What does the rise in extreme events in India tell us? Climate change is here and now

-- Anjal Prakash

At the starting of 2021 in February, a flash flood occurred in Chamoli District in Uttarakhand. A large mass of glaciers separated due to heavy snowfall and sudden sunny days in the glaciated region upstream leading to a huge mass of glacial rock that came down with ice, snow and rocks leading to huge and sudden devastation downstream. Some 72 people are reported killed and 200 people had been missing.

This glacial avalanche destroyed the Rishigagna Power plant and smashed the tunnels of the Tapovan-Vishnugad hydel power project. In October 2021, Nainital and adjacent districts of eastern Uttarakhand experienced extremely heavy rainfall up to 400 mm in just 24 hours leading to deluge and destructions downstream. Since 2015, there are some 7500 extreme rainfall events have been reported but the October rainfall had broken all records since 1897 when the first weather station was set up in the area.

The new IPCC report published in 2021 reiterates the past IPCC reports that clearly show that these extreme events are climate change phenomena. The first of the three-part reports of IPCC which focused on the science of climate change showed that human actions have unequivocally contributed to climate change, something which was not observed in 2000 years of recorded history of the world's climate. It also calls for urgent action as the next 2 decades are crucial for humanity as our action today will show us if we would be able to keep the earth's temperature below 1.5 degrees. Checking each fraction of warming is important as they feed into climate change affecting the lives and livelihoods of millions of people around the world.

Cyclones affecting coastal India

Apart from extreme rainfall events and glacial avalanches, another factor that is hitting India is the frequency and severity of cyclonic storms. In 2021 itself, there were six severe to extremely severe cyclones that caused devastation in coastal districts of India. To name a few, cyclone Tauktae (May), Yaas (May), Gulab (September), Shaheen (September) and now Jawad (November) which has created wide-scale devastations to lives and property. It is a no-brainer that the increased frequency and severity of these events are directly linked with very rapidly changing climatic conditions. Most of the warming of the world has been absorbed by the oceans of the world. As a result, our oceans are warmer, acidic and less productive. A warmer ocean feeds into the cyclonic systems

and due to which the number of cyclonic events is on a rise. More acidic ocean leads to them being less productive as it disturbs the natural habitats of the species living in oceans. Fish production is reported to be declining in many parts of the world. Also due to sea-level rise, the groundwater is becoming more saline. India has around 7500 km of coastline and more than 400 mn people are in these areas including some of the megacities such as Mumbai, Kolkata, and Chennai. Increased cyclonic events mean that people living in megacities and other coastal cities are more prone to climatic risks due to the concentration of population and lack of infrastructure that may guard them against these risks.

Floods in Indo-Gangetic plains

Indo-Gangetic plains are one of the most fertile lands in India and also the most populous. It produces a major portion of India's food production that is fed by Himalayan rivers such as Ganges, Yamuna and its tributaries such as Kosi, Ghagra, Gomati, Gandak etc. These Himalayan rivers are connected with the glaciers upstream. Due to global warming, the Himalayan glaciers are at a huge risk. Some estimates show that around two-thirds of the glaciers will be drying up by end of the century. Some recent reports have shown that this rate is much faster due to increased global warming. The recent IPCC report has also reiterated the fact that glacial retreat is one of the major climatic change led events that will affect huge populations in Asia including South Asia.

The glacial retreat in the Himalayas is changing the water regimes of the major rivers that originate in the region. Due to the variability of climate, the rainfall is erratic, and the number of rainy days has come down. Due to this, sudden rainfall events are observed in the entire Himalayan region in recent years that feeds into a flood. As rainfall events increase upstream, the water flows downstream flooding the rivers and surrounding areas. Huge landslides affect the infrastructure and flow of goods to the mountains as the roads get blocked. The rise of flood-related events in Tarai areas of Uttar Pradesh and North Bihar regions hits the headline every monsoon. The loss of property and lives are unaccounted for. Many people migrate to urban areas as flood events rise in these locations that keeping them in the spiral of poverty. They continue to live in inhuman habitations in urban locations.

Summing up

Climate models are showing us that the changing climatic conditions especially global warming is contributing to glacial retreats and rise in cyclonic events. Due to elevation-dependent warming, 1.5-degree warming means a couple of degrees higher for high mountains and glaciated regions such as the Himalayas. The glacial melt is feeding into the floods in the rivers originating from the Himalayan region. It also leads to the rise in sea level. In the mountain regions, it leads to drying up of springs which are the main source of drinking water for the people.

Rising cyclonic events are affecting the lives of fisherfolks as they are increasingly exposed to the associated risks. The increased runoffs contribute to flooding downstream and hugely affects the lives and livelihood of the people in the mountains. Similarly, the reduction in fish production is affecting coastal communities that are dependent on this. The mountain communities and the people living downstream are more prone to climate risks and the incidences of such climate-related disasters are increasing in the region in the past 2 decades. I see that these would greatly affect the people in the two extremely inter-connected systems – the oceans and glaciers. These regions are also home to one of the densely populated and poverty-stricken regions of the world and any small climate change will affect a large proportion of people. It's high time that we take action to adapt and mitigate so that climate change doesn't alter our lives beyond repair.

Dr Anjal Prakash is a research director at the Bharti Institute of Public Policy, Indian School of Business. He was the coordinating lead author in the IPCC's special report on oceans and cryosphere in a changing climate. Currently, he is an IPCC's lead author of the chapter on cities, settlements, and key infrastructure and a cross chapter paper on mountains as part of IPCC's 6th assessment cycle. Views expressed here are personal and do not represent the associated institutions. Dr Prakash can be contacted via email – anjal_prakash@isb.edu.

10 most expensive climate events of 2021 and their economic burden

1. Texas Winter Storm (US, $23 billion)
2. Australian floods (Australia, $2.1 billion)
3. French cold wave (France, $5.6 billion)
4. Cyclone Tauktae (India, Sri Lanka, Maldives, $1.5 billion)
5. Cyclone Yaas (India, Bangladesh $3 billion)
6. European floods (Europe, $43 billion)
7. Henan floods (China, $17.6 billion)
8. Typhoon In-fa (China, Philippines, Japan, $2 billion)
9. Hurricane Ida (US, $65 billion)
10. British Columbia floods (Canada, $7.5 billion)

These climate-related events cost $170.3 billion on the global economy. India witnessed two of these extreme climate events in 2021 which caused financial losses worth more than $1 billion, apart from loss of lives and livelihoods.

Source: Kramer, K. & Ware J. (2021) Counting the cost 2021- A year of climate breakdown, Christian Aid, UK, December 2021