

CYCLONE AMPHAN: A GRIM SNAPSHOT OF INDIA'S CLIMATE CHANGE FUTURE

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

Fuelled by climate change, Cyclone Amphan tore through the Sunderbans and devastated Kolkata. What lessons should we learn from this extreme event?

When it developed in the southern Bay of Bengal on 13 May, the storm that was going to become cyclone Amphan was a low pressure system. It travelled north from a point a couple of hundred kilometres east of Colombo, Sri Lanka, seeking warmer waters, gathering power. The India Meteorological Department (IMD) issued its first warning the same day, predicting that it would intensify into a cyclone by the evening of 16 May.

That is exactly what happened. The storm deepened into a depression and by the evening of 16 May, into cyclone Amphan. Climate change added a twist to the tale. It was predicted that the storm would develop into an extremely severe cyclonic storm (ESCS) by 19 May, with wind speeds of 90 knots (166 kmph). That would have been the equivalent of a Category 2 hurricane on the Saffir-Simpson scale. Instead, by the morning of 18 May, Amphan had intensified into a super cyclone with wind speeds of up to 240 kmph. In under 24 hours, its wind speed had gone from 65 knots to 125 knots.

To climate scientist Roxy Mathew Koll at the Indian Institute of Tropical Meteorology (IITM) in Pune, the answer lay in a marine heatwave sweeping through parts of the Bay of Bengal. "Cyclones keep evolving based on where the warm waters are. We observed some of the highest surface temperatures recorded by weather buoys installed in the Bay of Bengal, with unprecedented values of 32-34 degrees Celsius, just before the cyclone," he says. Koll says normal surface temperatures at this time of the year are 29-30 degrees Celsius. But the marine heatwave led to a rapid intensification of the cyclone into a super cyclone. "So in about 18 hours it developed from a Category 1 to a Category 5 storm with winds of up to 250 kmph. That's something unprecedented."

The heatwave also led to massive bleaching of coral reefs in the Gulf of Mannar through April and May. As last year's Intergovernmental Panel on Climate Change's Special Report On The Ocean And Cryosphere In A Changing Climate demonstrated, marine heatwaves are a result of climate change. The global ocean has absorbed 90% of the excess heat generated by greenhouse gas emissions since 1970. The rapid, devastating intensification of tropical cyclones, as well as the destructive bleaching of coral reefs, is the result. Last year's cyclone Fani, which struck Odisha in early May, had shown somewhat similar intensification, but Amphan had no peer in how rapidly it intensified.

The vulnerable delta

Cyclone Fani had exacted a devastating cost. It affected over 16.5 million people in 14 Odisha districts and the state suffered an estimated loss of 24,176 crore; 64 people were killed. From 2007-20, the Bay of Bengal basin has seen at least 15 major cyclones. Some of these, like Sidr in 2007, Aila in 2009, Phailin in 2013, Hudhud in 2014 and Bulbul in 2019, caused widespread damage in Odisha, West Bengal and Bangladesh. The main focus of most of these cyclones was the Ganga-Brahmaputra delta and the Sunderbans.

Amphan too made landfall in the Sunderbans, between Digha in West Bengal and Hatiya Island

in Bangladesh, between 2.30-6pm on 20 May. The path had been predicted definitively by IMD as early as 16 May, and according to the National Disaster Response Force (NDRF), over 500,000 people were evacuated from coastal West Bengal. The cyclone had weakened to an ESCS and was packing winds of 160-170 kmph, with wind gusts of 190 kmph. As the cyclone headed straight for Kolkata, it left a trail of devastation in its wake over the South 24 Parganas and North 24 Parganas districts: A storm surge of over 13-14ft swept through large parts of these districts and sea water inundated the land. River embankments across the Sunderbans and low-lying districts were swept away, sweetwater ponds salinated, houses and crops destroyed.

According to Sugato Hazra, director of the School of Oceanographic Studies at Jadavpur University, Kolkata, it could have been worse. "The inundation may not have been as high as with cyclone Aila because the landfall coincided with a low tide in the Sunderbans," he says. However, due to the saline water, he says, waterlogging will affect the areas for a long time.

Giriraj Amarnath, senior researcher and research group leader, water risks and development resilience, at the Colombo-based International Water Management Institute (IWMI), says that while the Sunderbans mangroves are a resilient system, and did a great job of weakening the cyclone, their ability to protect communities depends on the storm surge. "If the storm surge is 25-30ft, even the trees can get submerged," he says, adding that "the people living here will suffer the most."

As more of the Sunderbans is turned into arable land, mangrove density declines. And people are subjected to greater risks. "So the question is how much you want to develop in a region and how much you want to take the burden of human deaths and infrastructure losses," says Amarnath. "We have to revive the channels in the delta, revive the rivers in the delta, bring more freshwater so the mangroves can regenerate fast. And the people can get some freshwater. Without this the delta cannot survive," says Hazra.

While the delta took the brunt of the violence of Amphan, Kolkata wasn't spared. Over 5,000 trees were uprooted, there was large-scale flooding, electricity and water lines were down for days. The city came face to face with its climate change future as winds of 130-140 kmph battered it on the evening of 20 May.

"Kolkata is a very vulnerable city because of its density of population as well as very underdeveloped infrastructure because it's an old city. And it is a very low-lying area, it is more or less like a basin. So water cannot escape easily," says Hazra. He emphasizes that high-intensity rainfall has increased over the past decades in the city. "The city will remain flooded unless you can pump out the water. And pumping out the water will depend upon your readiness and preparedness of flood management," he says.

Amarnath holds similar views on the risks that Kolkata faces. "We don't really plant the trees that are required in an urban system. We don't allow for groundwater recharge. Our drains are still of 1m width and less. They are from British times and need to be upgraded," he says.

Rebuilding for the future

Amarnath shares high-resolution images from international disaster monitoring satellites to show the extent of flooding. As West Bengal picks up the pieces and rebuilds, detailed flooding maps like these, he says, can help chart a path of resilience. "I was looking at media sources which reported that the government of West Bengal has given an initial loss estimate of 1 trillion. How can you be sure? It can even be 2 trillion. I would say use these footprints of satellite data which show inundation and breaches, then people could estimate really where the damage has

happened, how much compensation should be given," he says. "There is a term called post-disaster need assessment. So if you do it in a detailed way, you can come up with where are the locations and what the priorities should be for recovery planning," he adds.

When it comes to cities like Kolkata, Amarnath says, "We cannot plan for today and say we can manage every disaster in the future." He suggests we make a habit of climate screening for managing land, water and ecosystem services. "Look at more bio-retention, more green infrastructure. You need to improve your water system, regulate for climate and plan for flooding mitigation," he says.

Hazra insists the mangroves need to be taken seriously; without them, such storms will hit Kolkata directly. He also says it's time the government thinks of relocating people away from vulnerable coastal areas, giving them access to other livelihood options and compensating them equitably for the move. "You cannot keep them there and go on saving them. It is better to rehabilitate them a little away from the delta margin because nearer to the coast there is higher vulnerability and risk," he adds.

In Hazra's view, India's climate policy leaves a lot to be desired. He says the country has a gender-blind climate policy, even when it's clear that it is women who suffer the most. "There's no place for the most vulnerable people in the delta. There's no place for the delta in the Indian plan. This is the most vulnerable part and you don't have an Indian plan for that." He says the government doesn't even generate gender-segregated data for communities affected by extreme climate shocks.

What is clear is that the wounds inflicted by cyclone Amphan will fester for a long while. And given the worsening climate crisis, this entire tale of devastation may be repeated later this year, or next year. There are many questions about planning, adaptation and resilience that need to be addressed right now, but, as Hazra says, such questions should be asked all the time, not just after a disaster.

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