

Integrating Climate Change and Biodiversity into Impact Assessment

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Purpose

The aim of the study is to evaluate the range of tools available to integrate climate change and biodiversity into impact assessment, and the degree to which these tools are currently utilised in New Zealand. This will be achieved by identifying the tools available for use globally, followed by an investigation of New Zealand's legislation, policies and plans for explicit or implicit use of such tools.

This study started in November and will run for three months into early 2016.

Background

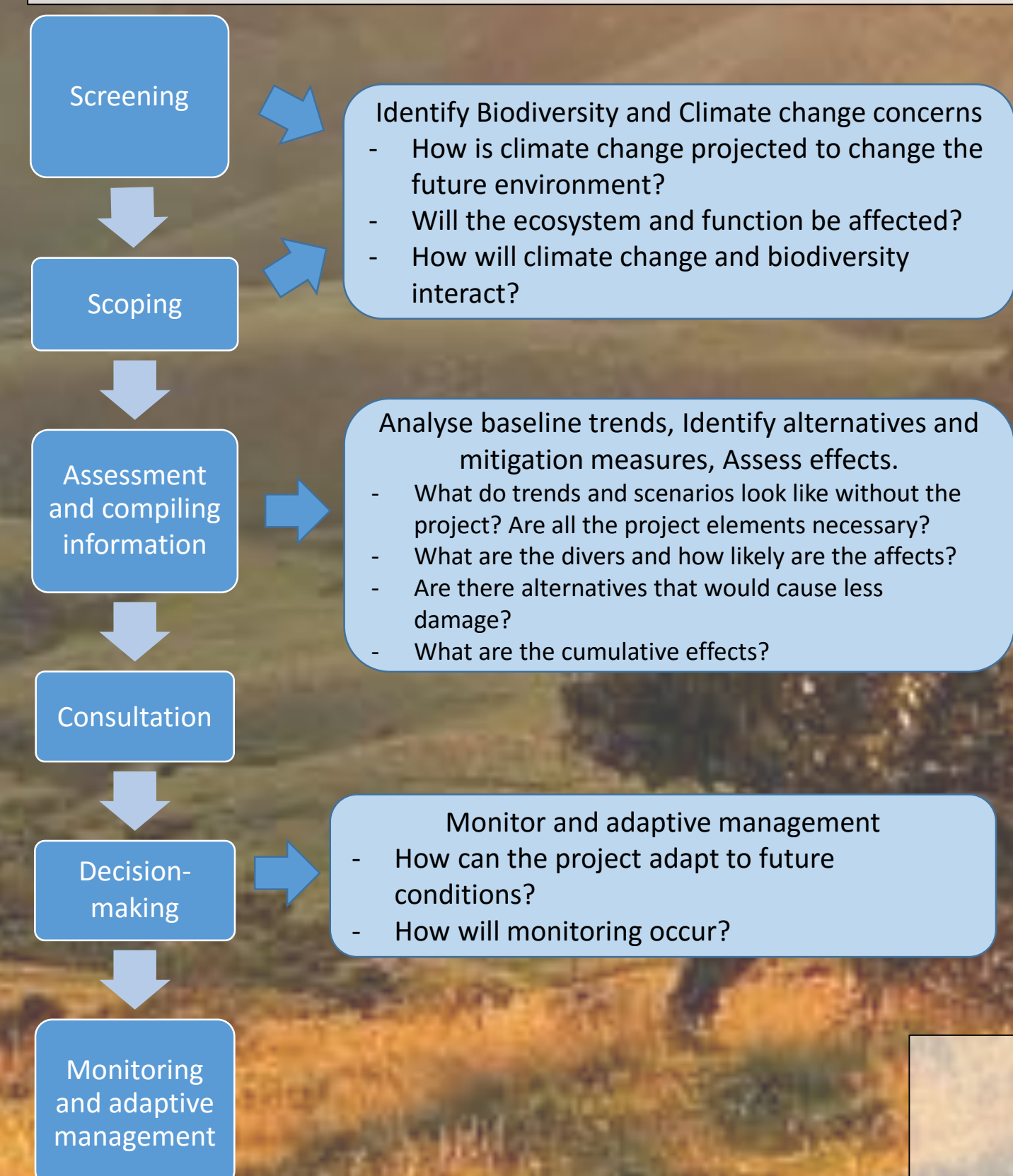
The impacts of climate change and the loss of biodiversity are two of the biggest environmental issues we face today³. Although complex issues, integration into policies and plans is vital to prevent further degradation of the environment. Impact assessment has an important role in achieve such a goal.

Climate change and biodiversity can be integrated into impact assessments through both EIA and SEA. This integration can occur at a number of entry points (Fig. 1 and Table 1) using a multitude of tools including: ecosystem approaches, ecosystem service approaches, risk assessment, scenarios, and vulnerability analysis^{2,3}. An interesting new tool developed in the UK, at the University of Oxford, is the Local Ecological Footprint Tool (LEFT).

Table 1: Possible application of tools within SEA²

Technique	SEA Stage					
	Baseline	Identify Impacts	Predict Impacts	Significance	Mitigation	Ensure plan is internally coherent
Expert judgement	✓	✓	✓	✓	✓	✓
Public participation	✓	✓	✓	✓	✓	✓
Spatial analysis technique	✓	✓	✓	✓	✓	
Land unit partitioning analysis			✓			
Integrated habitat system	✓			✓	✓	
Network analysis	✓	✓	✓		✓	
Scenario			✓		✓	
Multi-criteria analysis				✓		
Vulnerability analysis	✓		✓	✓		
Risk Assessment			✓	✓		

Figure 1: Integration of Climate Change and Biodiversity³



LEFT: recently developed tool

The Local Ecological Footprints Tool (LEFT) allows users to determine an area's ecological features through the use of global databases, modelling and algorithms⁵. The outcome is based on five distinct categories; biodiversity, vulnerability, fragmentation, connectivity and resilience⁵ (Fig.2).

This tool can be used to aid the planning process through identification of important ecological areas which are located outside of protected areas⁵. A study in Alberta Canada (fig.3) showed that the highest ecological values of this area were associated with river boundaries and large areas of continual boreal forest⁵ (fig.3). This was based on the five categories outcomes below:

Category	Database	Outcome
Biodiversity	GBIF	Highest concentration found in the North-West area.
Vulnerability	IUCN	Two globally threatened species can be found over entire study area.
Fragmentation	FRAGSTAT	Wide range of vegetation patch sizes <1ha – 1000ha.
Connectivity	N/A	59 migratory species with 52-59 at any one location.
Resilience	N/A	Highest concentration in North-west corner.

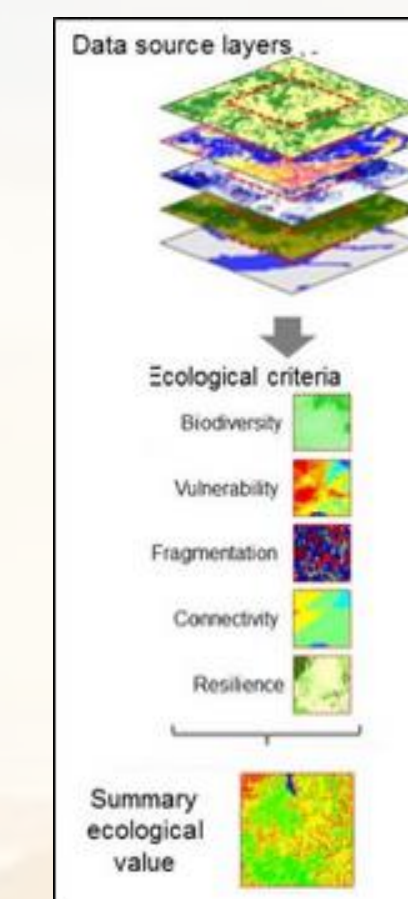


Figure 2: LEFT map compilation⁵

The tool is intended to provide developers and decision makers with a way to identify area's suitable for project development, that have the least important ecosystems.

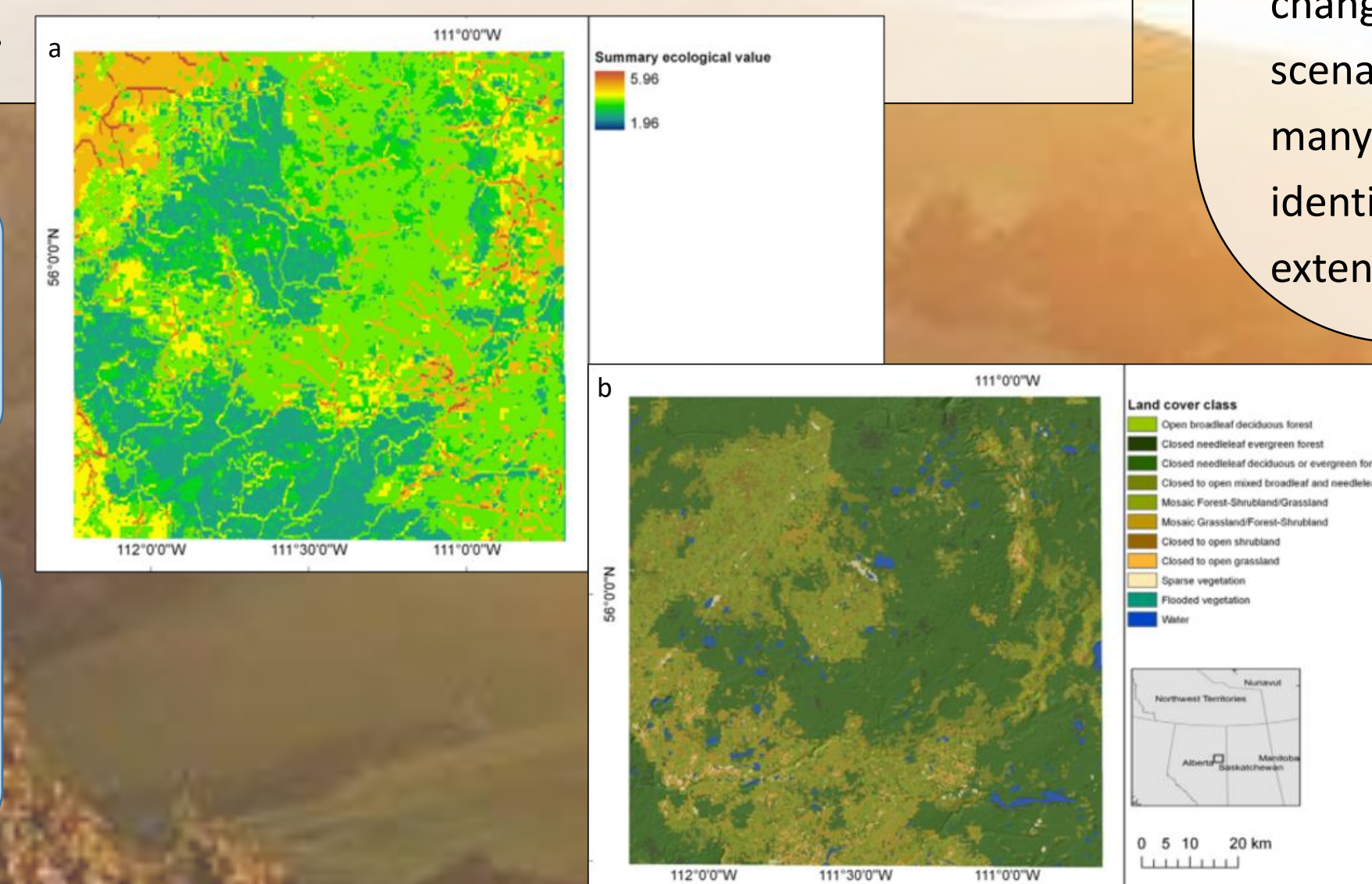


Figure 3: (a) Summary of LEFT analysis, (b) Study site for LEFT analysis.

New Zealand

New Zealand has a number of critical overarching policies and plans which allow for the consideration of climate change and biodiversity, while maintaining goals to achieve international objectives. Such policies include the New Zealand Biodiversity Strategy, and the RMA 1991. The RMA incorporates both biodiversity and climate change, however the depth to which these are considered is restricted.

As suggested by Brown *et al.*, unclear regulations, poor cooperation, insufficient information, lack of enforcement, and inadequate monitoring are to blame for scarce biodiversity management¹. However there are a number of possible solutions such as economic incentives or broader mandates¹. To achieve such outcomes though, the use of tools similar to ecosystem service valuation, biodiversity screening map and ecological surveys would be needed. To what extent these tools are used within New Zealand system is identified by this study.

In contrast, guidance on climate change integration is far more explicit. MfE guidelines for local councils on climate change and impact assessment have been identified to use scenarios and risk assessment. However there are still many other useful tools that could be used. This study will identify the main tools used in New Zealand, and the extent of their use.

Where to from here?

A number of tools have been identified as possible methods for inclusion for biodiversity and climate change within impact assessment. However within New Zealand initial analysis shows limited explicit use of these tools. Further investigation will be carried out into local and regional usage of tools, as well as determining the degree to which biodiversity and climate change are addressed throughout policies and plans. This will be achieved through web-based research of New Zealand's AEEs and literature searches.

¹Brown, M. A., Stephens, R. T. T., Peart, R., & Fedder, B. (2015). Vanishing nature: facing New Zealand's biodiversity crisis. *Auckland: Environmental Defence Society.*

²Countryside council Wales. (2004). Strategic environmental assessment and biodiversity: Guidance for practitioners, Wales.

³European Commission (2013). Guidance on integrating climate change and biodiversity into EIA, *European Union: European commission.*

Ministry for the Environment (2008). Climate Change Effects and Impacts Assessment: A

⁴Guidance Manual for Local Government in New Zealand. 2nd Edition. Mullan B; Wratt D; Dean S; Hollis M; Allan S; Williams T, Kenny G and MfE. Ministry for the Environment, Wellington.

⁵Willis, K. J., E. S. Jeffers, C. Tovar, P. R. Long, N. Calthness, M. G. D. Smit, R. Hagemann, C. Collin-Hansen, and J. Weissenberger. (2012). Determining the ecological value of landscapes beyond protected areas. *Biological conservation, 147*(1), 3-12