

## Water conservation: bottom up at Motu

The Motu River is one of the district's most pristine river environments. Flowing from the Raukumara Ranges northwards to the Bay of Plenty, the Motu is a designated wild and scenic river that forms one part of the nationally significant ecological haven that is the Motu area. The area's isolation and the presence of the Motu and Whinray Scenic Reserves make Motu a prime candidate for conservation initiatives, a fact not overlooked by locals who are taking numerous steps to ensure the health of their river is preserved.

### Motu School Eel Survey

For the past five years, the staff and students of Motu School have been conducting an annual survey of the eel population of the Motu River. The initiative was prompted when local Department of Conservation representatives pointed out the threatened nature of the species. Previously unaware of this fact, staff at the school saw an opportunity to contribute to the conservation of the species in their local river.



The project started in 2007 in conjunction with senior students from Wainui School. Students and parents were involved in all aspects of the survey, from making their own hinaki (eel trap) to deciding which methods would be used to carry out the survey. Eels are caught, weighed and measured in February each year and the results are compared to get a trending picture of the eel population of the river.

Figure 1: Summary of Results

Year	Heaviest Weight	Length	Lightest Weight	Length	Total Caught	Over 1kg	Under 1kg
2008	2kg	85cm	300g	46cm	88	14	74
2009	2.5kg	76cm	300g	45.3cm	58	9	49
2010	1.4kg	75cm	200g	45cm	47	2	45
2011	3.5kg	85cm	200g	41cm	72	31	41

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# From the editor's desk...

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Your feedback, comments, articles, pictures and letters are welcome. Email us if you can; neat handwriting is fine too. We reserve the right to edit contributions for brevity and clarity.

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This autumn edition of CQ focuses on Water issues and the development of the Water Plan. It has been a long time running for Council to develop the Water Plan in order to have a clearer direction on where we want to be in the future.

The articles in this issue range from the technical side of composing a water plan, to innovative ideas (floating Wetlands, dolos) and water conservation in a local context (Motu School article front page).

This is the first issue that I have put together, taking over from the very experienced Louise Savage, and I can say that it has definitely been very rewarding in terms of extending my knowledge of Water Conservation and the issues we are faced with in the region.

I moved to the Soil Conservation section in August last year from the Planning section. My motivation for the move steered from my enjoyment of exercise and the outdoors. So far, it has been great and I am definitely glad of the move. It is really nice to be working alongside a great bunch of people that are passionate about their work and enjoy getting out there and making changes. To be honest, I had no idea of the extent of issues we are faced with in terms of soil erosion and water quality in the region. It reiterated to me how important our roles are as Soil and Water Conservators to work with land owners and ensure best practice is applied in land use and development.

The floating wetlands and river bank protection practices in Ruatoria were the most intriguing articles to write for this issue. It seems that floating wetlands may become a common approach in some regions for enhancing water quality. The best thing about the man made wetland is that it looks appealing too. It will also be exciting to see how the groynes at Ruatoria hold up over winter. I'm sure they will get a hammering with high water levels due to this wet winter period we are likely to see.

I caught up with Councillors' Rehette Stoltz and Pamela Murphy to see what their interests are in terms of conservation in the district. In the next issue there will be an introduction to Manu Caddie and Patrick Tangaere.

If you haven't already done so, send in your pole order forms (found in the summer edition of CQ) to Soil Conservation to ensure you get the numbers you require. 

## Water conservation: bottom up at Motu

Continued from front page

The project was fortunate to have the support of Mr Ian Ruru, a local marine scientist with experience on previous eel projects, who helped the students to identify parts of the eels and learn some interesting facts. In the initial year of the project, Mr Ruru estimated the age of one of the larger female eels as being around 70 years old. To validate this, the eel was dissected to retrieve its otolith (a small bone in the ear which scientists can use to tell the age of the eel). Surprisingly, the eel was found to be approximately aged at 30 years old which was nearly half the originally estimated age. From similar samples it was concluded that the eels are growing well in this river system which suggests a healthy waterway.

The results of the annual survey are published in the school newsletter and have generated a lot of interest amongst parents. School principal Paul Cornwall suggests that this filtering-up effect is where the true value of the project lies. As well as being a valuable learning tool for students and creating a useful data set, the project has had a flow-on effect into the local community. The knowledge gained from the



Above: Fencing at Waitangirua.

project has led to more sustainable practices around the taking of eels and use of the waterways.

An example of this is the local eeling competition, which used to be an annual event with the aim of catching the biggest eel. Through the project it was learnt that the largest eels are the breeders and are essential to the continued survival of the species. This has led to the eeling competition being cancelled.

Motu School now intend to take their river monitoring one step further and plan to set up a water quality monitoring programme with the aim of backing up the results of their eel study. They want to be able to show through scientific methods, that the Motu River is healthy and be able to monitor any changes in water quality. Parameters such as clarity, conductivity and pH will be used to monitor the health of the river. The hope is that this further knowledge of the state of the river and what affects its quality will encourage further local ownership of river issues and prompt local landowners to take further steps to ensure their land use activities do not compromise the quality of this important waterway.

### Fencing and Riparian Planting

Pastoral farming is a fundamental part of the Motu community and a major land use along stretches of the river. In the past, stock in rivers, as well as runoff and erosion caused by general farming activities have been identified as sources of pollution in the river. In a bid to limit their impact on the river and employ more sustainable land management practices, local farmers are fencing major waterways and planting up river banks.

At present, most of the fencing consists of single wire temporary fencing on the river bank which stops stock crossing the waterways. The challenge facing more permanent fencing comes from the constantly changing shape of the river. Severe erosion of the river banks means that whole fences are frequently washed away in major rain events making it difficult for farmers to permanently fence waterways.

Downstream of the Motu Falls, Mangatu Blocks Incorporated invested significantly in permanently fencing off sections of the Motu River that run through their property. The fencing is 2,830 meters (142 Chain) in length and cost \$30,185 to install.

Low river flows in recent years have also made it more difficult for farmers to exclude stock from waterways, as flows that were previously a natural barrier to stock have dropped and now allow animals to cross.

To combat the riverbank erosion, a number of landowners along the Motu River have begun planting poplar and willow poles to stabilise the banks and prevent further loss of land. This planting has positive spin-offs for the conservation of the river as it reduces the amount of sediment entering the water and acts as a natural barrier to stock. According to Mr. Cornwall, local farmers would ideally like to plant and permanently fence entire sections of the Motu, but are currently limited by costs.




Above: Measuring an eel.



Above: Pole planting and fencing at Motu.



Above: Temporary fencing to keep out stock.

The development of a township plan for the Motu-Matawai area established the river as a key asset to the community. The township plan aims to foster better land management practices and research sources of funding to make riparian restoration more affordable. The community also plans to establish a landowners group to oversee the riparian transformation. The full township plan can be viewed on the GDC website. 

# Developing a freshwater plan

The Gisborne District Council Natural Resources Policy and Water Conservation sections have been busy working on identifying how effective and efficient the current water management practices are, analysing the outcome of projects conducted by NIWA and liaising with the Fresh Water Advisory Group, all in order to develop a freshwater plan for the region.

The process of developing the plan involves identifying freshwater values (ecological, economic and cultural) and developing water quality standards and allocation limits.

Council currently uses a pragmatic approach to water management and manages freshwater in a number of ways:

## Water forces combine

A Water Plan Team was formed in mid 2010 to contribute policy and technical advice for the development of freshwater planning in the District. The Team, along with Councillors Seymour and Haisman, represent the Council at Freshwater Advisory Group (FWAG) Meetings. The FWAG is the governance group for the development of freshwater policy.

The Team generally meets fortnightly at Council offices, but has spent some time in the field together and attending community consultation. The Team recently attended the Land and Water Forum at the Lawson Field Theatre.

The Water Plan Team comprises five Water Conservation and Natural Resources Policy staff, including the Team Leaders of both teams. The membership means that there is knowledge within the Team across all the values streams that are being investigated for policy development. These include the ecological, social, cultural, recreational and economic values of water. Staff will lead technical working groups in these areas that will report to the Freshwater Advisory Group.


Yvette Kinsella is the Team Leader of Natural Resources Policy. Yvette has ten years experience in developing and implementing policy at a national and local level. She has worked at the council for five years and is the project manager for the Water Plan.

Dennis Crone is the Team Leader of Water Conservation. Dennis has worked at Gisborne District Council for eight years. Dennis has an extensive background in economic and water policy matters, having formerly worked for MAF as a policy analyst. Yvette and Dennis will work together to lead the work programme looking at the economic values of freshwater.

Paul Murphy is a Water Conservator who has been working in the Water Resources Section at Gisborne District Council for six years. Paul has a very good understanding of water management in the Gisborne Region.

Jo Callis is a planner who joined the Natural Resources Policy Team late last year. Jo has six years experience in planning, mainly in resource consents, and will work with Paul in leading the work programme looking into the ecological values of freshwater.

Keriana Wilcox is a planner with over 10 years experience in local government. She was previously involved in the Sustainable Hill Country Project and will lead the work programme looking into the social and cultural values of freshwater.

Other Council staff are also involved in helping out with data collection and providing advice as required. The Water Plan Team is working well together so far and the Team is acting to ensure Council is taking a comprehensive and balanced approach to managing water resources in the District. 



Above: From left, Dennis Crone, Jo Callis and Paul Murphy.

- Discharges to freshwater are managed through the Discharges Plan
- Sedimentation of freshwater is managed through the District Plan including requirements to plant “Land Overlay 3A’ – the worst eroding land in the district
- Water permits are granted for a maximum of 5 years. This allows adaptation to medium-term fluctuations in the water availability and changes in land use
- Permits for surface water takes within the Waipaoa and Te Arai catchments, include conditions with shut-off levels should water levels drop below specific thresholds
- The Poverty Bay Water Users’ Group collaborates to manage water resources across the Waipaoa catchment within Council minimum flow levels.

To date, projects to help with the decision making have been completed on groundwater, annual flows, tangata whenua values and ecological flows.

These studies include:

- Completion of assessment of Mean Annual Low Flows for Waipaoa and Te Arai Rivers
- Completion of minimum ecological flows assessment for Waipaoa and Te Arai Rivers
- Identification of method for determining tangata whenua freshwater values
- Identification of method for calculating groundwater recharge rates
- Advice on tools for managing the impacts of dairying on the Motu River

The studies could not have been completed without the help of funding from various sources. The Ministry of Agriculture and Forestry’s Community Irrigation Fund contributed just over \$23,000 for the groundwater recharge rates to be assessed and to determine the total allocatable water volumes in the catchments of the Waipaoa and Te Arai rivers.

A further \$50,000 has been approved by the Community Irrigation Fund for research related to agriculture and horticulture freshwater uses on the Poverty Bay Flats and engagement with key stakeholders.

The rest of the research has been funded through the Foundation for Research, Science and Technology’s Envirolink grant scheme. Envirolink has approved a total of \$155,000 worth of grants paid directly to providers of the research. Without this funding we could not afford to source such robust data at the levels required for effective decision making.

### Freshwater Advisory Group

The development of a freshwater plan will be of interest to a range of stakeholders including iwi and horticultural user groups. The Freshwater Advisory Group (FWAG) has been set up to guide Council in developing sustainable, practical and cost-effective solutions that meet the needs of stakeholders and our communities.

The group represents a balance of freshwater interests including abstractors, water users, farming interests, iwi representatives, government departments, recreational and environmental users; and council staff.

The responsibilities of the FWAG are to:

- Guide the development of freshwater management planning provisions for the Gisborne District;
- Provide a forum for discussion allowing improved understanding of freshwater management issues and mutual understanding of stakeholders views;
- Help identify knowledge gaps
- Facilitate the sharing of information between group members, their respective organizations and the community.

A work programme for the FWAG has been set up to give the group a clear direction on their expected outcomes.

The first stage of the project focuses on identifying key values and issues affecting values and setting general objectives for water management.

The second stage focuses on appropriate water quality standards and water allocation limits and developing specific management tools including any planning provisions under the Resource Management Act, 1991.

The third stage will involve detailed implementation plans to give effect to water management objectives including actions feeding into Council’s Ten Year Plan.


Deadlines for Stages One and Two have been set for June and September this year.

The FWAG is supported by three technical working groups (TWG) looking at ecological, economic and social / cultural values. Each working party has at least one specialist Council staff member and one FWAG member with the aim of providing technical expertise and input for the development of a water plan for the Gisborne District.

The first tasks of the TWG’s are to draw on members’ expertise to assist the FWAG to:

- Identify fresh water values across the District; and
- Identify the key issues that impact on those values.

The information members provide will inform a discussion on where the key freshwater values are in our District, what objectives we have for fresh water management and where our information gaps are.

For more information on the completed projects and other documents relating to the water plan contact Yvette Kinsella at GDC or search on the GDC website. 

# Habitat mapping: how low can we go

To get information on the ecological values of our waterways it is important to have some basic knowledge of the aquatic habitat that exists.

NIWA was contracted using Envirolink funds (no cost to the Ratepayer) to look at two local rivers and to map aquatic habitats. The two rivers were the Te Arai and Waipaoa rivers as a vast majority of the water allocated in the Gisborne District is from these waterways.

The mapping is done by collecting a range of data about the flow of the river over different points of a river system. A significant length of the river is studied so that a good representation is included in the mapping.

First of all, the river is defined by the proportion of pools, runs, riffles, rapids, cascades etc. Then a runner is sent to identify the proportion for each type of water to a length of 2km up and downstream from the point where more detailed information is collected.

At the detailed collection points the flow of the water is recorded




Above. Te Arai at Reays Bridge. *Photo courtesy care of NIWA*

by gauging the river (see next article about river gauging) and fish counts are made to determine what is actually living in each part of the river.



Above: Eel caught for fish counts.

The habitat mapping exercise then collates all this information to give an overall picture of the aquatic habitats that exist in the river and models based on the fish species present can provide a guide as to what flow is required in the river to sustain that habitat and the fish life that exists there. This information can then be used by the Gisborne District Council to set flow objectives in the regional plan.

For more information on the Habitat Mapping, the NIWA study is available on the GDC website under Insteam Habitat Values: <http://www.gdc.govt.nz/assets/Files/PlanningPolicy/Regional/Freshwater-Reports/> 



Above: Large eel found in the Te Arai.



Above: Bully from Te Arai.

# River gauging and flow rate monitoring

River gauging is a term used to describe a way that the flow rate of water in a river is determined.

The Gisborne Region can't rely on knowing how much water is flowing in our rivers by measuring the depth of the water alone. We require the depth and the volume of water measured to calculate a flow rate. This is because the bed of a river can change dramatically with each rainfall event and these events shift the shingle and silt on the river bed.

The Gisborne District Council website has graphs showing the level of water for 18 rivers in the district and these can be viewed on [www.gdc.govt.nz/environmental-monitoring/](http://www.gdc.govt.nz/environmental-monitoring/) The graph to the left shows the graph for the Waimata River at Goodwin Road Bridge.



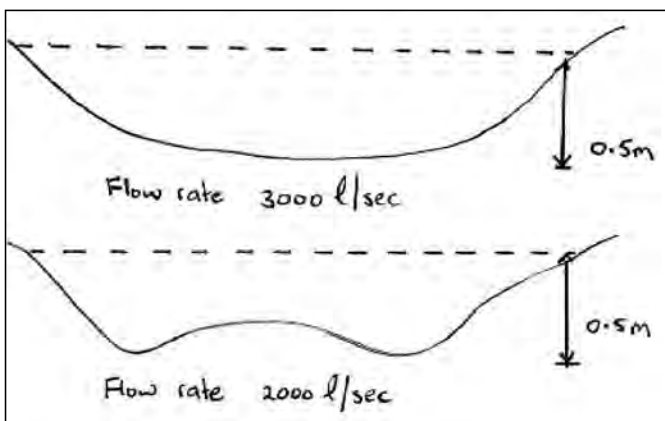
The graph show that the water level in metres was a little over 1m in early April and a fresh on April 5th has increased the water level to 1.26m. Water levels are recorded every 15 minutes by the GDC telemetry system and the website is updated within a few minutes of that record reaching the Council's computer system.

Council employs a local company to provide it with hydrological monitoring information. Hydrotechnologies Limited regularly complete river gaugings on a range of rivers so that we can get a true picture of the water flow.

The following drawing shows how the same water level in the same river can alter quite dramatically following a flood or even some freshes.

The diagram below shows how the same water level in the same river can alter dramatically following a flood or even some freshes. Often shingle banks form or new beaches develop near the banks.

To complete a gauging the depth of water across a cross-section of the river is required. This is achieved by wading through the water and taking two measurements.



1. The first measure is depth. This is done every 1m across the river.
2. The second is the speed of the water that is flowing. This is done by using an instrument that operates similar to a water wheel and spins around at a speed that is determined by the flow rate of the water at that part of the river.

This information is then used to calculate the river flow.

The main rivers in our region are gauged 18 times each year and minor rivers and streams may only be gauged 2-3 times per year.

Rivers also provide water supply for underground sources of water. These groundwater sources provide most of the water that is used for irrigation within the region so it is important that we monitor how well the groundwater is being recharged by

rainfall and by leakage from rivers.

River gauging can be carried out over a stretch of a river and we can detect leakage through the bed of the river. This leakage is often the main water supply for an underground aquifer.

A project is part way through that is aimed at determining the interaction between flow rates and volume of water in the Waipaoa River and volumes of water that disappear under ground. To achieve this a series of river gaugings were completed in October/November 2010 and this will be repeated in Autumn 2011 (weather permitting). It is better if these gaugings are done when no irrigation water is being pumped out of the river. It is also better if the river flow at the time of the two gaugings differs so that some comparisons can be made. 🗨️



Above: Photo showing technician measuring the flow velocity and the water depth.

# World first to protect Ruatoria

The Gisborne District Council is thought to be the first in the world to use dolos to create groynes as a form of river protection. The idea was initiated by Jurgen Komp, Council's Asset Manager: Rivers and Land Drainage, who saw the potential of these structures to be effective in the fight to help stop the erosion of the river banks in the region. These man-made flood protection structures have already started to show benefits in the Waiapu river since their installation over the last year. Council plans to continue the construction of groynes using the dolosse in areas where erosion is a threat to riverbanks.

## What is a river protection structure?

A groyne is a protective structure of timber, steel, stone or concrete which extends from the shore or bank into the water to prevent a beach from washing away. A dolos (plural dolosse) is a concrete block in a complex geometric shape weighing up to 20 tonnes, commonly used in great numbers to protect coastal environments from the erosive force of the ocean waves. They were developed in East London, a port city in South Africa, in 1963 and are found in millions all over the world. Their design ensures that they form an interlocking, but porous wall.

After some experimentation with building a river groyne from concrete dolosse, the Gisborne District Council decided to use the dolosse instead of rock. Dolosse are traditionally used



Above: Waiapu River pre-groyne installation.

only for coastal protection work and not in rivers. In this part of the country, any rock material used for the groynes would have to be sourced from the upper reaches of the catchment, and taking rocks from the river bed leads to riverbank erosion and channel movement both upstream and downstream of that point. The idea behind the groynes is to slow water down, catch debris and silt flowing in the river that will eventually create an island in between the groynes. These islands will then start building up and can be planted to reclaim the bank edges.



### Waiapu catchment trials in Ruatoria

Stream bank erosion is one of the many issues facing the lower Waiapu catchment. Prior to Cyclone Bola the Waiapu River flowed along the true left bank of the river channel approaching Ruatoria. After Bola, a channel was created that cut across to the true right bank. This channel has caused the erosion of valuable land to such an extent that the township of Ruatoria is now threatened.

The first steps to stop the Waiapu River from threatening the Ruatoria Township were put in place late in January this year. Two groynes were placed downstream from the Rotokautuku Bridge using the dolosse. The purpose of the groynes was to direct the Waiapu River towards the true left bank where it used to flow before Cyclone Bola.

The groynes are made up of approximately 40 large dolos. Each dolos weighs 4.5 tonnes, is 2.5 metres long and nearly 2 metres wide and high. The dolos have been manufactured in the area by a Ruatoria based contractor Ron Hedley Ltd. Local labour and shingle from the Waiapu River has been used to make the concrete. The shingle has been washed with a specially made cotraflow washer, designed by Mike Ross from local company Waiapu Metal/Rock Products. The steel moulds used to cast the concrete were salvaged from scraps in Gisborne from M. E. Jukes & Son.

The installation of the two groynes could only occur during a spell of dry weather when the river levels were low. Dolosse were placed by a Tolaga Bay based contractor and the process took 2 days, with a further day to tie the wire rope to each of the dolos to help keep them in place. CR Taylor's crane was bought up from Gisborne to lower the dolosse down the bank.

The groynes were installed just in time as a cyclone hit days after the installation. Mr Komp checked the groynes after the high water levels had dropped and found that they held up well. Normally after that amount of rain further erosion of the right bank would be expected however this was not the case and the groynes were seen to already be creating a small diversion towards the left bank.

The installation of the third groyne started on 15 April this year. It is located downstream of the existing two groynes. The new groyne is the largest so far and it extends 55 metres out from the riverbank, using about 168 large dolosse. Twelve small dolos have been placed on the riverbank to protect it from scouring. Up until now, a total of 260 dolos have been used for the three groynes in this location. It is expected that some dolosse will sink into the shingle but the groyne will be topped up with additional dolos when required. The aerial on page 8 shows the planned maintenance work of the Waiapu River.



Above: Groyne being created on the Waiapu River.



Above: Dolosse are placed on top of one another to form an interlocking wall.



Above: Third groyne installed earlier this year.

### Saving the Kainanga Hill

The effects of the groynes have already been realised at other sites. Nine groynes composed of rock were consented to be installed near the Kainanga Hill, some of which have been in place since 2006. The site, north of Ruatoria Township,



Above: Installation of dolosse.



Above: Addition dolosse placed onto the groyne. The poles planted can be seen in the foreground.



Above: Islands are forming behind groyne.

experiences continual riverbank erosion and an earthflow causing the Waiomatatini Road to close every so often. After discussions with the Water Conservation section of Council, it was agreed that dolosse could be used in the groyne as well as rock material. A new groyne was constructed using dolos in 2010. Since installation, silt has built up between the groyne




Above: Kainanga hill bank pre groyne 2005.

and has created a toe at the slope of the Kainanga Hill. This beach area will help limit erosion of the old bank face. Willow and poplar poles were planted in the river bank to help with the erosion control. After a heavy rain event, some of the poles were bent over and covered in silt, however the survival rate of these trees was found to be around 80%, which is positive in the fight of reclaiming river banks and avoiding further erosion. The river path has also been diverted to the left, away from the bank. Bedrock (that has never been exposed before) can be seen as the river shifts towards the island in the middle of the river.

#### Future for flood protection

Dolos are currently located at four locations. This includes the two locations near Ruatoria in the Waiapu River discussed above. Dolosse are also in the Mangahauini river near State Highway 35 between Tokomaru Bay and Te Puia Springs. In this area the dolosse have been used to form a debris dam to collect rocks and slow down water velocity. This in turn will reduce the erosion energy of the river. The other site is south of Tokomaru Bay where the dolosse groyne protect a bridge abutment.

When you drive north over the Rotokautuku bridge spanning the Waiapu River on State Highway 35 at Ruatoria, you can see a stockpile of the dolosse on the right which will be used to create future groyne. The effectiveness of the dolosse used in the groyne construction will be monitored over winter to see how they perform. It is hoped that this innovative idea will benefit the East Coast region in the fight to reduce riverbank erosion and silt in the rivers. 

# Streamside planting and wetland creation

Gisborne's urban area has an extensive network of streams, rivers and wetlands that connect the city to the wilderness. Unfortunately due to land clearance and development, the health of these waterways is relatively poor, with limited native fish, insect, bird and plant life remaining. It is not an uncommon sight to see these urban streams overrun with unwanted weeds, pests and other debris.

In order to rejuvenate these low quality waterways an active approach is required by private landowners whose properties boarder the waterways. Native planting along streamsid es is not only good for the health of the streams, but it also beautifies the area, provides stream-bank stability, flood prevention and can increase property value.

Gisborne District Council and the Department of Conservation have developed a "Streamside Planting Guide" which gives an overview of planting native species along urban streamsid es. This initiative aims to encourage and motivate people to take pride in our streams and treat them as an important and valuable part of their property. The guide includes plant selection advice, stream profiles for effective planting and information on weed control.

Another recent publication the Gisborne District Council has been involved in is 'Working with Wetlands in Hawke's Bay and the East Coast'. Wetland habitats have significantly depleted throughout New Zealand where these sensitive areas have been drained and the land filled and reclaimed for farming and productive purposes.

Currently we are seeing more and more farmland owners taking a proactive step in fencing off areas to re-attract birds and other native species associated with wetlands onto their land. On the East Coast, wetlands under restoration include Oranga wetland at Nicks Head Station, Te Wherowhero lagoon and Tarau Valley wetland. Funding from QEII National Trust and the Biodiversity Fund support these projects.

The "Working with Wetlands" guide gives a step by step process in developing a wetland including planning and ongoing maintenance. It also includes a list of help and advice available for those wanting to look into setting up a Wetland as well as planting guides.

Copies of these guides can be found on the GDC website or from the front counter of the Fitzherbert St office.



Above: Planting can be a whole family experience.

Other publications on waterway planting and protection include:

- Stream shade: towards a restoration strategy – Department of Conservation
- Streams are worth protecting – Department of Conservation
- Managing waterways on farms: a guide to sustainable water and riparian management in rural New Zealand – Chapter 5: restoring the vegetation – Ministry for the Environment 

# Floating wetlands

Ponds and wetlands have become widely accepted as stormwater quality improvement devices over the past two decades. This growing popularity has been largely due to the fact that pond and wetland based systems offer the advantages of providing a relatively passive, natural, low-maintenance and operationally simple treatment solution whilst enhancing habitat and aesthetic values at the same time.

Floating wetlands are an innovative man-made system that has been proven to have a greater ability to improve water quality than the typical wetland system. A floating wetland basically involves the growth of wetland plants on a structure that floats over a pond. Water receives treatment as it passes through the rootmass that develops beneath the floating wetland. These floating wetlands may be likened to a hydroponic system, as the plants acquire their nutrition directly from the water column in which their roots are suspended, rather than from the soil. Because of this feature, floating wetlands offer great promise for rainfall driven stormwater treatment applications as they are little affected by fluctuations in water levels that may submerge and adversely stress bottom-rooted plants.



Above: Cross section of a typical floating treatment wetland system with partial cover of pond surface with floating wetlands. Figure courtesy of Heady & Tanner (2006)

Over the past two decades, artificially created floating wetlands have been studied in various parts of the world for a range of applications, such as water quality improvement, habitat creation, and aesthetic enhancement. Systems created for water quality improvement, termed Floating Treatment Wetlands (FTWs), have been used for the treatment of:

- Combined stormwater-sewer overflow
- Sewage
- Acid mine drainage
- Piggery effluent
- Poultry processing wastewater
- Water supply reservoirs.

Floating wetlands have been trialed at Heathrow Airport since 1994 for the treatment of stormwater runoff containing glycol derived from de-icing compounds. In Belgium a system has been designed to deal with the variable event-driven nature of combined sewer overflows. India is currently conducting a research project into the use of floating wetlands to restore water quality to the holy River Kshipra. The floating rafts are

constructed locally using low-cost materials such as bamboo. This project is the first innovation of this kind in India.

Closer to home, these FTW have been trialed in various places in the country. Hawke's Bay Regional Council have installed a "floating island" in the drain running alongside the Waipukurau end of the Tukipo River. The Tukipo river has the poorest water quality in the Ruataniwha Plains. The project is a trial to test the benefits of the wetland in reducing the resulting nutrients from a 250ha catchment of pastoral land. The Regional Council is collaborating with the National Institute of Water and Atmospheric Research (NIWA) on the project with the aim of removing ninety percent of the nitrogen in the catchment. If the wetland proves successful, they plan to identify other nutrient rich waterways flowing into rivers and find if they are suitable for treatment.

Auckland Regional Council is looking at using FTW as an urban stormwater quality improvement device to remove contaminants such as copper and zinc from catchments, particularly near commercial and industrial landuses. The

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removal of these metal contaminants will minimise the impacts on downstream aquatic ecosystems.

Environment Bay of Plenty has made an agreement with the Te Arawa Lakes Trust to create nutrient-reducing floating wetlands in the Rotorua lakes suffering from water-quality issues. A resource consent to construct floating wetlands on eleven of the lakes in the Rotorua Restoration Programme has been granted. Two demonstration wetlands have been built at Lake Rotoehu for trials by NIWA. Youngsters from Whangarino School built their own wetland on Lake Rotoiti. The wetland was constructed using artificial floating coconut matting and foam with plastic material holding it together, and was planted with indigenous plants to form a new habitat for native plants and wildlife. The plan is that any community group, hapu or school can initiate a wetland, and manage it themselves. 



Above: Floating wetland for the Tukipo River. *Courtesy Chris Tanner*

## Introducing...

The Mayor, Meng Foon, and fourteen Councillors were elected in October 2010 for a term of three years. There are four fresh new faces to the team of Councillors from this election. These include Manu Caddie and Rehette Stoltz for the Gisborne Ward, Patrick Tangaere representing Matakaoa Ward and Pamela Murphy for Waikohu.

This issue will introduce the ladies, Pamela and Rehette, to get an idea of what interests them in the region in terms of conservation and what their visions may be.

Pamela Murphy has lived in Waikohu for 43 years where she and her husband run a successful tourism operation called Murphy's Lodge in the Motu township.

Pam stood for Council as she feels that a gender balanced committee that reflects a cross section of the community needs to be maintained in order to make informed decisions. She is a member of the Community Development and the Environment and Policy Committees.

Pam was asked to comment for the Conservation Quorum on what particular interests she has on conservation issues in the East Coast Environment.

After a quick meeting with her, it was clear that she is most passionate about the Waikohu area and the rivers that are apart of it. She handed me a piece of paper with her hand written comments on it, and this is what it read:

"The Gisborne District Council is fortunate to have within its boundaries many types and sizes of waterways. From the crystal clear Waitahia to the discoloured waters of the Waipoa. GDC manages all of these.

This can be a definite asset to the ratepayers or a huge unpredictable financial burden. Mostly this depends where you live and what your interests are.

As Councillor for Waikohu and living at Motu, naturally the

waterway I am most familiar with is the Motu River. The Motu river is one of the few in New Zealand that is protected by legislation as a wild and scenic river. It has three important aspects to it: commercial, recreational and educational.



**Pam Murphy.**

The river also has future perceived problems such as quarrying and dairy farming. The latter having already caused problems with effluent flowing into the stream feeding the Motu".

Rehette Stoltz moved to Gisborne nine years ago and currently is raising a young family while running a successful medical recruitment business.




**Rehette Stoltz.**

Rehette believes that she will bring a youthful and energetic voice to the Council being one of a few Councillor's that are within the 20 – 40 age bracket.

Rehette is a member of the Community Development, Environment and Policy, Hearings, and Wastewater Management Committees.

Rehette along with the other Councillors were involved in a tour up the Coast in April in order to get a glance of the work Council has been doing in the northern areas. Rehette was impressed with how Council was dealing with the erosion of the riverbanks threatening Ruatoria (See page 8). She sees how protecting waterways is an important factor of the community as well as being proactive in initiating riverbank protection to ensure the long-term stability of the riverbank.

Of interest to her were also the forestry operations in the area. Rehette commented that both farming and forestry are high value economic providers in the region however it is important to strike a balance between production and conservation of the land and waterways. The primary sectors still need to be economically viable but the methods to reduce the degradation of land and water is still important for the continued health of the environment. 

# Landuse trends for Poverty Bay Flats 2007 – 2011

Data has been collected each summer season since 2007 by Council's Water Conservation section on the actual landuse on the Poverty Bay flats. The purpose of this study is to provide information on area percentages of certain crops which will be used for development of the Freshwater Management plan. The study shows the trends of crop popularity and fluctuations in the area over this four year period and is important to assess changes in irrigation demand.

The area of land surveyed extended from Muriwai, just past Williams Road, to as far north as Whakarau Road past Te Karaka including Ngatapa and Waingake Road in between.

The information was collected by printing off aerial maps to identify boundaries and then marking crop types on these maps by visiting the sites. Such information is unavailable from existing data bases.

There have been some interesting findings since the study started. This summer season, the total area of land included in the land use survey was 17,376ha. Of this area, one third is in pasture or is unused, one quarter is planted in maize and sweetcorn and one tenth in grapes. The main crops that have shown a marked decrease are grapes, maize/sweetcorn

and tomatoes whereas squash and kiwifruit have gradually increased.

Grapes have slowly declined over the past three seasons by 2% on average each year resulting in 12% of the Poverty Bay flats harbouring grapes in the 2010/2011 season, compared to 15% in 2007/08. Maize/sweetcorn suffered a large decline in 2008 and 2009 by 1259ha although increased again this 2010/2011 season and now occupies 26% of the flats. The area of tomatoes also declined from 2007/08 to 2008/09 and the past two seasons have seen little change.

Areas of kiwifruit and squash have been gradually increasing by small amounts each season. Kiwifruit now occupies 391ha (Figure 2), and squash occupies 1621ha.

Minor crops such as melons, persimmons, onions and lettuce/cabbage have fluctuated over the past four summer seasons (Figure 3). No significant changes in the area have been detected in avocado, stone fruit, cauliflower/broccoli, stock feed, lucerne and strawberry crops across the past four years.

The changes in crops can have a direct effect on water intake required on the flats. For example, Kiwifruit is the most water

demanding crop out of any other and absolutely needs water for successful growth. The amount of water applied to the crop is a function of the desired weight of the fruit; less water produces smaller fruit that cannot be sold. On contrast grape plants require no irrigation (except, young and newly planted grapes) and produce better grape loads when under stress. The consequences of the different water requirements of different crops, particularly as grape production declines and kiwifruit rises, would be increased demands on the district's water resources as land is developed into different more water demanding crops.



Above: Aerial view of the Poverty Bay Flats.

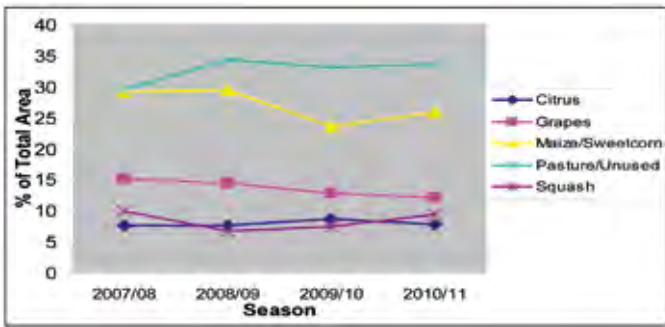


Figure 1. The percentages of the total Poverty Bay flats area for the five major crops across the past four summer seasons (07/08 – 10/11).

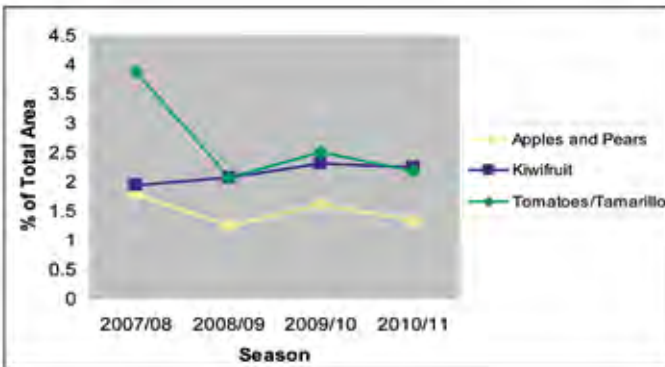



Figure 2. The percentage of the total PB flats area planted in apples/pears, tomatoes/ tamarillos and kiwifruit for the past four summer seasons (07/08 – 10/11).

The Gisborne District Council is currently in the preliminary stages of conducting a study on the economic value of water on the Poverty Bay flats and the economic implications of water restrictions that may be implemented in the new Freshwater Management Plan. This, along with other value sets, will help the Council to set water uptake limits in the area. For more information on the field study you can contact the Water Conservation Section of Council. 

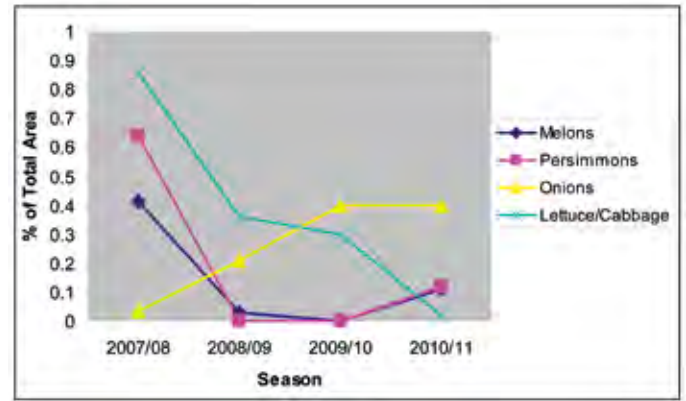


Figure 3. . The percentage of the total PB flats area planted in minor crops for the past four summer seasons (07/08 – 10/11).

## A date for your diary:

**Maintaining farm productivity and profits in an uncertain climate presentation**

**When:** 10am Monday 23rd May

**Where:** Lawson Field Theatre, Fitzherbert Street

**Speakers and topics:** Dr Jim Salinger an Auckland Climate Scientist, will speak on the latest information on climate change science and its impacts on farming and communities in the New Zealand and local context.

Professor Caroline Saunders, from Lincoln University, will speak on what all this means for agricultural trade, greenhouse gas emissions and what practical and cost-effective steps farmers can take in reducing their emissions whilst improving their economic viability and business opportunities in a changing world.

Rod Oram, a Business Journalist, will talk on emissions trading and compare New Zealand's climate change targets with our trading partners' targets, and what this means for agricultural trade.



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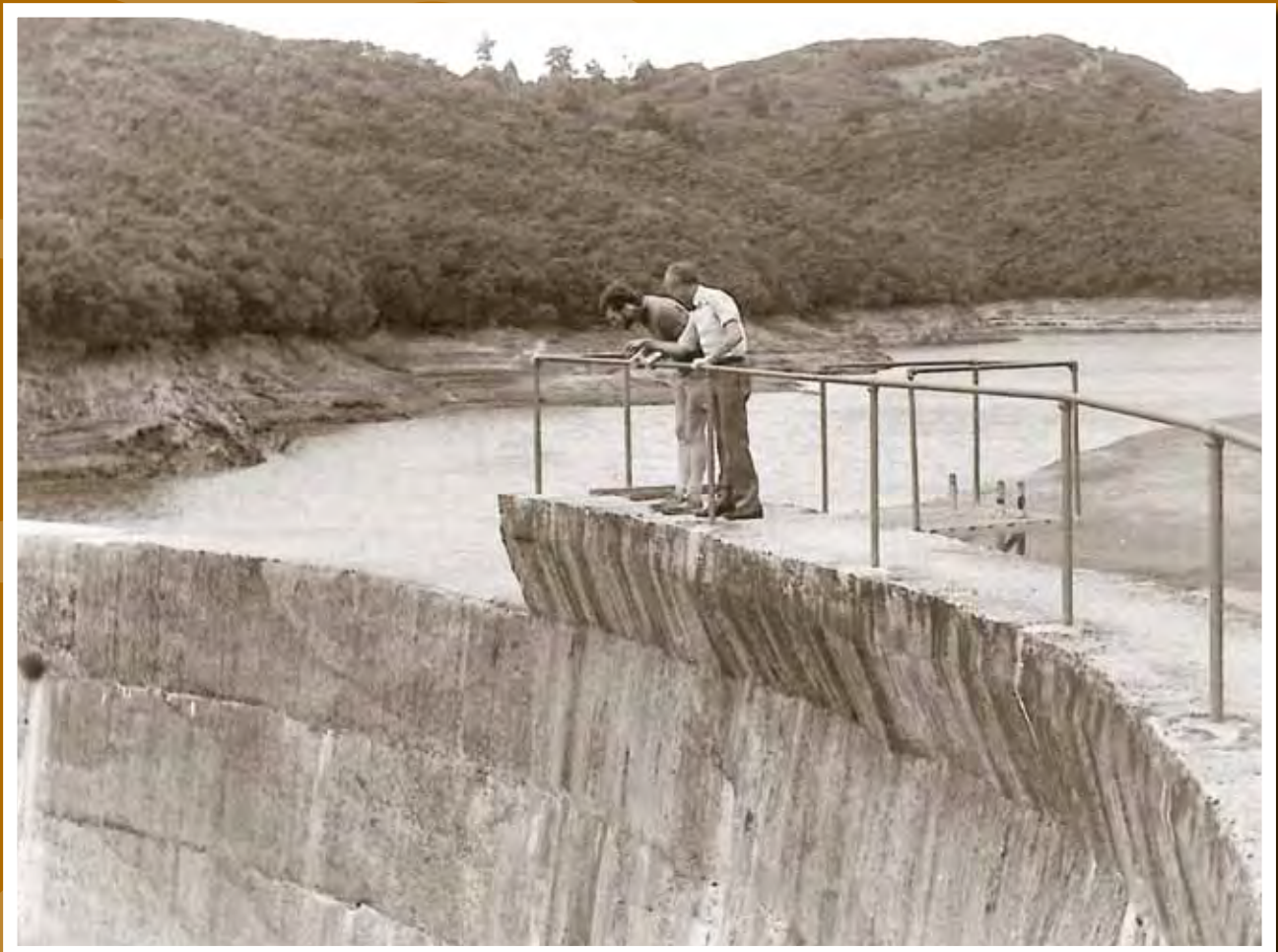
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# Those were the days . . .



"Opening of the Rowing Regatta 1891"



"Concrete Dam and Mangapoike No. 2" (no date) The Clapcott Dam was built in 1948. Going by concrete condition of the dam and by the adidas sneakers of the bearded guy, I'd say mid to late seventies. *Courtesy of Tairāwhiti Museum*