



Review of the Climate Risk Atlas of Coastal Hazards and Risk in Negril

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April 2016

This document contains the professional opinion of the Jamaica Environment Trust (JET). In arriving at our opinion we made every reasonable attempt to ensure that our resource persons are informed and reliable and experts in the area in which their comment and analysis is sought. JET encourages readers to apply their own critical analysis to the information provided in this document and by others, particularly where JET's opinion differs from those others.

The Jamaica Environment Trust (JET) was asked by the Planning Institute of Jamaica (PIOJ), the National Implementing Entity for the GOJ/Adaptation Fund Programme (GOJ/AFP) to review the Climate Risk Atlas of Coastal Hazards and Risks in Negril, Jamaica on April 5th, 2016. JET sought expert advice from the Environmental Law Alliance Worldwide (ELAW), with whom we have had a long-standing partnership. ELAW provides legal and scientific advice from experts to members of the alliance. Our review follows:

In general, the objective of the Climate Risk Atlas of Coastal Hazards and Risks in Negril (hereinafter referred to as the Negril Risk Atlas or Atlas) seems to be to maintain and protect tourism in the area, although it is not clearly stated. There is no detailed adaptation strategy provided in the document, though adaptation will surely need to occur. Questionable assertions are made; for example – the main cause of beach erosion in Negril is said to be “hurricane induced storm surges” and the erosion is treated as if it is equal along the length of the beach, which it is not. But the loss of beach started in the 1960s when hurricane activity was low and Page 62-65 describes all the factors leading to beach erosion, none of which are storm surge or sea level rise. The series of images from Page 60 are very telling – every one shows significant removal of vegetation and drainage interruption. Loss of sand dunes is also mentioned in the descriptions.

The Atlas focuses overwhelmingly on storms, storm surge and sea level rise. The values for sea level rise used in the Atlas are conservative and taken from old studies (2007): there are more recent projections that should be used.

The description of the development trajectory says virtually nothing about the development mistakes which continue to this day and render Negril that much more vulnerable to climate impacts. The Atlas presumes the solution to the many issues in Negril is breakwaters and discusses no other approach. The objectives for the breakwaters are not well-articulated. Finally, the restoration plans are not defined with regard to resiliency for the region, or really at all.

Negril is a beach barrier system consisting of three “pocket” beaches – Bloody Bay, Long Bay North and Long Bay South. Bloody Bay and Long Bay are separated by the limestone promontory at Point Village. While Long Bay might look like one long beach, the reef in the middle makes it function like two pocket beaches, promoting beach accretion in its lee and trapping sediment that is transported from other parts of the beach. The characteristics of pocket beaches are that the sand is stable and there is little exchange with other areas. Once the “sand budget” is depleted or trapped in a pocket beach, it is very hard for the beach to return. This is what has happened in Negril.

Beach erosion is a human concept: land loss only exists from the perspective of land-based development – a barrier beach system will move in response to the wave climate, large storms and changes in sediment supply. Prof Ted Robinson’s work has shown that the Negril Beach has been moving landward for many decades. Tourism development, however, has stopped this natural movement, solidifying a shoreline that was inherently dynamic. The Norman Manley Boulevard acts as a barrier between the beach and the Negril Morass, which has influenced both surface and ground water flow as well as sediment movements. The hotels have changed the sediment pathways along the coast. Negril Beach is now a “stranded” beach with insufficient replenishment of sand after storms and other depletion

events. The Negril Beach is suffering from “coastal squeeze:” the beach is being squeezed between the ocean and the hard structures of buildings and hotels and is no longer functioning as a natural system. Unfortunately, once the coastal infrastructure is in place, managers are locked into maintaining it, with increasingly greater effort, time, money, and resource commitments required.

Prof. Robinson’s work described a “cool” spot behind the reef – where the breakwaters are planned – where sand is accreting. He identified two “hot” spots to north and south, where sand is depleting. The breakwaters will work to trap sand in the “cool” area, but this will come at the expense of sand which is drawn from the north and south “hot” spots. So the breakwaters will work to accrete more sand where it is wider, and deplete the areas where it is already depleted and narrowing. Put another way, the available sand may build up in the middle of Long Bay behind the breakwaters but this is already occurring.

These types of breakwaters are often used in tourist areas because they are not emergent and therefore not considered to have aesthetic impacts. They do not, however, work very well to protect entire beaches and very often, when stakeholders see “hot” spots with sand building up in one area but not others, the response is to extend and expand the breakwaters, which leads to even greater erosion in the areas not “shadowed” by the breakwaters.

These types of breakwaters are most effective where there is a small tidal range (this is true in Jamaica) and where there are no hurricanes with large storm surges (not true in Jamaica). **They are not particularly effective in reducing or preventing storm surge and in fact, the protection afforded the coast by the addition of these breakwaters amounts to a difference of fewer than 10 centimeters.**¹ Necessarily, they will become even less effective as sea levels rise.

With regard to the risks of the breakwaters’ rock armor being dislodged in a storm, the smaller the rock, the greater the risk. If rocks do move in a storm, it will tend to be onshore. Bigger, more stable rock are more expensive, so there is always the risk that smaller rock will be used to save costs. Given the weaknesses of environmental monitoring and enforcement in Jamaica, this is a very real risk which is not discussed.

Much more work needs to be done to understand how the Negril beach system actually works and what the overall restoration objectives are. Perhaps a wide beach cannot be restored to all areas. Nourishment will replace some of the lost sediment, but the beach will have to be repeatedly nourished unless the cause of the erosion is addressed. Given the realities of climate change, a depleted beach which requires nourishment might be the unavoidable cost of having a hotel on a beach. Perhaps some of the hard structures now on Negril Beach will have to be moved. Seagrass restoration could be a benefit to beach stability but is extremely difficult to do, especially in areas with constant re-nourishment requirements. **There should be no further dredging (of the river or coast) or removal of sand from the area as these activities work to retard or prevent long term restoration.**

¹ Office of Disaster Preparedness and Emergency Management, (2015). Climate Risk Atlas. Produced for the Enhancing the Resilience of the Agriculture Sector and Coastal Areas to Protect Livelihoods and improve Food Security Project/Programme. P. 41

The breakwaters as designed might provide a short term solution for the area of the beach that needs it least, without addressing the most severe, long-term, erosion problems which could even be exacerbated.

The recommendations appear to facilitate maintaining the status quo and focused on monitoring and involving stakeholders. This plan as it currently exists will not enable successful ecological restoration or nearshore habitat protection, nor will the solutions proposed adequately protect the area from the long term impacts of climate change, including erosion, sea level rise, and storm surge.

In summary, the Negril Risk Atlas is not a holistic approach to climate adaptation but it does provide valuable information on hazards and vulnerability that will be very useful in developing adaptation strategies. It is over focused on justifying the use of breakwaters, does not adequately consider other solutions or approaches, does not adequately analyze the reasons for beach erosion in Negril, does not fully describe this complex ecosystem, and uses very conservative sea level rise estimates.

Jamaica Environment Trust

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