



Natural capital is critical to New Zealanders living standards. Describe the strengths, weaknesses, opportunities and threats relevant to managing New Zealand's natural capital, and how the government can measure and track progress against this. Consider the range of stakeholders that will be impacted by these

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1. INTRODUCTION

The New Zealand (NZ) society, culture, and economy is built on a foundation of natural capital. For living standards to increase, NZ must learn to live off the excess or 'interest' from its natural capital. The main natural resources which play a key role in NZ are the climate, fresh water resources, and biodiversity. Natural capital management must consider strengths, weaknesses, opportunities, and threats, such as climate change and contamination. Comprehensive management requires both general and specific measurement and tracking of progress. This can only occur with stakeholder consultation and consideration. Stakeholders include local Iwi, the public, the agricultural and horticultural industry, and non-governmental organisations (NGOs).

2. NATURAL CAPITAL IN NEW ZEALAND

NZ capitalises on its natural resources in its two biggest export industries: dairy and tourism (Treasury, 2011). Since 1999, NZ has been marketed as '100% pure' (Tourism New Zealand, 2017). The slogan emphasises the significance and role of natural capital in NZ. The management of NZ's natural capital is affected by local and central government bodies, the state of natural capital, attitudes toward natural capital, and the economy. The role of regional councils includes enforcing the Resource Management Act (RMA) and protecting land, air, and water.

3. GENERAL STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS

General strengths relevant to managing natural capital include availability, quality, and contribution to the economy. However, a prominent weakness of both renewable and non-renewable natural capital is that it is, in general, finite. This is obvious in species extinction as well as land and water contamination. Once contamination occurs, it is likely that the resource, such as groundwater, can no longer be used. Furthermore, remediation can be costly in terms of time, finances, and environmental impact.

A major strength and opportunity in managing NZ's natural resources is education. Inevitably, as the population (and use of natural capital) increases, the challenges associated with water management will also increase. Although early childhood and primary school aged children already receive environmental education through the NZ curriculum, more can be done in a joint societal effort. Starting education from a young age on conservation importance and social, political, environmental, and economic consequences of improper natural resource management, will engrain these issues into general knowledge. Consequently, the public and forthcoming generation of leaders will be more conscious about natural capital usage and quality.

In natural capital management, there are also aspects which can be both an opportunity and a threat. Natural capital has the opportunity to contribute to economic growth and sustainability. Maintenance of natural capital's purity can lead to economic growth. This is evident in the tourism industry, where pristine, 'untouched' NZ natural resources are marketed towards people in

heavily urbanised areas. Natural capital can also contribute to sustainability, a purpose of the RMA. Furthermore, NZers are called to express kaitiakitanga. Educating the population of this responsibility will be a significant opportunity in management.

Conversely, economic growth can be a threat. Contribution to economic growth encourages capitalisation of natural resources. It can also lead to exploitation in the form of over extraction, excessive pollutant levels, and complacency towards resource levels. However, the biggest threat to natural capital management is a culture of ignorance. Despite the paradigm shift away from a 'she'll be right' attitude towards natural resources over the past decade, there is still a lack of knowledge and realisation surrounding the depleting rate of natural resources.

NZ's high seismic activity levels pose a threat. Major events such as the Napier earthquake in 1931, Canterbury earthquakes in 2010/2011, and Kaikōura earthquake in 2016 have demonstrated the devastating effects to not only society but to natural capital as well. Research by Aqualinc has indicated that groundwater levels in Christchurch changed significantly after the 2010/2011 Canterbury earthquakes (Rutter et al., 2017a). Another major threat is urbanisation, given the vast destruction of natural resources to fuel human needs.

4. GENERAL MEASURING AND TRACKING PROGRESS FOR NATURAL CAPITAL MANAGEMENT AND CONTRIBUTION TO LIVING STANDARD

The NZ Department of Conservation (2014) has previously suggested for NZ to follow the United Kingdom (UK) model for natural capital assessment. Figure 1 illustrates the UK model.

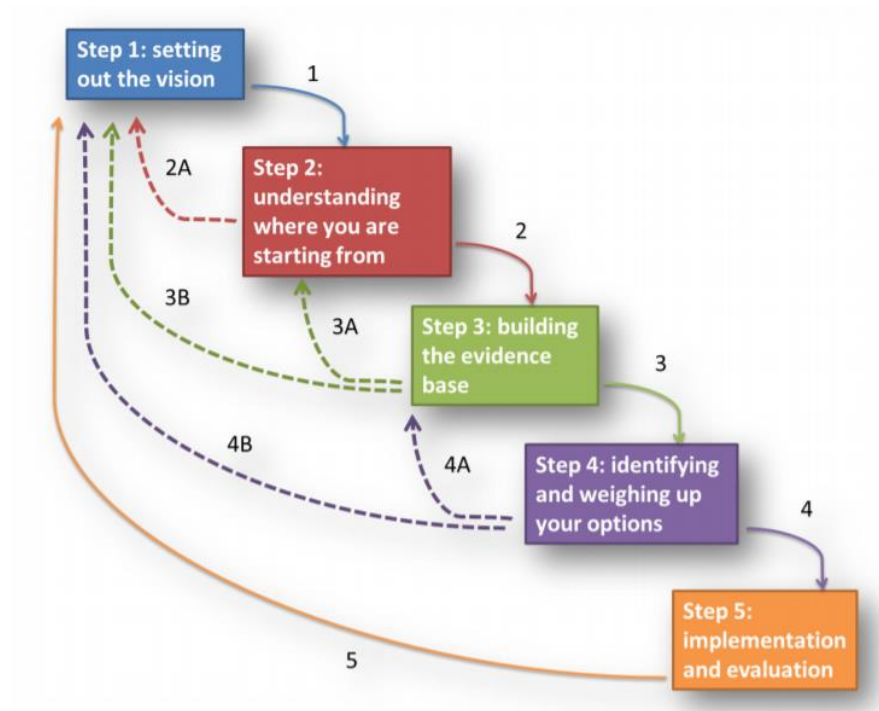


Figure 1. UK model for natural capital management (Natural Capital Committee, 2017)

Currently, Statistics New Zealand follows the United Nations System of Environmental Economic Accounting (SEEA), a framework which aims to bring together environmental and economic information onto the same platform (United Nations, n.d.). This model covers three main areas (United Nations, 2014):

1. The resources and energy flows between the environment and the economy, and in the economy
2. Environmental asset stocks and variation in these
3. Environmentally related economic activities

These areas quantify natural capital as an economic asset and allows a predominantly economically driven society to realise the value of natural capital.

Living standards are connected to economic growth, managing risks, sustainability for the future, increasing equity, and social infrastructure (Treasury, 2014). These standards are generally quantified by disposable income, housing affordability, household consumption expenditure, and overall life satisfaction (Statistics New Zealand, 2017). Natural capital is critical to improving living standards and to quantify this, NZ should further the SEEA by utilising the data. For living standards and resource sustainability, efficient and effective natural capital management must occur.

5. THE CLIMATE

5.1. Strengths, Weaknesses, Opportunities, and Threats

The NZ climate is a major strength for many industries, such as horticulture and agriculture. The temperatures and rainfall levels give ideal conditions for such practices. However, a weakness is that once a short-term forecast is predicted, changing impending weather is extremely difficult. Although forecasts can be made, the climate will vary season to season. Risk management must work around the climate to succeed. As the climate adapts, there will be opportunities to venture into industries which suit new climatic conditions.

The Ministry for the Environment projects that NZ will experience rising sea levels, increased flood risk, higher temperatures, more frequent extreme weather events, and a change in rainfall patterns (Ministry for the Environment, 2016). Climate change is a threat to NZ's natural capital. Thus, it is critical to manage the climate as a whole because resources are interconnected.

5.2. Stakeholders

Key stakeholders include local Iwi, the public, climate-dependent industries, and NGOs. Māori society, culture, and economic systems have a strong connection to the climate. Thus, it is generally accepted that Māori society is climate sensitive (NIWA, 2012). Iwi (and respective hapū within each) will be faced with varying climate issues, such as flooding and coastal erosion. This

will affect their mahinga kai and lifestyles. The public, climate-dependent industries, and NGOs also need to be consulted as their survival heavily depends on the climate. Significant temperature changes can affect daily routines, agriculture, and horticulture. This will have flow-on effects to the economy, the healthcare system, and society.

5.3. Specific Measurement and Tracking of Progress

Although accurate predictions about the climate are difficult to make, collating current data will show trends. NZ ratified the Paris Agreement on climate change in 2016 (Bennett, 2016). This commitment can only be managed if progress is measured. Thus, it is important for data collation to be current, accurate, and technologically adaptable.

6. WATER SOURCES AND SOIL

6.1. Strengths, Weaknesses, Opportunities, and Threats

In a country blessed with abundant quality and quantity of fresh water, water is constantly being taken advantage of. There are over 20,500 consented fresh water takes nationwide (Rutter et al., 2017b). A strength of NZ's groundwater is low pollutant levels, allowing regions, such as Canterbury, to have untreated potable water. At the same time, this is a weakness. Complacency has been prevalent in NZ's attitude towards water use. An average NZer uses 240 L/day of fresh water (Greater Wellington Regional Council, n.d.). This is significantly higher than the global average of 170 L/day.

A weakness in measuring fresh water use in NZ is the lack of requirement for stock water intake to be measured (Rutter et al., 2017b). This creates a loophole in monitoring fresh water intake levels, as not all intake is recorded. Another weakness includes its dependence on rainfall levels, given rainfall variability. Furthermore, landfills are NZ's main waste management method. This is a weakness in soil and water management. Although the Waste Minimisation Act 2008 encourages better waste management and waste reduction, existing and decommissioned landfills are degrading the quality of natural capital, namely soil and water.

There is ample opportunity for hydropower to be used as an energy source. Although 57% of NZ's generated electricity comes from hydropower, there is opportunity for more hydro-generation. However, increasing hydroelectric capacity can significantly detriment other natural resources, such as native fish population (Chui, 2017).

According to Rutter et al. (2017b), threats to NZ's water supply include microbial contamination, nutrients, pesticides, arsenic, and industrial contaminants. These threats heavily affect groundwater and surface water quality. Microbial contamination usually occurs in the form of campylobacter, giardia, E.coli 0157:H7, and cryptosporidium. If these micro-organisms contaminate drinking water supply, not only will the natural capital be affected, but human health, the financial economy, attitudes towards local authority, and society will also be affected.

Contrary to consensus, contaminated potable water can exist in developed nations. Major examples include the 2016 campylobacter outbreak in Havelock North and the 2000 E.coli outbreak in Walkerton, Canada. Furthermore, increasing nutrient levels encourages plant growth in water. This is caused by improper fertiliser application, animal manure, and wastewater and stormwater discharges (NIWA, 2016). Arsenic contamination in waterways, occurring due to rock erosion (University of Otago, 2017), is a carcinogenic threat. Water and Soil remediation can also be a hazard to remediators and the surrounding environment (Yeung, 2017).

6.2. Stakeholders

The main stakeholders in fresh water are the agricultural sector, the public, industry, and local Iwi. Approximately 75% of groundwater is used for irrigation, while 9% is used for both industry and drinking water supply (Rutter et al., 2017b). Each Iwi holds different views on water matters. However, many oppose discharge into water. For instance, in the Te Rūnanga o Kaikōura Environmental Management Plan, they have 'a baseline or benchmark policy of no discharge to water' (Te Rūnanga o Kaikōura, 2007).

6.3. Specific Measurement and Tracking of Progress

Measurement and tracking of progress of water is instrumental for natural capital management. Regular data capture on water quality, flows, intake, and pressure head is vital to tracking progress. It also identifies strengths and weaknesses. As previously mentioned, stock water is not measured. A system should be implemented to quantify intake for stock water.

7. BIODIVERSITY

7.1. Strength, Weaknesses, Opportunities, and Threats

NIWA (2015) has found that almost 70% of NZ's native forest has been deforested since humans arrived, causing extensive habitat loss. Introduced foreign species of plants and pests, such as possums and wilding pine, have competed against native species, causing their decline and endangerment (MFE, 2015). There are opportunities to breed native species and implement protection programs. A threat to biodiversity, especially in native fish and bird species, is urbanisation. Many man-made river structures, such as culverts and dams, obstruct natural fish routes. These are often designed without considering the jump height of fish.

7.2. Stakeholders and Progress Management

Key biodiversity stakeholders are similar to those mentioned in section 6.2. The introduction of foreign species has reduced available mahinga kai and natural remedies for Māori. Biodiversity affects industries in forestry, conservation, and horticulture. Similar to asset management, biodiversity progress can only be tracked with adequate data capture. For informed decisions regarding schemes, such as in protection and rehabilitation, comprehensive data must be collated and analysed.

8. CONCLUSION

Quality natural capital management is the key to unlocking a sustainable present and future. Living standards are dependent on natural capital. The strengths, weaknesses, opportunities, and threats vary for each resource. However, the major threat to natural capital is urban development. This threat can be changed into an opportunity if the right management, maintenance, and protection steps are taken. For natural capital prosperity, comprehensive data sets must be collected to analyse trends and to make informed decisions. Stakeholders are a key consideration for the government in natural capital management due to their interests and investments.

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