



WATER QUALITY IN THE BBB

BOWEN BROKEN
BOGIE CATCHMENT

Improving water quality through landscape
interventions and land management





NQ DRY TROPICS WHO WE ARE

NQ Dry Tropics is a community-based, not for profit company that has been delivering sustainable management of land, water and biodiversity in the dry tropics of North Queensland for 20 years. We have been delivering reef programs since 2008.

We work in the 146,000km² Burdekin Dry Tropics region connecting the Great Dividing Range to the Great Barrier Reef. More than 90 per cent of our region is managed by farmers and graziers and this is where our focus is concentrated.

Many of the issues we deal with are complex – our approach focuses on innovative solutions developed and delivered in partnership with land managers, community, researchers, governments, and Traditional Owners. We bring together the best science and local knowledge, in a framework of adaptive management and continuous improvement.

THE ROLE OF NRMS

Natural Resource Management (NRM) is the integrated management of natural resources that makes up Australia's natural landscape.

The 54 regional NRM organisations cover all of Australia and its estuarine and coastal areas. Each organisation works and partners with a wide range of people across the country, from the local scale to the national level.

The principle driver underpinning the regional delivery model for NRM is to harness the capacity of those closest to the issue on the ground, build on local knowledge, experience and expertise and enable flexible and responsive solutions to local NRM challenges.



THE CHALLENGE

Fine sediment and nutrients from agricultural land are a significant threat to the Great Barrier Reef.

The Burdekin catchment is the largest contributor of anthropogenic fine sediment loads of the 35 catchments that drain to the Great Barrier Reef. It delivers, on average, 3.3 million tonnes per year; more than double the load of any other catchment. Most comes from gully erosion in grazing areas.

The Bowen Broken and Bogie (BBB) river catchment encompasses an area of 11,718km², and is part of the much larger Burdekin River system (130,000 km²). Despite its relatively small size (less than 9 per cent of the Burdekin, and less than 3 per cent of the total catchment area draining into the Great Barrier Reef, the BBB catchment generates almost a quarter of the total fine sediment load into the GBR lagoon. About 65 per cent of that fine sediment comes from gully erosion. A total of 22,311 active gullies were mapped within the BBB study area (~3,500 km²), with a cumulative active area of 4,620 ha.

This makes the gully remediation in the BBB catchment a focus for investment activity.

Gully remediation in this landscape is challenging. The area is vast, sparsely populated and poorly serviced. The climate exhibits a pronounced wet and dry season, with most rain falling in intense falls between November and April. Average annual rainfall is 715mm (28.1 in), with significant year-to-year variability. The window for undertaking large-scale earthworks is often narrow, and revegetation is constrained by water availability.

Many of the gullies are a legacy of historical land management, and unrelated to current land management practice or current owners. Many gully works involve high capital cost, and deliver little private benefit to the landholder. Characteristics vary considerably between gullies, requiring bespoke treatment plans for each gully.



ABOVE: Active gully system in the BBB. INSET: A Burdekin River flood plume. MAIN PHOTO: An untreated gully on Havilah Station near Collinsville.



THE RESPONSE

NQ Dry Tropics is piloting a suite of landscape interventions and land management efforts at a catchment scale to improve water quality and long-term sustainable land management in the Bowen Broken Bogie (BBB). This work is funded by the Queensland Government through the Queensland Government Reef Quality program, and the Australian Government through the Great Barrier Reef Foundation and the Reef Trust Partnership.

The project was born from recommendations made by the Great Barrier Reef Water Science Taskforce. This project was called Landholders Driving Change (LDC), a reflection of the grass-roots led Major Integrated Project model. The underlying premise of the LDC project was that every grazier had different knowledge, resources, motivations and barriers and, consequently, 'one size fits all' solutions did not deliver the necessary landscape-level changes required.

LDC was designed from the 'ground up', with actions and support targeted to landholder needs in a flexible, tailored way. LDC trialled a mix of new and conventional activities to achieve land management outcomes at a landscape scale, providing a foundation for the adoption of improved management practices for increased sustainability, profitability and for management of erosion and sediment loss.

Our understanding of where and how to remediate gullied landscapes in the dry tropics has grown from a low base five years ago, to now having a significant body of guidance. Work arising out of the LDC includes:

- transferable procedures for the remote sensed mapping and characterisation (including load estimates) of gullies;
- an extensive, spatially-explicit, GIS dataset that identifies, characterises and prioritises 22,311 active gullies within the BBB area;
- a framework for site selection that incorporates a range of biophysical and socio-economic considerations; and
- a spatial prioritisation based on cost-effectiveness that incorporates both the biophysical characteristics and socio-economic considerations.

More than 20 gully systems have been remediated in the BBB, by NQ Dry Tropics and Greening Australia. The following section details some of those remediation projects.

LARGE-SCALE LANDSCAPE INTERVENTIONS

MT WICKHAM

Mt Wickham was the first large-scale gully in the BBB to be remediated by NQ Dry Tropics.

The 3.03ha gully was treated in two phases and completed in 2019. A number of active gullies were reshaped, the sides battered and a series of rock chutes installed before stabilising vegetation was established. Earthworks were completed by local contractors.

Vegetation improvement was a big win at Mt Wickham. Prior to treatment 100 per cent of the site was in D condition. In 2021, 89 per cent was in C condition.

Total fine sediment reduction from the treated gully site on Mt Wickham was 1498t/y.

GLEN BOWEN

Three sites, covering an area of 10.2ha have been treated. They are part of an extensive gully system adjacent to the Bowen River.

These photos show the progress of remediation works on the first site. Treatment included reshaping and battering the active gullies, installing rock chutes and bunds to control water movement, and establishing vegetation.

The first automatic monitoring triggered by a rain event early in 2022 showed 52,800mg/L coming from the untreated site compared to 794mg/L at the treated site.

PROJECT ACHIEVEMENTS (2017-2020)

Supported

318

businesses

Delivered

\$2.6m

worth of direct
local employment



The water samples, (pictured), showed a median sediment concentration from the control site almost 70 times more than the sediment load from the treatment site.



Total fine sediment reduction from the combined treatment sites is 2,581 2581t/y.



Established a community water quality group made up of **9** properties

29 gullies remediated

Built trusted relationships with

91%

>10,600 tonnes of fine sediment prevented from reaching the Great Barrier Reef annually

Leveraged **>\$3m** in co-investment (cash and in-kind)

Partnered with **63** organisations

of BBB large grazing properties, covering more than **1m ha**

SMALL-SCALE

LANDSCAPE INTERVENTIONS

MT PLEASANT

Small-scale, low-cost gully remediation measures installed at the Mt Pleasant Learning Hub on Mt Pleasant Station, near Bowen, are doing what they were designed to do after heavy rain.... holding water in the landscape.

These interventions, also known as landscape rehydration, are designed to restore landscape function by increasing rainfall infiltration and improving water tables. This intervention is complemented by landscape management practices, including sustainable grazing practices aimed at improving soil health and pasture cover.



Before



After

DARTMOOR

Problem: A gully head was encroaching onto productive grazing land.

Solution: A series of rehydration banks, (pictured right), each about 200 metres long, were constructed above the head of a gully. The aim was to halt the progress of the gully head.

Water is now being held in the landscape by the banks instead of running into the gully system, improving water infiltration. The area was seeded with native grasses.

Early indications are positive. A complementary grazing management plan has been implemented to improve ground cover and soil health.



EMOHROU

Problem: The by-wash of a dam, one of the property's major water sources, was too narrow to handle the volume of runoff generated in the catchment.

Solution: The by-wash was widened and reshaped and rock chutes and gabion baskets, (pictured), were installed to prevent existing gullies progressing up the by-wash. A grade bank was built and contour ripping completed upslope to manage surface water flow.

Stock will be reintroduced at this site when a suitable level of ground cover returns.



HILLVIEW

Problem: Over-grazing around waterways had resulted in low ground cover generating excess runoff and causing soil erosion.

Solution: Two diversion banks were constructed from each side of a gullied area to divert surface water runoff to a centre point above the gullies. A rock chute, (pictured), was installed to carry the discharge from the diversion banks into the creekline area below.

Works have promoted water infiltration and aided pasture growth.



WATER MONITORING

Nine properties in the BBB catchment formed the LDC Community Water Quality Monitoring Group to better understand the water quality variations throughout the BBB catchment.

More is being learnt about how, when and where sediment (and nutrients attached to it) moves, through the monitoring. This means graziers can respond better to help reduce the sediment load reaching the Great Barrier Reef lagoon.

Data are strongly used to enhance the Paddock to Reef Integrated Monitoring, Modelling and Reporting Program.



Graziers were taught by scientists to take water samples.



MOBILISING A COMMUNITY

The BBB community is taking responsibility for the sustainable use and management of its land. It is expected that in time, landholders everyday decisions will have positive downstream effects on the Great Barrier Reef.

77%

of stakeholders felt the project had made a significant contribution towards achieving long-term water quality and stewardship outcomes

75%

of landholders were positive about trialling something new

84%

of stakeholders highly agreed that longer-term water quality and stewardship outcomes would continue

76%

per cent of landholders believed the project supported peer-to-peer learning

89%

of landholders supported the large-scale gully remediation trials

1 million ha

91%

of Bowen Broken Bogie grazing land engaged

ACTIONS:

400
property visits

2500
attendees at events

84
landholder contracts