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Banana farming for healthier wetlands

Gaia farms are applying wetland filtering processes to treat runoff and wash plant water, improving water quality to wetlands and the Reef.

Mike, Rene and Brett Gaia operate Gaia Farms, a 95 hectare banana farm bordered by Cowley and Liverpool Creeks, south of South Johnstone in the wet tropics region of Queensland. The farm grows Cavendish bananas on 60 hectares of the property and supplies their product to large retailers.

The Gaia family's goal is to provide high quality, nutritious food to the consumer 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.

Key messages

- Constructed wetlands can be used to help treat runoff from farms
- Constructed wetlands complement good farm management practices
- Wetland plants are an essential part of treatment wetlands
- Improved farm practices, including treatment structures, are not only good for the environment, they make good economic sense

"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"

Gaia farms

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1 Improving farming practices

To achieve their goal Mike, Rene and Brett have made a number of changes to the way they farm, for example:

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

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 negated the need for nematicides completely.

The management changes reduce the risk of excess nutrient, sediment and chemical leaving the banana production area, reducing runoff 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 the operating costs"

2 Treating runoff

The Gaia's value their soil and the essential nutrients it contains and have put in place a range of measures to ensure this valuable asset stays on the farm. Grassed inter-rows, vegetated swales and sediment basins help to keep the soil in place and trap any sediment in the runoff. 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, to prevent erosion of the creek banks and filter runoff 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 runoff 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 slash herbicide use

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3 Constructed wetland

Recently, the Gaia's embarked on a project to construct a wetland which will treat runoff 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.

2.45ha wetland; designed and built to treat runoff from the banana farm

The Gaia's set aside 2.45 hectares of unproductive, flood prone land on their farm for the constructed wetland. Stormwater runoff modelling software was used to model the runoff 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% 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.

Wetland Specifications

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

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The constructed wetland project has been a partnership between the Gaia family, Terrain NRM, Growcom, the Queensland Wetlands Program and 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 Gaia's also received $40,000 in Reef Rescue funding from Terrain NRM to undertake the wetland construction and $5,500 from the Queensland Wetlands Program for wetland plants. The Gaia's 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.

John Reghenzani from Terrain NRM believes that if designed and constructed correctly, water treatment wetlands will compliment 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".*

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 Gaia's 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".*

Brett Gaia surveying the site for the wetland.

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

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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