

THE BURDEKIN RIVER BASIN

A developing water crisis mimicking the Murray-Darling disaster



BACKGROUND

The Burdekin River is a natural treasure of North Queensland. However, it is threatened by several large development plans, mainly involving dams and large irrigation farming. These plans would severely impact the Burdekin River, its delta and coast. These plans are proposed by four different development proponents, each one looking after its own plan in one part of the river basin without anyone looking at the cumulative impact of all the developments on the whole river basin. If all these plans are approved, it would lead to repeating the mistakes done in the Murray-Darling River, where historical haphazard developments lead to the present disastrous situation of that river.

The four areas of environmental impact can be summarised here as follows:

- a) **Turning the Burdekin turbid for the full 12 months of the year below the dams.** Construction of HGD would result in 50% of the Burdekin being turbid all year.
- b) **Increased water application in the Lower Burdekin River Irrigation Area.** Rising water table and salinisation that threatens current agricultural production in the Lower Burdekin.
- c) **Coarse sediment starvation and erosion of Cape Bowling Green.** Erosion occurs along the length of the Cape and breach points are forming which would result in profound damage to the Ramsar site of Bowling Green Bay.
- d) **Increased nutrient flows to the Great Barrier Reef,** which continue to damage the reef.

Unlike rivers in temperate zones fed by steady winter rains, our rivers in the north are fed by extreme weather events *as the norm* (i.e. tropical cyclones). This results in very high sediment loads. All but one of the issues outlined above (i.e. rising water table) are associated with the ways that dams interact with high sediment loads in tropical rivers.

In 2020 NQCC formed a Burdekin Basin sub-committee. This has been active in raising awareness of the issues facing the Burdekin with the key objective to see established a **basin-wide mechanism to manage the Burdekin**. The actions towards this objective taken to date include:

- Hosting the seminar “Ensuring a viable Burdekin basin” at James Cook University on 14 September 2020 for invited stakeholders (regional councils, irrigators, fishing community and researchers). The talks are available at https://www.nqcc.org.au/burdekin_seminar
- An opinion paper (authored Eric Wolanski) titled “Threats to biodiversity in Australia’s Burdekin River basin”. This summarised the most of the key findings of the seminar and is available at <https://crimsonpublishers.com/boj/pdf/BOJ.000513.pdf>
- Submissions on the draft Terms of Reference (ToRs) for the Urannah Dam and Burdekin Falls Dam Raising projects. The final ToRs released by the Coordinator-General now include specific sections for “**coastal processes**” (Items 15.41 – 15.48) and “**cumulative impacts**” (Items 15.179 – 15.206). A submission has also been made on the Productivity Commission’s draft National Water Reform 2020.



EROSION OF CAPE BOWLING GREEN

The erosion of Cape Bowling Green and the potential profound impact on Bowling Green Bay deserves special mention. This can be described based on field surveys (June 2020 and May 2021), and analysis of aerial and satellite imagery by Prof Eric Wolanski with Chris Hopper.

This work also includes geomorphological changes to the **riverbed and mouth of the Burdekin**. The Burdekin Falls Dam has decreased the peak discharges of the river, thus reducing its sediment carrying capacity. As a result, the riverbed in the area of the delta is silting up. This at points has caused an increase in river bed level of 3 m. Whether that will lead to increased flooding in the Ayr and Home Hill area is unknown due to a lack of survey data.

Historically the river carried coarse sediment or sand out into the bay during flood events. This began to form the sandspit – Cape Bowling Green - about 2500 years ago. The Burdekin Falls Dam now blocks 95% of the sand from the Upper Burdekin catchments. As a result, the Cape Bowling Green peninsula is being starved of sand and is eroding. A **breach zone** is rapidly developing. This is summarised using the images below mostly from the 09 May field study.



The peninsula width at the breach point is now only 15 m, compared to 24 m in 2018 and 108 m in 2011. The length of the breach zone is now about 300 m compared to 50 m in 2018.

In that breaching zone, erosion cliffs are now present.



All the trees in that area have been killed. Some trees are still standing but are dead, with others already toppled over.



The elevation of the sand dune forming the peninsula is about 2.5-3 m. At several points, this has been reduced by **waves overtopping the dune**. This has eroded 1 m off the top of the dune, and removed protective vegetation. This has left erosion scars 1m deep through the sand dune, going all the way from the sea to the mangrove fringe in the bay.



These erosion scars have no protective vegetation; creepers are trying to colonise and stabilise these breaches. Quad bikes use these gaps in the sand dune to traverse the peninsula, further damaging any protective vegetation and enabling further erosion. The two pictures show erosion scars from wave overwash (overtopping) over the dune and quad bike tracks



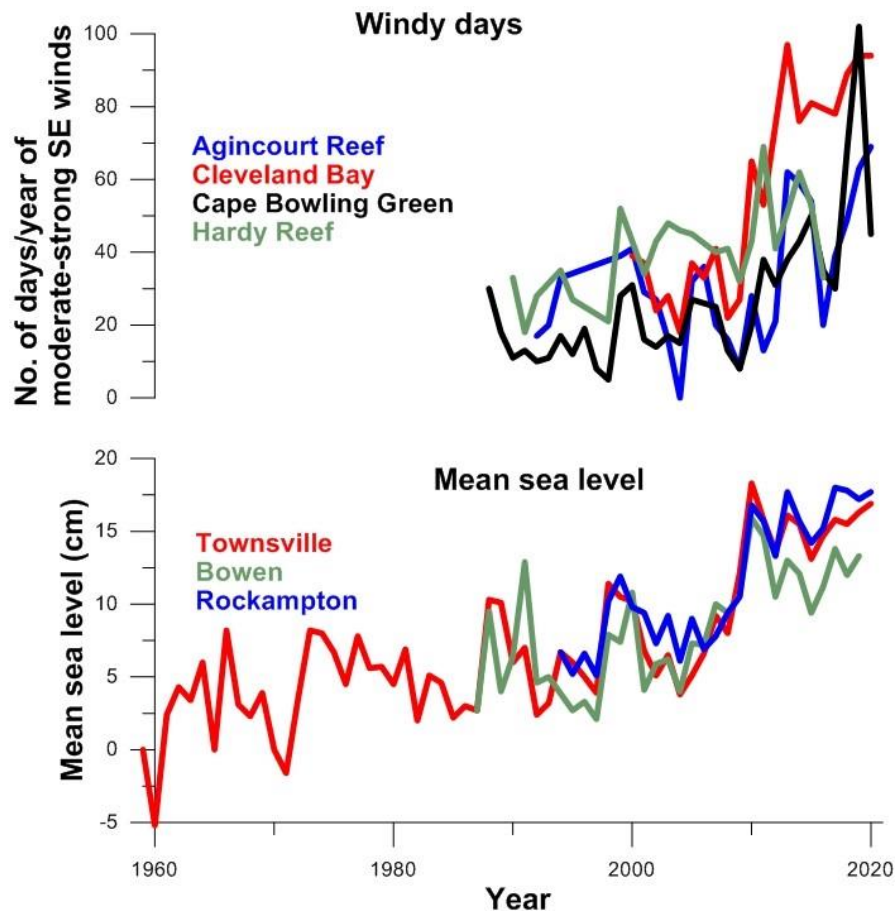
If and when the breach fully develops, possibly during a storm, the top 4 km of Cape Bowling Green will become a sand island and probably erode away with the waves and disappear altogether over time. The Cape Bowling Green peninsula will then be much smaller and sea waves will readily penetrate Bowling Green Bay. The small townships of Cungulla and Jerona will be affected.

The Bowling Green Bay Ramsar-listed wetlands of international importance (<https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/ramsar-wetland-bowling-green-bay/>) will also be impacted. How the Bay will be affected by changed exposure resulting from degradation of the Cape is not known, and there is no current study of this.

FACTORS CONTRIBUTING EROSION

There are several possible contributors to this developing breaching of Cape Bowling Green. The two main ones, that could both contribute to the erosion problem, are:

- 1) the Burdekin Falls Dam that is trapping the riverine sand that is needed to maintain Cape Bowling Green. (The Broken/Bowen catchment is located below the Burdekin Falls dam and it is now the only source of coarse sandy sediment for the Burdekin River; the Urannah Dam in that river will stop the sand reaching the Burdekin River, thus it will accelerate coastal erosion. Further, raising the Burdekin Falls Dam will reduce river peak flows, thus preventing the sand to reach the coast).
- 2) changing winds and sea levels at the coast, as is shown in the figure below.



It appears that the **number of days of moderate to strong SE winds** has increased significantly over the last 2 decades. (The SE winds drive waves that cause erosion along the peninsula; this erosion is further accelerated by rising sea levels at the coast).

The wind data are freely available on the AIMS web page (<https://weather.aims.gov.au/#/overview>), and the sea level data at the PMSL web page (<https://www.psml.org/data/obtaining/stations/637.php>).

Prevention is better than a cure. Remediation measures are needed to prevent Cape Bowling Green from breaching. Presumably that could include rock groynes like in Townsville and/or replenishing beach sand by pumping sand from offshore like at the Gold Coast, or even pumping sand out of the lower Burdekin River to put it at the coast (this would also alleviate the increased flooding risk for Ayr and Home Hill as the river bed there has silted since the Burdekin Falls dam was built).

At the same time, at the local scale, measures to prevent dune erosion by quad bikes are urgently needed.

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