are inevitably made, that this is done in a way that identifies and engages with all relevant stakeholders.

For the purpose of implementation across all parts of the Regional Council, the use of ecosystem services as an approach is best served by a series of broad principles that can be incorporated into understanding the effects of various Regional Council activities, underpinned by a stepped assessment (see section 3.4).

The key principles of the approach for the Regional Council are:

- **Principle 1**

**An integrated and holistic approach to decision/policy-making and delivery, with the focus on maintaining healthy ecosystems and ecosystem services.**

There is integration of natural and socio-economic sciences for a comprehensive understanding of the service delivery process, dependency on the service, and consideration of stakeholder perceptions to both understand the variety of ways in which ecosystems generate wellbeing,

and establish legitimacy of decisions based on the valuation of ecosystem services. Ecosystem services are created by interactions between natural capitals (e.g. air, land, water, biodiversity), so equally an integrated and holistic approach is needed to manage them. The Regional Council ensures the focus of policy making and delivery is away from looking at natural resources policies in separate 'silos' – e.g. air, water, soil, biodiversity – and towards a more holistic or integrated approach based on whole ecosystems, and across environmental, social, cultural and economic outcomes.

The RPS provides thorough guidance as to the manner in which this principle can be implemented. While the RPS identifies what resource managers shall/should do, it also details approaches as to how to do it. For example, Policy 4.1 of the RPS sets out the manner in which an integrated approach can be undertaken:

*An **integrated approach** to resource management will be adopted that:*

- a) recognises the **inter-connected nature of natural and physical resources** (including spatially and temporally) and the benefits of aligning the decisions of relevant management agencies across boundaries;*
- b) maximises the benefits and efficiencies of working together;*
- c) recognises the **multiple values** of natural and physical resources including ecosystem services;*
- d) responds to the nature and values of the resource and the diversity of effects (including cumulative effects) that can occur;*
- e) maximises opportunities to achieve **multiple objectives**;*
- f) takes a long-term strategic approach which recognises the changing environment and changing resource use pressures and trends;*
- g) applies consistent and best practice standards and processes to decision making; and*
- h) establishes, where appropriate, a planning framework which sets **clear limits and thresholds** for resource use.*

Policy 4.1 is supported by Method 4.1.6, which provides further detail of areas where the Regional Council can promote an integrated approach:

*Waikato Regional Council will promote an integrated approach to resource management, including by:*

- a) promoting sustainable land management practices;*
- b) educating landowners/managers about the adverse effects of land use practices, including off-site and cumulative effects;*
- c) promoting understanding of the values and benefits of resources in contributing to community wellbeing through providing ecosystem services;*
- d) promoting understanding of the different ways in which resources are valued by people and communities;*
- e) advocating for consistent application of best practices standards and processes, including best practice tikanga and maatauranga māori;*

- f) encouraging research to increase understanding of the effects of climate change on the Waikato region;*
- g) making submissions on the long-term plans and annual plans of territorial authorities to seek the appropriate allocation of resources to give effect to the Regional Policy Statement; and*
- h) advocating to central government agencies, tāngata whenua, and other stakeholders to assist implementation of the Regional Policy Statement.*

- **Principle 2**

**As guardians of the Region’s healthy environment, vibrant communities and a strong economy a priority is placed on sustaining the Region’s natural capital, from which all ecosystem services derive.**

- Maintaining natural capital is essential for future flows of ecosystem services. Focusing only on trends in the provision of ecosystem services is insufficient.
- Natural capital understanding is a critical element for informing and achieving strong sustainability.
- An ecosystem services approach will require good information and understanding of:
  - The state and stocks of natural capital;
  - Changes in natural capital and the ecosystem services that derive;
  - How the state of natural capital impacts on the state of ecosystem services, so that we can understand where environmental limits, are or should be;
  - Location and spatial extent and change of ecosystem services (through modelling and mapping for example).

- **Principle 3**

**The values of ecosystem services are fully reflected in decision-making, including understanding how that value may change as a result of decisions.**

The Regional Council must seek to ensure that the value of ecosystem services is fully reflected in policy and decision-making at all levels, alongside intrinsic, environmental or te ao Māori values. Decision making is values based, and includes consideration of values across the four wellbeings. Reaching the goal of valuing and incorporating ecosystem services into decision making requires accounting for any environmental limits, constraints or thresholds. Information, communication, transparency, and education are critical. Decision makers need the data, tools, and understanding to help them consider a combination of objectives. Decision support tools should be able to bridge communication gaps to educate and engage the public and decision makers in decision making and planning, and to provide a framework for integrated assessment of the concepts and the sustainability of associated with different scenarios.

- **Principle 4**

**Environmental limits for natural resource use and ecosystem service functioning and delivery are considered in the context of sustainable management.**

The Regional Council considers the concept of environmental limits and the extent to which it helps to evaluate trade-offs. This recognises the ‘strong sustainability’ concept, i.e. that people and the economy have to live within the limits of the environment. It also includes limits with regard to how much degradation communities are willing to tolerate or accept as the cost of economic and social development, and between alternatives that might be beneficial to some sectors while being detrimental to others. The longer-term consideration is about acquiring wealth now versus wealth in the future. Environmental limits should be considered on the basis of the intrinsic properties of a natural ecosystem as well as the way people value environmental benefits or ecosystem services. These two perspectives will need to be reconciled in decision-making. Acknowledging the linkages between natural capital, ecosystem services and environmental limits is also fundamental to sustainable management. An ecosystem services approach will make the dependency of communities and business from natural capital more transparent resulting on a path towards sustainable development.

- **Principle 5**

**Working with and involving others, to understand values and achieve multiple benefits.**

If the Regional Council is to embed an ecosystems approach, it will need to continue to engage a wide range of partners, iwi, stakeholders and the public at large. The Regional Council will need to work across traditional policy and organisational boundaries to raise awareness of the value of ecosystem services, to survey people’s views about such services and to promote the design and implementation of policies that deliver the fullest possible range of environmental, social, cultural and economic benefits. The Regional Council has a lead role to play in this agenda, but will need to work closely with many others.

The Regional Council will involve people, especially those who benefit from ecosystem services and those who manage them. This means valuing people’s knowledge, helping people to participate, increasing collaboration and giving people greater ownership and responsibility.

- **Principle 6**

**There is adaptive management of natural capital and ecosystem services to respond to changing pressures.**

Given that there are significant levels of uncertainty existing in terms of ecosystem service measurement, monitoring, modelling, valuation, and management, there should be a continuous collation and integration of appropriate information regarding ecosystem services, with the goal of continuous learning and adaptive improvement. To do this the Regional Council should have a program to constantly evaluate the impacts of existing management approaches, and design new approaches with stakeholder participation and case studies / pilot projects from which it can more effectively measure performance and learn.

- **Principle 7**

**The ecosystem services approach should be undertaken at the appropriate spatial and temporal scales.**

The approach should be bounded by spatial and temporal scales that are appropriate to the objectives. Boundaries for management will be defined operationally by users, managers, scientists and communities. Connectivity between areas should be promoted where necessary. Ecosystem processes are characterised by varying temporal scales and lag-effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

- **Principle 8**

**The ecosystem services approach considers all forms of relevant information, including scientific knowledge, local knowledge, Mātauranga Māori, innovations and best practices.**

Information from all sources is critical to arriving at effective ecosystem management strategies. A much better knowledge of ecosystem functions and the impact of human use is desirable. Assumptions behind proposed management decisions should be made explicit and checked against available knowledge and views of stakeholders.

### 3.4 A Stepped Ecosystem Services Assessment

The key principles set out above are intended to underpin all policy development and decision making undertaken by the Regional Council. The methodology below sets out a stepwise assessment method to guide the Regional Council in designing its processes for appraising and considering nature's benefits in policy decisions.

As with the key principles above, the stepped approach is based on a number of synthesised factors (refer to Section 3.1).

Three points to note:

- The methodology is not intended to replace existing processes for project design, but rather (where necessary) complement and augment existing process. It should be viewed as a lens to be placed over existing process to ensure that ecosystem services are a conscious part of the process.
- The methodology is not one size fits all, and will need to be tailored to specific projects.<sup>10</sup>
- This is not an implementation plan, and further work would be required to understand how to operationalise the steps.

---

<sup>10</sup> The term 'project' has been used to represent various aspects and processes of Regional Council business.

### **Step 1. Defining scope and identifying key stakeholders.**

As with most projects, the first step defines the objectives and the scope of the project. From an ecosystem services approach perspective, it must include:

- Considering sectoral and geographical focus;
- The main issues or resource management challenges to be addressed;
- The key ecosystems (natural capital) and associated services;
- The main stakeholders to be involved. One of the principles of the ecosystem services approach is that it is participatory. Once they have been identified, the main stakeholders should be brought into the planning process as soon as possible. Stakeholder consultation will help to refine and focus the objectives and scope so as to reflect the realities of the on-the-ground situation, and will enable new perspectives and knowledge to be built into the design of the project. It is also a critical step in ensuring buy-in (for this reason alone, ongoing communication with stakeholders is essential). Stakeholders can also help identify the full range of ecosystem dependencies and impacts.

Key considerations for the Regional Council during this step are:

- What are the primary management issues that need to be addressed, and to achieve what outcomes?
- What are the relevant stocks (ecosystems, natural resources/capital) and flows (ecosystem services)?
- What opportunities are there, and where, to achieve multiple benefits / outcomes that are sought through the RPS and other strategies and plans?
- Who are the relevant stakeholders / iwi, and how should they participate in the process?
- What are the requirements for staff expertise, funds and other inputs, specific to incorporation of ecosystem services?
- How is the Regional Council going to communicate key ecosystem services messages to groups in a manner that they can understand?
- What level of communications planning is required?

### **Step 2. Prioritising ecosystem services**

This step involves identifying ecosystem services within the project area and determining which of these services needs to be included in an assessment of their current condition and recent trends. The criteria for choosing priority ecosystem services may depend of the nature and objective of the project, taking into account the ecological and societal importance of the services. However the Regional Council's 15 prioritised ecosystem services could be used as a starting point (Hart *et al.*, 2013, and Box 7).

The purpose of this step is to draw the link between ecosystem services and human wellbeing and the economy. Until ecosystem are linked to some aspect of social/cultural or economic wellbeing, an assessment is not truly about ecosystem services.

This step will also help identify users and benefactors of the ecosystem services that may affect or be affected by the project. There is a strong focus here on identifying the stakeholders that are affected (positively and negatively), and on the distribution of public and private costs and benefits between different groups.

Key considerations for the Regional Council during this step are:

- Which are the priority ecosystem services for the project, and why?
- How does the project impact and depend on ecosystem services?
- Which are the main stakeholder groups that are affected by ecosystem services?
- What values do people associate with the identified ecosystems?
- How are the benefits and costs distributed between different groups?
- How can the natural environment help deliver objectives?
- What are the risks from the natural environment to policy objectives?
- What are the pressures on the natural environment's ability to function as a system?
- Are there any aspects of the natural environment that need protecting / safeguarding by law or other constraints e.g. significant natural areas, outstanding landscapes?

#### Box 7: The Regional Council's 15 Priority Ecosystem Services

In 2013 a collaborative process between Landcare Research and the Regional Council set out to develop a plan to implement RPS Objective 3.8 (ecosystem services), including prioritising, describing, mapping and modelling of high-priority ecosystem services (Hart *et al*, 2013).

The process began with a review of the Proposed RPS to identify how ecosystem services were considered. Following the review, Landcare Research and the Waikato Regional Council worked through a collaborative and iterative process to first identify specific ecosystem services of relevance to the Proposed RPS and second develop a draft prioritisation scheme for ranking identified ecosystem services based on a set of RPS and strategic direction priorities, relevance to social and cultural wellbeing and risk management. The result of the prioritisation process was the identification of a suite of 15 high-priority ecosystem services for further investigation including characterisation, mapping, and modelling (see Box 8).

The project concluded that the ecosystem services prioritisation method still requires further discussion, development and refinement. But while incomplete, it provided a foundation of specific ecosystem services for consideration and integrating across all of the Regional Council's functions, including policy development, planning, resource management, economic development, consent processing, education and outreach, and co-management with iwi.

While the 15 priority all of these services are of importance to the Waikato Region, some are determined to be of higher importance because of the particular characteristics of the Waikato Region. As with any prioritisation there is an inherent risk of placing focus on a set of services at the risk of overlooking or undervaluing others. Therefore the 15 priority ecosystem service should only be seen as a *starting* point, with relevant ecosystem services in any given instance determined through a process of value identification.

### **Step 3. Identifying condition, trends, constraints/limits and trade-offs of ecosystems and associated services.**

This step involves developing a clearer idea of how ecosystems (natural capital) and ecosystem services are being managed and used, and identifies the factors that may be leading to their degradation – or may, with intervention, be harnessed to maintain and enhance them.

Key considerations for the Regional Council during this step are:

- What kind of information and evidence related to the condition and trends of ecosystems and associated services exists and what are information gaps?
- What are the current conditions (location, use, demand etc.) and likely future trends / scenarios relating to the supply of and demand for the identified ecosystems and associated services? See Box 8 for use of scenario modelling to help understand the future outcomes and trends as a result of management options.
- What is the baseline service provided by ecosystems? What is the Regional Council's current level of service? How does this differ from where communities want to be long term?
- What are the main drivers of change?
- Are there any constraints, limits or thresholds for the provision of ecosystem services?
- What trade-offs might arise between land use objectives and ecosystems and associated services, or between stakeholder groups?
- How can the changes in ecosystems and associated services be valued so that they can be fully considered in cost / benefit analyses (e.g. s32 assessments).
- What is the baseline of what the natural environment is currently providing in terms of services and their economic value so any changes can be measured?
- What is the impact of management option on the ecosystems and services they provide that the natural environment provides and the value of those services to communities?
- Which option makes the most of the ecosystems and services that the natural environment can offer whilst protecting its ability to function as a system now and in the future (sustainable management)?
- What are the costs of the management options? What costs are acceptable to the community? What are the costs of 'doing nothing'?

### **Step 4. Assessing stakeholder framework**

This step complements the information that has been gathered above about ecosystem demand, supply, drivers, limits, trade-offs etc. It appraises organisational, policy, legal / regulatory and cultural frameworks that exist in relation to ecosystems. These factors influence, and in some instances instruct, how people manage, use and impact on ecosystems and their services. They may act as drivers of either ecosystem degradation or ecosystem conservation, and are also key to considering any trade-offs that occur. An important factor will be the perceptions and insights of ecosystem managers (for example Regional Council zone managers), users themselves, and traditional knowledge (Mātauranga Māori).

#### Box 8: Scenario modelling: Waikato Integrated Scenario Explorer (WISE)<sup>11</sup>

Scenario analysis is a useful tool to evaluate current levels of ecosystem use, and support decision-making by examining the trade-offs implied by each of a set of feasible policy options. Scenario analysis aims to ensure that ecosystem services are incorporated into decision-making and policy prioritisation (Ortega et al, 2015). Economic valuation links with this by estimating the societal costs and benefits when moving from a baseline scenario to an alternative state, and helps to identify options with positive benefits. Scenario analysis for ecosystem service assessments hence requires that services are not considered in isolation, but in combination, showing where trade-offs have to be made or potentially where synergies can be achieved in ecosystem management (Turkelboom *et al*, 2016).

The Waikato Integrated Scenario Explorer (WISE)<sup>12</sup> is a regional spatially-explicit policy support system designed to help the Regional Council explore possible future development options, identify trade-offs of different combinations of policies and plans, and evaluating the potential consequences, both positive and negative, from those different combinations. A scoping document of how to incorporate ecosystem services modelling into WISE has been completed (Fenton, 2016).

This is another opportunity for considering directions from the RPS, and to consider how multiple parts of the RPS could be implemented for multiple benefits.

In combination with Step 3 it should help develop a clear idea of what underlies behaviours and values as regards ecosystems and their services, and have identified where potential areas of conflict might exist.

Key considerations for the Regional Council during this step are:

- Which organisations govern or influence ecosystems and their services? Who participates in these, and in the decisions they make?
- Which policies, regulations and other incentives influence people's use and management of ecosystems and their services? Who or what do they target, and how are they enforced?
- What opportunities are there to achieve multiple benefits / outcomes that are sought through the RPS?
- Are there conflicts or inconsistencies between institutional, policy, legal and cultural frameworks?
- Which other kind of needs, interests and rights drive management choices regarding ecosystems?

---

<sup>11</sup> [www.creatingfutures.org.nz/wise/what-is-wise/](http://www.creatingfutures.org.nz/wise/what-is-wise/)

<sup>12</sup> [www.youtube.com/watch?v=RgEABCz1RrI](https://www.youtube.com/watch?v=RgEABCz1RrI)

## Step 5. Informed decision-making

This step assesses the policy options and instruments that can be used<sup>13</sup> to improve the way in which ecosystem services are used in support of achieving objectives, and to ensure that activities in turn provide a basis for sustainable ecosystem management and use. It involves identifying the main risks and opportunities that ecosystem services pose.

This is the decision-making stage that synthesises all the information that has been gathered in the previous steps. There should now be a greater *richness* of material to support decision making.

Note that informed decision making is as much about recognising what is known, as it is about recognising what is not. Ecosystems are complex. If information is indicative, uncertain, or there are gaps in knowledge then a precautionary approach to decision making should be taken.

Key considerations for the Regional Council during this step are:

- What ecosystem service related risks and opportunities emerge as a result of the prior assessments?
- Which are the most feasible policy options, changes and / or entry points to use to capture ecosystem service opportunities, and mitigate or avoid risks?
- Which policy / management options deliver the best overall outcomes and reflect best against the identified values?
- What are the public and private costs and who is it that actually benefits? How are policy options matching these benefit / cost assessments? Taking this into account, which activities being incentivised / rewarded / penalised / restricted?

## Step 6. Implementation

The last step in the process is to develop an implementation strategy, action plan, policy or operations plan. As this process is intended as a lens to be applied to existing processes, there are likely to already be such mechanism used in the Regional Council. However to complete the ecosystem services approach this mechanism should explicitly set out the process, guiding principles and intended outcomes for the policy measures and instruments to integrate ecosystem services into Regional Council actions.

Key considerations for the Regional Council during this step are:

- Are there the necessary financial, technical, human resource and organisational capacities to deliver on the selected policy options?
- Who is going to be involved in implementing the policy measures, and in what role?
- How will the impacts of the policy be monitored?
- How will learning be generated, shared and communicated, throughout the Regional Council and to others?

---

<sup>13</sup> The brief for this report did not include the analysis of policy mechanisms for implementing an ecosystem services approach. A detailed review and discussion has been undertaken by Greenhalgh and Selman (2014).

### 3.5 Tiered and Phased Approach

It may be useful for the Regional Council to consider a tiered approach to the above assessment process, recognising the individual nature and scale of projects.

For example, a tiered approach could look like (refer to Figure 4):

- Tier 1 – Simple qualitative assessment;
- Tier 2 – Simple quantitative assessment, which may include modelling and/or monetary valuation;
- Tier 3 – Detailed quantitative assessment including modelling and/or monetary valuation;
- Tier 4 – Bespoke and in-depth site-specific research.

The amount of effort, cost and level of expertise required increases further up the tiers. The level of detail required will depend on matters such as geographic size, potential impact, and level of community interest in the project. For small projects with little impact it may not be necessary to do anything more than a Tier 1.

The Regional Council may also wish to consider ‘phasing in’ the ecosystem services approach, initially prioritising implementation recommendations where the Regional Council is seeing high potential conflict between provision and degradation of services (hot spots) and, where appropriate, utilising pilot projects (see section 3.11).

### 3.6 Effective implementation of Strategic Direction and Waikato Regional Policy Statement

The Strategic Direction identifies ecosystem service maintenance as a long-term outcome. Similarly the environmental results anticipated in the Waikato Regional Policy Statement (RPS) are long-term outcomes. The ultimate measure of success will be the extent to which ecosystem services can be sustainably maintained in perpetuity. In the short term, there is perhaps no one outcome or answer as to whether the Strategic Direction and RPS Objective 3.8 is being achieved. Embedding an ecosystems approach will look different for different situations. However as a measure of short term success, and to evaluate progress towards achieving the Strategic Direction outcome and RPS Objective 3.8, a policy or decision making process that is *incorporating* an ecosystems approach is likely to be where:

- A definition and common understanding of ecosystem services is adopted by the Regional Council. More broadly, it is vital that there is a common language consistently used.
- The environment is viewed as a system that can contribute to the delivery of outcomes and where decisions may have impacts on a number of parts of it.
- The full suite of values derived from the natural environment are incorporated into policy and decision making.
- A list of ecosystems (natural capitals) and ecosystem services is developed and agreed.

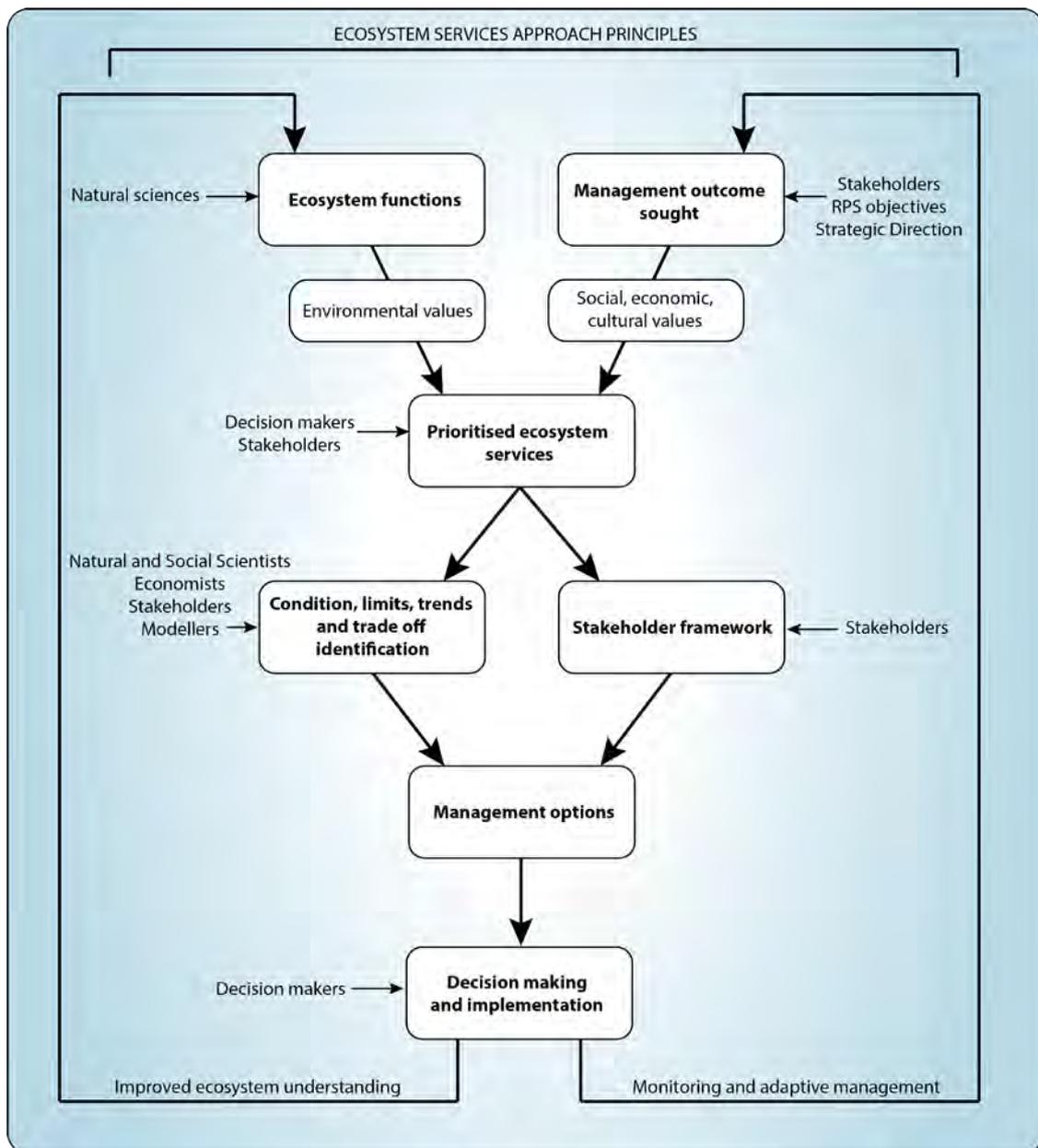


Figure 4: Proposed ecosystem services approach for Waikato Regional Council.

- Policy and decision making is values based, recognising environmental, economic and community outcomes.
- There is explicit use of an ecosystem services approach in decision making, including statutory plan making (e.g. section 32 analysis).
- Multiple policies of the RPS, across multiple resource management matters (e.g. biodiversity, soil, air) are implemented for any single project.
- Options are developed and decisions made at a scale that is appropriate to the nature of the potential environmental impacts involved.
- Responsiveness and adaptability to change is built into policy.
- Limits of our natural capital and associated ecosystem services are incorporated into decisions and plans.

- There is improved transparency of the decision-making process, greater involvement of stakeholders, and greater trust in, ownership and resilience of the process and decisions made.
- The full range of interested parties likely to be affected by the policy or decision and its impact on the services that the natural environment provides are involved.

If policy or decision making processes at the Regional Council are displaying these characteristics and there is evidence that they are shaping outcomes then the principles of an ecosystems approach are starting to be achieved, and progress is being made towards achieving longer term sought outcomes.

### 3.7 Evaluating Progress

Evaluating progress could also be measured in a temporal manner, for example:

- Short term goal (1-2 years): An enhanced **appreciation and understanding** of an ecosystem services approach to supporting policy, planning, and decision making is identified and supported by all levels and directorates of the Regional Council.
- Medium term goal (3-4 years): The importance of ecosystem services is better understood and the Regional Council has increased its **capacity for quantitative measurement** of ecosystem services to support policy, planning, and decision-making.
- Long term goal (5 years and longer): A strong qualitative and quantitative capacity exists within the Regional Council to enable the ecosystem services approach to be **common practice within policy, planning, and decision-making processes**.

### 3.8 Valuing Ecosystem Services

An ecosystem services-based approach inherently implies an assessment (qualitative or quantitative) of the services delivered by ecosystems, and the identification of the social/individual values of services in monetary and/or non-monetary terms. This is motivated by the need to incorporate these values into decision-making processes (Ortega et al, 2015).

Valuation at its simplest is putting a value on something, usually to assess whether one action is preferable to another. In an ecosystems approach, it is used to put a value on the changes in ecosystem services that could result from policy approaches and operational decisions. Valuing ecosystem services is a fundamental aspect of an ecosystems approach because it enables the value of ecosystems services to be taken into account in impact assessments alongside other costs and benefits (Defra, 2015).

There is a range of monetary and non-monetary methods of valuing ecosystem services that can be used (Defra, 2007; Greenhalgh *et al*, 2014). Both are important and relevant. Only those ecosystem services that are captured in the market economy have a monetary value; many ecosystem services are non-market/non-use values (e.g. landscape, spiritual, cultural values). This report does not endeavour to assess the merits of different types of valuation in depth. The most appropriate type of valuation for policy will depend on the purpose of using valuation, and the availability of time and data.

There are valid concerns within the Regional Council that the identification of monetary values for ecosystem services, or the use of payments, may lead to over-emphasis on some services to the detriment of others. Another identified risk is that ecosystem services policy will result in an increased focus on managing ecosystem services that can be relatively easily measured, generally to the detriment of other services that are not. There also remain challenges in identifying appropriate methodologies for valuing different ecosystem services., e.g. it is much easier to place a monetary value on provisioning services (e.g. agricultural production) than supporting services (e.g. photosynthesis), which are fundamental aspects of ecosystem functioning.

The argument for the valuation of ecosystem services still remains as it serves a variety of purposes. It would provide solid evidence for decision makers to “fully”<sup>14</sup> account for the benefits obtained from ecosystems and the natural environment in a measurable method that can be easily understood by all stakeholders. Monetary valuation would help determine whether to allow for the prioritisation of funding, evidence for decision making (value for money) between trade-offs and determination of whether policy intervention delivered benefits to society (Defra, 2007). However, it is important to distinguish between total and marginal values: often the marginal value of an ecosystem service (i.e. how the service changes in response to something else, such as a policy) is more relevant than the total value. For example, the difference of alternative policy options or actions on ecosystem services for a preferred policy option than the total value of affected ecosystem services.

It is however, worth noting that there are other potential approaches to valuation that do not involve monetisation. Non-monetary approaches can be applied at various stages of ecosystem service planning and management, e.g. in problem framing, mapping, valuation, and decision making. Such approaches examine the importance, preferences, needs or demands expressed by people towards nature, through qualitative and quantitative measures other than money (Chan et al., 2012). They can demonstrate the multi-dimensional nature of human wellbeing with monetary value being just one aspect of importance amongst a range of others.

Recommendations for addressing some of these matters and establishing a robust valuation process are outlined in the key actions below (section 3.13).

### 3.9 Regulatory and Non-Regulatory Approaches.

Using a framework of ecosystem services also allows for a wide variety of policy tools to be used, each one selected for a different purpose and outcome, depending on the nature of each resource. Policies may include education, regulation, and incentives. For example, some critical services may be best protected by legislative processes, others may require incentives. No one tool will fit all options and each will be used for different outcomes or targets. In carrying out wider programmes of ecosystem restoration to help deliver ecosystem services in the future, consideration must be given to a suite of methods that promote ecosystem changes at different scales, spatially and temporally. In terms of the adaptability principle described above, there may be a need to have flexibility in mind.

---

<sup>14</sup> Any monetary valuation/assessment of ecosystem services is an underestimate of the real value because not all ecosystem services or aspects thereof can be valued in monetary terms.

However the regulatory system plays a vital role in the protection and enhancement of the natural environment, and could potentially be an effective *part* of ecosystem service management. Despite all the debate about regulatory and non-regulatory methods of resource management, regulation still plays an important ‘backstop’ role for maintaining bottom lines. Beginning by embedding the principles of an ecosystems approach in the planning system will help regulation achieve the over-arching goal of sustainable management by:

- Ensuring that the positive and negative impacts of development on ecosystem services are reflected in sustainability appraisals.
- Enabling planners to more effectively integrate environmental, social and economic objectives.
- Improving the information available to planners in the decision-making process.

The values based approach to regulatory planning at the Regional Council is already partly evident in Proposed Plan Change 1 (Healthy Rivers), which embarked on policy development by first identifying values (intrinsic and use values) associated with the Waikato and Waipa Rivers.

A key component of resource management under the RMA is the use of objectives and policies to guide environmental decision-making. The use of objectives and policies in relation to the maintenance and delivery of ecosystem services is already evident in the Waikato Regional Policy Statements (much less so in the Regional Plan). Objectives and policies in the Regional Plan may not necessarily be prescriptive, but could provide strong enabling approaches for different land use approaches. For example, objectives and policies could be articulated for the purposes of giving land use more recognition for maintaining and enhancing ecosystem services. There is also the possibility of promoting different ecosystem services within different catchments or areas. These differences in focus for each catchment could be based on the lack of a particular critical ecosystem service or it could be to promote the delivery of services that meet particular, identifiable community aspirations.

The evaluation of objectives and policies (for example through a section 32 analysis of costs and benefits) can also be undertaken with much greater clarity if tied to clearly defined outcomes. An ecosystem services approach can assist by helping to identify the full range of values (and therefor benefits) associated with ecosystems.

Ultimately there is no overall answer as to whether regulatory or non-regulatory approaches (e.g. offsets, payment for ecosystem services (PES), impact investment) are best for implementation of an ecosystem services approach. The stepped assessment described above should begin by having all of the possible tools and mechanisms in mind. Only through the process of understanding values, trade-offs, options, costs etc. can the right tools/mechanisms for any given circumstance be determined.

### 3.10 Communication and Awareness

Two matters of communication are key to successful implementation of an ecosystem services approach – internal (with the Regional Council), and external (with stakeholders).

Due to the complexity and breadth of information required to understand ecosystem services and their contribution to human wellbeing, communication on the ecosystem services approach across the Regional Council is crucial to:

- Agree and use a common terminology.
- Avoid duplication of efforts.
- Avoid inefficient use of resources through use of various and inconsistent approaches;
- Allow for common learning about ecosystem services.
- Achieve integrated management of natural and physical resources (Policy 4.1 of the RPS).

If wide application of the approach proposed in this report is to be achieved, the benefits of applying an ecosystem approach to policy need to be communicated to all Regional Council staff, management and politicians. Guidance for decision makers on applying the tools, as well as case studies and pilot projects demonstrating the benefits would all help. It may also be useful for the Regional Council to utilise a cross-organisation ecosystem services steering group to oversee implementation of the ecosystem services approach, particularly while the approach is still new. Existing forums such as the Land and Water Steering Group or Ecosystem Service Coordination Group could be utilised to fulfil the role.

The ecosystem services approach is participatory. Stakeholder involvement is already part of many Regional Council decision-making processes. To achieve the support crucial to achieving objectives, stakeholders (which can include the public / communities) need to be more actively involved in decisions affecting them. Improving public / stakeholder involvement and understanding will help:

- Get support and buy in, for example, for natural flood management measures where the benefits to individual households may not be so clear.
- Inform assessments of ecosystem service provision; to examine why and to who ecosystem services matter.
- Educate and influence in order to raise awareness of ecosystem services and what they offer for wellbeing.
- Define the issues.
- Develop and evaluate relevant scenarios.
- Ultimately help inform policy and management decisions through the addition of knowledge on values and uses.

Engaging with stakeholders is not always easy, and can be resource intensive. To enable pragmatic implementation of the approach, there is a need to assess the level of engagement required, and rationalise this against what can be provided. This is a fundamental reason for considering the development of a communications plan from the outset of the approach.

Incorporating ecological and socio-economic data into decision making may be challenging because translating scientific data into a form that is useful and easily understood by decision makers and communities with different levels of scientific expertise can be challenging. In both instance – internal and external communication – the Regional Council must find a way to describe ecosystem services in a manner that makes it relatable. *Relatability* is the key (fundamental) to improving understanding of ecosystem services.

Communications recommendations are made in the Key Actions section below (section 3.13).

### 3.11 Pilot Projects

To some extent, the only way the Regional Council can *demonstrate* the benefits of taking an ecosystems approach is by actually putting the approach into practice. There are already good examples of an ecosystems approach being embedded within the Regional Council, including the Local Indigenous Biodiversity Strategies programme (see Box 9).

Distillation and analysis of the lessons learnt can contribute significantly in the practical application of an ecosystem approach. It is necessary for as many parts of the Regional Council as possible to promote what experience they have in implementing an ecosystem approach and to give their views on how applicable they are and what problems have had to be overcome. Such experiences need to be shared.

Pilot studies are a useful tool for testing the approach on a limited scale. These studies are likely to have greatest value when they are used to identify both successes and opportunities on the as well as failures and barriers. Pilot studies should be viewed as a *transitional* step from high level outcomes to full Regional Council implementation of an ecosystem services approach.

In a draft Regional Council paper titled '*A Framework for Natural Capital and Ecosystem Services for WRC*' (Document Number 4101740, Huser 2017) sets out a preliminary list of Regional Council projects where the use of a Natural Capital / Ecosystem Services framework could provide significant benefits. These could provide focus areas for pilot projects. Examples include:

- Proposed 'Farm/Property Plans' for the Healthy Rivers Plan Change could identify and manage for multiple benefits of outcomes in addition to balance economic benefits and water quality (e.g. water quantity, biodiversity, carbon sequestration, landscape and cultural values, tourism) to optimise overall benefits ('best use of land') and avoid non-intended consequences on other ecosystem services.
- Integrated catchment plans/zone plans, Harbour and Catchment Management Plans and 'Farm/Property Plans' could be developed and implemented that manage land for multiple benefits, including economic profitability, water quality (nutrients, sediments), water quantity, biodiversity, carbon sequestration, landscape and cultural values, tourism) for the best use of land.
- Initial work has been undertaken to explore what 'Green Growth' means for the Waikato. An ecosystem services approach could provide a framework for identifying and implementing opportunities, e.g. in agriculture, Māori economy, marine economy, transport etc. Transition to low carbon, efficient use of resources (e.g. water, energy) and life cycle assessments (minimising waste) are key principles of green growth.
- Regional Plan and Regional Coastal Plan Review: 'issue statements' are the starting point for identifying the information and policy needed. Applying an ecosystem services lens to this process would provide a more realistic assessment, by making links to non-RMA matters and connecting to Council's strategic direction. This would result in more effective policies and better outcomes. An ecosystem services approach would provide useful input into S.32 (evaluate trade-offs of alternative policies, cost/benefit analysis).

- The coastal marine area contains many different types of ecosystems, including estuaries and wetlands, beaches, dunes, and rocky reefs. Coastal ecosystems are often highly productive and highly valued but are also sensitive to human-induced activities and pressures. Ecosystem services maps been produced on a broader scale for the entire Hauraki Gulf, e.g. for nutrient recycling, as part of marine spatial planning for the Sea Change Tai Timu Tai Par.<sup>15</sup> However, the scale is too coarse for considering ecosystem services, in particular for estuaries, and more detailed intertidal information is needed.<sup>16</sup>
- Local Indigenous Biodiversity Strategies (Box 9) are an example of a (prototype) ecosystem services approach. While the focus is on indigenous biodiversity, the project aims to maximise the benefits of a number of other ecosystem services on a property/catchment scale (e.g. economic/farm viability, iwi/cultural, water quality, social).

#### Box 9: An Ecosystem Services Approach Case Study – Local Indigenous Biodiversity Strategies (LIBS)

While maintaining and enhancing biodiversity underpins LIBS, added value and opportunity is realised through broad implementation across the four wellbeings. Delivery is aimed at being strategic and broad, fitting with the Regional Council’s strategic direction to deliver on several priority areas, and numerous RPS methods e.g. Indigenous biodiversity, Mātauranga Māori, Kaitiakitanga, freshwater, soil, natural character etc. LIBS considers that the only way to achieve such an outcome is to look at a broad range of tools that incentivise biodiversity management into existing land uses/activities. Broad implementation across the four wellbeings also opens up a wider range of funding options and partners, rather than reliance on single (usually environmental) options.

The pilot project established that an ecosystems services framework would be a useful way to measure and communicate multiple benefits from biodiversity restoration but that any development of such a framework should be linked to work that is being undertaken at a broader level as part of assessing how to measure progress against the Regional Council strategic direction and links to regional development (and green growth).

- Soil Strategy: The soil resources of the Waikato region are valued and managed to support sustainable economic growth while maintaining and enhancing the natural capital and diversity of services to the region’s wider wellbeing and health of its people. The Regional Council is currently undertaking a soil strategy. Using an ecosystem services approach would identify and evaluate the many potential benefits of the soil resources.
- Council’s Executive Leadership Team is considering developing and implementing a sustainability approach to Council’s work. At a basic level this will include some sustainability principles supported by operational tools (‘Sustainability Assessment Checklists’). An ecosystem services approach would provide a useful framework.

<sup>15</sup> [www.seachange.org.nz/](http://www.seachange.org.nz/)

<sup>16</sup> [www.waikatoregion.govt.nz/assets/PageFiles/41458-coastal-fact-sheets/5263-Estuaries-Facsheet-Ecosystem-Services-WR.PDF](http://www.waikatoregion.govt.nz/assets/PageFiles/41458-coastal-fact-sheets/5263-Estuaries-Facsheet-Ecosystem-Services-WR.PDF)

### 3.12 Challenges

An ecosystem services approach presents challenges associated with its implementation.

- **Language.** Ecosystem services is a term that may not mean too much to communities. Terms such as multiple benefits or the ‘benefits we receive from nature’ may be more relatable for people. The concept is not well expressed in everyday terms and possibly still (inherently) reflects an emphasis on environmental values.
- **Complexity.** Bringing a new range of factors into the mix could make decision-making more complex. It involves more stakeholders, more time, more information, more inter-relationships between options and, potentially greater uncertainty in the outcomes.
- **Valuation.** Cost benefit analysis and trade-offs require valuation and not just in monetary terms. Factors such as the intrinsic nature of services, value for future generations or the special relationship of te ao Māori with nature, may be particularly hard to value.
- **Data and knowledge availability.** Data may not always be available, or difficult to obtain / collate. Data for many services, especially cultural ones are not always readily available. Furthermore, the knowledge of ecosystems and ecological processes, and how they interact with providing services for people and the economy is often lacking.
- **Integration.** Existing entrenched processes and resourcing required to effect change can hinder integration. It may be perceived as another framework implemented from above or another toolkit to apply without additional support, training, finance or staff resources
- **Raising expectations.** Involving local communities more and using scenarios of potential futures will raise expectations. As well as risking stakeholder fatigue in the engagement process, expectations may not be realised.
- **Communication.** The complexity of the ecosystem services concept and its difficult language need to be translated into easy to understand ideas focusing on the benefits to people wellbeing and the economy.
- **Coordination.** The current organisational structure is not ideally suitable for the cross-cutting nature of ecosystem services work. This is reflected in the piece-meal nature of current ecosystem services project across the organisation.
- **Inter/Intra-disciplinary.** The current focus on environmental science needs to be matched by social science and economics to reflect an increased emphasis on the dependency of people and the economy on the environment (rather than focusing on the impacts of human activities).

### 3.13 Key Actions

Transitioning to approaches that fully account for wider ecosystem services approaches will be a long and ongoing process.

While the key principles and steps described above set out an ecosystem services approach for the Regional Council, there are a number of 'set up' and implementation actions necessary to establish the approach.

#### Communications

- Ensure staff, management and politicians:
  - Understand the principles and benefits of an ecosystems approach.
  - Recognise the importance of ecosystem services, and how people's wellbeing and the economy depend on them.
  - Think consistently in terms of whole ecosystems and the need to maintain ecosystem services when defining policy outcomes.
  - Take full account of the value of ecosystem services when assessing policy options or undertaking impact assessments.

Therefore, in practical terms it is important now to transform the idea from a conceptual framework to operational guidance. There are a number of approaches to this which would support a robust strategy for implementation, for example:

- General guidance.
- Guidance on implementing the key principles.
- Guidance in relation to specific areas or topics.
- Guidance on key scientific and technical queries from stakeholders.
- Lessons from experiences and case studies.
- Start to embed the key principles of an ecosystems approach in any new standard policy-making procedures (noting comments below on the use of pilot projects).
- Embed key 'ecosystem services approach' messages in strategic communications on the natural environment, and its relevance to people's wellbeing and the economy.
- Develop a 'common language' to ensure that the key concepts of ecosystem services and the ecosystem services approach can be understood by all. This includes ensuring that methodologies are in place to communicate science in an effective and understandable manner.
- Develop specific decision support systems / instruments / methods that convey technical ecosystem services information (social / economic / cultural / environmental) in a user friendly manner.

### **Pilot Projects**

- Develop further case studies and pilot projects to demonstrate the benefits of an ecosystems approach in decision and policy-making. This could include engaging with stakeholders to identify cross organisational projects for mutual benefit.
- Explore further benefits and risks/challenges of an ecosystems approach, drawing on the lessons learned from pilot projects and case studies where this approach is being applied.
- Explore how an ecosystem services approach could be applied for developing and using a Sustainability Decision Support Tool'' for the Regional Council e.g. for a sustainability assessment of Integrated Catchment Management, including flood protection and drainage services.

### **Valuation**

- Develop case studies that will explore the extent to which valuation of ecosystem services could be integrated into existing decision-making processes and the advantages this might bring.
- Investigate an approach towards valuation that includes both monetary and non-monetary valuation, and guidance on when to use monetary valuation. Develop a methodology to compare monetary and non-monetary values (e.g. multi-criteria analysis).
- The involvement of the public and stakeholders in decision-making on the natural environment is already required on a statutory basis and integrated into existing decision-making mechanisms. However, in order to value ecosystem services, the Regional Council will need to continue to develop public and stakeholder engagement to ensure decisions are informed by views on how best to deliver environmental, economic and social objectives; how people relate to and identify with their environment; and how changes in ecosystem services impact on human wellbeing, and how people's wellbeing and the economy depends on our ecosystems and the services they provide.
- There is also a real need to encourage more interdisciplinary working between natural scientists and social scientists (including economists), so that knowledge across the board can inform valuation methodologies.

### **Corporate Planning**

- Explore how the key principles of an ecosystems approach can be embedded in corporate plans and strategies (e.g. Long Term Plans) and identify potential barriers to doing so.

### **Review of Existing Policy**

- Review existing policy and project appraisal tools to explore how the key principles of an ecosystems approach, including the valuation of ecosystem services, could be incorporated.

### **Information Collection**

- Develop information instruments to support an ecosystem services approach. Information instruments relevant in the context of ecosystem services and natural capital consist of identifying and agreeing on a list of ecosystems/natural capitals, ecosystem services and associated values; common indicators for assessing the implementation of policies; databases and frameworks for monitoring, accounting, mapping and modelling, and a range of integrated assessments supporting policy development.
- The ecosystem services approach that has been outlined in this report is likely to be applied in a way that will not, most often, be based on long and detailed primary data collection. Knowledge gaps could remain, which may need to be filled during the course of policy implementation. Information collection and dissemination should form a part of any strategy and operations plan etc.

### **Partnerships**

- Working together with research providers, other regional councils (Special Interest Groups (SIG), e.g. Policy SIG, BioManagers SIG), iwi/Māori, central government (Ministry for the Environment, StatsNZ, Department of Conservation, Ministry of Primary Production, Ministry of Business, Industry and Employment) and other strategic partners is essential to effectively apply an ecosystem services approach.

## **3.14 Conclusion**

As noted regularly in this document, ecosystem services is an emerging concept that is still subject to ongoing research and development. It strongly encourages a better understanding of the connections between society/economy and the environment, and the need for these interactions and dependencies to be taken into account during environmental decision-making. Ecosystem services play a critical role in maintaining a quality of life for all our communities through natural hazard mitigation, the provision of water, or the aesthetic values that attract people and vitality to this district. A healthy environment has more resilient ecosystems that ensure the delivery of ecosystem services which can allow for more development opportunities. This, in turn, can improve economic, social, cultural and environmental wellbeing.

## REFERENCES

- Chan, K.M.A., Guerry, A.D., Balvanera, P. (2012): *Where are Cultural and Social in Ecosystem Services? A Framework for Constructive Engagement*, BioScience 62(8).
- Christopherson, R.W. (1997): *Geosystems: An Introduction to Physical Geography*, 3<sup>rd</sup> Edition, Prentice Hall Inc.
- Convention on Biological Diversity (1992): Summary Report prepared for the United Nations
- Deutsche Gesellschaft für Internationale Zusammenarbeit (2012): *Integrating Ecosystem Services into Development Planning A stepwise approach for practitioners based on the TEEB approach*, Federal Ministry for Economic Cooperation and Development Publication.
- Department for Environment, Food and Rural Affairs (Defra) (2007): *An Introductory Guide to Valuing Ecosystem Services*, Technical Publication.
- Department for Environment, Food and Rural Affairs (Defra) (2007): *Securing a healthy natural environment: An action plan for embedding an ecosystems approach*, Technical Publication.
- Department for Environment, Food and Rural Affairs (Defra) (2015): *What nature can do for you: A practical introduction to making the most of natural services, assets and resources in policy and decision making*, Technical Publication.
- Fenton, T. (2016): *Ecosystem Services Modelling with Wise: Methods and Issues*, Draft Technical Report prepared for Waikato Regional Council.
- Institute for European Environmental Policy (IEEP) and Milieu (2013): *The Guide to Multi-Benefit Cohesion Policy Investments in Nature and Green Infrastructure*, A Report for the European Commission. Brussels.
- Fisher, B., Turner, R. & Morling, P. (2009): *Defining and classifying ecosystem services for decision making*, Ecological Economics, 68, 643–653
- Haines-Young, R.; Potschin, M. And D. Cheshire (2006): *Defining and Identifying Environmental Limits for Sustainable Development. A Scoping Study. Final Full Technical Report to Defra, Project Code Nr0102.*
- Harmsworth GR and Awatere S (2013). Indigenous māori knowledge and perspectives of ecosystems, pgs 274-286. In Dymond JR ed. *Ecosystem services in New Zealand – conditions and trends*. Manaaki Whenua Press, Lincoln, New Zealand.
- Hart G, Rutledge D, Vare M, and B Huser (2013): *An Evaluation and Prioritisation of Ecosystem Services Models for Inclusion into the Waikato Integrated Scenario Explorer (WISE)*, Waikato Regional Council Technical Report 2013/28.
- Greenhalgh S, Selman M, Daigneault A, Kaighin C, Sinclair R 2014. *Review of Policy Instruments for Ecosystem Services*. Landcare Research Science Series, no. 42. Lincoln, New Zealand, Manaaki Whenua Press.

Julia Martin-Ortega, Dídac Jorda-Capdevila, Klaus Glenk, and Kirsty L. Holstead (2015): *What defines ecosystem services-based approaches? Water Ecosystem Service*, International Hydrology Series, Cambridge University Press.

Matheson, B (2013): *A Call for Regional Leadership: Why regional policy statements must enable social, cultural and economic wellbeing*, Resource Management Journal, August 2013.

Millennium Ecosystem Assessment (MA) (2005): *Ecosystems and Human Wellbeing: A Framework for Assessment*, Island Press.

Queensland Government (2014): What is Biodiversity, <https://www.qld.gov.au/environment/plants-animals/biodiversity/about>.

Raudsepp-Hearne, C and G Kerr (2011): *Ecosystem Services Approach Pilot on Wetlands Operationalizing an Ecosystem Service Approach within the Government of Alberta*, Alberta Government, Policy and Legislation Integration Branch.

Royal Society of New Zealand (2011): *Ecosystem Services: Emerging Issues*, Discussion paper.

Scottish Natural Heritage (2009): *Applying an Ecosystem Approach in Scotland: A Framework for Action*, Technical Report.

Spray, C and Blackstock, K (2013): *Optimising Water Framework Directive River Basin Management Planning Using an Ecosystem Services Approach*, Technical Publication CD2012\_17.

The Economics of Ecosystems and Biodiversity (TEEB) (2008): *Interim Report*, European Commission, Brussels.

Turkelboom F. Thoonen, M. Jacobs, S. García-Llorente, M. Martín-López, B. and P. Berry (2016): *Ecosystem services trade-offs and synergies*. In: Potschin, M. and K. Jax (eds): *OpenNESS Ecosystem Services Reference Book*.

Vare, M (2016): *Local Indigenous Biodiversity Strategy (LIBS) Pilot Project: Source to the Sea*, Waikato Regional Council Technical Report 2016/03.

World Resources Institute (2008): *Roots of Resilience - Growing the Wealth of the Poor*, United Nations Development Programme, United Nations Environment Programme, World Bank and World Resources Institute.

Zhang M, Tan F. Lu Z (2014): *Resource-based Cities (RBC): A Road to Sustainability*, International Journal of Sustainable Development and World Ecology, Vol 21, Issue 5.

**HE TAIAO MAURIORA**

HEALTHY ENVIRONMENT

**HE ŌHANGA PAKARI**

STRONG ECONOMY

**HE HAPORI HIHIRI**

VIBRANT COMMUNITIES

Waikato Regional Council Policy Series 2017/09  
ISSN 2230-4339 (Print)  
ISSN 2230-4347 (Online)

Private Bag 3038  
Waikato Mail Centre  
Hamilton 3240  
New Zealand

**0800 800 401**  
[waikatoregion.govt.nz](http://waikatoregion.govt.nz)

