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Opinion

Threats to Biodiversity in Australia's Burdekin River Basin

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Opinion

The Murray-Darling basin in Australia (Figure 1) is a prime example of a whole river basin suffering from environmental degradation from historical, haphazard developments without integrated planning [1]. A similar scenario is developing for the Burdekin River basin in North Queensland.

The average flow of the Burdekin River is over 40% that of the Murray-Darling. The only existing large dam on the river is the Burdekin Falls Dam, constructed in 1998; it traps 88% of the watershed. It provides irrigation water for irrigated sugar farms in the lower Burdekin. For the environment and biodiversity, the key issues from dams are the impact on the river, the coast, and the Great Barrier Reef of the dams interfering with the sediment loads and the runoff from fertilized irrigated farms. There are currently business case studies for raising by 2m the Burdekin Falls Dam, and for three new dams (Figure 1): Hells Gates Dam, Urannah Dam, and the Big Rocks Weir. The Hells Gates and the Urannah dams would double the existing extraction of water for irrigation.

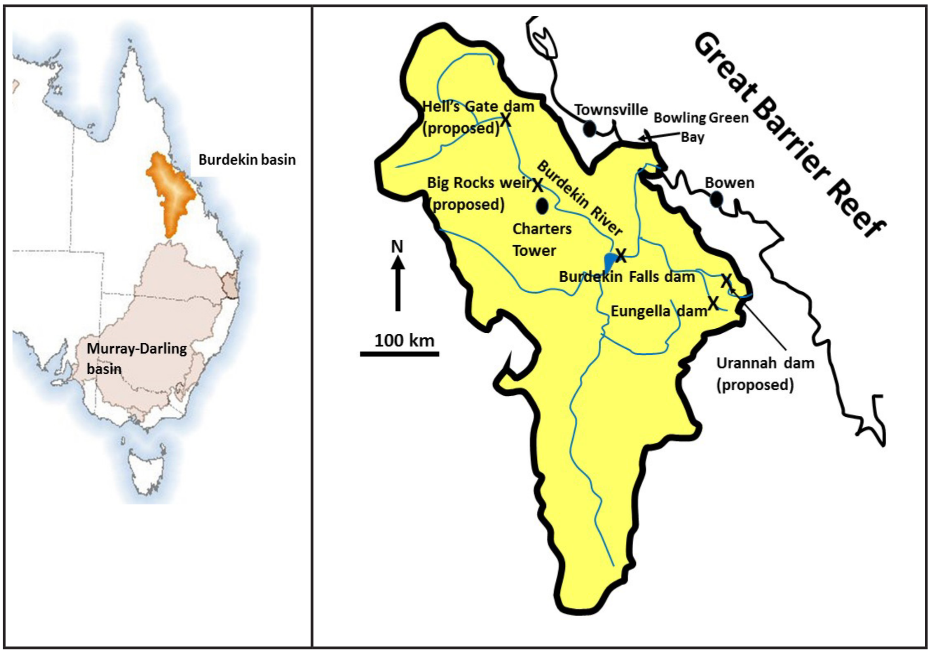

Figure 1: (Left). A location map of the Murray-Darling and the Burdekin River basins in Australia. (Right). A map of the Burdekin River basin showing the drainage pattern and the dams and weirs.

The EIS for the Burdekin Falls dam predicted that the dam would have good water clarity and would even improve the clarity of the 159km of river downstream of the dam to the coast. However, in reality the water behind the dam and all along the river downstream is almost permanently turbid due to limited settling of the suspended colloidal sediment trapped in the reservoir [2,3]. The proposed Hells Gates Dam will likely degrade the river similarly for a further 270km. This turbidity affects all aquatic life in the river, including the vegetation, fish spawning and migration and ability to find food.

During floods, the Burdekin River carries large quantities of sand [4]. The Burdekin Falls dam captures 95-98% of the sand that comes in the reservoir, i.e., from 88% of the catchment [5]. The only other sand now carried by the Burdekin River comes from the small Bowen/Broken tributaries downstream of the dam [6]. Some of that sand will similarly be trapped in the reservoir if the Urannah dam is built. All that sand is needed on the coast to maintain Cape Bowling Green, an 11km long sand peninsula that protects Bowling Green (Figure 2). This peninsula is maintained by a balance between new sand coming in with Burdekin River floods and sand eroded away from the coast by waves and currents all year long [7,8]. The Burdekin Falls dam is depriving the coast of new sediment. Satellite and aerial photographs reveal that the peninsula is eroding away and that it is likely to breach possibly within 10-15 years. This will likely affect the Ramsar-listed wetlands in Bowling Green Bay. These wetlands protect resident and migratory birds, and they are also a breeding ground for popular fishing species such as the 'mangrove jack' and 'barramundi', and the bay also protects endangered species of turtle, dugong and juvenile black marlin fish [9-11]. All this marine life will likely be affected if the Cape Bowling Green peninsula is breached.

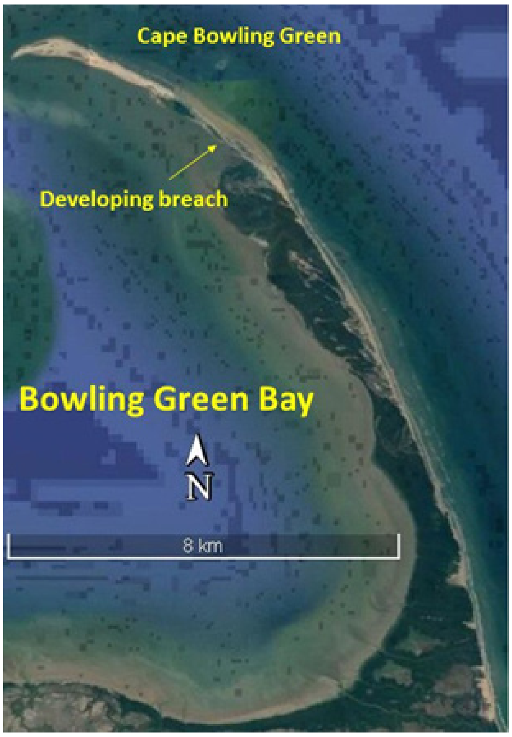

Figure 2: A Google Earth view of Cape Bowling Green peninsula showing the location of the developing breach. Much of the wetlands inside Bowling Green Bay is Ramsar-listed.

Recent research has correlated large flood events of the Burdekin, and their nutrients (from fertilizers), with coral-eating Crown-of-Thorns Starfish outbreaks in the Great Barrier Reef [12]. Increased irrigation and increased use of agricultural chemicals made possible by new dams in the Burdekin basin will accelerate the degradation of the Great Barrier Reef.

Water allocation for irrigation is a key socio-economic and environmental issue [13]. There are three mainly sugar cane in three irrigation areas in the lower Burdekin: the Burdekin Irrigation Area, the Burdekin Haughton Water System Scheme, and the Delta. This water has caused the water table, and with it salinization, to rise from 10m to at some sites 2m below the surface in the last 20 years. Continued rise will undermine the agricultural productivity of the whole area. Polluted (by fine sediment, NOx, and pesticides) water from the irrigation areas drains into the wetlands of Bowling Green Bay and threatens their ecological functioning [14].

Are there solutions to all these problems from new dams so that the Burdekin basin does not become the Murray-Darling of the North? The irrigation system in the Lower Burdekin is a basic open channel system. Irrigation rates could be significantly reduced in some area by restructuring the architecture of the irrigation system [15]. The cost would be 2000-8000/ha or something approaching $300 M for the whole area. This is small in comparison the projected cost for raising the Burdekin Falls Dam of $1-2B. In addition, reducing water use would create about the same amount of water, 150,000ML, as raising that dam by 2m. This should be seen not just as a re-guard action to prevent the salination of the area, but as an investment to create a highly modern and efficient irrigated agriculture. The reduction in water would be accompanied by reduction in agricultural chemicals, and thus a better compliance with regulations protecting the Great Barrier Reef. For protecting Cape Bowling Green and Bowling Green Bay, one can be pro-active and invest in erosion protection measures such as sand replenishment.

Mechanisms for the management the Burdekin Basin remain inadequate and haphazard. For example, the Queensland Coordinator General will assess the proposals for the four new dams in isolation, with no assessment of the cumulative effect-this is duplicating the mistakes done when developing the Murray-Darling basin. The Burdekin Water Management Plan can proscribe each user the volume of water that they can extract but it places no requirements on water quality and sediment loads and their impacts on Ramsar-listed sites and the Great Barrier Reef. All these haphazard development plans for the Burdekin will likely lead to its degradation, just like that of the Murray-Darling. A shift is needed when planning the future of Australia's river systems. One need to invest in infrastructure that is smart and efficient, that will reduce excess and waste of our limited water resources, and to sustainably manage the whole river basin as an ecosystem that includes the river system, the Great Barrier Reef, and the Bowling Green Bay Ramsar site.

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