GISBORNE DISTRICT COUNCIL

LAND, SOIL AND BIODIVERSITY

Soft rocks, steep hills and fertile soils

Principal findings

- Farming has had two very profitable years
- Forestry harvesting and new planting dipped in 2003. Areas harvested were still required to be replanted
- The East Coast Forestry project continues and interest in alternative species is high; demand is outstripping availability of planting material
- Consents for farm improvements are up including tracking and scrub clearing
- The willow sawfly was not a major problem in 2003/04
- Twenty conservation projects were granted funding from the Biodiversity Condition Fund in 2004
- The inventory of Protection Management Areas is virtually complete. There are 309 in total, comprising almost 58,000 ha
- Gisborne District had 3,363ha of natural areas protected by QEII covenants by the end of 2004

Gisborne District is situated on an actively rising fold of the earth's crust, the crest of which is the bush-covered Raukumara Range. Those rocks are relatively stable, except where crushed and fractured by tectonic movement, creating areas that are highly erodible, for instance the upper Mangatu catchment. Geologically younger sedimentary rocks extend eastwards along the coast, dominated by soft mudstones containing shrinking and swelling clay minerals such as bentonite and montmorillonite.

Because of a high rate of uplift (4mm per year), tectonic crushing, soft rocks, mild climate and the removal of much of the original forest cover, Gisborne experiences some serious erosion problems. Gisborne district contains much of the severely eroding land in the North Island. This presents a big challenge for sustainable land use.

Soils

Soils of the region developed under indigenous forest cover in naturally fertile rocks overlain by tephra (volcanic ash and sand) erupted over the past 10,000 years from the volcanoes of the central north Island. Soils develop rapidly due to the mild and humid climate.

The highly productive and versatile soils of the Poverty Bay and Tolaga Bay flats are derived from river-deposited sediments from the hill-country, mixed with volcanic ash.

Above: Some of the country's most versatile and productive soils are found on the Poverty Bay flats, and the mild, humid climate allows them to be used intensively.

Tree cover is the answer

92% of Gisborne District is hill country with some limitations on its use because of soil erosion. The entire district has been mapped to show LUC (land use capability classes). The Council has an advocacy role to promote tree planting at the required density to stabilise the soil for each LUC class. Most landholders are proactive in their approach, and the tools commonly used are spaced-pole planting of poplars and willows, and reafforestation of the steeper and erosion-prone slopes.

Above: Indigenous vegetation, where it remains, often occurs as isolated patches of bush in farmland.

Biodiversity and natural heritage

Historically, the easier classes of land were cleared of bush earliest, and indigenous vegetation is rare on land use capability classes I to IV (Gray's Bush being one notable exception). Where patches of bush remain, they are often tiny remnants, suffering under the pressures of browsing stock and possums.

The steep, remote hill country and bush-clad ranges are closer to their natural state, having survived because the land was not suitable to be developed for farmland. These areas are appreciated for their soil and water conservation value, and the recreational opportunities they provide. However steep and mountainous country is not an ideal refuge for much of our indigenous wildlife, and the pest and weed problems are significant, and expensive to address.

Gisborne District also contains large areas of land that were cleared in the past and are now in various stages of reverting to indigenous vegetation, notably kanuka/manuka scrub and forest.

Wetland habitat is poorly represented in Gisborne District. There are no lakes of significance and few wetland areas survived drainage to make way for farmland. Happily many landholders have gained an appreciation for wetlands and there has been much interest in recent years in restoration, and even in creation of wetlands from scratch.

The District Plan defines significant areas of natural vegetation on private land as Protection Management Areas (PMAs), and there are rules in place to afford them some protection. As at 2004 the inventory of PMAs is virtually complete. There are 309 areas that have been mapped, totalling 57,950 hectares, around 7% of the District.

Hill country farming

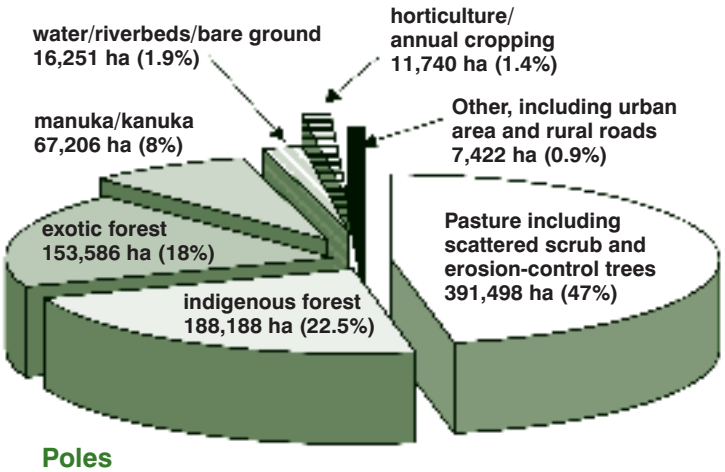
Sheep and beef farming is the predominant land use in the district, and agriculture employs 21% of the labour force. Most farms are owner-occupied and some have been in the same family for 5 or 6 generations. Once very large, they have been divided into smaller farms over the generations. The average farm size is 435 ha with stocking rates of 10su/ha. The trend has now reversed, and the average family-farm size is increasing as landowners buy adjacent properties in order to remain viable businesses.

Above: Sheep (and beef) farming is the predominant land use in Gisborne district.

The remaining larger stations of over 800ha comprise rolling land through to steep erosion-prone slopes reverting to native bush. Regionally around 40% of these properties are Maori-owned and run by managers. The average size of the large stations is 1,500 ha with a stocking rate of 7.75 su/ha.

There has been a major change in land use towards large-scale production forestry (mostly pinus radiata), especially since 1990. Forestry companies and investors have bought whole farms to be converted to forestry, including easier rolling land. In addition, the East Coast Forestry Project has encouraged many farmers to take out steeper, erosion-prone land for smaller forestry blocks, while continuing to farm stock on the remainder.

Vegetation cover for Gisborne District



Poles

Numbers of poplar and willow poles space-planted on farms have increased in recent years, reflecting the profitability of farming, farmers' ability to spend more on improvements, and the growing awareness of sustainable land use.

There are a dedicated group of 12 farmers with their own pole nurseries now established (up from just 3 five years ago), supplying all or part of their own annual requirement for material. Sleeves to protect poles are still sourced through the council, so we are able to compile figures for 'home grown' poles planted on farms: 4,230 in 2003 and 3,760 in 2004. These poles are a significant contribution to the total for the district.

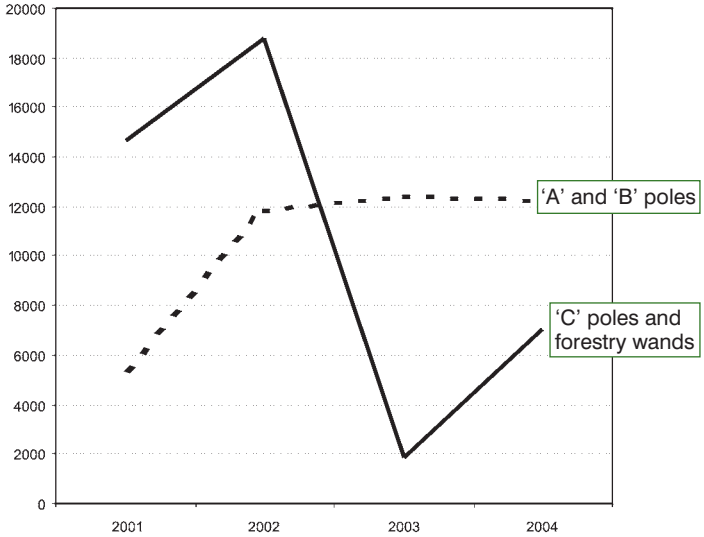
In addition, many farmers have adopted the practice of cutting limbs from established poplars and planting those as poles.

The growing seasons in both 2003 and '04 were favourable and poles of all types had good survival rates.

The Council-owned nursery at Waerenga-o-Kuri is currently being extended to increase capacity to 10–12,000 poles per year by 2008.

'A' poplar poles (big ones which can resist cattle grazing) have increased in price from $4.50 to $5. The Council is

Poplar and willow pole and wand planting trends



Gisborne District livestock numbers

	Total beef cattle	% change	Ewes/hoggets put to ram	% change	Total sheep	% change	Dairy cattle*	% change	Total Deer
1994	351,000				2,089,000		6,000		
2002	313,000	-11	1,097,040		1,679,377	-20	12,533	209	25,752
2003	350,000	112	1,333,000	122	1,870,000	111	7,000	-56	..s
2004	342,000	-2	1,345,000	101	1,848,000	-1	..s		38,000

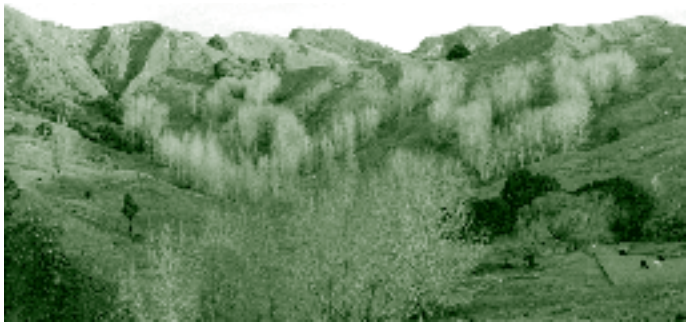
* There are only four dairy farms on the Poverty Bay Flats, as at 2004. These figures represent dry cows grazed in Gisborne District.
..s supressed *Source of data: Statistics New Zealand Agricultural Production Surveys 2003,2004*

Above: An established farm nursery, with poles ready to harvest once they have lost their leaves.

Above: A poplar pole protected from stock by a plastic sleeve.

sourcing as many as possible from outside the district and we can sell all we can get, and more.

Small planting material ('C'poles and willow wands) took a huge dive in 2003, reflecting an hiatus in exotic forestry harvesting (and consequently in replanting, which requires poles to be placed in watercourses).



Above: Established poplars in farmland.
Below: A gully newly planted with poplar poles.

Willow sawfly infestation

Since its' arrival in Gisborne in 1997, willow sawfly *(Nematus oligospilus)* has spread throughout the district. Sawfly is considered a pest in Gisborne District because most of our willows are intentionally planted conservation trees, holding river-banks and stabilising streams and gullies in farmland and exotic forests.

While the larvae have the potential to kill willows by repeatedly stripping the leaves during the growing season, it has been observed the effects are highly variable and dependent on weather and climate conditions.

Sawfly larvae, if blown off the trees or washed off by heavy rain, appear to not climb back up. The number of lifecycles/ generations of sawfly per season is highly temperature-dependent. Gisborne has experienced several cool, windy and wet summers over the past four years and our worst fears for willows have fortunately not been realised - yet.

Denuded willows were noticed only in March of '03 and '04 around Tokomaru Bay. The damage was much later and less severe than that noticed prior to 2000, when landowners and Council staff were very concerned.

From 2003 sawfly-resistant varieties of willow were becoming available as poles and research continues into the lifecycle of this pest, particularly how it pupates over winter, in the hope of finding a control.

How do we monitor the state of our soil?

It is actually quite a difficult thing to do, and it is early-days for this type of monitoring in Gisborne District.

The entire district has now been mapped to show Land Use Capability (LUC) classes. Each class categorises the soil according to its slope and stability and is indicative of its potential productive use. For instance, Class I to IV land, is flat to gently undulating and able to be cultivated; Class VIII land is very steep and unsuitable for any productive use (for instance cliff faces and mountain tops). The Classes in between, VI and VII, comprise the "hill-country", suitable for pastoral farming and forestry.

In practice much of our hill-country land, which comprises 46% of the district, has limitations on its use because of potential for soil erosion. Trees, planted at the correct density, are required for the sustainable use of our hill country soils. The question is: what are the effective tree species and spacings for each class of land?

To measure progress towards our goal of sustainable land use we need to be able to see measurable changes over time. Council soil conservators use a point-sampling technique, looking at enough "points" (in reality of rugby-field size) to gain a statistical representation of the various erosion types, vegetation cover and landforms within the district. The same points will be monitored each time the survey is done; there are over 4000 of them arranged in a regular grid pattern across the whole district. Each survey point is delineated on cadastral maps, examined using aerial photographs, and as many as possible are actually looked at in the field.

The first survey has revealed, unsurprisingly, that hill-country used for pastoral farming contains the most erosion. What is alarming is that a fifth of our pastoral land has recent and "fresh" soil disturbance visible in aerial photos.

It is likely the survey will be repeated at intervals of five to ten years. It will therefore take time and several repeat surveys using this method to determine changes that are occurring, and quantify our progress towards sustainable land use for Gisborne District.

Other regional councils are using similar surveys to quantify the state of their soil, and it is hoped a national standard for soil monitoring can be developed so that results may be compared all over the country.

Above: Hill country with recent erosion scars.

Consent activity –‘ swings and roundabouts’

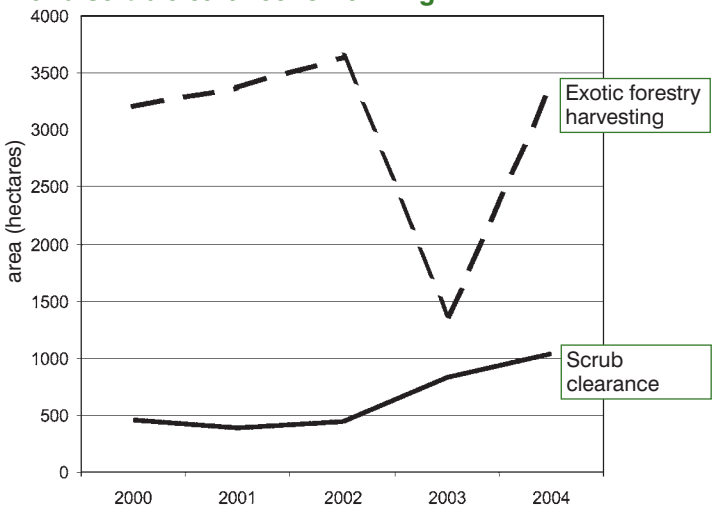
Figures for consent applications in ‘03/’04 reflect profitable times for pastoral farming and the reinvestment of those profits in farm improvements. There were significant increases in formation of farm tracks and the area of scrub clearance (including spraying) more than doubled compared with previous years. Field officers reported anecdotally there was a lot of fencing also going on in the district.

Conversely, exotic forestry slowed significantly: 2003 saw the smallest area of pine trees harvested in the past five years; one third of the area typically harvested. Interestingly, there was also a resource-consent application received by Council for the aerial spraying of pine trees, the land to be returned to pasture for grazing.

Where exotic forestry on erosion-prone land is harvested, the land is required to be replanted in the subsequent season as a condition of the harvesting consent. The reason: to ensure a protective closed-canopy is achieved as soon as possible, while the root network of the harvested trees still persist in the soil.

Category	Activity	Area/length 2003	2004
Exotic forestry	Scrub clearing	134 ha	327 ha
	Harvesting	1,376 ha	3,379.4 ha
	New road formation	83.5 km	80.9 km
	New track formation	24.4 km	14 km
Indigenous vegetation	Harvesting	none	261.7 ha (selective)
Quarrying	Earthworks/veg.clearing	8.62 ha	8.3 ha
Residential/ housing	New access road	2.6 km	2.6 km
	New track formation	0.2 km	1.3 km
	Earthworks	1.28 ha	2.27 ha
	Vegetation removal	0.01 ha	150 ha
Farming	Scrub clearing	837 ha	1,038.2 ha
	New road formation	4.2 km	10.7 km
	New track formation	40.4 km	91.3 km
	Earthworks	12.81 ha	7.13 ha
Council/ public works	New road formation	50 km	31.4 km
	New track formation	4.2 km	none
	Earthworks	17.4 ha	20.82 ha
Total	**Vegetation removal**	**2,347.4 ha**	**5,158.3 ha**
Total	**New road & tracks**	**210 km**	**232.2 km**
Total	**Earthworks**	**40.4 ha**	**39.52 ha**

Trends in exotic forestry harvesting and scrub clearance for farming



The Poverty Bay Flats

The main soil conservation issues on the flat land of the Waipaoa Basin are the loss of highly productive soils due to subdivision for lifestyle properties, and the potential for losses due to depletion of soil fertility and damage to soil structure.

The minimum allowable size for a smallholding was increased in the District Plan (1997) from 4 to 8 ha to prevent the fragmentation of the most productive soils into paddocks too small to be cultivated. Adequate provision for lifestyle blocks and rural subdivision has been made on areas of the flats where less productive soils occur, and in the hill country close to Gisborne city.

Soils on the flats are at risk of damage to soil structure where arable crops are planted in succession and a spell in pasture (which restores structure) is reduced or even eliminated.

Some growers have invested in specialised machinery, for instance rubber-tracked vehicles, to reduce soil compaction. Where machinery is used in waterlogged paddocks, especially when harvesting winter crops, serious compaction can occur, destroying the structure of the soil.

Techniques to maintain soil structure include: cultivation at optimum soil-moisture levels, ensuring nutrient status with organic additives and fertilisers, and crop rotation with pasture or restorative crops (mustard, lupins, chicory, which are ploughed into the soil prior to planting the crop).

Net planted horticultural area

	Pipfruit (ha)	% change	Kiwifruit (ha)	% change	Citrus (ha)	% change	Avocados (ha)	% change	Wine grapes (ha)	% change	Tomatoes outdoor (ha)	% change	Squash (ha)	% change
1994	200		300		n/a		-		1,200		1,600		1,600	
1995	329*	165	286*	-4.6	570*		-		1,430*	119	2,061*	129	1,633*	102
2002	300	-9	300	105	695*	123	57*		1,700	119	c	c	2,427*	148
2003	260*	-13	268*	-10.6	n/a		61*	107	1,595*	-6	c	c	2,447*	100.8

C confidential, - nil or zero, n/a *not available, * Source of local data: Gavin Louden, MAF Policy (Gisborne)*
Remainder of data: Statistics New Zealand Agricultural Production Census,1994 and June 2004

East Coast Forestry Project

In Gisborne District we have unique soil stability issues, and large-scale gully, slump and earthflow erosion not seen to the same extent in other districts.

The East Coast Forestry Project is a major government initiative that aims to encourage afforestation of steep and erosion-prone land (identified by LUC mapping) where pastoral farming is no longer considered a sustainable option. Landholders currently apply through a tender process for grants to plant trees in blocks ranging from 5ha to entire properties.

The ECFP began in 1992 and heralded significant changes in land use from pastoral farming to closed-canopy *pinus radiata* forestry on target land. In 2001 the criteria was broadened to include 'alternative treatment' on land where it was agreed other species / planting densities would be able to halt erosion. Fencing to allow reversion to indigenous vegetation on erosion-prone scrubby land is another possible option.

Above: Closed-canopy afforestation of the steeper classes of land is seen as a move to more sustainable land use.

Gisborne District land use

	Grazing, arable, fodder and fallow land (ha)	% change	Horticultural land (ha)	% change	Planted production forest (ha)	% change
1994	532,000		8,000		89,000	
2002	397,000	-25	7,000	-12	146,000	164

Source of data: Statistics New Zealand Agricultural Production Census, 1994,June 2002.

The changes have been significant: in 2003 there were 10 blocks (177ha) approved for planting in poplar and willow poles, and only 6 for pines (although the area of pines was greater in total). In 2004 there were 19 applications to plant poles and 6 for pines; that year pine blocks were down in area.

There have been 600 ha 'treated' under the fencing-and-reversion option. The criteria include 50% scrub-cover on the land, and a requirement to control goats once stock are excluded. This is a very appropriate new option for some land, including some of the severe, deep gully systems.

The interest in planting poles reflects landholders' desire to continue pastoral farming in a more sustainable manner. Farming has had several very profitable years and large-scale planting of exotic forestry significantly slowed in 2003, reflecting weaker prices for timber products.

The problem has now emerged that the numbers of poles and stakes required to fulfil ECFP applications vastly outstrip the number of poles available. Normally an application is approved the year before it is to be planted. With pines one year of lead-time was sufficient for seedlings to be ordered and grown by a nursery. A pole nursery has an establishment time of 2 to 4 years before material can be harvested.

Sustainable Hill-country Project

The Council is working on development of policies and a rule, to be inserted into the District Plan, to require tree-planting on the most erosion-prone land, and to require maintenance of trees already on that land. Inclusion of this rule in the plan is a prerequisite for central government funding of the ECFP to continue.

A series of meetings were held between June and August 2003 with landholders most likely to be affected. The preferred options were inclusion of an option for landholders to just get on with the job of planting trees, or to develop a staged plan of implementation. Proposals would be checked and certified to ensure they meet the criteria for ECFP funding.

Work is currently progressing on mapping of the target land using a combination of earlier farm plans, catchment schemes, high-resolution aerial photos and field-checking.

The proposed rule will be considered by Council, then forwarded to affected landholders for comment, and the variation to the District Plan will be notified mid-2005.

Land information held by the Gisborne District Council

As at the end of 2004 the Council had obtained high-resolution digital ortho-photos of two-thirds of the district (the remaining area to be completed 2005). These are stored in the Council's GIS (geographical information system). The photographs will be able to be used in conjunction with other GIS 'layers' to show, for example, property boundaries, vegetation types and LUC polygons.

Second-edition (1999) NZLRI (New Zealand Land Resource Inventory) work sheets are available as a digital layer on the GIS system.

Also available are black and white 'hard copy' photographs shot in 1988, post-Bola, of the entire district.

Colour non-rectified, non-digital photographs are available of the whole district, taken at various times between 1997 and 2000.

Farm-scale and catchment-scale LUC mapping is available for significant areas and dates from the 70s through to the 90s.

Conservation Quorum

The Conservation Division of the Council produces "Conservation Quorum", a popular quarterly magazine for the rural people of Gisborne District. "CQ" deals with environmental issues, sustainable land use, biodiversity, soil and water conservation, and is sent to every rural address, farm, orchard, Marae and school in the District.

CQ is a great advocacy tool and has been frequently complimented for not pushing a particular viewpoint, instead enabling a wide range of views and opinions to be discussed. Articles often comprise interviews with landholders on practical conservation solutions they have used on their properties. Expert opinions also feature, alongside articles covering field days, restoration projects and the Gisborne Rural Environmental Awards.

At the end of 2004, 37 issues of CQ had been produced.

Pole requirements – East Coast Forestry Project applications

	Pole planting totals	Number poles required for approved ECFP tenders	Shortfall in planting material
2001	20,078		
2002	30,643		
2003	14,100	19,190	**-5,090**
2004	19,283	72,077	**-70,905**

Biodiversity Condition Fund

The nationally-administered Biodiversity Condition Fund aims to improve and maintain the condition of native vegetation, species and habitats on private land, and broaden community participation in nature protection in New Zealand.

Council was successful in securing funding of $25,000 from the Fund in December 2003. This was used to employ expert consultants to carry out condition checks and provide management advice on natural heritage areas (especially Protection Management Areas). Around 30 landowners requested site visits and as a result there were at least two successful QEII applications, and a potential Nga Whenua Rahui kawenata application.

Conservation on private land received another big boost following the April 2004 round of applications. Council secured funding of $168,290, on behalf of six private landholders. In addition the QEII Trust received $75,607 for 14 restoration projects in existing covenants. The total funding was $243,897 for the twenty projects within Gisborne District.

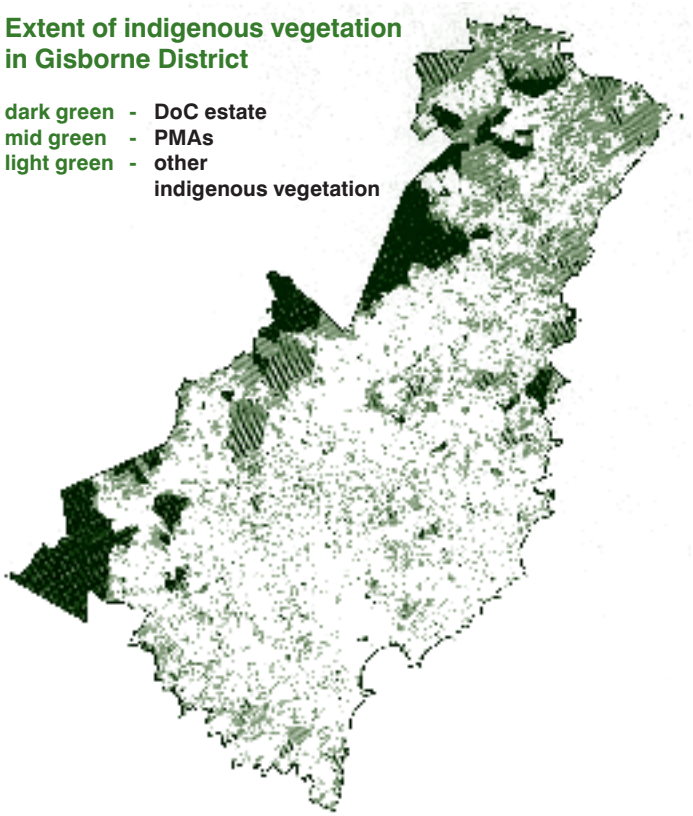
In the December '04 application round, another twelve landowners in the Gisborne District successfully obtained funding for projects to be carried out in 2005.

It would not have been possible to fund this conservation work locally, however by accessing central government funding these very worthy biodiversity projects have been possible.

The last programmed allocation round for Biodiversity Funds is in April 2005, however due to the success of the funds in achieving national biodiversity objectives, further allocation rounds are possible.

Extent of indigenous vegetation in Gisborne District

dark green - DoC estate
mid green - PMAs
light green - other indigenous vegetation



QEII National Trust Open Space Covenants

Covenants are a way to legally protect a natural area on privately owned land while still retaining ownership. There has been a surge of interest in covenants in recent years.

An application for an open space covenant is first put before the QEII Trust board for approval. The next stage involves the survey, stock-exclusion fencing, and the area is registered on the land title; a process normally completed within two years.

QEII National Trust Open Space Convenants

	Area of covenants registered	Approved covenants (awaiting registration)	Total covenanted area end 2004	Largest covenant	Average covenant size
2003	584 ha	232 ha			
2004	429 ha	41 ha	3,363 ha	1,104 ha	35 ha

Biodiversity Condition Fund projects, accepted April 2004

Location	Project	Grant
Otoko	Fencing and pest control in two bush remnants, totalling 118 ha.	$15,295
Otoko	Fencing and pest control of 12ha around the Makaretu Stream.	$38,060
Tiniroto	Fencing and pest control to aid regeneration of streamside conservation values. A 1.9 km fence is proposed to protect native forest by the Hangaroa River.	$18,375
Ormond	Fencing and restorative work (planting and earthworks) on a small existing wetland and surrounding area.	$4,728
Te Karaka	Fencing of two bush remnants as part of an ongoing fencing and pest control programme in covenanted areas on two properties. The rare native mistletoe *(Tupeia antarctica)* will benefit.	$27,212
Matawai	Fencing and pest control of 183ha of sub-montane and montane forest. This will enhance its biodiversity values and contribute to the connectivity and buffering effect that it has on the adjacent Waioeka Gorge Scenic Reserve and Urutawa Conservation Area.	$39,620

Rural Environmental Awards, 2003

Kees and Kay Weytman were the winners of this biennial award, the purpose of which is to recognise and promote sustainable land use practices.

The Weytman's 32 ha property, Knapdale, has been intensively developed since Kees took it over in 1991. Intensive weed control was undertaken and areas planted in exotic trees: redwoods, lusitanica and Tasmanian blackwoods, with natives as an understorey. A large dam provides wetland habitat for waterfowl and eels, while production includes cattle, deer, a few sheep, avocados, bees, fruit and vegetables.

From 2005 the construction of eco-friendly accommodation and conference facilities will be undertaken.

The winners receive a trophy and prize package, however a key outcome of the awards is the field day held on the winning property. Field days attract good numbers and enable information on sustainable land management to be discussed. In addition, the Environment Award winners and runners up are featured in the Council's Quarterly publication "Conservation Quorum".

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