

Soil and Water in New Zealand

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Soil issues

- Soil degradation – highly erodable soils
 - Erosion – mass movement, gulley (fluvial) erosion, surface erosion and river/stream bank erosion
- Steep-land focus – new planting/harvesting risks
- Hill country erosion reduces the productivity of soils - 20 years to recover to within 70-80% of its pre-erosion levels
- Coastal impacts of sediment deposition and debris
- Aesthetics and tourism
- Public perception

Impacts of erosion



SCION
Forest - water - people

Impacts of erosion



SCION
Forest - water - people

Impacts of erosion



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Innovation in Forestry

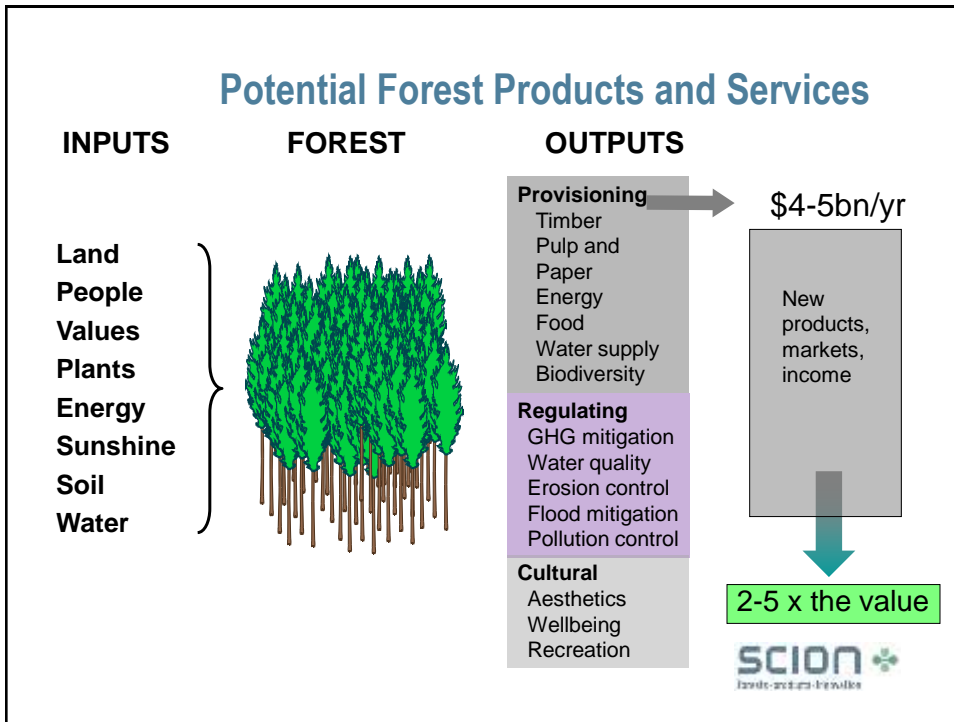
Water issues



- Water allocation and rights
- Water quality (increasing trends in four nutrients: total phosphorus, dissolved reactive phosphorus, oxidised nitrogen and total nitrogen in pastoral catchments)
- 70% lowland rivers polluted.
- Forests versus other land-uses – cross sector comparisons
- Fairness? (need to account for ecosystem services)

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Potential Forest Products and Services



Governance and institutional frameworks



- NZ governance frameworks
 - East Coast Forestry Project
- Institutional/cross sectoral issues (Land and Water Forum)

Monitoring and indicators

- Forest Monitoring – LUCAS, PFMF
- Soil and water monitoring approaches
 - Councils
 - Central Govt
 - Primary sectors
- Indicators we would use for soil and water issues
- Issues
 - Multiple land uses – tensions
 - Indicator technical issues
 - Growth versus the Environment

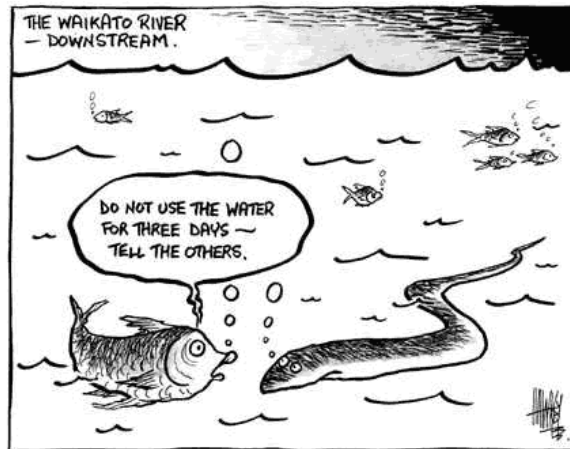


People, values and value

- New Zealanders attitudes to water and water use
- Tourism and recreation
- Aesthetics
- Valuation of water and soil ... ecosystem services ... levelling the playing field



Public awareness



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Maori values

- Impacts of environmental degradation on Maori, Maori values and cultural needs:
- *We are losing our mana. The river is eating away at the land. Without this land we are nothing.*
- *When the trees were cut the land began to move... That place is filled with rocks from the slips, it is the same with the Waipuu; it has been filled in. The stations [farms] there have all gone, there are blocks of land that are there in the Waipuu.*

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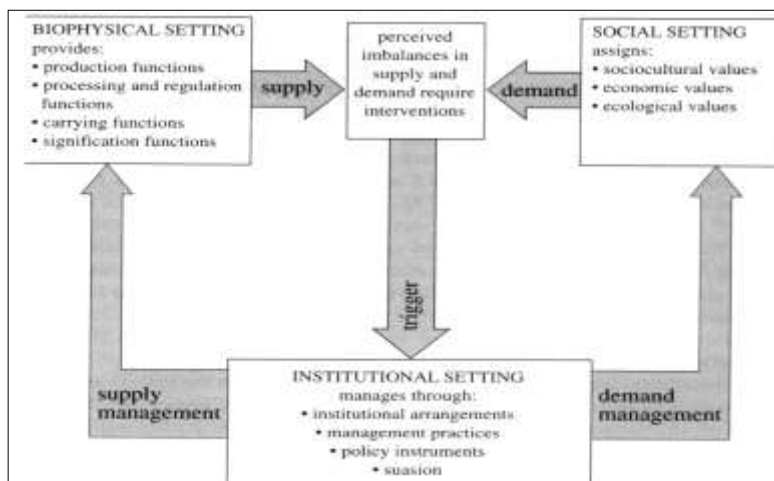
Maori governance



- Future governance - mana motuhake
- Treaty of Waitangi settlements
- Maturanga Maori – implications for resource management



Using indicators to explore supply and demand relationships between geo/biophysical and social settings



Mapping flow on effects using indicators

| Biophysical changes | Impact/issue | Effect/outcome | Social/economic/cultural changes | Human impacts | Flow-on impacts |
|--|---|--|---|---|---|
| Loss of physical support functions for natural forest flora & fauna (landslide etc.). Depletion and ecosystem performance | Ecosystem degradation or destruction (C1,3,4) | Loss of habitat (C1.1, 1.2, 1.3a) Reduced forest area & forest production (C6.1) Changes in supply of key flora and fauna (C1.2,6.3) | Reduced availability/accessibility of wild foods (C6.3) Reduced availability of forest materials/fibres etc. & chemicals (C6.3) Loss of natural pharmaceuticals /medicines (C6.3, 6.5) Loss of biodiversity (C1.1, 1.2) Loss of recreational opportunity (e.g. hunting, walking, relaxing) (C,6.3, 6.4) | Nutrition/health effects (C6.5) Loss of cultural practises and associated knowledge (6.5) Reduced independence /self-reliance (C6.3) Changes in livelihoods strategies (6.3) | Reduced individual and collective health & wellbeing (C6.5) Reduced quality of living environment/amenity, and sense of place (C6.5, 6.3) Reduction in cultural integrity & identity (C6.5) Psychological and spiritual stress/loss (6.5). Loss of local and regional cultural diversity (6.5). |



Montreal Process Criteria and Indicators (third edition - 2009)

| | | | | |
|---|---|---|--|--|
| <p>Criterion 1: Conservation of biological diversity</p> <p>1.1. Ecosystem Diversity</p> <p>1.1.a Area and percent of forest by forest ecosystem type, successional stage, age class, and forest ownership or tenure</p> <p>1.1.b Area and percent of forest in protected areas by forest ecosystem type, and by age class or successional stage</p> <p>1.1.c Fragmentation of forests</p> <p>1.2. Species Diversity</p> <p>1.2.a Number of native forest-associated species</p> <p>1.2.b Number and status of native forest-associated species at risk, as determined by legislation or scientific assessment</p> <p>1.2.c Status of on site and off site efforts focused on conservation of species diversity</p> <p>1.3. Genetic Diversity</p> <p>1.3.a Number and geographic distribution of forest-associated species at risk of losing genetic variation and locally adapted genotypes</p> <p>1.3.b Population levels of selected representative forest-associated species to describe genetic diversity</p> <p>1.3.c Status of on site and off site efforts focused on conservation of genetic diversity</p> <p>Criterion 2: Maintenance of productive capacity of forest ecosystems</p> <p>2.a Area and percent of forest land and net area of forest land available for wood production</p> <p>2.b Total growing stock and annual increment of both merchantable and non-merchantable tree species in forests available for wood production</p> <p>2.c Area, percent, and growing stock of plantations of native and exotic species</p> | <p>2.d Annual harvest of wood products by volume and as a percentage of net growth or sustained yield</p> <p>2.e Annual harvest of non-wood forest products</p> <p>Criterion 3: Maintenance of forest ecosystem health and vitality</p> <p>3.a Area and percent of forest affected by biotic processes and agents (e.g. disease, insects, invasive alien species) beyond reference conditions</p> <p>3.b Area and percent of forest affected by abiotic agents (e.g. fire, storm, land clearance) beyond reference conditions</p> <p>Criterion 4: Conservation and maintenance of soil and water resources</p> <p>4.1 Protective Function</p> <p>4.1.a Area and percent of forest whose designation or land management focus is the protection of soil or water resources</p> <p>4.2 Soil</p> <p>4.2.a Proportion of forest management activities that meet best management practices or other relevant legislation to protect soil resources</p> <p>4.2.b Area and percent of forest land with significant soil degradation</p> <p>4.3 Water</p> <p>4.3.a Proportion of forest management activities that meet best management practices, or other relevant legislation, to protect water related resources</p> <p>4.3.b Area and percent of water bodies, or stream length, in forest areas with significant change in physical, chemical or biological properties from reference conditions</p> | <p>Criterion 5: Maintenance of forest contribution to global carbon cycles</p> <p>5.a Total forest ecosystem carbon pools and fluxes</p> <p>5.b Total forest product carbon pools and fluxes</p> <p>5.c Avoided fossil fuel carbon emissions by using forest biomass for energy</p> <p>Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits</p> <p>6.1 Production and Consumption</p> <p>6.1.a Value and volume of wood and wood products production, including primary and secondary processing</p> <p>6.1.b Value of non-wood forest products produced or collected</p> <p>6.1.c Revenue from forest based environmental services</p> <p>6.1.d Total and per capita consumption of wood and wood products in round wood equivalents</p> <p>6.1.e Total and per capita consumption of non-wood forest products</p> <p>6.1.f Value and volume in round wood equivalents of exports and imports of wood products</p> <p>6.1.g Value of exports and imports of non-wood forest products</p> <p>6.1.h Exports as a share of wood and wood products production, and imports as a share of wood and wood products consumption</p> <p>6.1.i Recovery or recycling of forest products as a percent of total forest products consumption</p> | <p>6.2 Investment in the Forest Sector</p> <p>6.2.a Value of capital investment and annual expenditure in forest management, wood and non-wood forest product industries, forest-based environmental services, recreation and tourism</p> <p>6.2.b Annual investment and expenditure in forest-related research, extension and development, and education</p> <p>6.3 Employment and Community needs</p> <p>6.3.a Employment in the forest sector</p> <p>6.3.b Average wage rates, annual average income and annual injury rates in major forest employment categories</p> <p>6.3.c Resilience of forest-dependent communities</p> <p>6.3.d Area and percent of forests used for subsistence purposes</p> <p>6.3.e Distribution of revenues derived from forest management</p> <p>6.4 Recreation and Tourism</p> <p>6.4.a Area and percent of forests available and/or managed for public recreation and tourism</p> <p>6.4.b Number, type, and geographic distribution of visits attributed to recreation and tourism and related to facilities available</p> <p>6.5 Cultural, Social and Spiritual needs and Values</p> <p>6.5.a Area and percent of forests managed primarily to protect the range of cultural, social and spiritual needs and values</p> <p>6.5.b The importance of forests to people</p> | <p>Criterion 7: Legal, institutional and economic framework for forest conservation and sustainable management</p> <p>7.1.a Legislation and policies supporting the sustainable management of forests</p> <p>7.1.b Cross sectoral policy and programme coordination</p> <p>7.2.a Taxation and other economic strategies that affect sustainable management of forests</p> <p>7.3.a Clarity and security of land and resource tenure and property rights</p> <p>7.3.b Enforcement of laws related to forests</p> <p>7.4.a Programmes, services and other resources supporting the sustainable management of forests</p> <p>7.4.b Development and application of research and technologies for the sustainable management of forests</p> <p>7.5.a Partnerships to promote the sustainable management of forests</p> <p>7.5.b Public participation and conflict resolution in forest-related decision making</p> <p>7.5.c Monitoring, assessment and reporting on progress towards sustainable management of forests</p> |
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Closing thoughts...

- Complex institutional, policy, reporting and monitoring environment...
- Soil and water indicators within wider context of forest ecosystem services...
- Inter-connectedness of indicators... flow-on and, direct and indirect effects...
- All environmental issues are ultimately social ones...



Hierarchy of decision making

- Social goal: erosion control
- Principles to be applied: precautionary principle?
- Frameworks: MP C&I (other C&I), policy assessment, risk management, etc.
- Tools and techniques: research and monitoring, risk assessment, environmental impact assessment, CBA, non-market valuation, deliberative techniques etc...

