

Banana farming for healthier wetlands

Gaia Farms is applying wetland filtering processes to treat run-off and wash-plant water, thereby improving water quality to wetlands and the Great Barrier Reef Reef.

The goal

The Gaia family's goal is to provide to the consumer high-quality, nutritious food that is grown in an environmentally sustainable way. Living and farming alongside Liverpool and Cowley Creeks, only 10 kilometres from the Great Barrier Reef World Heritage Area, has been a key driver to change some of the farming practices.

'Our goal is to remain a high production, commercially viable plantation whilst adopting clean water practices for the benefit of neighbouring wetlands and the Great Barrier Reef.' (Brett Gaia)



Gaia banana farm. Photo: DEEDI

1. Improving farming practices

To achieve their goal the Gaias have made a number of changes to the way they farm, including:

- cutting back on chemicals, such as fungicides and nematicides
- applying nutrient in a targeted way through fertigation
- producing and applying compost to increase organic matter
- monitoring soil moisture and managing irrigation water
- reducing soil compaction and improving drainage
- maintaining soil cover with fallow crops and inter-row cover
- monitoring plant nutrition through soil and leaf analyses.

About the property

Mike, Rene and Brett Gaia

'Gaia Farms' Cowley Creek, south of Innisfail

Bordered by Cowley and Liverpool creeks

95 ha property

60 ha production area growing Cavendish bananas

Key messages

- Constructed wetlands can be used to help treat run-off from farms.
- Constructed wetlands complement good farm management practices.
- Wetland plants are an essential part of treatment wetlands.
- Improved farm practices and treatment structures are good for the environment as well as the farm enterprise.
- Water quality should be managed with a 'treatment train' which comprises:
 1. improved farming practices
 2. vegetated swales, buffers and sediment traps
 3. constructed wetlands.

These changes have seen an improvement in plant health, a reduction in pests and disease and increase in yield. They have also led to a reduction in the use of granular fertilisers by a third, cut the use of fungicides to around one third of the industry standard and removed the need for nematicides completely.

The management changes reduce the risk of excess nutrients, sediments and chemicals leaving the banana production area, and reduces the amount of run-off to adjoining waterways.

'We are using improved plant health to manage the incidence of pests and diseases, this means less chemicals are used which reduces operating costs.'

(Brett Gaia)



2. Vegetated swales, buffers and sediment traps

The Gaias value their soil and the essential nutrients it contains so they have implemented measures to ensure this valuable asset stays on the farm. Grassed inter-rows, vegetated swales and sediment basins help keep the soil in place and trap any sediment in the run-off. Maintaining the grass cover on the inter-rows and swales has slashed herbicide use by half.

The banks of Liverpool Creek have been revegetated to provide a buffer between the production area and the waterway that prevents erosion of the creek banks and filters run-off before it enters the creek.

This series of treatment structures forms a 'treatment train' where soil and nutrients are progressively captured and treated as the run-off moves through the treatment structures, keeping soil and nutrients on the farm where it is needed most.



Grassed and slashed inter-rows keep soils in place and reduce herbicide use. Photo: DEEDI

3. Constructed wetland

Recently, the Gaias embarked on a project to construct a wetland that will treat run-off from more than 26 hectares of the banana production area and waste water from the banana packing shed.

The constructed wetland has been designed to replicate natural wetland filtering, by slowing water flow to capture sediment and remove nutrients through the use of dense wetland vegetation.

A constructed wetland will 'polish' water prior to it leaving the farm.

The Gaias set aside 2.45 hectares of unproductive, flood-prone land on their farm for the constructed



Brett Gaia surveying the site for the wetland. Photo: DEEDI

wetland. Stormwater run-off modelling software was used to model the run-off from the banana farm and help inform the design of the constructed wetland.

This modelling showed that for the 26 hectare catchment **the wetland could reduce the phosphorous and sediment by nearly half and remove a third of the nitrogen.**

Once established, around 80 per cent of the wetland will be covered by dense wetland vegetation, including a range of native reeds, sedges and grasses. These plants are the key to a successful water treatment wetland, as they help to trap sediment, uptake nutrients and promote nutrient cycling and reduce the chance of weeds dominating the system.

The constructed wetland project has been a partnership between:

- the Gaia family
- Terrain Natural Resource Management (NRM)
- Growcom
- Queensland Wetlands Program
- Department of Employment, Economic Development and Innovation (DEEDI).

Terrain NRM and the Queensland Wetlands Program, through DEEDI, provided the stormwater modelling and design for the wetland. The Gaias received \$40 000 in Reef Rescue funding from Terrain NRM to undertake the wetland construction and \$5500 from the Queensland Wetlands Program for wetland plants. The Gaias contributed around \$100 000 in-kind in the form of planning, labour, machinery and equipment.

Some of these costs can be offset by using the soil removed from the wetland to fill in low points in their production area, and the wetland itself could be used as a source of irrigation water.



The 2.45 hectare wetland designed and built to treat run-off from the banana farm. Photo: DEEDI

John Reghenzani from Terrain NRM believes that if designed and constructed correctly, water treatment wetlands will complement other practices to ensure good water quality in our waterways and the Great Barrier Reef.

‘Constructed wetlands, in conjunction with on-farm best management practices, offer a range of benefits to producers and the broader community in addition to improved water quality leaving farms.’
(John Reghenzani)

Wetland specifications

- 2.45 ha area
- 350 m long, 70 m wide
- Average 1.3 m deep, with three 2 m deep pools
- Incorporates a sediment basin and high-flow bypass
- Captures and treats ‘first flush’ run-off from banana farm and packing shed wastewater
- Reef Rescue funding of \$40 000 received
- Around \$100 000 contributed in-kind

The wetland construction has presented a few hurdles for the Gaia family. Mike Gaia said:

‘Installing the pipe for the wetland intake and sourcing the right wetland plants has been difficult and the long wet season has delayed the completion of the wetland. We have adapted the wetland design to suit our farm whilst maintaining the treatment function of the wetland.’

Despite the capital outlay and challenges, the Gaias saw the constructed wetland as an important next step to achieving their goal of ‘achieving better water quality leaving the farm with minimal impact on the neighbouring environment’.

Having a wetland in the centre of their farm, which has become a haven for Burdekin Ducks and other wildlife, is an added bonus.

Acknowledgements

Thanks to Mike, Rene and Brett Gaia for taking the time to share information on their banana farm.

Thanks also to the Australian Government and Terrain NRM for providing Reef Rescue funding towards design and construction of the wetland and Growcom for their technical support and advice.



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The Queensland Wetlands Program supports projects and activities that result in long-term benefits to the sustainable management, wise use and protection of wetlands in Queensland. The tools developed by the Program help wetlands landholders, managers and decision makers in government and industry.

The Program is a joint initiative of the Australian and Queensland Governments.

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