WATER AND SOIL RESOURCE MANAGEMENT

ON THE EAST COAST

Office of the
PARLIAMENTARY COMMISSIONER FOR THE ENVIRONMENT
Te Kaitiaki Taiao a Te Whare Pāremata

WATER AND SOIL RESOURCE MANAGEMENT ON THE EAST COAST

A review of progress towards Sustainable Land Management in the Gisborne region following the Bola storm in 1988

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PARLIAMENTARY COMMISSIONER FOR THE ENVIRONMENT
Te Kaitiaki Taiao a Te Whare Pāremata

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Summary of findings

Rationale for review

The erosion and flooding in the East Coast region caused by the Bola storm was a warning that many existing land uses were not sustainable. My report to the Planning and Development Select Committee in 1988 urged that Government action should be taken to mitigate further soil loss from the hills and flooding on the plains. Large scale reafforestation to lessen soil erosion and slow build-up of debris in river channels was seen to be essential.

I decided to review progress on implementing the recommendations concerned with changes in land use and some aspects of flood protection.

Afforestation initiatives

Since 1989 successive Governments have initiated land use change through afforestation schemes and soil conservation works for the at risk land in the region. The East Coast Conservation Forestry Scheme has resulted in some 9,000 hectares of land in the region being planted over the last four years at a cost of about $5 million. This 9,000 hectares is about 4.5% of the area of land needing a change in land use. (In the 1993 planting season an estimated 4,000 hectares should be planted at a further cost to Government of some $2.2 million.) This Scheme was targeted at the severe to extreme eroding land within the Class VII land use category, ie the land most at risk.

The East Coast Forestry Project, announced in 1992, also has the goal of encouraging the conversion of eroding or erosion prone land to forestry use through a tendered grant scheme. This Project was further refined in 1993 to encourage protection of existing indigenous vegetation and to give preference to tenders which include higher proportions of severely eroding land.

Soil conservation

Soil conservation works have proceeded over the past four years with some 2,000 hectares of land planted with poles (1% of land needing change) at a cost to Government of some $1.6 million.

Sustainable land use

Despite this level of Government assistance, only 5.5% of the at risk land is estimated to have changed to a more sustainable use over the last four years. If the East Coast is to continue to move towards sustainable land use, afforesting the at risk land is critical. The ***Minister of Forestry** needs to use the East Coast Forestry Project to plant at least 20,000 hectares of at risk land within the next five years.* Even with this target, only about 15% of the at risk land will have been planted by 1999.

Priority areas

The cost of land use change is high and Government money needs to be targeted extremely carefully. This means the ***Minister of Forestry** needs to give greater attention to identifying in detail the areas most at risk.* With the recent growth in commercial forestry, which looks likely to continue, it is essential that the ***Minister of Forestry** monitors Government subsidised plantings to ensure that taxpayer funding is targeted appropriately.*

District Council role

At the same time, ***the Gisborne District Council** needs to target, through the District Plan, those areas of at risk land which are not suitable for large scale afforestation.* The Council *needs to complete the Vegetation Removal and Earthworks Plan for establishing, harvesting and replanting of all afforested lands at risk of erosion.* The Council could also, with Federated Farmers, *encourage the establishment of Landcare groups where needed to assist in achieving sustainable land use.*

Cost of disaster relief

We should not forget that while the cost of land use change is high, the cost of disaster relief is enormous. Immediately after the Bola storm, Government disaster relief totalled $111 million. Money spent on disaster prevention is money well spent.

Helen R. Hughes

Helen R Hughes
Parliamentary Commissioner for the Environment

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1.0 Introduction

Purpose of report

The purpose of this report is to inform the House of Representatives on progress that has been made towards sustainable land management in the East Coast region in the first four years following the Bola storm in March 1988.

Recommendations on ways of achieving sustainable land management were made by the Parliamentary Commissioner for the Environment in a report to the Planning and Development Select Committee in December 1988. The Commissioner has been monitoring the implementation of the recommendations contained in both the 1988 report and the subsequent report of the Planning and Development Select Committee.

This present investigation, initiated in late 1992, has reviewed recommendations concerned with changes in land use and some aspects of flood protection.

The Commissioner visited the Gisborne area in March 1993 and held discussions with the Gisborne District Council, Federated Farmers, Department of Conservation, Ministry of Forestry, Farm Forestry Association and environmental groups.

2.0 Background

The East Coast region comprises some of the most highly erodible land in New Zealand. Although other areas also have erodible land, areas in the Gisborne region are the most extensive. The long history of erosion in the region resulted in the steady aggradation, or build up, of the river beds, thus increasing the flood risk with time. A brief history of erosion control is given in appendix 1.

The Bola storm in March 1988 caused widespread devastation in the East Coast area. Catchment damage through erosion contributed to the cumulative impacts of flooding and siltation in river valleys throughout the region. There was extensive damage to horticultural areas, to Gisborne's water supply and to the railway bridge across the Waipaoa River. The bulk of the damage occurred in catchments with minor or no soil conservation works and no flood control schemes.

Following the Bola storm, the Parliamentary Commissioner for the Environment was requested by the Planning and Development Select Committee of the House of Representatives to examine the effectiveness of flood mitigation policies and practices and to assess the likely effects of new policies on future flood protection measures.

2.1 Parliamentary Commissioner's investigation

The Parliamentary Commissioner for the Environment's investigation was completed in December 1988 and, at the request of the Planning and Development Select Committee, was tabled in the House of Representatives.

The Commissioner concluded that it was time to change policies and practices to meet the goal of sustainable land use. The Commissioner emphasised that action was required by central and local government as well as land managers to achieve sustainable land use.

Recommendations on policy development, programmes, planning, research and monitoring in the areas of soil conservation and flood control to achieve that end were directed to both central and local government agencies. The recommendations are summarised in appendix 2.

2.2 Select Committee inquiry

The Select Committee accepted the Commissioner's report and conducted its own inquiry. The major conclusion was that clear policy is required to ensure that erosion and flood control measures take account of future as well as present needs. Of the Select Committee's 13 recommendations to the House of Representatives, the following matters are the subject of this report:

* Policy for water and soil resource management to achieve sustainable land use should be developed and coordinated by Government.

* In recognition of the off-site benefits and benefits to future generations, part of the funding of water and soil resource management should be met by Government.

* Research into the effectiveness of water and soil resource management activities to achieve sustainable land use should be continued by Government.

* Monitoring strategies for water and soil resource management to evaluate whether sustainable land use policy is being achieved should be developed and implemented.

* Policies for flood plain management and flood hazard mapping should be maintained and further developed.

The full set of recommendations is given in appendix 3.

2.3 Government response

Government was required, under Standing Orders, to reply to the Committee's report and responded on 7 November 1989. Government advised that it had all recommendations under action as part of the reviews of local government funding, adverse climatic events assistance and the reform of resource management legislation.

2.4 Authority for investigation

This investigation has been conducted under Section 16(1)(a) of the Environment Act 1986. The Parliamentary Commissioner for the Environment has a policy of following up the recommendations made in previous investigations to ascertain whether changes made in environmental management have been effective. In this instance, the Commissioner has reviewed Government policy and programmes related to changes in land use which were recommended for the East Coast region.

3.0 Disaster relief : Immediate response of Government

3.1 Financial assistance

The scale of the damage arising from the Bola storm was such that Government considered it necessary to provide short-term disaster relief to the Gisborne region.

Government assistance to farmers in the region was by way of a Farm Assistance Fund. Farmers were compensated to 60% of their total non-insurable losses resulting from the storm. The money was to be used at the farmer's discretion. This was a change in the way disaster relief traditionally had been given to the regions. The disaster package had three objectives:

* to give an economic and psychological boost to the region,
* to restore damaged farms to their position before the Bola storm,
* to facilitate major land use and ownership change.

The total relief package of approximately $111 million included the following:

* Repair of damaged catchment works	$3.2 million
* Gisborne water supply	$6.6 million
* Gisborne railway bridge	$3.5 million
* Roading repairs	$34.3 million
* Farm Assistance Fund	$50.0 million
* Disaster Recovery Employment Scheme	$4.7 million
* Horticulture Salvage Scheme	$0.75 million
* Civil Defence Disaster Recovery Coordination and ancillary services	$3.3 million
* Contribution to Mayoral Relief Fund	$150,000

3.2 Evaluation of the Farm Assistance Fund

The Ministry of Agriculture and Fisheries (MAF) commissioned a review of the effectiveness of the Farm Assistance Fund in September 1989. The consultants' report concluded that the financial package achieved only limited success and would do nothing to prevent a future disaster of the same type. The Minister of Agriculture, in releasing the report, noted that the funds succeeded in preventing immediate economic disaster but had not helped the region in the long-term.

The consultants noted that much of the money received by farmers was paid to the finance sector as farmers reduced the debt on their farms. The package gave farmers facing financial ruin "breathing space" to consider their options but made little difference to their long-term viability.

A few farmers used the compensation to make significant land use changes, but the general farming pattern showed little change from pre-Bola days. The Minister noted that the financial package may have been counterproductive to encouraging more appropriate land use and risk management by farmers.

4.0 Policy development by central Government

Two principles underlie the development of policy in the areas of land and hazard management since 1989. The first is sustainable management. The second involves a shift in responsibility for disaster prevention and recovery from central government to local government and its communities. The Bola storm and the analysis of the effectiveness of the Farm Assistance Fund provided a major impetus to policy development with a recognition that disaster recovery may need to include a change in land use patterns as well as restoration of communities.

4.1 Sustainable management

From 1988, the Ministry for the Environment has undertaken a major review of resource management legislation. As part of the review, the concept of sustainable management became the focus for new resource management policy and legislation. Sustainable management is defined in Section 5 of the Resource Management Act 1991.

The Resource Management Act 1991 includes provision for the development of Regional Policy Statements and Plans. These policies and plans can provide for the broad range of resource management issues, including water and soil resource management, that impact on the way that land resources may be used. Natural hazard management is a significant part of the Act.

The Resource Management Act 1991 (Sections 30 and 31) outlines the responsibilities of regional councils and unitary authorities to control the use of land for the purpose of soil conservation and the maintenance and enhancement of the quality of water in water bodies and coastal water. The Act also requires regional councils and unitary authorities to monitor the outcomes of policies which have been developed and implemented (Section 35).

In October 1990, as part of the development of sustainable land management policy, the Minister of Agriculture announced the FARM Partnership Scheme. (FARM stands for Facilitation of Action for Risk Management.) This programme was designed to promote sustainable agriculture in areas where land uses and farming methods have over time brought about significant degradation of the land, thus putting it at risk from adverse climatic events. Risk management is included to counter the traditional response of periodic disaster relief

handouts. This policy initiative was developed throughout 1990 with consultation of the affected stakeholders and, although the policy was deferred following a change in Government in 1990, the concepts are being used in ongoing policy work.

As part of that ongoing policy work, the Government established an Inter-Departmental Working Group on Sustainable Land Management which developed the Sustainable Management Outcome Statements adopted by Government in November 1991. These Statements include :

(i) the maintenance of the potential of the nation's soil resources to achieve viable land use options for present and future generations;

(ii) the adoption of management skills and application of appropriate technology to enable people and communities to provide for their social and economic wellbeing;

(iii) the adoption of land management practices that maintain or enhance the quality of waterways, and ground water resources and coastal waters, from suspended sediments, nutrients, harmful microorganisms and other contaminants;

(iv) the avoidance, mitigation and remedying of the impacts of land related hazards including flooding, subsidence and erosion;

(v) the maintenance of catchments to provide high quality water resources for downstream users and users of coastal spaces (sea bed, water, intertidal areas);

(vi) the maintenance of cultural values associated with land and water, including the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, wahi tapu and other taonga;

(vii) the maintenance of aesthetic, ecological and conservation values related to land and water.

The followup intended by Government in setting out these Statements was for individual departments to develop sustainable land management policy in their area. The Ministry of Agriculture and Fisheries produced discussion papers and a Sustainable Land Management policy in March 1993.

Government has agreed to the establishment of an Officials Standing Committee on Sustainable Land Management. Its role will be to develop a national strategy of sustainable land management, to ensure that government programmes are coordinated across departments and to address any cross-portfolio issues that may arise.

4.2 Disaster prevention and recovery

A policy on Natural Disasters and Emergencies Within New Zealand has been developed. This establishes the principle that primary responsibility for recovery after a natural disaster, such as a major flood, rests with the local community. Central government's only role is to provide assistance where communities are unable to assist themselves and where public benefit can be identified.

In 1987 Government reviewed its overall funding support for local government and devised principles of allocation based on equity and efficiency where some national public good is involved. Substantial changes in policies applying to catchment grants were made. From 1988 a wider range of water and soil conservation activities became eligible for assistance. The new arrangements also required a greater degree of cost sharing between the nation, the region and direct beneficiaries.

The policy applying to subsidy-assisted activities was modified for the 1990/91 year because the Resource Management Act 1991 was due to come into effect. The Resource Management Subsidy Policy encompasses a greater range of resource management activities than under previous policies. It focuses on:

* achieving a smooth transition to new and devolved resource management functions under the Resource Management Act 1991;
* achieving environmental quality standards established in the national interest;
* assessing options for risk management associated with contaminated sites and natural hazards, and for the preliminary assessments of common property resources for sustainable management; and
* making adjustments to risk from hazards that reduce the Government's liability as insurer of last resort.

The policy is administered by the Ministry for the Environment. Five million dollars were appropriated to this policy in each of the 1990/91, 1991/92 and 1992/93 years.

Funding assistance is limited to unitary and regional councils and is apportioned on an ability to pay basis. In 1992/93 subsidies ranged from 10% on a limited range of resource management activities for regional councils most able to pay to 60% on a broader range of activities for councils with least ability to pay. Gisborne District Council was eligible for a 60% subsidy for many of its regional functions under the Resource Management Act 1991, including some of its soil conservation activities.

5.0 Research

During the years 1989 to 1992, major changes to the way in which scientific research is organised and funded were made, including the dissolution of the Department of Scientific and Industrial Research and the formation of Crown Research Institutes.

From 1989 to 1992 research into the effectiveness of erosion control measures was undertaken by scientists at DSIR Land Resources (now Landcare Research). This included work on storm damage to bush, pasture and forest after the Bola storm, the physical and economic impacts of soil conservation on storm damaged hill country and the impact of erosion on hill country pasture production in several North Island regions.

The Forest Research Institute, whose staff are now within Landcare Research, also researched the impact of storm damage on immature and mature stands of pine in the East Coast area after the Bola storm and the contribution of tree roots to slope stability.

The need for a national science strategy on research for sustainable management is being actively considered by the Ministry of Research, Science and Technology (MORST). An issues and options paper has been developed by consultants for MORST and will be presented to the Minister of Science in the near future. A decision on whether to proceed with a strategy will then be made.

The detailed implications of the changes in organisation and funding for research programmes on sustainable land use practices are not yet clear. There have been some positive developments, such as the recognition of the New Zealand Land Resource Inventory (NZLRI) as a database of national significance. This inventory is important as a primary source of physical information on which to plan sustainable land uses.

There is recognition by several Crown Research Institutes of the importance of integrated research for sustainable land management. However, there have been funding cuts to research over the last two years and most of the DSIR Land Resource/Landcare soil conservation expertise has been lost.

The development of a national science strategy for sustainable land management would assist the science providers and users to see where generic research programmes on sustainable land management are needed.

The funding of this research is another important issue as much of the research is long-term but gaining funding for long-term projects is difficult when priorities are set on a five year basis.

An important aspect of research is technology transfer. The results of the research into sustainable land management are needed by regional and unitary councils and by land managers to plan their land use practices. The development of a national science strategy should include means to communicate the research in a timely and effective manner.

6.0 Government programmes

6.1 East Coast Conservation Forestry Scheme

In 1988 Government announced a five year scheme to target the large areas of severely eroded land identified in the critical headwaters of the Poverty Bay and Tologa Bay catchments. The East Coast Conservation Forestry Scheme, which started in 1989, has been administered by the Gisborne District Council. The Scheme allows up to 15,000 hectares of hill country with severe to extreme soil erosion problems to be the subject of subsidised planting.

The Scheme applies to land upstream of Gisborne City, the Poverty Bay Flats and Tologa Bay. Government pays 67% of the cost of planting, Gisborne District Council 28% and landowners 5%. The criterion of targeting the severe to extreme eroding land was set by Government in the Scheme requirements.

In the first four years of the Scheme, some 78.6% of the area planted has been land so targeted while the remaining 21.4% has been land of other types planted within stable fencelines. The targeted land has been identified using the "Red Report"[1] land categories which are an interpretation of the Land Use Capability classes. (For further discussion on the land use classes refer to appendix 4.) The actual areas planted and the total block size in hectares are given in table 1. The extra area planted includes planting to the nearest stable feature in the landholding.

Table 1: East Coast Conservation Forestry Scheme Plantings

Year	Actual Area Planted (hectares)	Total Block Size (hectares)
1989	2029	2029
1990	2483	2496
1991	1705	1726
1992	3023	3105
1993 (estimated)	4200	4400
Total (estimated)	**13440**	**13756**

Source: Gisborne District Council

1 Anon, 1978: "Red Report" (Report of land use planning and development study for erosion-prone land of the East Cape region). Poverty Bay Catchment Board, Gisborne.

The Scheme has not provided money for continued pruning and thinning of trees. Thinning is especially important to maintain the stability of stands of trees and is, therefore, important for soil conservation. This becomes the landholder's responsibility in the future.

In spite of the massive 95% subsidy, landowners were reluctant to make application to the Gisborne District Council in the early years because of the time needed to make adjustments to farm management. The ongoing costs of management, such as pruning and thinning following planting, are also likely to have been a constraint. However, interest from investors and farmers was high in Year 4 and Year 5, 1992 and 1993. This renewed interest in the Scheme can be attributed in part to the attractiveness of forestry investments on the target land.

6.2 East Coast Forestry Project

In the 1992 budget, the Minister of Forestry announced a forestry initiative involving the planting for commercial purposes of 7,000 hectares of forest per year for 28 years on eroding LUC Class VII land in the East Coast region (Category 2 and 3 land; refer to appendix 4 for discussion of land use types). During the 28 year period, the Government aims to plant 200,000 hectares of forest on moderately to severely eroding land.

The Project was developed with three objectives:

* to address the severe soil erosion in the area and reduce its off-site effects;
* to increase employment in the region; and
* to contribute to regional growth and development.

The objectives of the Project were further refined in August 1993 when the Minister of Forestry announced that not only applications which would set aside large areas of indigenous vegetation be given preference in the approval process but that applications containing higher proportions of severely eroding land would also be given preference. A target of 50% of grants applying to severely eroding land would be utilised.

Areas currently eligible for the East Coast Conservation Forestry Scheme are not eligible for planting under this Project until 1994, when the Scheme will end. From the second year of the Project the areas eligible for planting will be considered 2:1 in favour of the northern East Coast region (north of Tolaga Bay). The focus on planting in the northern area is to be commended, as this area has received little assistance with afforestation initiatives in the past, and is badly in need of more sustainable land uses.

The Project, administered by the Ministry of Forestry, allows any land owner to tender for a grant to plant, prune and thin approved commercial species of trees on targeted land. As from 1992, tenders are being called for landowners to plant a minimum area of 25 hectares to encourage the creation of commercial scale forests. In the first two years, there is an allocation of 500 hectares of each year's annual planting to be made available to landowners to plant between 25 and 50 hectares, although this minimum area is being reviewed. The Minister of Forestry, in August 1993, indicated that the Regulations would be changed to reduce the minimum qualifying area from 25 hectares of Class VII land in one year to a minimum of 15 hectares spread over three years. This change is intended to allow more local landowners to participate in the Project.

Annual reviews of the Project are being undertaken with a major review scheduled for June 1995.

During preparation of this report, the Parliamentary Commissioner for the Environment became aware of the considerable debate surrounding the extent of indigenous vegetation able to be cleared for planting pines with government assistance. The debate has focused on the clearance of kanuka and manuka. Questions about the objectives and criteria of the Project have been raised which have not been addressed in this report. The Commissioner may undertake a separate investigation into these aspects, including implications for tangata whenua.

7.0 Local government response

The local government response to matters of water and soil management following the Bola storm has been closely aligned with the central government policy initiatives. The Gisborne District Council has been responsible for administering catchment control schemes which were in place before the Bola storm and for the East Coast Conservation Forestry Scheme.

7.1 Resource Management Act 1991 and Plans

Under the Resource Management Act 1991, the Gisborne District Council is working towards the production of a Regional Policy Statement which should include sustainable land management issues. A draft Statement will be subject to public consultation before finalisation.

The next step will be to produce a District Plan to outline practical ways of implementing changes in land management. These could include:

* making pastoral farming a conditional land use in the LUC Class VII land;
* providing financial incentives/disincentives for different land use practices.

The Gisborne District Council has prepared a proposed Regional Plan in respect of land development and management practices which replaces the Section 34 Notices issued under the Soil Conservation and Rivers Control Amendment Act 1959 to control the removal of vegetation and the disturbance of land. The former Catchment Board operated a Public Notice on all LUC Classes VI, VII and VIII land through its district. Submissions have been requested and received on the proposed Plan from many stakeholders, including Maori and forestry interests. While the Plan, having been notified, is operational, there are a number of unresolved issues that require consultation between affected parties.

The changes to the East Coast Forestry Project, announced in August 1993 by the Minister of Forestry, will ensure that approval will not be granted for planting on riparian strips and reserve areas imposed under the proposed Vegetation Removal and Earthworks Regional Plan.

The conditions under which both future establishment (where clearance of existing vegetation is involved) and harvesting of trees can be undertaken within the provisions of the East Coast Forestry Project will, to a large extent, depend on the rules and policies adopted by the District Council in this Plan.

7.2 Flood mitigation measures

Between 1989 and mid-1993, the Gisborne District Council has continued work on various aspects of flood mitigation. This work, needed to maintain the viability of the Waipaoa River Flood Control Scheme, has included:

* Restoration of damage to the Scheme as a result of the Bola storm. The total cost was $2.9 million, comprising a Government grant of $1.682 million and $1.218 million funded by the Flood Control Scheme ratepayers.

* Work to raise Scheme banks at strategic locations, particularly at the upstream end of the Scheme, has been approved by the District Council. The total cost is expected to be about $180,000 and is being funded by the Scheme ratepayers.

* Ongoing maintenance and design costs of the Scheme for the period 1990 to 30 June 1993 are estimated to be $200,000 and $75,000 respectively.

* An independent review of the Scheme is expected to be completed at the end of 1993. In 1992/93 Government contributed a 60% subsidy of $24,000 to this review.

* Other expenditure on the Scheme includes substantial loan repayment costs, sinking funds, depreciation and land purchase costs. It is estimated that these costs, borne by the Scheme ratepayers, totalled $580,000 for 1992/93.

* The telemetry system has been extended to the Hikuwai catchment. The Waipaoa River catchment telemetry system was repaired using a Government grant of $78,000 and minor improvements have been made at a cost of $16,000, which was funded by Scheme ratepayers.

Flood hazards on the Poverty Bay floodplain were investigated by the District Council in 1990 and 1991 and reported to the Council in 1992. Council adopted new design criteria for floods to guide planning and building on the Poverty Bay floodplain. The design flood is equivalent to the Bola flood plus 10%. The 1985 floodspread map of the extent and depth of floodwaters on the Poverty Bay floodplain was also adopted as a guide to the extent of future flooding.

The Gisborne District Council will need to keep a long-term commitment to maintaining the integrity of the Waipaoa River Flood Control Scheme as evidenced by this level of expenditure over the last four years. Until such time as the plantings in the headwaters of the Waipaoa River catchment start to take effect and the rate of channel aggradation slows, continued work will be required.

7.3 On-farm conservation work

Catchment Control Schemes

Between 1989 and 1992 the Gisborne District Council had four catchment control schemes operating. Catchment control schemes involve as many of the landholders in a catchment area as possible. The soil conservation work done on individual farms is coordinated so that the benefits to the whole catchment are greater than if farmers had carried out individual works. These schemes had started before the Bola storm but were continued through the period 1989 to 1992. The Waihora Valley Scheme was evaluated soon after the Bola storm and the evaluation showed the benefits of the on-farm works in preventing major damage to the land in this catchment[2]. Details of these schemes are presented in table 2.

Table 2: Catchment Control Schemes

Scheme	No. Poles Planted	Equiv.Land area planted[1] Hectares	Government Subsidy	Farmers' Contribution
Waihora Valley	20,825	208	$170,093	$73,244
Waikura Valley	39,642	396	$441,738	$189,316
Waiomoko (ended 1990)	14,437	144	$137,276	$58,832
East. Tareheru	4,918	49	$18,835	$20,131[2]

1 100 poles planted is equivalent to 1 hectare of land with soil conservation although much of the land planted is in gullies.

2 District Drainage costs $20,982.

Individual farms

Soil conservation works on individual farms have resulted in an estimated 1,200 hectares planted with 122,000 poles between 1989 and 1992. The total cost of this work was estimated to be $1,787,000 of which an estimated 45% ($800,000) was Government subsidy and $987,000 contributed by the landholders.

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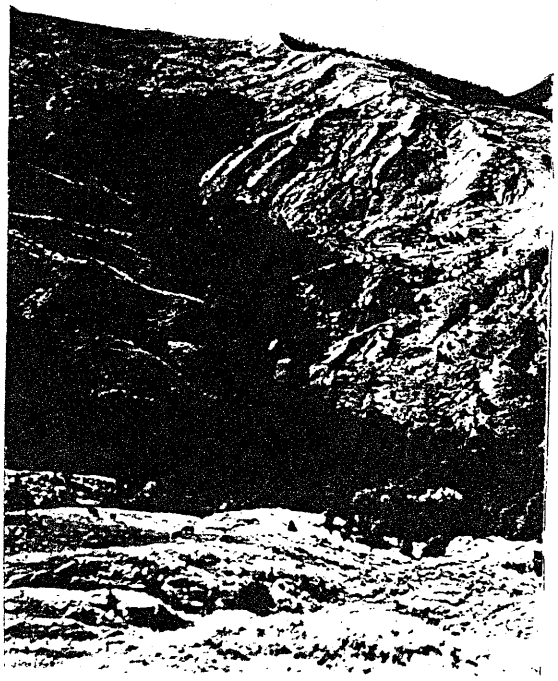
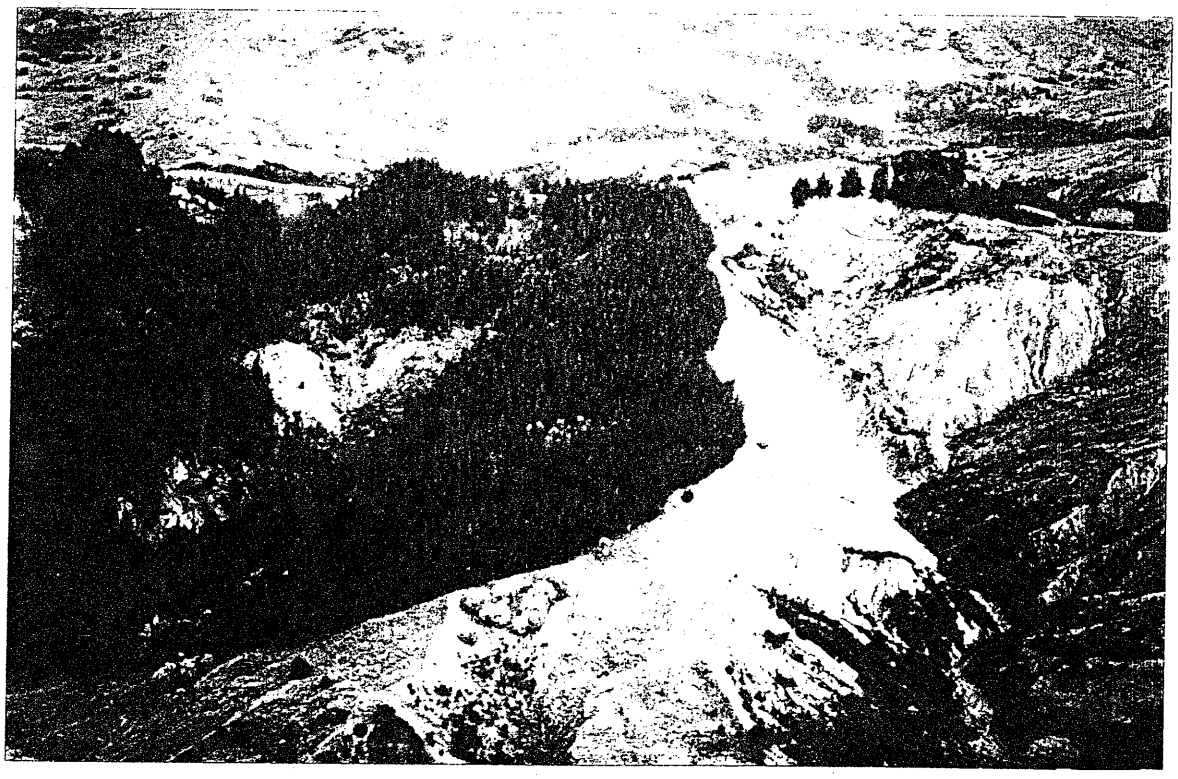
2 East Cape Catchment Board and Regional Water Board. *Waihora Catchment: Cyclone Bola Storm Survey.*



Waihora Catchment 1987: severe earthflow and slump erosion requiring blanket protection forest. Photo: Gisborne District Council

Waihora Catchment 1993: results of afforestation undertaken since 1987. Photo: H Hughes



Comparison of bare and afforested catchments near Ihungia. Photo: H Hughes, 1993

Subsidies continue to be available through the Ministry for the Environment for soil conservation work on the East Coast. Soil conservation works are eligible for a subsidy of up to 35% from the Government with 10% provided by the region (in this case the Gisborne District Council) and the balance being met by the land-owner. Soil conservation activities other than works are eligible for a subsidy of 60%.

Despite the availability of these subsidies, the Gisborne District Council did not uplift subsidised assistance for on-farm erosion control works during the 1992/93 financial year. The Council recently resolved to cut its soil conservation budget by $86,000 in the 1993/94 year.

For these subsidies to be uplifted, catchments requiring soil conservation work would have to be placed in a priority order. This would require public consultation and land use capability maps for each catchment. The identification of priority catchments for soil conservation work should not be a major impediment given the long history of erosion control work undertaken by the District Council and its predecessor, the East Cape Catchment Board.

7.4 East Coast Conservation Forestry Scheme

The Gisborne District Council has contributed its 28% of the East Coast Conservation Forestry Scheme costs over the four years to date. The cost to the regional community has been $2,087,000 to date and has stretched the resources of the Council.

Now that the Scheme is ending, the Council will have to decide:

* what level of resources to provide for sustainable land management;
* whether such resources should be targeted to education in respect of effecting land management changes;
* whether any financial support can be given to landholders to continue catchment control schemes with farms that are more likely to remain in pastoral production; and
* whether the Council should target the remaining LUC Class VIII land in need of land use changes.

Approximately 195,500 hectares or 94.5% of the land in need of soil conservation work still needs a change in land use. An estimated 4.5% of land in need of soil conservation work has been planted under the East Coast Conservation Forestry Scheme, with an additional 1% planted under soil conservation works. With another estimated 4,200 hectares to be planted this season, the estimated change in land use will rise from 5.5% to 6.5%.

The estimated 11,200 hectares that has been planted since 1987 has been achieved at a cost to the Government of about $6.5 million. Gisborne District Council has contributed about $2 million and private interests about $1.6 million. Table 5 summarises the costs and who has funded the work that has been achieved.

Within the land identified as eligible for assistance under the East Coast Forestry Project, the LUC Class VII land is subject to varying degrees of actual or potential erosion. It is the severely eroding or erodible LUC Class VII land that must be targeted by the new Project in order to meet the first objective (to address the severe soil erosion in the area).

While Class VII land has been the focus of soil conservation work, Class VIII land does not appear to have received attention. Given the potential of these areas to cause high downstream impacts, the Gisborne District Council should consider these areas in their assessment of priorities.

8.0 Changes in land use: What has been achieved?

The following section makes an assessment of the "on the ground" progress that has been made in changing land uses on the East Coast.

8.1 Changes in land use since 1987

An outline of estimated categories of land in the East Coast Region in 1987 is provided in table 3[3].

Table 4 identifies the categories of land in need of soil conservation work and afforestation that have been planted since 1987. These categories are further described in appendix 4. The land at risk from erosion is generally within the 2a, 2b, 3a, 3b, and 3c categories.

While the amount of land planted under the East Coast Conservation Forestry Scheme and land which has been subject to soil conservation work has been identified in this report, the scale of unsubsidised plantings has not been quantified in any detail.

Advice from Ngati Porou[4] is that they have planted 1,374 hectares with some planting being carried out this year. Advice from one forestry consultant[5] suggests that, although unsubsidised planting took place on some Class VII (category 2 and 3) land, the areas concerned fell outside the areas targeted by the Gisborne District Council in its operation of the East Coast Conservation Forestry Scheme.

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3 Ministry of Works and Development, December 1987 : *The East Coast Project Review.*

4 R C Miller, personal communication, 14 July 1993

5 N Bunting, personal communication, August 1993

Table 4: Changes in Land Use 1987-1992 achieved with Government assistance

Category	Description	Pastoral Land without soil conservation measures in 1987	Land under East Coast Conservation Forestry Scheme*		Land with soil conservation works		Area remaining in need of soil conservation works	
		hectares	hectares	% change	hectares	% change	hectares	% remaining
2	Erosion prone and less stable hill country	110,100	5,400	5	2,000	2	102,700	93
3 (a)	Relatively stable but steep and infertile country	19,100	100	0.5			19,000	99.5
3 (b)	Undulating to steep hill country: prone to severe earth flow and gully erosion	38,600	3,000	8			35,600	92
3(c)	Undulating to steep hill country: prone to severe earth flow and gully erosion. some land prone to severe gully erosion	36,800	700	2			36,100	98
4	Steep hill country. many small pockets of extremely eroded land	2,100					2,100 ha	100
Total		206,700	9,200	4.5	2,000	1	195,500	94.5

NOTES

* The total includes 2200 hectares of land made up of a mixture of categories planted to stable fencelines

TABLE 3: Estimated Land Use in the East Coast Region (April 1987)

Category	Description	Total Area hectares	Native Forest and Scrub hectares	Plantation Forest hectares	Pastoral Land with soil Conservation hectares	Pastoral Land without soil conservation measures hectares
1(a)	Arable Farming	63,900	900	400		62,600
1(b)	Arable and pastoral farming	170,700	28,300	8,300		134,100
2(a)	Erosion-prone hill country	102,200	4,100	4,300	28,200	110,100
2(b)	Less stable hill country	70,900	18,600	6,700		
3(a)	Relatively stable but steep and infertile hill country	55,600	31,700	4,800		19,100
3(b)	Undulating to steep hill country. Prone to severe earth flow and gully erosion	50,300	600	11,100		38,600
3(c)	Undulating to steep hill country. Prone to severe earth flow, gully erosion. Some land prone to severe gully erosion.	65,100	7,600	20,700		36,800
4	Steep hill country. Many small pockets of extremely eroded land.	44,600	40,200	2,300		2,100
TOTAL		**623,300**	**132,000**	**58,600**	**28,200**	**403,400**

Table 5: Expenditure on Soil Conservation Planting, East Coast 1989-1992

Funding/Provider Type of Work Funded	Central Government	Local Government	Private Sector
East Coast Conservation Forestry Scheme	$4,910,533	$2,086,976	$368,290
Catchment Control Schemes	$768,752	Admin costs to local government covered by central govt/private funding	$341,523
On-Farm Soil Conservation Works	$800,000	Admin costs to local government covered by central govt/private funding	$987,000

8.2 Other factors affecting changes in land use

Aside from plantings on erosion prone land, forestry as a commerical venture appears to be gaining momentum in areas which are not the target of Government subsidised schemes. Factors which are likely to be encouraging the development of forestry in the region include changes in the taxation regime for forest plantings and the recent increase in log export prices.

One private nursery in Gisborne has noticed a huge increase in the number of farmers contacting the nursery about tree planting. The customer base has, over recent years, gone from 50-100 people up to 2,000 people. According to staff of the nursery[6], at least half of these would be in the Gisborne - East Coast area with half the regional interest being in erosion control plantings and the other half in farm diversification. Since the Bola storm, this nursery estimates that at least 70 farmers per year have decided to plant 5 to 15 hectares per year of land into pines or alternative commercial timber.

6 G Hope, personal communication, March 1993

For the purposes of this report, a full investigation into the scale of private unsubsidised planting has not been carried out. However, information obtained from a review of the Conservation Forestry Scheme (*East Coast Forestry Scheme. An Evaluation of the First Four Years 1989-1992*) shows that there has been some interest in the region from outside investors. The pattern of ownership for the 1992 planting season indicated that investors accounted for 11.2%, forestry companies for 29.1%, Maori multiple for 26.5% and private landowners for 33.2% of land ownership. There is strong investor interest in the 1993 planting season which is now under way.

One forestry consultant[7] suggests that areas eligible for subsidy have been included as part of larger unsubsidised plantings. There is also some suggestion that the availability of subsidies has increased the price of land in some cases. In future, careful targeting of Government assistance to commercially unattractive areas, and ongoing monitoring in the light of changes in the commercial environment, will be essential.

Where large scale investors and forestry companies are not involved, the establishment of Landcare groups may be helpful to farmers. The establishment of Landcare and other sustainable land management groups in other parts of New Zealand has assisted farmers to share information, cooperate on land use practices and establish consistent management goals in their areas. Sixteen groups have been established in Southland and Otago where there have been severe land degradation problems.

While the scale of the problem faced by the East Coast is similar, few such initiatives have been taken. One initiative has been the formation of a farmers' committee at Whangara. Federated Farmers may be able to help promote the establishment of such groups.

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7 N Bunting, personal communication, August 1993

9. Conclusions

With reference to the recommendations made by the Planning and Development Select Committee (refer section 2.2), this review has identified the following:

Policy development

The Government has established a framework within which to develop policy to achieve sustainable land use. Much of the impetus for that work was provided by the events of the Bola storm. Part of the policy framework has been established by the Resource Management Act 1991 and the increased responsibilities of regional and local government.

The establishment of the Government's sustainable management "outcomes" and the development of an Officials Standing Committee on Sustainable Land Management recognise the responsibilities that many agencies have to assist moves towards a more sustainable form of land use, and the need for those agencies to cooperate to that end.

The Government has established clear policies on natural disasters and emergencies based upon the principle that primary responsibility rests with local communities.

The Government must continue to assist communities to make the necessary transition to more sustainable land management if the scale of damage caused by the Bola storm and the corresponding need for large disaster relief payments is to be avoided in future. However, as the study undertaken by MAF has shown, finance provided by the Farm Assistance Package only provided farmers with a "breathing space". The real work has only just begun.

With its responsibilities as a regional and territorial authority under the Resource Management Act 1991, the Gisborne District Council will need to recognise in its policies and plans that provision for a change to sustainable land use will require flexibility and diversification within the farming and forestry sectors. While the Council does not have a direct role in the administration of the new East Coast Forestry Project, the completion of its Vegetation Removal and Earthworks

Regional Plan will be a crucial element in setting the appropriate conditions for some of the initial planting and all harvesting and replanting. While the plan has been notified, the hearing of submissions on the plan and the resolution of outstanding issues must be given priority.

Government contribution to water and soil management

Since 1987 the Government has continued to fund aspects of water and soil management where community benefit can be shown. In the case of the East Coast Region, Government has contributed a large proportion of that funding on efforts to promote a change in land use in the region. This has been allocated through Catchment Control Schemes, on-farm conservation works, both of which were continuations of measures in place prior to the Bola storm, and the more recent East Coast Conservation Forestry Scheme. The new East Coast Forestry Project began in December 1992; a further assessment of its effectiveness will be necessary.

The East Coast Conservation Forestry Scheme over its first four years has achieved good targeting of that land categorised as severe to extreme potential for erosion in the Gisborne headwaters.

This Scheme has made the highest contribution to changing land uses in the region over the last four years. However, the area of land that has been converted to forestry under the Scheme remains tiny - about 4.5% - compared to the area of land in need of change. (The total area planted, including land planted under soil conservation works, amounts to 5.5%.)

The equal weighting of the objectives of the new East Coast Forestry Project may not result in the afforestation of the land most in need of planting for soil conservation purposes. If sustainable land use is to be achieved, equal weighting of the objectives may not be appropriate for all land in the targeted categories. The recent changes to the Project in which applications with higher proportions of severely eroding land will be given a higher weighting in the tender process should ensure that the soil conservation objective is realised.

The greater emphasis on the soil conservation objective is important because there are still approximately 100,000 hectares of land classed as having severe to extreme erosion that must be subject to land use changes. Government investment in the new Forestry Project will be at risk if this land is not given priority. Even though there may be some difficulty in obtaining pine seedlings for the 1994 planting season, the eroded land must be planted as a priority. It would be feasible to plant

of the order of 5,000 hectares of this severe to extreme eroded land in a planting season. While the Government is faced with the question of how best to encourage planting on private land, incentives in the form of Government assistance should be targeted to land that is the least attractive from a commercial point of view.

Even with a planting rate of 5,000 hectares of targeted eroded land, progress in changing the land use on the 100,000 hectares will still be slow. At the end of five years the area of land in need of land use change will still be of the order of 80,000 hectares. This means that identification of the land most at risk on a scale that is suitable for landholders as well as land managers is essential.

Local contribution

There has been some interest in small plantings on individual farms over the last four years, although the Gisborne District Council does not appear to have given as much priority to on-farm works as it has to the East Coast Conservation Forestry Scheme.

Landowners have made some contribution to planting over the last four years. In the last two years there has also been an increase in interest in afforestation from investors. The ability of landowners to fund a change to sustainable land management in the future will be dependent, to some extent, on market conditions prevailing over the short and medium term, and upon the appropriateness of a complete change to forestry, mixed farm and forestry or on-farm conservation works. Changes in land use would involve farmers not only in extra capital investment but also in changes to present cash flows as land is taken out of pastoral production. These dual requirements can put marginal farming operations at risk. Limited farm incomes may have meant that even those farmers with a strong commitment to erosion control have ceased to undertake new work between 1989 and 1992.

With the completion of the East Coast Conservation Forestry Scheme and the adoption of the new forestry project by central Government, the Gisborne District Council should consider targeting assistance to works such as on-farm soil conservation measures that will not be covered by the East Coast Forestry Project. Targeted areas should include LUC Class VIII. With the ongoing provision of resource management subsidies, the Gisborne District Council has every incentive to prioritise the areas in need of assistance.

The establishment of Landcare groups in the region may complement any work the Council decides to undertake by helping farmers to develop and implement ways of helping themselves to make changes.

Research

Research to support many aspects of changing land use will be vital to the future management of the land. The coordination of research, especially through the national science strategy, needs to ensure that land managers have the information on which to base management decisions that will be needed in the medium and long term. Nevertheless, Government should continue to support research into water and soil resource management.

The Government appears to be placing a high priority on issues relating to sustainable management. However, it is still too early to establish how effectively such research will be carried out with the formation of the new Crown Research Institutes.

Monitoring

Continued monitoring both by central and local government to establish the effectiveness of policies and programmes to encourage a change in land use is required. It is pleasing to note that as part of the new East Coast Forestry Project a major review by the Ministry of Forestry will be undertaken after the first three years. With the growing interest in forestry amongst commercial companies, it will be important to monitor the targeting of Government assistance in the light of changes occurring in the private sector.

The Gisborne District Council, with its regional resource management responsibilities, also needs to monitor the effects of changes in land use.

Flood plain management

Continuing assessment of the flood hazard of the river systems in the East Coast area and requisite changes made to the various schemes will be necessary until such time as the planting in the headwaters of the major rivers starts to decrease the bed load of the river systems.

Gisborne District Council is making progress in this area, especially with their review of the Waipaoa River Flood Control Scheme.

Recommendations

To the Minister of Forestry

1. That forestry for the purpose of soil conservation on the East Coast at risk land (the severe to extreme eroding land with the classification of LUC Class VII) continue to be encouraged and monitored.
2. That the East Coast Forestry Project target as a priority severely eroding or erodible Class VII land so that 20,000 hectares of this targeted land is planted by 1999.
3. That greater attention is given to identifying areas of at risk land.

To the Foundation of Research, Science and Technology

1. That adequate funding is provided to undertake research into new techniques that promote soil conservation and sustainable land management appropriate to the East Coast conditions.

To the Gisborne District Council

1. That the new District Plan encourages forestry on the targeted at risk land.
2. That the Vegetation Removal and Earthworks Regional Plan be completed so that landholders have certainty about the appropriate conditions for establishing, harvesting and replanting trees in areas of land which are at risk.
3. That the Council review its role in on-farm soil conservation work to ensure that landowners are encouraged to continue implementing soil conservation measures on land which can remain in pastoral farming.
4. That the Council, together with Federated Farmers, consider encouraging the establishment of Landcare groups in the region.
5. That the Council undertake a monitoring programme that is able to illustrate the trends in and effects of land use change on the region's water and soil resources over time.

To Federated Farmers Gisborne Branch

1. That the establishment of Landcare groups, in association with the Gisborne District Council, be given consideration.

Appendices

APPENDIX 1
Erosion control in the Gisborne region

APPENDIX 2
Recommendations of the Parliamentary Commissioner for the Environment "Inquiry into Flood Mitigation Measures following Cyclone Bola"

APPENDIX 3
Recommendations from the Select Committee report

APPENDIX 4
Land use classification systems

Appendix 1
Erosion control in the Gisborne region

The following briefly outlines the measures put in place by successive central and local governments to address the land use issues of the region.

Brief History of Erosion Control

1920: Two Government geologists concluded that the downstream effects of deforestation would result in greatly increased soil erosion and more severe and frequent flooding.

1949: Planting of the Patunamu Forest began.

1959: Cabinet approved an erosion control scheme.

1960: Planting of the Mangatu Forest began.

1964: The Taylor Committee was set up to investigate remedies.

1968: The East Coast Project commenced.

1978: East Cape Catchment Board reviewed the land use plan in the Taylor Report and published the "Red Report"*.

1987: Only a quarter of the East Coast Project completed.

1988: Bola Storm (one of many in the region over the years).

1989: East Coast Conservation Forestry Scheme commenced.

1992: East Coast Forestry Project announced.

1993: East Coast Conservation Forestry Scheme concludes.

* Anon, 1978: "Red Report" (Report of land use planning and development study for erosion-prone land of the East Cape region). Poverty Bay Catchment Board, Gisborne.

Appendix 2

Recommendations of the Parliamentary Commissioner for the Environment "Inquiry into Flood Mitigation Measures following Cyclone Bola"

(a) Central Government

(i) Ministry for the Environment

* development of policies for soil conservation within the context of sustainable land use, including the NWASCA 1987 policy statement

* development of monitoring policies for soil conservation within the context of sustainable land use to evaluate whether policy objectives are being achieved

* the funding of part of the cost of soil conservation activities in the context of sustainable land use in recognition of the importance of the off-site benefits and the benefits that will be accrued to future generations

* provision of positive suggestions to the new Gisborne Regional Council as to how changes to achieve sustainable land uses and mitigation of damage from floods can be instituted in the north of the East Coast region

* the undertaking of research into systems for allocating financial responsibility for future flood mitigation measures and for resource management. These systems would: (a) delineate between individual, regional and national user/beneficiaries as well as risk generators; and (b) delineate between those who contribute to off-site risks and those who benefit from the protection provided

* the undertaking of research into more consistent assessment frameworks and presentation to give due account to social and environmental factors as well as financial factors

(ii) Resource Management Law Reform

* inclusion in any new planning legislation of the requirement for natural hazard mapping, including flood hazard mapping

* consideration of extending the term of a Section 34 notice or similar mechanism up to 15 years in any new water and soil management legislation

* inclusion in any new planning legislation of the intent to restrict unwise developments in flood prone areas

* inclusion in any new planning legislation of floodplain management planning as a basis for planning land uses on floodplains

(iii) Ministry for the Environment, Ministry of Agriculture and Fisheries and Ministry of Forestry

* recognition that policies on soil conservation and land management should be integrated to achieve the goal of sustainable land use

(iv) Ministry for the Environment and the new Resource Management Agencies

* recognition that sufficient funding for future capital works, such as flood protection schemes and other resource management projects, should be made available to complete works as quickly as possible. Delays in construction adversely affect economic viability when the project is subjected to discounting

(v) **Local Government Reform**

* recognition that flood forecasting and flood warning should become a regional responsibility and function

(vi) **Department of Scientific and Industrial Research**

* maintenance and refinement of the New Zealand Land Resources Inventory land classification system so as to continue to provide a sound basis for land use planning according to the capability of the land

* continuation of research into the effectiveness of soil conservation activities in the context of sustainable land use and to evaluate and quantify, if possible, the on-site and off-site benefits to be achieved

* integration of Water Resources Survey telemetry sites into the relevant regional resource management agency's telemetry system

* consultation with the Ministry for the Environment and the New Zealand Catchment Authorities Association, or its successor, to ensure that the research needs of water and soil resource management are identified and met;

* encouragement to continue to provide training in land use assessment and management to staff of the new regional resource management agencies

(b) The new Resource Management Agencies

* emphasis on social and environmental impacts as well as financial ones where these factors are significant in assessments of flood mitigation measures and other resource management activities

* planning and appraisal of future flood mitigation measures on a catchment or subcatchment basis

* documentation of one or two areas with recently completed soil conservation measures in a catchment or subcatchment each year for the purpose of accumulating baseline data for the future assessment of the effectiveness of these works

* provision of resources to document the effectiveness of soil conservation measures after a significant storm in a catchment of subcatchment for which detailed information is available

* recognition of the importance of maintenance of existing river control schemes where these schemes are meeting agreed objectives for mitigation of flood damage

* production of flood hazard information according to an agreed regional list of priority areas

* provision of flood hazard information to the public and other relevant regional agencies

* recognition that the civil defence section and the flood forecasting section of the organisation should be coordinated so that flood situations can be identified and information disseminated in time to mitigate damage

* extension of upgrading of flood forecasting telemetry systems so that major catchments can be monitored for developing flood situations

(c) The new Gisborne Regional Council (now Gisborne District Council)

* increased consideration to the long term planning of soil conservation works and large scale afforestation on the basis of the sustainability of land use, as particularly reflected in the potential of land for erosion

* increased recognition of the sustainability of land use, as particularly reflected in the potential for erosion of hill country land, in indicating appropriate land uses in district and regional planning schemes.

* encouragement of soil conservation and pastoral agriculture, or production forest on the 110,000 hectares of Class 2 land instead of pastoral agriculture with no soil conservation works

* encouragement of production/protection forestry or managed reversion on the 77,500 hectares of Class 3b, 3c, 4 land instead of pastoral agriculture

* recognition that any policy development or implementation of policy for promoting sustainable land use that impacts on Maori land should involve consultation with Te Runanga O Ngati Porou and Runanga O Te Aitanga-A-Mahaki

* development of policies and funding arrangements for sustainable land uses in consultation with communities in the East Cape

* maintenance of the Waipaoa River Flood Control Scheme and augmentation of the effectiveness of the Scheme by integration with other flood mitigation measures

* provision of the long-term security of the Waipaoa River Flood Control Scheme by giving high priority to afforestation and other soil conservation measures in the Upper Waipaoa River Catchment within best technical options

* full appraisal of the commercial and conservation impacts when assessing the total worth of afforestation undertaken in the Upper Waipaoa River Catchment

(d) The new Hawke's Bay Regional Council

* development of policies for sustainable land uses in consultation with communities in the new Hastings and Wairoa districts

(e) The New Zealand Catchment Authorities Association or its successor

* consideration to establishing both a Soil Conservation Action Team and a Flood Hazard Action Team to assist the new regional resource management agencies if needed after a major storm or flood. These teams could be appointed on an annual basis.

Appendix 3
Summary of Recommendations from the Select Committee Report, July 1989

The Committee recommends that:

- policy for water and soil resource management to achieve sustainable land use can be developed and coordinated by Government;

- the Government continue to fund part of the cost of water and soil resource management in the context of a sustainable land use policy in recognition of the off-site benefits and the benefits to future generations;

- the Government should continue its research into the effectiveness of water and soil resource management activities to achieve sustainable land uses;

- the Government should develop techniques to achieve sustainable land uses through land management planning in erosion prone areas;

- the Government continue to provide nationally consistent resource management information to assist sustainable land use policy development;

- the Government develop consistent assessment techniques for water and soil resource management activities that include social and environmental factors;

- the Government develop techniques for allocating financial responsibility for water and soil resource management activities that take into account the risks and benefits to individuals, the region and the nation;

- the Government develop and put in place monitoring strategies for water and soil resource management to evaluate whether the sustainable land use policy is being achieved;

- the Government pursue the integration of DSIR telemetry sites with those of the relevant regional agency to ensure that flood forecasting is as effective as possible;

- the Government include in any new planning legislation a requirement for flood hazard mapping and floodplain management planning to be undertaken by local government;

- the Government include in any new planning legislation an objective for floodplain management to minimise the risk of flood damage by restricting unwise development in flood prone areas;

- the Government include an effective mechanism to control land management practices on erosion prone land in any new water and soil management legislation.

Appendix 4
Land use classification systems

The New Zealand Land Resource Inventory (NZLRI) land classification system was developed by the then Ministry of Works and Development, now Landcare Research. This system has been in general use throughout New Zealand since the 1950s. This classification provides an assessment of any given piece of land's capacity for sustained productive use, taking into account physical limitations, management requirements and soil conservation needs.

The present approach to erosion assessment used by catchment boards is based both on evaluating the severity of the erosion that is already present and on assessing the capability of the land according to its potential for future erosion. Soil conservation works, however, tend to be targeted to the control of existing erosion and not to the prevention of future erosion. By concentrating on existing erosion, there is also a tendency to place less emphasis on the implication of current management practices for long-term land use sustainability. From a long-term land use perspective, it is more appropriate to place an increasing emphasis on the land's potential for erosion and to increasingly match the erosion potential rating to genuinely sustainable land uses.

The erosion potential approach can be used to indicate how much land would need to be treated if erosion was to be comprehensively controlled. It also shows the state to which pastoral land would ultimately deteriorate if erosion control works are not undertaken. The erosion potential of land is one of the parameters derived as part of land classification according to the New Zealand Land Resource Inventory system.

There are eight land use capability classes. As we move from Class I land through to Class VIII land, limitations to productive use increase while versatility decreases. In general terms the land use capability classes are:

Class I	Land with no significant limitations to use for horticulture, cropping, grazing or forestry.
Class II	Land with slight limitations to use for horticulture or cropping. No significant limitations to grazing or forest use.
Class III	Land with moderate limitations to use for horticulture or cropping. No significant limitations to grazing or forest use.
Class IV	Land with severe limitations to use for horticulture or cropping. Slight limitations to grazing or forest use.
Class V	Land unsuitable for horticulture or cropping. Slight limitations to grazing or forest use.
Class VI	Land unsuitable for horticulture or cropping. Moderate limitations to grazing or forest use.
Class VII	Land with severe limitations to use for grazing or forestry.
Class VIII	Land unsuitable for productive use.

Land use capability coverage

Full land use capability assessment for the East Cape region is provided at a scale of 1:63,360 as part of the New Zealand Land Resource Inventory Survey. Relevant extended legends are those for Northern Hawke's Bay Region and Gisborne-East Cape Region.

The Gisborne District Council and its predecessor, the Poverty Bay Catchment Board, have completed more detailed assessments at a scale of 1:15,800 over a substantial part of the region's pasture lands. It is this more detailed scale that is required for farm scale planning of conservation work and land use change.

Land use classes used in "Red Report"

In the "Red Report"* the Catchment Board used an interpretation of the NZLRI classes and created four categories of land that required similar land management. The categories and their descriptions are as follows:

Category 1: Land with a long term future in farming and requiring, at most, moderate soil conservation treatment.

Category 2: Land with a long term future in pastoral farming only if intensive erosion control practices are carried out.

- **Category 2a:** Land considered suitable for farming with soil conservation measures and farm scale forestry.
- **Category 2b:** Recommended uses are farming with soil conservation measures, farm scale forestry and, in some areas, large scale forestry.

Category 3: Land predominantly more suitable for afforestation but includes some land with a future for pastoral farming.

- **Category 3a:** Land is appropriate for large scale production forestry and with low priority for protection.
- **Category 3b:** Land most suitable for farm scale and large scale conservation forestry and with medium priority for protection.
- **Category 3c:** Land recommended for large scale conservation forestry and with the greatest priority for protection.

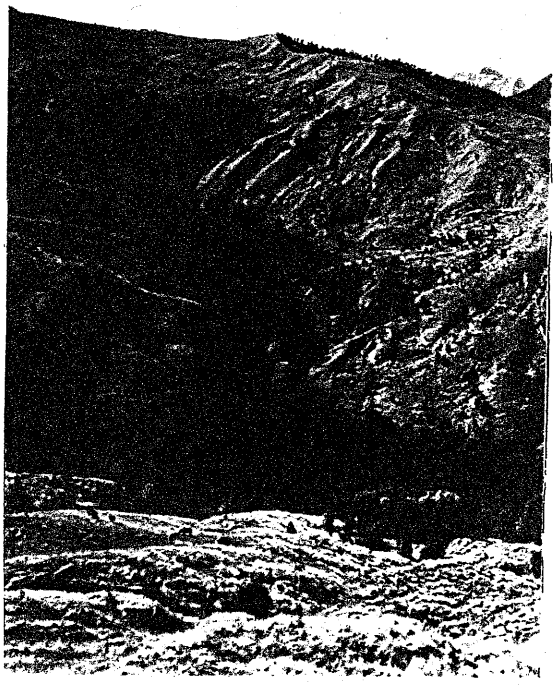
Category 4: Land with no potential for primary production.

* Anon, 1978: "Red Report" (Report of land use planning and development study for erosion-prone land of the East Cape region). Poverty Bay Catchment Board, Gisborne.

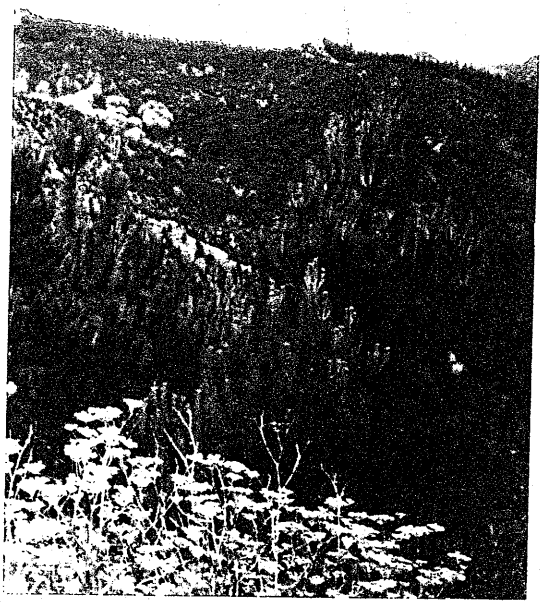
The relationship between the NZLRI classification system and the "Red Report" interpretation is presented below.

East Coast Land Use Categories

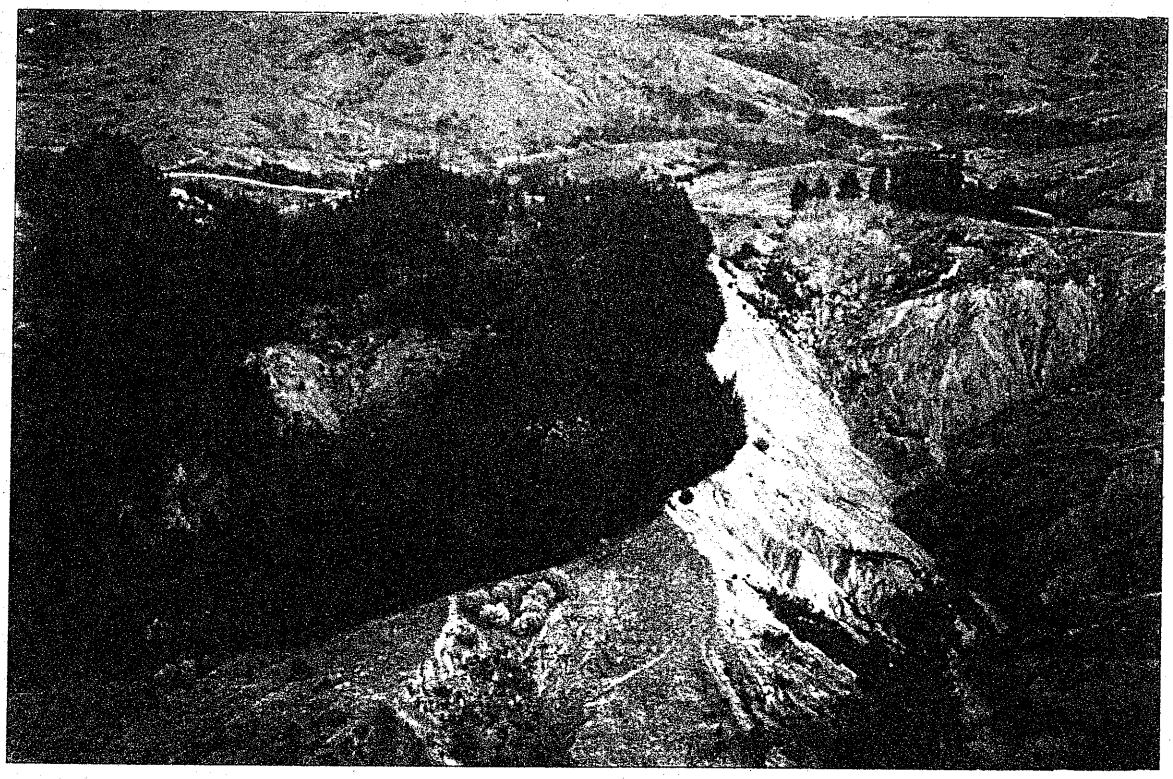
Category	Recommended Use	LUC Classification	Total Area (ha)
1	(a) Arable farming	Classes II, III	63,900
	(b) Arable and pastoral farming	Classes IV, VI	170,700
2	(a) Conservation farming and farm scale forestry	Units VIIe1, 2, 5 and 7	102,200
	(b) Conservation farming farm scale and large scale forestry on some areas	Units VIIe3, 4, 6, 8, 19 and 21	70,900
3	(a) Large scale production forestry (low priority for protection)	Units VIIe9, 10, 11 and 17	55,600
	(b) Large scale and farm scale protection/ production forestry (medium priority for protection)	Units VIIe12, 14, 16 and 20	50,300
	(c) Large scale and farm scale protection/ production forestry (high priority for protection)	Units VIIe13, 15 and 18	65,100
4	Protection forest	Class VIII	44,600



Waihora Catchment 1987: severe earthflow and slump erosion requiring blanket protection forest. Photo: Gisborne District Council



Waihora Catchment 1993: results of afforestation undertaken since 1987. Photo: H Hughes



Comparison of bare and afforested catchments near Ihungia. Photo: H Hughes, 1993