

# STATE OF THE ENVIRONMENT

## Researchers wave red flag: floods pushed some KZN coastal environments to tipping point

*Scientists have raised the red flag that multiple KwaZulu-Natal coastal ecosystems are collapsing. The warning comes on the back of the province's first State of the Coast Report (SoCR), released late last year, which brought the "dismal" state of many systems to light. According to authors, recent extreme weather may have pushed many ecosystems to their tipping points and beyond, to new, altered reference states which may not provide the required goods and services anymore. Petro Kotzé reports.*



At stake is the roughly 580 km-long coastal strip from the Mozambican border in the north, to the uMthavuna River that borders the Eastern Cape in the south. The area is one of the country's richest environmental treasures, a major contributor to the economy, is scattered with dense urban populations, and a tourism hotspot.

### **The garden province's unravelling coastal border**

The SoCR is a statutory requirement and should provide decision-makers with relevant data and information about the state of the province's coast. Bronwyn Goble, Senior Scientist at Oceanographic Research Institute (ORI) and the KwaZulu-Natal SoCR editor, explains that coastal issues were previously broadly reported on in a subsection of the State of the Environment Report at provincial and national levels.

Now, the Integrated Coastal Management (ICM) Act calls for a report dedicated to the state of South Africa's coastal environment. It sets the baseline of where we are, she says. The documents identify emerging problems and guide management actions such as conservation, development planning, and legislation, in support of sustainable targets for development. The reports are to be published every four years and will, hopefully, address the progress of change, she says.

The KwaZulu-Natal SoCR provides an overview of six main ecosystems: coastal, estuarine, marine, human, economic and governance environments. It also describes the drivers of change, pressures, the current state and potential impacts on each ecosystem. The researchers also suggest key response actions for each ecosystem. "We tried to highlight actions that

government could reasonably put in place," Goble says.

The report builds on the most recent National Biodiversity Assessment which, in 2019, already highlighted several relevant concerns. For one, the assessment found estuaries in KwaZulu-Natal (with those along the Cape west coast) as the country's most threatened and to be prioritised for interventions.

Furthermore, this assessment highlighted the increasing rate of habitat loss linked to new developments along the KwaZulu-Natal coast and adjacent interior. Other mentions relevant to the province included the concentration of threatened amphibians along the east coast; threatened reptiles along the north coast; its critically endangered freshwater lakes, including Lake Sibayi, the country's largest at 8 400 ha; and, the rampant invasive plant diversity along the coastline.

Several impacts related to mining were also mentioned in the 2019 assessment. This included the increase of sand mining as a result of poor compliance, and the enormous demand for building material. This was further facilitated by freshwater draw-down from water abstraction to support agriculture, which exposes riverbeds, making these far easier to mine. Among others, this was causing large-scale sand movement downstream, with new sand deposits smothering the burrows of sandprawns (*Callichirus kraussii*), an important bait species. Other far-reaching effects included sediment supply disruption to beaches and the marine environment, the smothering of species, physiological changes to species and ecological changes to the coastal/marine system, explains Fiona MacKay, Senior Scientist at the ORI and a co-author of the SoCR.

Various social impacts were also reported in the NBA, such as limited accessibility to coastal systems because of mining machinery and infrastructure and accidents in mined pits. Increasing fishing pressure on estuaries was also being exacerbated by the effective open access to resources that

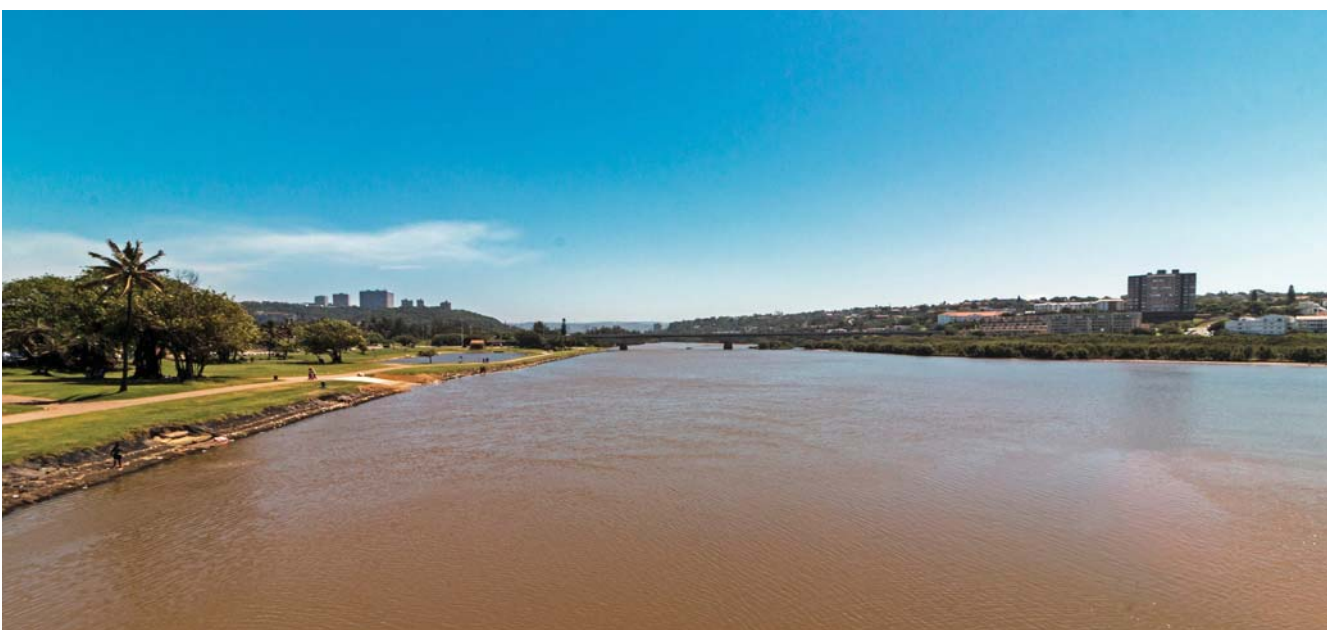
had arisen with the apparent collapse of fisheries compliance in KwaZulu-Natal.

"What was highlighted in the NBA for our province was dire," says MacKay "but since 2019 we've just further degenerated – as shown in the [latest] SoCR." The warnings do not seem to have been heeded and have continued on a downward trajectory, some systems reporting the worst health conditions ever reported, she notes. The SoCR authors highlight challenges in the way of improvement including a lack of collaboration across government departments, a lack of political buy-in, a lack of support for environmental concerns, a general aversion to the message emanating from scientific data and a hesitance to take responsibility or admit the scale of the disaster.

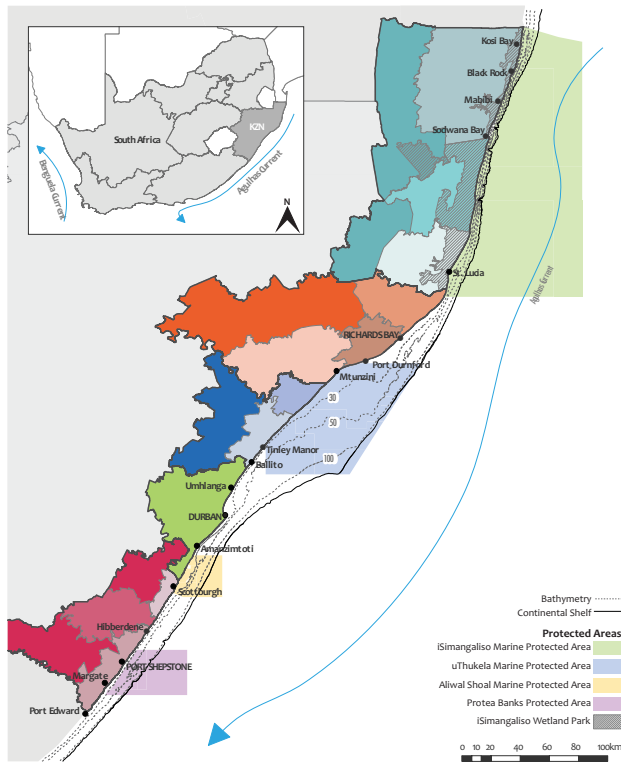
Already, the fragile state of the KwaZulu-Natal coast has been emphasised by a series of social upheavals. These include the COVID-19 pandemic and associated major lockdowns that swept over South Africa and the rest of the world over the last few years. The province was also rocked by violent riots in 2021 that resulted in severe damage to infrastructure and the interruption of basic services for months, adding pressure on wastewater treatment works, many already teetering on the brink.

Over and above these pressures, chronic sewage and various pollution spills, freshwater flow manipulation, invasive alien animals and plants, sand mining leading to general habitat degradation and poor water quality have all left devastating marks on the environment.

The culmination of these pressures are highlighted in the SoCR. Overall, the state of the KwaZulu-Natal coast is considered concerning, with 23 of the 35 sub-systems identified as being in a moderate state and 11 in a poor state. The overall trend shows a "dismal trajectory", with 18 sub-systems in a declining trend, 12 considered stable and only one, Marine Protected Areas, showing improvement. One of the main crosscutting environmental



*KwaZulu-Natal estuaries such as uMngeni have been impacted increasingly by anthropogenic pressures.*



Map of the KwaZulu-Natal coast.

threats identified was pollution and sewage treatment, and one that morphed over the last 30 years from a relatively minor pressure on the KwaZulu-Natal coast to a grave concern.

More threats include climate change, coastal sand mining, oil and gas exploration and changes in human settlements. In addition, water quality concerns, new diseases largely through aquaculture, and mining in the Estuarine Functional Zone (EFZ) have been identified as emerging concerns.

Of the coastal environments reported on, sandy and rocky shores were found to be in a moderate state, but declining. Swamp forests, coastal lakes, wetlands and vegetation were all found to be in a poor state, and declining. All estuarine environments, which included estuaries, mangroves and submerged macrophytes were also found to be in a poor state and declining. The report states that estuaries along the entire coast are under extreme threat and are being affected by bacteriological contamination. Sewerage infrastructure failures have resulted in repeated and prolonged raw sewage overflows into many systems over years, including the iKongeni Estuary (Margate), Durban Bay and uMngeni Estuary with the consequent closure of swimming beaches. The authors reported that direct consequences for human health, livelihoods and economies were already clearly emerging.

Of the marine environments assessed, coral reefs were found to be in a moderate state, but in decline, while rocky reefs and the pelagic environment were in a stable, moderate state. Soft sediments were in a moderate state but declining.

In April, a cut-off low system that swept over the province resulted in exceptionally heavy rainfall and the worst floods in living memory. More than 400 people died in

floods and landslides that displaced over 40 000 people, destroyed thousands of houses, and severely damaged other infrastructures like roads, health centres, schools, and ports. Only a month later, in May, more devastating rainfall, flooding and mudslides left thousands more homeless in the northeastern parts of the province.

“It was the last straw,” Mackay says. “We were already on a trajectory of collapse but now we are looking at collapsed.” We’ve probably pushed some systems beyond the tipping point, she says. One example of systems particularly at stake are estuaries, which are highly vulnerable to change and multiple human-induced pressures. However, a tipping point does not only refer to coastal ecosystems, but also to the greater socio-ecological system. Coastal communities are feeling the loss of basic resources like continuous water supply, loss of infrastructure and facilities. Due to the contamination of many beaches in eThekweni serially and continuously for months at a time, the use of the coast for recreation and cultural activities is also being lost.

### Forward, beyond the brink

Already before the floods, the KwaZulu-Natal SoCR stresses that the findings must lead to action. Over and above, the recommended actions in the report are very simple, Goble explains. “We’ve distilled it down to simple, achievable things,” she says.

Key actions to curb pollution, for example, include improving the development and maintenance of sewage. The Green Drop programme must be reinstated to ensure systems are in place to monitor wastewater works. Regular, systematic monitoring of receiving waters must be conducted. Marine laboratory capability must be improved. There must be a paradigm shift regarding the ways in which solid waste is generated and disposed of.

For estuaries, compliance and enforcement of legislation must be improved. Estuarine flow requirements must be prioritised. Discharges to estuaries should comply with the provisions of the ICM and the National Water Acts. Authorities need to ensure that those 70% of the province’s estuaries without formal management plans, must get them. Existing protocols, legislation and policies must be enforced – including the Protocol for Requests to Breach Estuary Mouths in KwaZulu-Natal: Mouth Maintenance Management Plans, the EFZs and Coastal Management Lines (CMLs) and water quality monitoring under the National Estuarine Monitoring Programme.

In general, the areas to focus on are, first, governance. “Human and financial resources are critically needed to improve coastal management and the management of critical ecosystems within KwaZulu-Natal.” Second, awareness, education and knowledge sharing are critically important to improving the overall understanding of the value of the coastal environment, its ecosystems and resources. Last, the researchers write that planning for future risk through the determination and enforcement of CMLs for the coast and estuaries is imperative in reducing risk to infrastructure and properties.

However, mere months after the above was published, they now heed that though some of the damage can be reversed,

some systems will not recover for possibly decades. "We need to evolve and refocus our science into restoration and promote ecosystem-based adaptation very quickly." They need absolute urgent action, MacKay says, and the action is no longer saving the systems, but rather, that some of those systems must be restored because they are no longer fulfilling critical ecosystem functions.

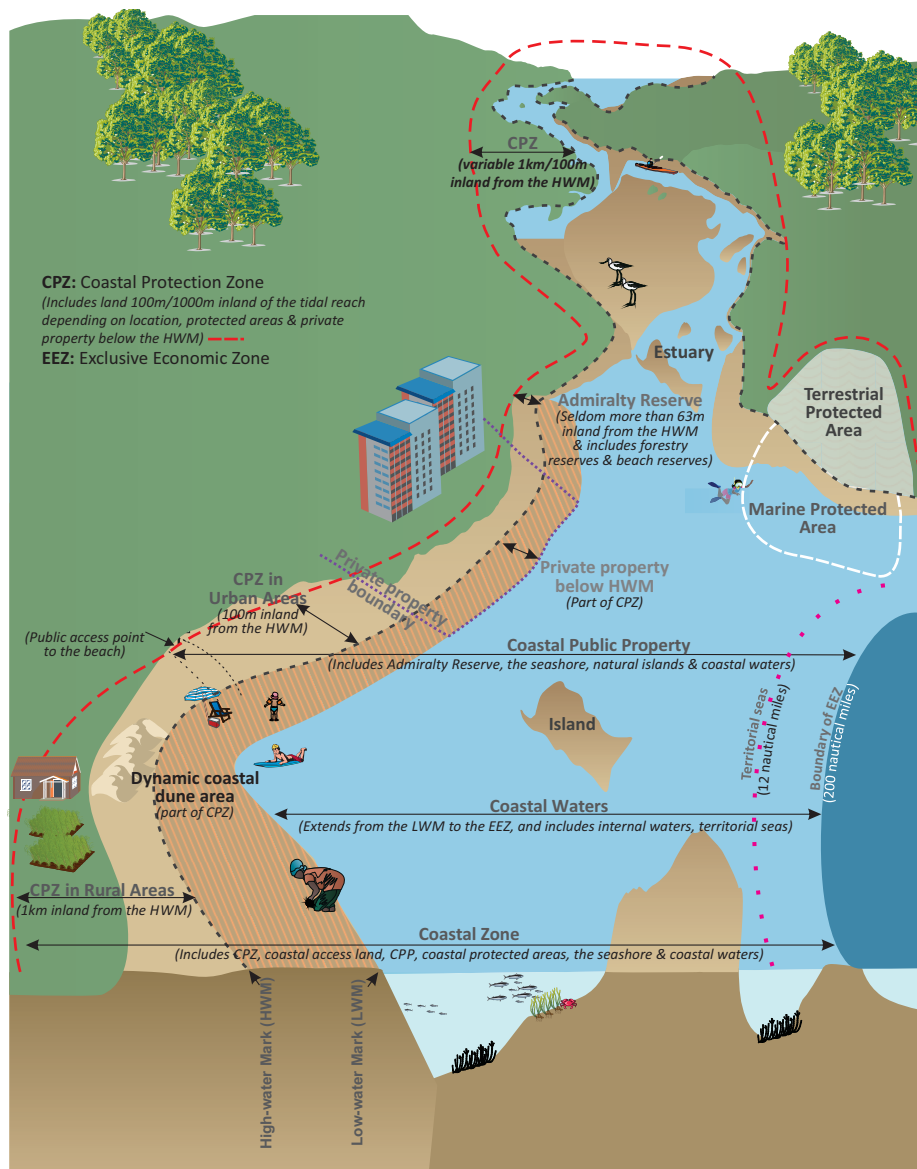
**Ignorance at our own peril**

Although it seems dismal, MacKay says there is a positive spin-off in that we should be learning from this. What is happening in KwaZulu-Natal should be a red flag globally, she says. For example, in 2005, the Millennium Ecosystem Assessment stated that coastal ecosystems are among the most productive in the world, but the most threatened by human settlement. According to estimates published in the report, about one third of coastal mangrove forests and one fifth of coral reefs had already been lost, while many fish populations have declined and estuaries and wetlands are under increased pressure from domestic and industrial waste.

Heed, and act on the red flags early on, MacKay says, because once they are compounded, you cannot easily stop and manage for the myriad of consequences.

**References:**

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Summary of the Coastal Zone.