

ernment

There is a good deal of evidence that a prosperous, growing economy provides many environmental benefits. Similarly, prosperous, growing industries also provide environmental benefits. The forest industry can afford the additional costs of protecting the environment and, over the last decade, the industry has managed its plantations and many of its wood-processing plants in a way which takes the protection of the environment into account. The industry is not perfect in an environmental and ecological sense but, backed by a world-renowned forest and wood-process research facility, the industry is becoming more sophisticated, technically competent and environmentally aware as it expands its contribution to the national economy and strives to ensure it remains environmentally and ecologically sustainable. To assist the forest industry to meet the sustainability goals a set of criteria is required against which the performance of the forest industry can be judged. Furthermore, there is a need for a sound and comprehensive forestry sustainability/environmental policy which clearly outlines the requirements of Government with respect to forestry and protection of the environment.

To return to the little girl saga in the introduction, her claims about the nature of God and Rosoman's claims about the unsustainability of New Zealand's forest industry do differ in one vital respect. There is little sound evidence to refute the girl's claims but Rosoman's unsustainability claims are full of more holes than the cheese the little girl intended to put on the church collection plate.

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Ecoforestry – towards a responsible plantation industry

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Introduction

The language of sustainability is seductive. It has become the oil of any debate over the use of natural resources. The plantation industry has been quick to adopt the language of sustainability to provide itself with a wholesale green endorsement. Examples include Shirley (1992), *Forestry Insights* (1994), and by nearly half the key industry people asked to comment in a forest industry magazine (*NZ Forest Industries* 1994). Yet where in the industry's rhetoric is the justification, a definition of what standards are being met, and the monitoring and auditing which go with it? In Greenpeace's review *The Plantation Effect* (Rosoman 1994), we sought to examine this suspicious 'greenwash', focusing on the environmental effects using a life-cycle analysis of the large-scale monoculture plantation industry.

The intention of the review was to stimulate debate. We did not intend to

offer a full comparison of the plantation industry with other primary industries. Furthermore, the review clearly states in both the subtitle and the introduction that economic and social aspects were not included. In this issue of *NZ Forestry*, Colin O'Loughlin bases much of his case against *The Plantation Effect* on the basis that it is "very selective". The scope and environmental focus of the Greenpeace review was clear. You will read in this issue of *NZ Forestry* how O'Loughlin selectively chooses information to back his case.

We also make the point that *The Plantation Effect* sought to offer positive solutions as a path towards ecoforestry. Greenpeace desperately wants trees and forests planted, but in a way that maintains and restores ecosystems, and recognises the multitude of values that go with forests. Greenpeace believes that land users have responsibilities as stewards of the land, and that this goes far beyond the simple maximisation of short-term profit. The plantation industry has itself chosen to apply the broad brush of sustainability

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to itself, and as such *The Plantation Effect* review focused on testing this through identifying unsustainable elements of the industry as a whole.

Following the negative hypothesis approach adopted by science, it is possible to prove unsustainability with some certainty, but very difficult to prove sustainability. The broad brush assessment of the whole industry means that many good practices at the site level are buried. We offer a draft of criteria for responsible management by the plantation industry including important social aspects and the key requirement of independent certification.

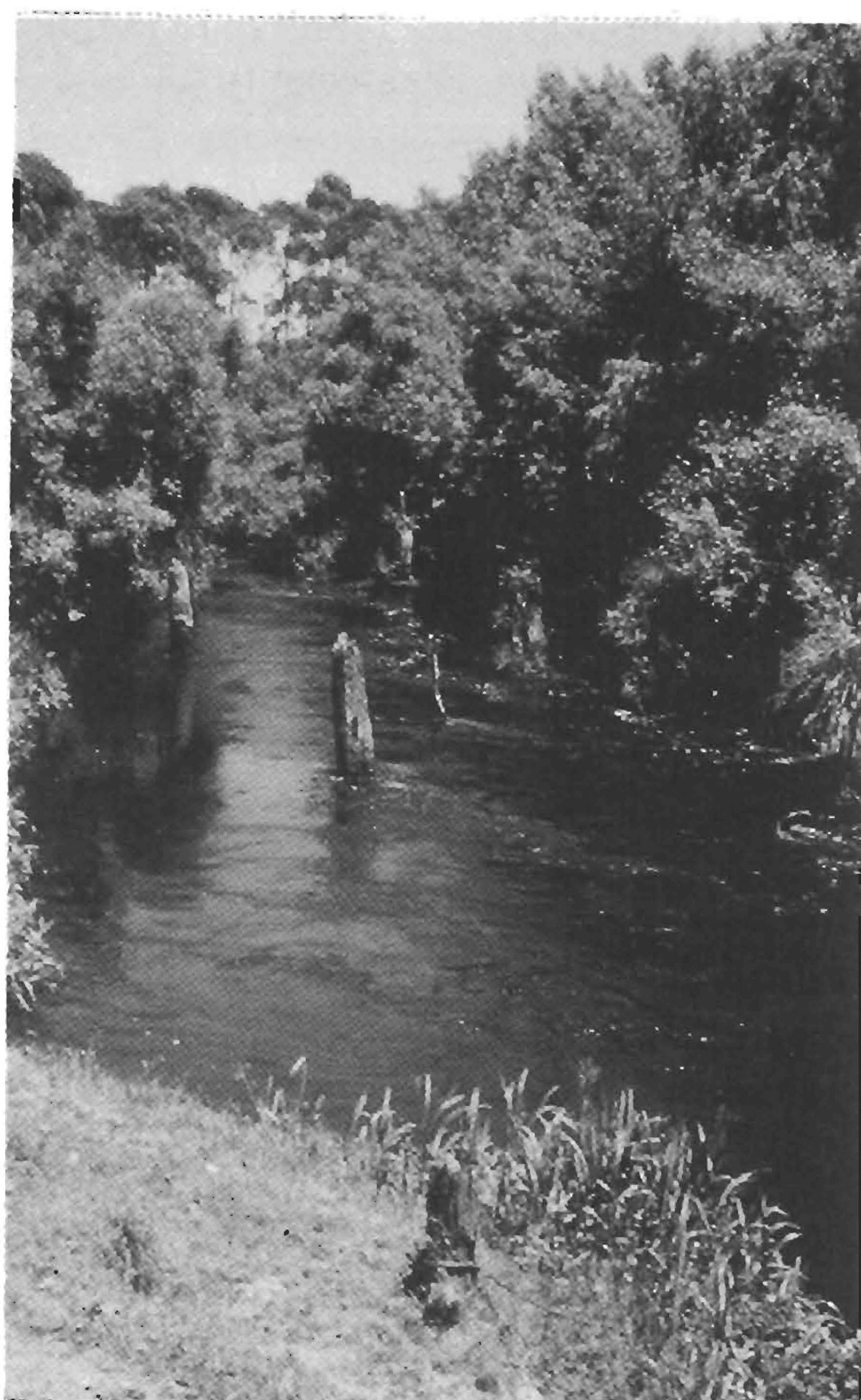
Following is an elaborated summary of the Greenpeace review *The Plantation Effect*, including proposed ecoforestry solutions for responsible management.

Plantation Influences on Biodiversity

Biodiversity is the pinnacle of nature's wealth. It is our green gold that we all rely on. Diversity is considered a primary indicator of ecosystem health, stability and resilience (O'Connor *et al* 1990). Here in New Zealand we have an ethical obligation to future generations and the international community to protect and restore our indigenous biodiversity. This was recognised in the signing of the legally binding Convention for Biological Diversity¹. The protection of our unique biodiversity not only includes existing natural areas but the restoration of an ecosystem network involving all land users.

Tree plantations in Aotearoa are now a major land use. They are generally planted on soils that were formed under native forests. Most new planting is now on pasture land and planting trees will improve a site's biodiversity by increasing the vertical complexity of the vegetation. The industry took their responsibilities for biodiversity protection seriously when most signed the NZ Forest Accord, voluntarily agreeing to not clear indigenous forest or regeneration for tree plantations. Also the simple act of growing wood that substitutes wood from destructively logged natural forests will be contributing to protection of global biodiversity.

However, protecting existing forest remnants will not be enough to maintain our native plants and animals. Our rich



The black drain – Tarawera river polluted by organochlorine containing waste. Photo: Greenpeace New Zealand

lowland forests in particular have been seriously depleted in the landscape. Kauri forests make up less than one per cent of their original range (Barton 1994). If we are to practise conservation, which is by nature precautionary, there are not sufficient areas to maintain our animals, birds, insects, reptiles, and our plants, in the long term, especially genetic diversity within a species and evolutionary potential.

The range of threats to our remaining natural forests is significant in the short term and further underlines the need for precautionary planning to enable systems to respond to changing ecological conditions. Climate research on future scenarios for our forests indicates that we may need to think and plan even more laterally by establishing ahead of time, refuges and preservation translocation of ecosystems outside their current range².

Compared to natural forests, large-scale monoculture tree plantations are biologically simple systems. This is particularly so of young plantation areas and can be attributed to plantation management practices such as large-scale clearfelling, aerial spraying, and short rotations. It does depend to some degree on whether the intention is to have a forest or an agricultural wood crop. Old plantation stands can become valuable habitat for native species (Clout 1984). However, of greater significance is the threat that large blanket planting of one species poses to biodiversity at the landscape level. Native ecosystem remnants become islands, lacking in connections and corridors, potentially preventing the movement

of key animals and plants. In Westland it was recently recommended that exotic plantations within wildlife corridors be allowed to regenerate or be restored to indigenous forest (Overmars *et al* 1992). As well, several plantation trees can invade neighbouring ecosystems, for example the wilding conifer problem in the North Island's central plateau, and in the eastern South Island high country.

Plantation managers will no doubt be asking, "Why should we improve the biodiversity in the production landscape?, and if we choose to do so, how do we do it?" In answer to the first part, there are several good reasons. As outlined above, the landscape will need more than remnants to maintain indigenous biodiversity into the future, and we have moral obligations to future generations and the international community. There are many positive benefits of biodiversity for production, including nutrient cycling, natural pest management, and diversity is a component of sustainability. New Zealanders value our unique wildlife and the variety in the appearance of the landscape.

The key to implementing a biodiversity protection approach is a landscape³ assessment that identifies the protection and restoration needs, and recommends and plans for a network of protected ecosystems. This will be precautionary and allow for future ecological change, and will be on a timescale of several hundred years. The key is a planning commitment, and it is accepted that in many areas depleted of natural systems it will take several decades to implement.

There will be cries that this is impractical, will cost too much, and why the focus on plantations. However, what will the cost to society be if we do not maintain our biodiversity? And this will involve all land uses, not just plantations. A priority area that is easily achievable for biodiversity protection is streamside zones. They can protect a multitude of values and offer good connecting corridors in the landscape. Rate relief for areas protected or restored is essential and has the support of conservation organisations. It is common practice with the change in land use to subdivision for housing, to restore and establish protected areas and streamside zones.

Within the plantation production areas there are many practices that could be carried out to increase habitat diversity. These have been recently reviewed by Spellerberg and Sawyer (1993). They include: plantation edge management, leaving dying and dead wood, planting mixtures or mixes of single species stands, planting broadleaf and native trees, leaving pockets of old growth, using systems that do not clearfell large areas, encour-

1 Signed by New Zealand at the Earth Summit in Brazil in 1992 and ratified in December 1993.

2 Neil Mitchell, cited in NZ Listener, January 7, 1995, p 30-33.

3 Used here and throughout this article in an ecological sense, i.e. large-scale ecological unit, rather than simply visual as is normally associated with the term.

aging a diverse understorey, using longer rotations, and creating multi-age stands.

Toxic Chemicals

New Zealand is still discovering the long-term impacts of chemical pollution on human health and the environment. Recent research on chlorine-based substances such as dioxin has found links to cancer and immune and reproduction system damage (EPA 1994), even at minute, virtually unmeasurable levels. The large-scale exotic plantation industry is reliant on the use of toxic substances, including those that are chlorine-based. This totally unsustainable practice has resulted in the toxic pollution of the New Zealand environment, with a yet to be counted cost to human health and life-supporting ecosystems.

Toxic chemicals are commonly used for weed and pest control in plantations, as it is certainly the easiest and seemingly most cost-effective method available. Use of chemical fertilisers in plantations is increasing. It takes the most environmentally conscientious land user to not use any chemicals at all, especially during planting, but it can be done. Also, some chemicals are definitely worse than others, and the sensitivity with which they are applied will determine levels of pollution. However, the long-term environmental cost of these chemicals, no matter how harmless the chemical companies claim them to be, is proving to be too high.

We have the legacy of hundreds of potentially toxic timber treatment sites all around the country (Jackman 1992). It is going to cost hundreds of millions to clean these sites up. They are the result of not acting in a precautionary way with a toxic substance, and of the necessity of modifying a timber to perform in a way that it is not naturally suited to. This problem would not have occurred if naturally durable timber trees had been planted to meet the market demand. Diversifying planting from the current monoculture, as many small growers are doing, will have the added benefit of phasing out the need for toxic timber treatment.

As well, the pulp and paper industry is a major toxic polluter, as part of the life-cycle of the plantation industry. For example, Tasman Pulp and Paper dumps 5-10 tonnes per day of organochlorine contaminated waste into the Tarawera River. The technology exists for paper to be made without the use or discharge of toxic chemicals. Toxic substances discharged

from Medium Density Fibreboard (MDF) and plywood factories, and other wood manufacturing processes include formaldehyde. Responsible plantation industry practices involve the zero use and discharge of toxic chemicals. Discussion of these toxic pollution aspects were not only selectively left out by O'Loughlin (1994)⁴ in his review of *The Plantation Effect* but he went further by concluding "... over the last decade, the industry has managed ... many of its wood-processing plants in a way which takes the protection of the environment into account".

Plantation Influences on Soil and Water

It is beyond doubt that trees can benefit our soils and water. However, when these trees become part of a plantation crop there will be negative impacts. Management practices, particularly at harvesting and on steep or sensitive soils, can degrade soil and water qualities. There are plenty of examples of where this has occurred (Rosoman 1994). Moreover, the influences and impacts of exotic tree plantations on soil biogeochemistry are still largely unknown. Conclusions cannot yet be drawn, particularly over the implications for many nutrients and pH, and any species effect.⁵

This is not to suggest that the industry is not concerned with soil and water quality and nutrient declines. They will be having a profound influence on future productivity and wood yield. There has certainly been significant positive advances in plantation management practices to maintain soil and water quality. However, until monitoring and nutrient budgets show a nutrient balance, zero soil loss from plantation practices, and maintenance of water quality throughout the rotation, can plantations be called "sustainable"?

With silt still commonly entering waterways at harvesting, fertiliser use on

the increase indicating a likely net nutrient loss from the system, and the possible trend of whole tree harvesting, there is still some way to go. It is generally accepted that most of the soil erosion at harvesting is due to roading. Low-impact technology such as Long Distance Cable (LDC) harvesting systems that can haul logs up to a distance of 2.5 km, offer a good method of reducing roading, and carrying out harvesting other than in large clearfells. Legume trees, shrubs and herbs, organic fertilisers, alternating rotations of conifers with broadleaf trees, and acceptance of lower yields on infertile soils will aid balancing nutrients.

The carbon budget of plantations has received a lot of attention recently with the recognition of sequestration from the atmosphere. Planting plantations is being touted as an alternative to fossil fuel use reductions. However, what has been left out is that plantations are a short-term "green" carbon store, whereas fossil fuels are a long-term irreplaceable "brown" sink. Also, the amount of fossil fuel carbon that is used by the plantation industry is often ignored. Carbon budget modelling for Greenpeace found that half of the sequestered carbon is lost after 100 years (Ford-Robertson 1994).

Risks of Plantations

Wisdom passed on and reaffirmed through hundreds of generations is, as the proverb goes: "Don't put all your eggs in one basket". Agriculture is learning that monocultures of genetically simplified plants are vulnerable to pests and diseases. There are plenty of examples, mainly in the tropics, of plantation monocultures suffering outbreaks of pests and diseases.⁶ The plantation industry takes this threat seriously by committing resources to finding technical solutions and together with the Government ensuring the necessary border control service.

Native forest ecosystems involve a

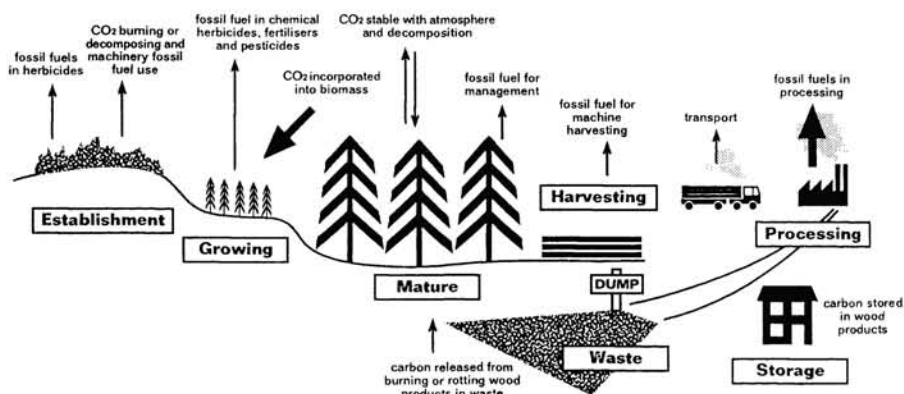


Figure 1: Carbon life-cycle of the tree-plantation industry.

4 See this issue.

5 This conclusion in *The Plantation Effect* seems to have been selectively ignored by O'Loughlin 1994 - this issue.

6 See Rosoman 1994 p 25-26.

complex of endemic "pests and diseases", and like plantations they are vulnerable to invading exotic organisms. It is certain that we will have more insects and fungi arriving on our shores. However, it is unlikely that a new pest or disease will affect every species, and more habitats mean more possibilities for a natural predator. Diversity as a general principle therefore provides a degree of protection, and monocultures are inherently more vulnerable. It would be both commercial and ecological folly to ignore this risk.

To put it more bluntly, the forestry industry has a gambling problem. Although they are already undertaking treatment, Greenpeace's suggested therapy includes diversifying the planting to a range of species over a range of different sites from mainly one species and planting indigenous species, but Greenpeace is not suggesting abandoning radiata pine altogether.⁷

Climate change is likely to alter ecological conditions throughout New Zealand. This will put additional stress on long-term crops like plantations as well as other systems. How many Cyclone Bola force winds can commercial plantations stand? If pests and diseases thrive under warmer conditions, plantations may become more vulnerable.

With the continued use of toxic chemicals by the industry, issues of liability will emerge as the cost of the downstream effects is assessed. The toxic timber treatment site issue is a good illustration of liability. Society's rising environmental consciousness will ensure that only "clean" management and production techniques have a place in the future.

Standards and Certification

A clear area of agreement between all stakeholders in the plantation industry is the need for standards. It is the only way that performance of plantation growers and wood processors can be measured. Criteria and the standards that follow from them will need to cover ecological, social, and economic aspects. As well, the process for developing them is critical, and for it to have any credibility it will involve the reaching of consensus of all the stakeholders.

The natural progression from standards and the independent monitoring of them is certification of plantation and forest areas, wood-processing facilities, and finally the wood product. Credible certification involves independent assessment and total transparency of information. Environmentally conscious consumers the



Blanket desiccation spraying – a common plantation practice. Photo: Greenpeace New Zealand

world over are now demanding credible 'green' products and a greater level of information and certainty with these products. False 'greenwash' claims with no accompanying standards, monitoring or independent certification, will haunt those that make them.

To meet the "green" demand of the international market place there is a proliferation of standards and certification schemes. The Forest Stewardship Council (FSC) – a joint trade and non-governmental organisation body – approved criteria and certification procedures for natural forests in August 1994, after two years of drafting and consultations. Greenpeace supports the FSC as a body to

oversee the certification of wood products. A set of Principles and Criteria for plantations is also currently under development.

Summary and Conclusions

As the environmental effects cited illustrate, the plantation industry's claims of sustainability are clearly not true. As an alternative Greenpeace offers ecoforestry solutions for a responsible plantation industry which include:

- the establishment of a protected ecosystem network to protect our indigenous biodiversity, following a landscape assessment,
- the use of management practices that



Indigenous regeneration management of black beech (*Nothofagus solandri*), Oxford, Canterbury. Photo: Greenpeace New Zealand.

⁷ See Greenpeace Positive Solutions in *The Plantation Effect*.

- encourage biodiversity in plantations,
- diversification of species that are being planted, including natives,
- zero nutrient loss and soil erosion from plantation operations,
- zero use and discharge of toxic chemicals/pollution, and
- independent monitoring and certification of compliance with standards.

It is acknowledged that the industry is already making progress towards these, in particular the recognition that better planning is needed, along with the development of standards. Adopting a precautionary approach and planning for the long term is the key to protecting biodiversity. Greenpeace believes the plantation industry has responsibilities to society as a land user, and urges the recognition of the multiple values of land and trees. For the industry to have credibility with environmental organisations, the consumer and society, a genuine openness to address the issues and independent monitoring and certification will be needed.

Note:

The Greenpeace review *The Plantation Effect*

is available for \$18 (incl. GST and P&P), from Greenpeace New Zealand, Private Bag 92507, Auckland.

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Some thoughts on the indigenous forest management crossroad and the paths of opportunity

R.K. Gover*

Introduction

This paper suggests firstly that the maintenance of ecological viability of the forests is the umbrella under which all management should be judged and permitted and, secondly, that the two divergent concepts of indigenous timber harvest and forest conservation are not necessarily incompatible: that is to say that indigenous timber production is a legitimate use, but only if it is strongly based on the maintenance of the basic forest ecological system.

It is time for both conservation and forest managers to recognise this principle and to frame management regimes that do allow compatibility on selected forest types in specific areas set aside for production.

Working within Environmental Constraints

The vision of sustained yield indigenous forestry must "embrace the sustained eco-

logical systems" philosophy (Findley 1990). Sustainable forest management can only be considered within the constraints of the need to maintain ecological viability and integrity. Managers should know the constraint levels, or "bench marks" at which ecological viability can no longer be maintained. Not just tree flora but in terms of all aspects of fauna and flora.

These bench mark indicators are not easy to assess or understand, although I believe that some significant work is being done in selected forest types to understand change and, more importantly, the effects of change (R. Allen pers comm).

In effect this is the build up of forest fragility ratings and, when it is done in conjunction with other environmental factors such as inherent soil fertility, erosivity, erodibility and others, it becomes a strong decision-making and management tool. It can answer the questions such as "to harvest or not to harvest?" It can also assist in matching forest management techniques to identified environmental constraints.

It should also be said that general forest harvest, if harvest in the interim is

restricted only to the more robust forest types, can afford to be conservative. It does not need to test the extremes of ecological breakdown. A cautious approach to the setting of forest management and harvesting practice will go a long way towards maintaining forest viability until the complex relationships of forest ecology are further unravelled by research.

The Use of Geographic Information Systems

In Papua New Guinea, where I currently work for the CSIRO Division of Wildlife and Ecology, we have just finished putting together the Papua New Guinea Resource Information System (PNGRIS). It is a geographic information system; that is, a database and associated mapping package that covers the whole country. It pulls together all the basic natural resource data that have been collected by CSIRO survey since the early 1950s and matches them against population statistics, conservation needs ranking and other administrative and spatially linked information.

It is used by agriculturists, environmentalists and foresters alike for develop-

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