# Case Studies on Forest Biological Diversity - New Zealand

## Scope of CBD Forest Biodiversity Case-studies

The CBD call for case studies focuses on the ecosystem approach to forest management. This approach is defined as a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit. It embodies the integration of conservation and sustainable use of biological diversity, taking account of social and cultural and economic considerations.

The attached case studies have been chosen to represent examples of how New Zealand is adopting the integrated approach to forest management based on the considerations above. In moving towards this type of management New Zealand needs to consider its mainstay commercial forestry management which is based on planted forests of introduced species. A small proportion of commercial forestry is also based on limited areas of indigenous forests that are available for commercial timber production. The development of the ecosystem approach in the context of both forest types focuses on integrating commercial management and biodiversity objectives. The case studies reflect a growing understanding about how forests provide scope for biodiversity conservation while still meeting commercial objectives.

Three of the case studies each illustrate different aspects of New Zealand's policy approach to sustainable management as it applies to commercial production forests. A fourth study prepared by New Zealand authors explores the establishment and monitoring of standards for biodiversity conservation in planted forests.

In the indigenous forest example the work on ecological site classification illustrates the key emphasis on understanding and working with complex forest associations merging the ability to achieve some commercial timber return with maintenance of indigenous forest values. The planted forest examples illustrate how commercial forestry can work more effectively to conform to umbrella environmental regulations and on the improvement in understanding about forest, which comprises introduced commercial timber species and understorey of naturally regenerating and sustained indigenous flora species.

New Zealand is strongly aware of its indigenous forest biodiversity. The development of planted forests and the strong legacy of over 80 years of experience in planted forestry management and research have helped reduce pressure on dwindling indigenous forests. At the same time there has been an evolution in methods for integrating sustainable use of the resource with biodiversity conservation. Further, there are better methods in and understanding of environmental management. The studies illustrate this evolution.

## Description of sustainable forest management practices in New Zealand

New Zealand forests include indigenous forests; forests of introduced planted species and mixes of both types. Mixed associations occur within planted forests in sub-canopy

associations and in more extensive patterns of planted forests integrated with conserved indigenous forest stands at the estate level.

New Zealand also has extensive areas of indigenous forest, largely in Crown ownership, which are managed for conservation but without timber production. Case studies for these forests are not included in this paper although they are an important part of New Zealand's forest estate.

Forest management practices in New Zealand include commercial management of planted forest generally under the ownership of larger international, and medium sized companies, forests owned by indigenous people (Māori), partnerships, farmers and other individuals. It also includes commercial management of limited areas of privately owned indigenous forests available for timber production.

While planted forest management is oriented to commercial timber production the establishment, management and harvest practices are constrained under sustainability provisions of the Resource Management Act 1991 (RMA). Requirements to ensure that management conforms to RMA provisions vary according to local conditions. Management practices for example may be required to make special provision for specific water and soil protection measures, setting aside of habitat area in remnant indigenous forest areas or specific landscape requirements.

New Zealand has particular concerns about the balance and integration of remnant indigenous vegetation landscapes with farming and planted forest landscapes. The New Zealand Forest Accord, discussed below, is an agreement setting out how planted forests fit into this framework.

**Policy Background**

There are a number of relevant policy strategies and related legislation, and voluntary mechanisms concerning New Zealand forestry and the framework of environmental management that set the background for the case studies.

In the last decade New Zealand has set in place a framework of Environmental Policy based on regulation through the Resource Management Act 1991 (RMA) and strategies that broadly govern the concept of integrated environmental management. Successive governments have continued to refine the strategies that are based on:

- principles covering sustainable management of natural and physical resources;
- integration of environmental, social and economic values;
- consideration of both regional and global environmental impacts; and,
- imposing the least cost on both the economy and the environment.

The strategy for the environment covered in the Environment 2010 Strategy brings together these principles in the broad context of the “biophysical environment”. This includes urban and rural environments, commercial primary production based on

introduced species together with indigenous species biodiversity, protection from and control of pests and diseases and social and Māori heritage issues. The strategy emphasises sustainable land management, recognising issues such as hill country erosion and protecting biological diversity.

The current Government has broadly followed these policies although moving to strengthen the environmental and biodiversity conservation aspects.

**Resource Management Act 1991**

The RMA promotes sustainable management of natural and physical resources, controlling the effects of activities on land, air and water. Local governments through district and regional plans administer the RMA. The Act operates by a process of plan preparation, public participation and submissions and implementation through regional and district councils. Restrictions on forest management can be imposed by rules arising from this process.

**Part IIIA of the Forests Act 1949**

In addition to the RMA the areas of indigenous forest, largely within private and Māori ownership are, subject to controls under the Forests Act 1949. The Act was amended in 1993 by the insertion of provisions covering sustainable management of indigenous forests (Part IIIA of the Act). Part IIIA requires the preparation of approved sustainable forest management (SFM) plans and permits, which specify requirements for sustainable management covering both timber and natural forest values.

**New Zealand Forest Accord 1991**

In addition to the regulatory policy framework there are also voluntary mechanisms, accords, for sustainable forest management practices. These are in the form of negotiated signed agreements between several parties, such as private companies, environmental NGOs and land owners, representing opposing interests. Accords can be quite local or more region and national in focus and typically embody agreement on specific conservation issues while giving greater certainty to forest use and management. They may involve government or only non-government parties.

The New Zealand Forest Accord is an agreement between non-government forest industry and environmental organisation representatives and was signed in 1991, by members of New Zealand's Forest Owners' Association and several conservation groups. It recognises the important heritage values of indigenous forests and the need for their conservation, maintenance and enhancement. The Accord recognises the role of commercial planted forests and the need for protection and conservation of indigenous forest and particularly recognises the principle that existing areas of indigenous forest should be maintained and enhanced. It sets protocols and defined limits for planted forest establishment on indigenous forest areas. The Accord also recognises the scope for sustainable management of indigenous forests allowing the harvest of timber for the production of added-value solid wood products in New Zealand.

New Zealand commercial forestry is largely dependent on plantings of introduced species, predominantly radiata pine, introduced from North American sources over 100 years ago. The planted forests while focused on commercial timber production are the result of a long-term strategy commenced in the early decades of the last Century to establish an alternative resource to offset the depletion of relatively slow-growing indigenous forest species. This development was enhanced by rigorous selection, through research, to achieve superior genetic tree stocks well adapted to New Zealand conditions. As a result planted forests now provide ninety-nine percent of New Zealand's present 16 million cubic metre wood harvest. More than 90 percent of the planted forests estate comprises radiata pine, with the remainder being predominantly Douglas fir, along with smaller quantities of Eucalypts and a variety of other introduced species. Further, the planted forests have ensured the protection of extensive areas of New Zealand's remaining indigenous forests although allowing the limited and sustainable production of specialty timbers from some indigenous forests.

**Presentation of Case Studies**

1. *Assessment of an Environmental Management System as a Self-Management Method under the Resource Management Act 1991 – Tasman District Council and Weyerhaeuser New Zealand Limited.*

The study is an assessment of enhanced methods to enable a commercial forestry company to operate under the RMA principle of sustainable management of natural and physical resources. The study focuses on process with the aim of establishing favourable conditions for continuous improvement in sustainable land management in commercial forest operations.

The project is an example of co-operative management between the Council, which administers a Regional Land Plan (RLP) under the RMA, and Weyerhaeuser, an international commercial forestry company. This study relates to forest on hill country in the northern part of the South Island. The Council manages soil loss, soil damage and sedimentation effects of land disturbance activities under the RLP. The Company is working to achieve sustainable management of its planted forests within standards set by the RLP.

The project is an investigation into how the company, operating under a self-managed Environmental Management System (EMS), can demonstrate compliance with the RLP with fewer of the normally required regulatory steps but nevertheless achieving a high environmental performance. The forest operations concern best management practices in roading and earthworks, pruning and thinning, harvesting operations, and land preparation for re-establishment. The Council's commitment under the project was to investigate whether the company could demonstrate that it is an "approved operator" by providing information on forest management activities through self imposed and auditable environmental performance standards. The study also considered the scope for a process of continuous improvement under the EMS.

The study concluded that an organisation, such as Weyerhaeuser, could meet the RLP, and therefore the RMA requirements, through a commitment to a management system. Cost saving may be expected where there is streamlining of consent processing and compliance monitoring. The study considers the scope over time for continuous improvement in the company's operations.

**Full Reference for Case Study**

Tasman District Council and Weyerhaeuser New Zealand 1999: *Assessment of an Environmental Management System as a Self-Management Method under the RMA,* Unpublished Paper, Nelson

2. *Determining an approach to forest site classification to assist in developing silvicultural systems, based on ecological principles, for use in sustainable forest management of privately- owned indigenous forests*

The New Zealand Forests Act 1949 requires that owners of indigenous forest wishing to harvest timber obtain approved sustainable forest management (SFM) plans or permits which specifies the level of harvest and any measures required to retain natural forest values.

SFM of indigenous forests, while permitting limited and continuing timber harvest, is an evolving process that continues to require the gathering of information through research to expand understanding of ecological aspects of forest management. The use of up-to-date tools such as geographic information systems (GIS) greatly assist the recording, analysis and presentation of information in the form of maps. Information and techniques add to the growing body of knowledge assisting policy development, refinement of standards and providing improved management guidelines for forest owners.

The case study describes Ministry of Agriculture and Forestry-commissioned research into methods of ecological site classification as a means of refining methods for SFM and covering examples of two separate indigenous forest types. The work was undertaken by Landcare Research Limited, a New Zealand Crown Research Institute (CRI).

The studies were undertaken in podocarp-tawa (*Beilschmiedia* ) and black beech (*Nothofagus*) forest types. The two forest examples typify the complex nature of New Zealand indigenous forests with variations in structure, species composition, growth and site conditions. Ecologically sensitive silvicultural systems need to take such variation into account and the study focused on how this could be achieved by a process including:

- Determining variation in forest composition, structure and size-specific growth in relation to site and stand development for the dominant trees species being managed under an existing plan as a basis for ecological site classification.

- Developing a GIS for the forest that includes a digital terrain model, edaphic variation (such as soil and terrain stability) and the mapped site classification which included the vegetation attributes.

- Considering a method for establishing permanent plots in benchmark stands to evaluate forest sustainability.

The study demonstrated the approach to ecological site classification on the basis of six management objectives.

- Maintenance of structural dominants
- Maintenance of compositional diversity
- Ensure adequate regeneration
- Sustainability of timber production
- Minimise the effects of weeds and pests
- Protect rare species and biological communities

The study concludes that while these objectives were important ecological site classification involves a wide range of differing values.

The study recommended use of the attributes described from the two forest sites based on the above objectives, plus existing knowledge about forest ecological processes, to prepare management guidelines for a range of forest sites. It further noted the need for permanent sample plots in which changes in forest patterns, over time, could be measured.

**Full References for Case Study**

Allen, R.B.; Wiser, S.K.; Burrows, L.E.; Brignall-Theyer, M. 2000: *Silvicultural Research in Selected Forest Types: A black beech forest in Canterbury.* Landcare Research Contract Report for the Ministry of Agriculture and Forestry.

Svarvarsdottir, K.; Allen, R. B.; Burrows, L.E.; Coombes, D.A.;Wiser, S.K.; Smale, M.; Benecke, U. 1999: *Silvicultural Research in Selected Forest Types*. Landcare Research Contract Report for the Ministry of Agriculture and Forestry.

*3. Species Richness within Tarawera/Matahina (central North Island) Planted Forests*

The case study describes an investigation into whether planted forests of radiata pine act as a significant resource for indigenous biodiversity of vascular plants. The research focused on factors influencing plant species composition and the significance of the indigenous plant species understorey for conservation and planted forest management.

The author chose a site in a commercial planted forest near Rotorua owned by Fletcher Timber Limited. The forest comprised both planted radiata stands and remnant

indigenous forest covering river terrace and hill country. The whole site was originally indigenous forest. Over the past hundred years some parts of the site were subsequently cleared and farmed and in later years planted in introduced species forest. Other areas were cleared before being planted directly into introduced species forest, although such practices are now restricted. The planted forest includes first to third rotation stands. Some indigenous forest also remains.

The study looks at three aspects.

- plant species occurrence and frequency:

A series of plots was measured in the site to record plant species occurrence and frequency. The analysis of the data sought to establish patterns of distribution of species and investigate likely factors that influence the patterns of species occurrence. The results showed that both previous indigenous forest land use, and the geographic land form, had a strong influence on the vegetation patterns.

- likely source of seed for the establishment of the understorey flora

The study reviewed the likely source of seed for the establishment of the understorey flora. A seed bank from earlier indigenous forest was considered unlikely because of the short span of viability of the seed of most species. Other dispersal methods, wind and birds, were considered to be the main agencies.

- the scope for pine plantings to act as nurse crops for indigenous species.

The study reviews the scope for pine plantings to act as nurse crops for indigenous species. It examines the capacity for pine planting, while primarily for commercial timber, to provide a suitable environment for the continued occurrence of native plant species as well as habitat for native bird species.

The study concludes that the use of staggered management with mixed age classes throughout the whole forest, plus the integration of indigenous forest remnants, ensures the survival of indigenous forest species entirely within the boundary of a planted forest. While forest operations can be made more difficult by the presence of understorey vegetation, there are important conservation benefits in having this component in pine stands. Native birds also find suitable habitat within the pine stands and help to broadcast indigenous plant seed. The pine itself is a good nurse crop for indigenous forest species although establishment also requires a suitable adjacent source of seed, such as may be found in the indigenous forest stands along water ways and other parts of the whole forest site. Under these circumstances the indigenous forest species are able to establish and regenerate with the management cycles of the pine stands.

**Full Reference for Case Study**

Van Wijk, P.; *Species Richness within Tarawera/Matahina Plantation Forests, A Summary of a thesis dissertation*

4. *Standards for biodiversity: a proposal based on biodiversity standards for forest plantations*

The case study explores how biodiversity objectives can be linked to planted forest management through the use of standards based on set targets for the manager to work to. It highlights the importance of being to able to measure the extent and success of initiatives to enhance and maintain biodiversity in forests. The study provides a conceptual plan for designing and implementing a program of biodioversity in a planted conifer forest. It also shows how biodiversity objectives can be linked to a monitoring procedure.

The study identifies the problems in establishing standards. These include:

- the risk of adopting generalised standards where the characteristics of specific sites (from stand to whole landscape) can be quite variable
- linking the standards with the transitory nature (both in terms of space and time) of planted forests, and
- catering for different levels of perception as to what is an acceptable standard for any biodiversity objective.

The study considers previous use of standards to meet forest management, structural (such as landscape) and wildlife-specific objectives noting that there may be benefits that these three approaches share. Previous standards were also based on intuition – drawing on long experience of a manager. Although this approach can be useful research-based methods provide a basis for establishing controls and monitoring.

The study notes that biodiversity standards are useful because they can measure effective management, provide a basis for making management accountable, give clear targets for managers and control management policies within defined limits.

**Full Reference for Case Study**

Spellerberg, I.F., and Sawyer, J.W.D. 1996: *Standards for Biodiversity: a proposal based on biodiversity standards for forest plantations.* Biodiversity and Conservation 5, 447-459.

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