

# Assessing Timberlands' Sustainable Beech Management using Concepts of Ecosystem Health and Ecosystem Management<sup>†</sup>

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*On 22 September 1998 Timberland West Coast released the sustainable management plan for the Crown-owned beech forests of the West Coast for New Zealand-wide public consultation. The proposal has already come in for considerable criticism from people and groups ranging from politicians to environmentalists of various persuasions, almost all basing their opposition on some concerns relating to ecosystem health. Timberland's proposal has also gained some support. This article presents one particular analysis of assessment criteria, emphasising ecosystem health and the its attainment through concepts of ecosystem management, and subjects Timberland's proposal to that test.*

## Introduction

When faced with any issue relating to the management of natural resources the debate in New Zealand almost always degrades into a narrow and dichotomous perspective of 'preservation or use'. The same is the case around the world (Wallace et al 1996), but in New Zealand the idea that conservation is mutually exclusive from use is more institutionalised — in our segregation of plantations and preservation forest lands; in our research structure; and in the non-integrated structure, and policy emphasis, of our government departments — environmental preservation on the one hand, food and 'fibre' on the other.

The black and white debate over the Timberlands West Coast (TWC) sustainable beech (*Nothofagus*) management proposals comes, therefore, as no surprise. Even before the release for public submission of the sustainable management on 22 September 1998, opposition had positioned itself along the 'preservation or use' divide, following the early leaking of

the plans.

Few commentators have come from a perspective of preservation (or protection) AND use — the concept that used to define the word 'conservation'. Simple concepts of ecology do not allow for such sophistication, and those who espouse it publicly, require a measure of courage.

One question that remains unanswered in New Zealand's environmental debate is whether the segregated land use approach has a viable long-term future — for social, commercial or environmental values. Regarding the latter, the theory of island biogeography (Quammen 1996) suggests that isolating biodiversity to pockets of sometimes poorly managed or resourced 'preservation' only increases the threat to that value. The ultimate goal would surely be to provide for biodiversity and other ecological values over the widest landscape possible, while providing for the economic and social needs of our own species. That requires the inclusion of commercial, as well as conservation land users in an ethical change.

However, the question of New Zealand's Manichaean dualism toward the environment is not the primary focus of this paper, however integral to the discussion — it is the assessment of Timberlands' beech management proposal.

## Ecosystem Health — a Basis for Assessment

The opposition rhetoric is of forests OR furniture (Cotter 1998), implicitly implying that the latter precludes the existence of the former. As a concept, management for forest protection AND furniture is not widely appreciated by the general public, yet that is exactly what TWC states that it is trying to achieve. This is demonstrated by its primary ecological management objective — "to protect biodiversity and avoid dysfunction in ecosystem processes" (Timberlands West Coast 1998, p56).

It must be assumed that the environmental advocates are also concerned with "protecting the environment". Their state-

ments with regard to Timberlands beech management proposal suggest as much.

Both parties, therefore, say they seek the same thing. Based on their written and spoken phrases, both would argue that 'ecosystem health' (the term used internationally), is paramount — maintaining, or enhancing, the 'health' of the beech forest and the wider ecosystems and landscapes. TWC would go further and say that, should beech forest ecosystem health be provided for, then there is no logical reason why any compatible social and economic forest values cannot also be managed for. Other environmental groups agree, and have supported the approach of Timberlands, by inference accepting that the proposal focuses on ecosystem health as a paramount objective.

## Establishing a Framework to the Debate

Why do the opponents of Timberlands not see them as allies in a shift in environmental values and standards in New Zealand? Given the assumed commonality of primary purpose, the dissension must relate to either a differing interpretation of what ecosystem health means, or perhaps another concern more related to trust in Timberlands' ability to achieve its objectives through both its cultural ethics and its operational management. A third possibility is that there is either a lack of appreciation, or acceptance, that people can manage for both intrinsic ecosystem health and other commercial and social forest values. If that last position is the case, then it follows that they must have a pessimistic outlook of the future of the human species in the long term.

One other alternative is the most cynical, and is only stated here for the record: some have implied that some environmental groups interest is not in the deeper environmental issues at hand, but rather it is in the 'market pull' of orchestrated dissent to drum up political and financial support for their institutions.

Whatever the case, the divergent responses point toward different premises

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— about the functioning of ecologies, about the appropriateness of human involvement in ecologies, about concepts of ecological health, about the relative trustworthiness of the participants and, perhaps most importantly, about what are the acceptable ethics that ought to be brought to bear on the issue.

We can attempt a definitional framework for ecosystem health, but we also need to assess whether Timberlands practices 'Ecosystem Management', the term that is used worldwide (though termed 'Nature Orientated Forest Management' in Europe) in the operational application of ecosystem health principles.

But before we can provide either some basis for ecosystem health, or some basis for judging Timberlands' management, we require some understanding of a concept of 'ecology' — the 'nature of nature' if you like. We also require at least some background in introductory environmental ethics — how we as humans relate to nature. I deal with the latter first, because the ethics dictates what concept of nature we will hold.

### Environmental Ethics

Kolb et al (1994) and Jenkins (1997) provide possibly the best introduction to the ethics surrounding ecosystem health. The former distinguishes between the 'utilitarian' perspective — in which any 'value' only relates to the potential for human use (or utility) — and the 'ecological' (or intrinsic) perspective where ecosystem processes are seen as having value in their own right, independent of human interaction. Jenkins points out the linkage between what is a manager's, or scientist's, implicit environmental ethics (utilitarian or ecosystem), and their actions, emphasis and interpretation. Jenkins identifies, therefore, that ethical perspectives are absolutely critical to how ecosystems are managed.

Aldo Leopold argued strongly for the latter 'ecological' perspective in *A Sand County Almanac* (1949); especially in his essays *The Land Ethic and Think Like a Mountain*. The theme in these essays — in fact throughout the book — is that all the 'parts' of an ecosystem have value in their own right, even if that value is not recognised as having an economic or aesthetic 'value' to humans. In *Think like a Mountain* his hindsight regret in culling wolves while a young forester, because they had no perceived utilitarian 'value', is one of the most poignant passages in natural history writing. His regret was in realising, as his conservation ethic dawned, that wolves — a metaphor for all our utilitarian prejudices — have value to the functioning ecosystem as a whole.

As a forester, hunter and wildlife manager Leopold acknowledged our species' resource requirements. That fact of the need for human 'use' underpins his environmental ethic. His advocacy for a land ethic that encompassed a respect for the environmental was not of the 'preservation OR use' status. He was advocating a deeper ecological ethic that provided room for the 'and', not just the 'or'. In this regard New Zealand's mutually exclusive environmental mentality is perhaps some way behind Leopold's, and what some have called the "new environmentalists" (Nash 1987).

It could be argued that most New Zealanders' concept of nature is based on a simplistic interpretation. This shallow environmental perspective is rooted not in any understanding of ecology as a process rather than a static picture, but in the soft-toy attractiveness of harp seal pups or a personal distaste for blood or chainsaws. Some have called it another form of animal liberation movement, or 'save the trees', where the concept of an individual tree's health is implicitly related to the health of the ecosystem. The concept of an environmentally sustainable harvest is excluded, and a human with a chainsaw felling an individual tree is implicitly seen as more harmful than a mildly attractive possum eating his fill of leaves and insects each night.

One environmental philosopher, J Baird Callicott, claimed that, with their shallow and limited perspective, the animal liberationists, and suchlike, are not even fellow travellers with the 'new environmentalists' (Nash 1987 p68). Callicott quotes one environmentalist whose advocacy is for a complete reform in human ethical relationships to the environment: "*the last thing we need is simply another 'liberation movement'*" (Callicott 1980, quoted in Nash 1987). The tree and animal 'liberation movements' may lack that deeper ethic, as well as the realistic acceptance that our species has resource needs. That may work against the development of an ethical change.

This is not a criticism of the animal (or tree) liberation programme, but rather an acknowledgment that there is a broader, fundamental, environmental ethics perspective. At least one prominent New Zealand environmentalist (Guy Salmon, interviewed on NZ television in relation to Far North District Plan) has focused on the same necessary ethical change by advocating that the long-term hope for the environment is "*to bring the conservationist out of the farmer*". This was in response to the not uncommon approach of imposing negative planning regulations based on mistrust, an aversion — or conceptual inability — to integrate any

human commodity use with the environment, and a narrow, short-term perspective. The narrower alternative may win a few battles, but risks losing the war.

### The Nature of Nature

The link between ethics and peoples' understanding of, and reaction to, 'nature', introduced by Kolb et al (1994), is strongly developed by Jenkins (1997). Jenkins states that the utilitarian perspective emphasises "*a small spatial scale and a short temporal scale*", typically dealing with the observable parts, in the context of the status quo.

For example they might observe a number of dying trees as an indication of poor forest health, either because they value the trees for their timber or for their contribution to the aesthetics of the status quo. Importantly, someone motivated by a strong sense of aesthetics, which like timber is a forest resource with 'utility' to the human valuer, cannot lay claim to a less utilitarian view than the most narrowly timber-conscious forester.

The ecological view is markedly different. Jenkins states that "*those with this perspective want forests that satisfy a range of diverse objectives — not primarily timber production — and define health in terms like resilience, balance, and function.*" This is a 'functional' rather than the more common 'structural' definition — the latter exemplified in "a forest is an assembly of trees, shrubs, birds and other bits." The functional definition emphasises the variety along the time and space continuum, and the processes that provide that diversity.

What Jenkins is referring to is that change over geological time periods, over large landscapes, and in response to sometimes the most minor of influences, is what characterises ecologies. Without this continual change many species would not have a 'niche' to stand on. This dynamic is the major characteristic defining ecologies, as it does evolution and biodiversity, yet it is arguably the one least understood, or at least accepted, by most people whose view is utilitarian — including most of the self-styled environmentalists, the bulk of farmers, and even many ecologically educated foresters.

Given Jenkins' analysis, a sick forest is not simply a matter of tree mortality. It involves the degree to which "resilience, balance and function" are impacted. Leopold had the same idea, referring to health as something like "the ability to renew itself". Norton (1991, quoted in Haskell et al 1992) has analysed natural functions further and suggested five axioms of 'the nature of nature', which provide a framework for defining ecolog-

ical health, including the:

- Axiom of Dynamism: nature is more profoundly a set of processes than a set of objects; all is in flux.
- Axiom of Relatedness: all processes are related to all other processes.
- Axiom of Hierarchy: processes are not related equally, but unfold in systems within systems, which differ mainly regarding the temporal and spatial scale on which they are organised.
- Axiom of Creativity: the processes of nature are creative and represent the basis for all biologically based productivity. The vehicle for that creativity is energy flowing through systems.
- Axiom of Differential Fragility: ecological systems, which form the context of all human activities, vary in the extent to which they can absorb and equilibrate human-caused disruptions in their creative processes.

This concept of nature as a complex, dynamic, interconnected system, from which our own species cannot divorce itself, is absolutely vital to understanding and interpreting any management of natural resources, including those of TWC, the Department of Conservation, and other land management in New Zealand. It provides not just the basis for appreciating ecosystem health, but also for appreciating and applying the concept of 'Ecosystem Management'.

### A Working Definition for Ecosystem Health

Constanza (1992) went into more detail than either Kolb et al or Jenkins. In leading toward a workable definition, he examined six human perspectives on ecosystem health ranging from:

- Health as absence of disease (the utilitarian human medical analogy).
- Health as homeostasis (no change is good, which is fine for homeostatic organisms, but not for non-homeostatic systems like ecosystems).
- Health as stability or resistance (the ability to recover from stress, but this lacks a vitality or organisational dimension).
- Health as diversity or complexity (based on the theory that diversity is a predictor of stability or resistance, and that these are measures of health).
- Health as vigour or scope for growth (recovery from stress is related to overall metabolism or energy flow).
- Health as balance between components (a form of environmental Buddhism, but how do we know when something is out of balance).

Constanza went on to provide what he

considered a working definition of ecosystem health integrating many of the concepts of health bullet pointed above, which, individually, are deficient. The result was a Health Index ( $HI = V \cdot O \cdot R$ ); in essence an index of the system's vigour of activity ( $V$ ) weighted by indices of relative biological organisation ( $O$ ) and resilience ( $R$ ). Constanza sites tools such as network analysis and simulation models that could "operationalise these concepts".

Based on this definition of health, eutrophication, as an example, is unhealthy in that the usually associated increase in metabolism is more than outweighed by the decrease in organisation and resilience. Artificial eutrophic systems, such as intensive agriculture, tend toward lower species diversity and shorter food chains, etc. (Constanza 1992).

### The Concept of Ecosystem Management

An institution's approach to natural resource management is influenced by their environmental perspectives on ethics and health (Jenkins 1997). Therefore the management approach expressed in Timberlands' management plans should provide some basis for interpreting their views on environmental ethics and ecosystem health.

Under 'ecosystem management' concepts there is recognition of intrinsic values of ecosystems, and an overall goal of at least maintaining ecosystem health. There is also recognition that humans are co-dependent on these ecosystems. Ecosystem management also emphasises integrated holistic science, socially defined goals and management objectives (especially of the local and indigenous communities), broader spatial and temporal scales, collaborative decision making and adaptable and flexible management institutions (Wallace et al 1996). Underpinning it is the change in perspective toward the environment and environmental values discussed above, moving closer to that envisaged by Aldo Leopold.

A pertinent point is that, where these points above relate to science, they closely follow the recommendations of the New Zealand National Science Strategy for Sustainable Land Management (Gow 1997). The whole concept also bears a very close relationship to the Forest Stewardship Council environmental forest management criteria, the New Zealand Institute of Forestry's Indigenous Forest Policy (O'Loughlin 1998), and to the spirit of the legislative examples of the Resource Management Act 1991, and Forests Act 1949 (1993 Amendment).

### Assessing Timberlands

Grumbine (1994) identified ten dominant themes useful as criteria for assessing whether an institution is managing along ecosystem management lines. Judging TWC on the basis of the criteria below does not guarantee that Timberlands will achieve maintenance or improvement in ecosystem health, but it does provide a basis of support as to their intentions. It should be noted that not even the Department of Conservation, tasked with a singular ecological objective, can make any guarantees regarding ecosystem health, such as the impacts of introduced animals on indigenous forests.

Grumbine's dominant themes include the following.

1. *Hierarchical Context*: involves a recognition that a focus on only one level of the biodiversity (genes, species, population, ecosystems, landscapes) is not sufficient. A systems perspective is required seeking the connections between all levels. TWC refer specifically to "the best possible integration between ecological, economic and social factors required to achieve a holistic and safe starting point for a sustainable system." (TWC 1998, p57). Other indications of this philosophical systems approach exist throughout the plan, including their research priorities model (TWC 1998, p171).
2. *Ecological Boundaries*: involves management working across administrative/ political boundaries and defining ecological boundaries at appropriate scales. TWC specifies an intention to manage such resources as recreation across administrative boundaries (e.g. TWC 1998, p194). Set aside reserve areas for threatened flora and fauna also indicate a broad management perspective.
3. *Ecological Integrity*: involves the conservation of viable populations of indigenous species, maintaining natural disturbance regimes, reintroduction of native extirpated species, and representation of ecosystems across natural ranges of vegetation. TWC uses a conceptual approach to management that fits in with natural disturbance over space and time. They state: "The objective of ecologically based sustainable management is to manage in such a way that the human induced disturbances created fall within the short term magnitude of natural disturbance" (TWC 1998, p57). The figure below visualises this objective and principle. It is applied in prac-

tice with the harvesting of small-scale, one to 10 tree gap sizes across representative diameter classes, and using low impact above-ground harvesting systems. This stated management intention is contrary to much of the public perception involving ground-based "logging" and "clear fellings".

and private owners to accommodate wider ecological boundaries.

TWC specify dealing with recreation concerns in cooperation with the Department of Conservation, and prior to the release for national submissions had consulted widely with local communities.

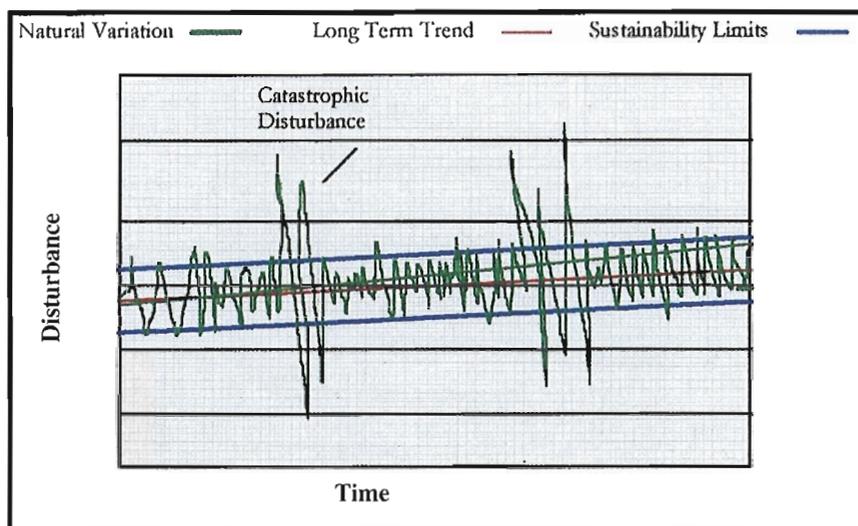
TWC, nor by many other ecologists (Drury 1998).

Values as determinants of behaviour: involves the concept that, regardless of the role of scientific knowledge, human values play the dominant role in Ecosystem Management. This is the concept expanded on by Jenkins (1997).

It is unclear from the management plans whether TWC explicitly understands the importance of values from an examination of the management plans. What does come through is that those who wrote these plans have these values. Whether they specifically develop them in their staff is not included in these plans.

Grumbine used these ten dominant themes to form a basis of a working definition of ecosystem management; "Ecosystem management integrates scientific knowledge of ecological relations within a complex socio-political and values framework toward a general goal of protecting ecosystem integrity over the long term." Timberland's intentions fit this description.

Figure 1: A Conceptual Approach to Beech Sustainable Management



Source: (TWC 1998, p58)

4. *Data Collection:* Ecological Management requires more research and data collection than the more commercial focused forestry practices. This includes such research as habitat inventory and classification, baseline species and population assessments, and disturbance regime dynamics. TWC have invested, and continue to invest, in these areas of research (TWC 1998, Section 6).
5. *Monitoring:* tracking the results of management actions so that success or failure can be evaluated and fed back into management processes. TWC appear to both recognise, and provide for, the need for monitoring in any complex natural resource (TWC 1998, Sections 6.2 and 6.4)
6. *Adaptive Management:* assumes that scientific knowledge is provisional and focuses on management as a learning process or continuous experiment where incorporating the results of previous actions allows management to remain flexible and adapt to uncertainty. This principle is also enshrined in Timberlands' management approach (TWC 1998, p167, p172).
7. *Inter-agency Cooperation:* involves cooperation with other administrators
8. *Organisational Change:* implementing Ecological Management requires changing accepted ways of operating, ranging from the simple (putting in place different operational guidelines, or forming inter-agency committees) to the complex (changing professional norms and relationships between community interests). TWC has a history of changing operational management over the last four years to include greater environmental value. From the outside the forestry management culture is perceived as being more environmentally focussed and open to such interest groups as members of the environmental movements, than are most other forestry companies.
9. *Humans embedded in nature:* Involves the concept that humans cannot be separated from nature. Humans are fundamental influences on ecological patterns and processes and are in turn affected by them. This is a philosophical perspective that accepts that the distinction between 'natural' and 'artificial' is arbitrary in much of environmental history. The sometimes doctrinaire reaction that human economic interaction is necessarily harmful, is not accepted by

## Conclusion

Based on Grumbine's themes and definition, Timberlands is undertaking, or planning to undertake, ecosystem management. Ecosystem management, with its emphasis on intrinsic values and functional definitions of ecologies, is more likely to attain ecosystem health than other, more utilitarian and commercially focused land management paradigms. That being the case Timberland's claims of sustainable management, at least in intent, look reasonable, if not very promising.

For those who are concerned with the ecological health of the beech forests, rational opposition to Timberland's plans can still exist on the basis that TWC have yet to prove their ability to 'deliver' on intentions. No one would argue that the public scrutiny of Timberland's operations should stop at the end of this initial public submission process. But for New Zealand to forego an opportunity to put in place such a model for future Ecosystem Management, purely on the basis of initial distrust, is hardly reasonable.

The fact that what Timberlands propose is not a blast from the forest exploitative past, but a complete shift in management perspective toward our natural resources is another reason why the lack of a priori guarantees should be tolerated. Some commentators portray ecosystem management as a precursor, not just to a new ethic toward the environment, but also of a new, more integrated approach to science; a new type of environmental organisation emphasising community-based conservation through

working with people; a new approach for natural resource agencies, accepting commodity as well as recreation use in some areas; a new approach for university education with greater emphasis on environmental ethics, landscape dynamics, and conservation biology; and a new environmental understanding by the public (Knight 1996). Such developments in human relationships to natural resources are not something for environmentalists to fear so much as they are something for them to hope for. It is not so melodramatic as it sounds to suggest that Timberlands is a representation of that hope.

As Haskell et al (1992) state: "Since fast-changing human cultures are embedded in larger-scale, slow moving ecological systems, we must develop policies that allow human cultures to thrive without changing the life supporting functions, diversity, and complexity of ecological systems." That inevitably involves integration of commercial use and environmental values, not mutual exclusion in discrete oases and deserts.

Agreeing on that concept is a huge step, particularly as most people do not appreciate the premises it embodies — that human culture depends on ecosystems, or that ecosystems are dynamic, though on time scales outside most of the public's ken.

Perhaps the most important premise to accept is that humans can use an ecosystem without its destruction or harm — throwing out the mutual exclusivity to which many preservationists hold with

regard to the use of New Zealand's indigenous forests. We can have timber, the environment and tourism. The West Coast can be allowed to have a little more diversity in its social and economic structure.

To the rest of the developed world such rights (including access to their native timbers) are integral to their culture and heritage. Perhaps it is time that we as a culture developed a more mature perspective as well, and stopped fighting the phantom, bush-clearing pioneer in every forest management plan.

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