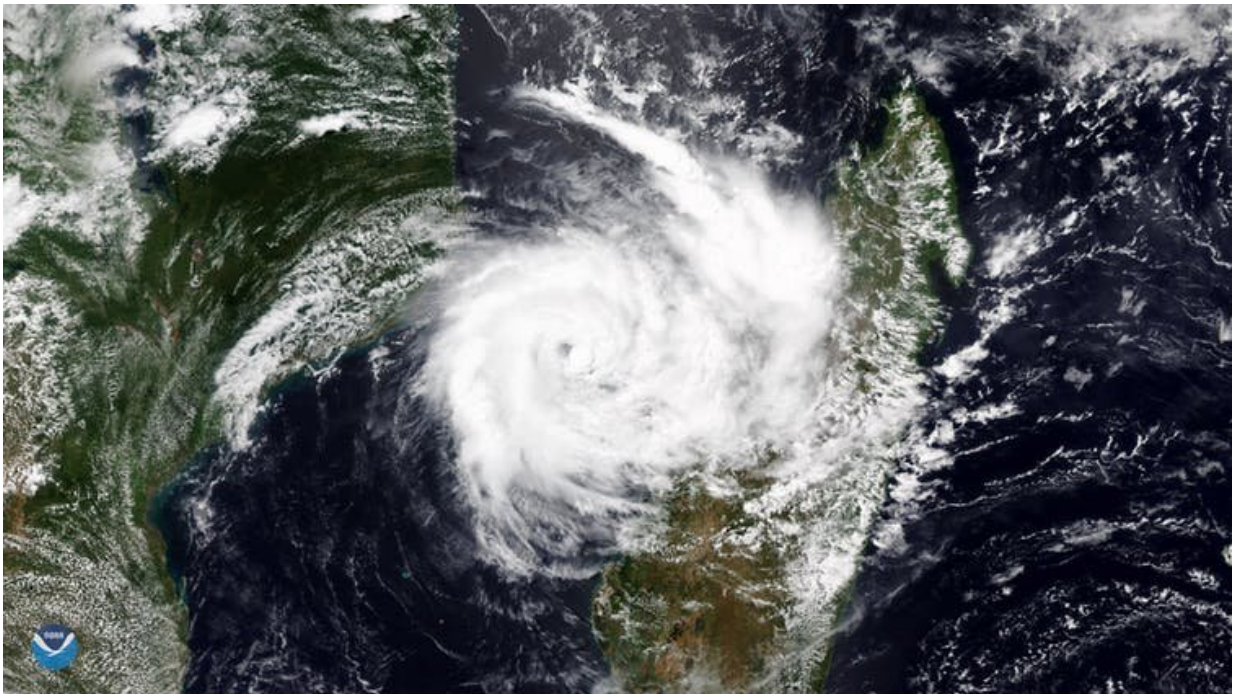


Hurricanes to deliver a bigger punch to coasts

March 21 2019, by Ryan P. Mulligan



Tropical cyclone Idai rapidly strengthened to a category 3 storm in the warm waters between Mozambique and Madagascar. Credit: NOAA

When tropical cyclone Idai made landfall near Beira, Mozambique on March 14, a spokesperson for the UN World Meteorological Organization called it possibly the [the worst weather-related disaster to hit the southern hemisphere.](#)

This [massive and horrifying storm](#) caused catastrophic flooding and widespread destruction of buildings and roads in Mozambique, Zimbabwe and Malawi. Mozambique's President Filipe Nyusi feared the [death toll might rise to more than 1,000](#) people.

Cyclones, also known as hurricanes or typhoons, are intense wind storms that can take thousands of lives and cause billions of dollars in damage. They generate [large ocean waves](#) and raise water levels by creating a [storm surge](#). The combined effects cause [coastal erosion](#), flooding and damage to anything in its path.

Although other storms have hit this African coast in the past, the [storm track for cyclone Idai is fairly rare](#). Warmer-than-usual sea-surface temperatures were directly linked to the [unusually high number of five storms](#) near Madagascar and Mozambique in 2000, including [tropical cyclone Eline](#). Warmer [ocean](#) temperatures could also be behind the intensity of cyclone Idai, as the [temperature of the Indian Ocean is 2 C to 3 C above](#) the long-term average.

[Climate change and ocean warming](#) may be linked to the increasing intensity of storms making landfall and to the development of strong hurricanes reaching places not affected in recent history. These regions may not be prepared with the coastal infrastructure to withstand the extreme forces of these storms.

The role of climate change

Scientists are working to improve their forecasts for [hurricane winds](#) and [waves](#), and research on [ocean and atmosphere interactions](#) is boosting our understanding of the relationship between climate and the formation of hurricanes. Still, there is considerable uncertainty in predicting trends in extreme weather conditions 100 years into the future. Some computer simulations suggest possible changes in these storms due to [climate](#)

[change](#).

For example, scientists have computed detailed simulations of hurricane-type storms for future climate-warming scenarios and revealed that in some cases the [hurricane season could be longer](#). The [intensity of storms could also increase](#) so that there are more [major hurricanes](#) (categories 4 and 5 on the [Saffir-Simpson scale](#)) with winds reaching speeds greater than 209 km/h.

Since these storms are fuelled by ocean heat, warmer ocean conditions will influence their intensity and longevity. This may enable them to travel further over ocean water at higher latitudes, and further across the continent after they make landfall.

With global sea level rise expected to continue to accelerate through the 21st century, the impacts of [coastal flooding from tropical cyclones](#) is also expected to worsen.

Atlantic hurricanes

On the Atlantic coast of North America, the hurricane season starts in June and runs to November. We have very recent reminders that these storms can be catastrophic. [Hurricane Maria](#), which struck Puerto Rico in 2017, caused infrastructure [damage of US\\$90 billion](#) and may have [killed more than 4,600 people](#).

Urban areas can take weeks or months to recover from the flooding caused by the storm surge, which can be compounded by heavy rainfall. When the category 4 [hurricane Harvey](#) hit Houston in 2017, it caused [US\\$125 billion](#) in damage, mostly due to flooding in the metropolitan area.



Hurricane Isabel made landfall on North Carolina's Outer Banks on Sept. 18, 2003. Its effects were felt as far as western New England and into the eastern Great Lakes. Credit: NASA

Hurricanes that reach places that historically have not been affected have major and long-lasting impacts. An example is hurricane Sandy in 2012, the largest storm on record in the Atlantic Ocean. This storm made a westward turn that is [very different from typical](#) tropical hurricane tracks.

Its waves and storm surge [pounded the coasts of New Jersey and New York](#), with a huge impact [washing over coastal dunes](#), [eroding beaches](#) and causing [flooding in New York City](#).

It also had a major economic impact, costing [US\\$71 billion](#) with long-term effects on the [coastal environment](#) and lasting [socioeconomic](#) impacts in a densely populated area.

Damage to coasts

Hurricanes can cause severe erosion and breach islands, creating new pathways for water flow between the ocean and back-barrier estuaries. As these storms impact land, they can also create a [dangerous multi-hazard environment](#) of fast-moving air, water and debris.

Urban coastal areas are under a major threat, since coastal structures may not have been designed for the waves and surges that these storms generate. Hurricane Katrina, the mega-disaster that took more than [1,200 lives](#) and cost [US\\$161 billion](#) in 2005, taught engineers the hard way that [hurricanes can cause unanticipated loads](#) on bridges, buildings and coastal structures.

The amount of damage a hurricane creates depends on the intensity and characteristics of the storm, combined with the physical and social setting of the coastal area that it hits. Cities face a high risk of [hurricane](#)-related disasters, since they contain higher populations and more infrastructure. This can lead to widespread and catastrophic impacts, such as the massive [storm surge](#) and flooding generated by [typhoon Haiyan](#), which led to [more than 6,000 deaths](#) in the Philippines in 2013.

Future Impacts

Regardless of changes to the climatic conditions that cause hurricanes to form and intensify, the fact is that these storms already occur frequently. Each year, [80 to 100 tropical storms occur globally. Of these, 40 to 50 are hurricanes, with 10 to 15 classified as major hurricanes.](#)

Climate change projections suggest the [number of intense hurricanes will rise](#). Ocean warming will enable these storms to travel further, and we may see greater [hurricane](#) impacts on coasts in the future.

This could include more storm strikes to northern coasts in places like Atlantic Canada, where [hurricane Juan made landfall](#) in 2003.

We may also see more hurricanes reaching large inland lakes such as the Great Lakes, affecting major cities like Toronto and Chicago. Rare events, such as [hurricane Ophelia that hit Ireland](#) in 2017, may become more common.

When we build houses, roads and bridges and increase population density in low-lying coastal areas, we walk a fine line if these coastal regions are not prepared for the ferocity of extreme storms in the future.

This article is republished from [The Conversation](#) under a Creative Commons license. Read the [original article](#).

Provided by The Conversation

Citation: Hurricanes to deliver a bigger punch to coasts (2019, March 21) retrieved 23 April 2024 from <https://phys.org/news/2019-03-hurricanes-bigger-coasts.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.