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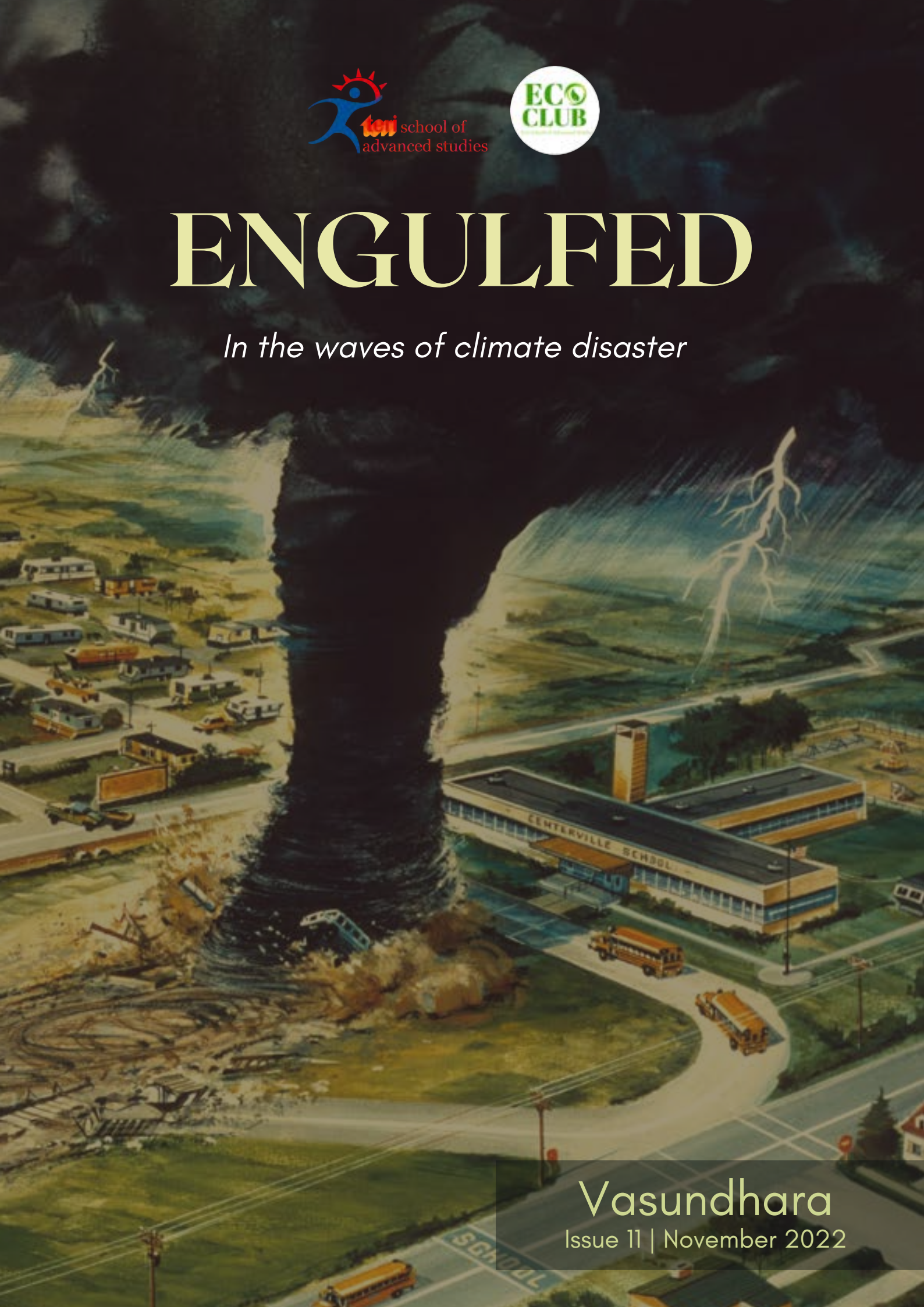
ECO CLUB

ENGULFED

In the waves of climate disaster



Vasundhara
Issue 11 | November 2022

We are elated to bring you the latest edition of Vasundhara, “Engulfed: In the Waves of Climate Disaster”. This edition explores and addresses the aspects of risk and vulnerability linked with disasters; primarily focusing on the Indian context. It comprehends the climate shock that mankind is currently facing owing to the increased anthropogenic intervention thereby disturbing the ecological balance. It tries to bring out the nuances associated with it through the lens of people of Eco Club, TERI SAS and has been essentially curated holistically. We sincerely hope that it contributes to climate education and awareness.

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In this Issue

Vasundhara

Editor's Note

Disasters are a natural phenomenon. They are nature's own healing mechanism, a medicine for recovery. Ever since the formation of the earth, they have been an integral part of the environment to reset itself. Barring some unprecedented large-scale disasters over the past years, the species of the planet have accommodated themselves in persevering through them. India is a subcontinent with five climatic zones and experiences almost all kinds of natural disasters in different regions. However, the ongoing effects of climate change are bringing about unexplained changes in weather patterns and thus initiating disasters causing major losses to human life and civilization.

We have been witness to aberrant climate disasters over the past few years - be it the large-scale cyclones on the coasts of West Bengal, Odisha, and Maharashtra or the flash floods of Uttarakhand. Rapid industrialization is causing the formation of urban heat islands, leading to heatwaves and resulting in some of the hottest summer months ever recorded in India. Although we have disaster alert systems and forecasts, it is difficult to accurately predict the dynamic nature of weather. Therefore, the close-knit role of government, organizations, and communities is required for proper disaster management and mitigation.

The current edition of Vasundhara focuses on climate disasters and their management system in India. From the recent major disasters, and resilient communities, to the task forces for disaster management, this edition aims to provide important insight to our readers and bring our focus toward this critical topic.

- **Saptarshi Kar**
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IN THE FACE OF CATASTROPHE

Climate Change has been defined as the unusual and long-term shifts in the temperature and weather patterns across the world and is a pressing concern for mankind today. Though the reasons behind such changes can be natural, however, human activities have been identified as a major driving force behind them, primarily due to the burning of fossil fuels, and other anthropogenic activities, which are a direct consequence of rapid economic development.

Excessive greenhouse gas emissions have heated up the earth's atmosphere, thus causing dramatic changes in weather patterns and disruption of nature's balance. The effects of climate change have become more pronounced over the last decade and are quite prevalent now. Apart from causing severe health hazards and economic disparity amongst the vulnerable sections of society, climate change has exposed us to greater threats from natural disasters.

India is the world's third-largest emitter of greenhouse gases and one of the most vulnerable countries to climate change. As per UN Report, natural disasters cost the country a total of $87 billion during the year 2020.

The frequency of heavy rainfall has increased over the last few years. Such abrupt changes have altered the precipitation patterns and have thereby increased the occurrence of floods and droughts. Higher than before sea surface temperature, which can be attributed to climate change, has led to destructive storms in and around the coastal areas of the country. Rising sea levels have led to increased salinity of the seawater and groundwater, thus further making the local population in the surrounding areas susceptible to health issues.

Cloudbursts in the Himalayan and the northern regions have led to flash floods and landslides, thus causing high fatalities and significant economic damage. The Uttarakhand cloudburst and subsequent flooding of 2013, displaced a huge chunk of the local population, with fatalities beyond 5000. Climate change has further aggravated the situation and has also increased the frequency of glacial lake outbursts, which further cause flash floods. The forests have become drier over the years, as a result of climate variability, causing intense forest fires which have not received much media coverage in the South Asian region. These fires contribute to GHG emissions and also lead to the destruction of our valuable carbon sinks.

With climate disasters escalating at an unprecedented rate, and due to the presence of several ecologically sensitive zones in the country, such as the Western Ghats, the Western Himalayas, the northeast, and many more, several problems are being encountered on a daily basis. These hazards have affected food security and the agriculture of the country and at the same time have been responsible for the greater vulnerability of migrants, refugees, and the displaced population.

There is an urgent need to devise policies, that will focus on enhancing the social and ecological resilience of the communities, and at the same time, take steps to increase the disaster preparedness of the country, by putting mitigating and adaptive measures in place.

Authored by Amulya Varma

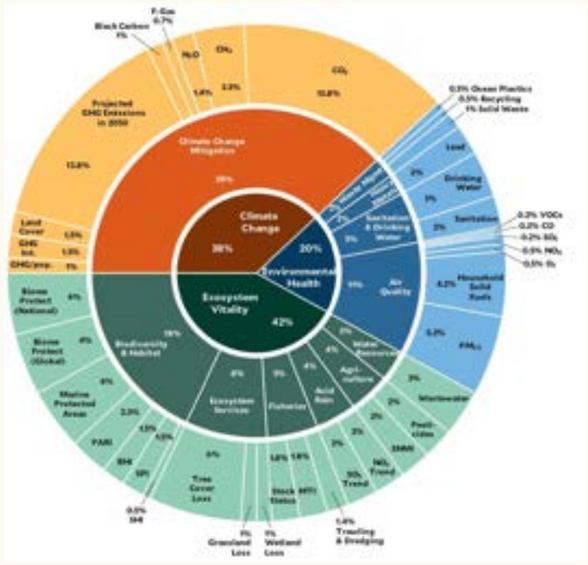
GAUGING INDIA'S STAND IN EPI

The environmental health and sustainability of nations are represented by a biennial international ranking index called the Environmental Performance Index (EPI). It was an initiative by the World Economic Forum, the Yale Center for Environmental Law and Policy, and the Columbia University Center for International Earth Science Information Network (2002).

The index is calculated using 40 performance indicators defined in terms of 11 categories, ranking 180 nations on their performance in climate change, ecosystem vitality, and environmental health. While nations like Denmark (considered the most sustainable nation), the UK, and Sweden, topped the list, India ranked 180th. Issues of eradication threats to existing environmental laws like the Coastal Regulation Zone, the Wildlife Act, laws related to mining in the forests, poor air quality, and excessive greenhouse gas emissions worsen the situation of climate action through policies. Persistent corruption and ineffective governance were also regarded as reasons for laggard response to climate policy. Analyzing the pattern of performance among nations through the top and bottom categorization, it can be found that nations that serve the manufacturing and production demands of the Global North have been at the receiving end of the negative externalities, thus scoring at the bottom.

The caveats associated with the calculation of the index include: -

- The exclusion of forests and wetlands as carbon sinks in computing trajectory of GHG emissions till 2050
- Ignorance of the extent of the ecosystem
- Productivity
- Reduction in weights for indicators where India performed well without an explanation



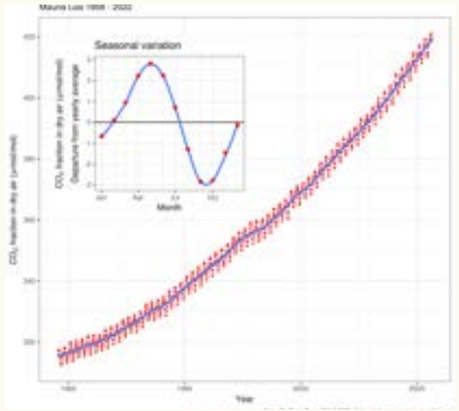
Source: Yale Center for Environmental Law & Policy, EPI

Though the methodology of the index has been widely criticized by Indian scientists based on the presence of subjective bias, the performance score does provide the nations to introspect and take more rigorous initiatives over sustainable measures for climate action. Thus, the EPI data analysis shows that improving a nation's sustainability depends on its allocation of financial resources, effective governance, human development, and regulatory quality.

Authored by Kriti Sharma

THE HUMAN REACTION

'Anthropocene' refers to the current geologic time where human activities are having a substantial impact on the climate and ecosystems in the history of the planet Earth. With the Industrial Revolution's dawn in the 1800s, human civilization achieved some of the most complex mechanisms. This started the emission of potent gases like Carbon dioxide and Methane which we know today as Greenhouse gases (GHGs). They are responsible for the onset of global warming with the domino effect of climate change that the contemporary world is facing.



The Keeling curve is one of the first pieces of evidence of anthropogenic climate change. It depicts the accumulation of carbon dioxide in the atmosphere measured at the Mauna Loa observatory, Hawaii since 1958. The increase in the concentration of CO2 is attributed to the indiscriminate burning of fossil fuels to quench the soaring energy demand of the world. The energy sector, transport, and agriculture are major contributors to global emissions.

Authored by Neha KN

Increases in land and sea surface temperatures, melting of glaciers, rise in sea level, coastal flooding, ocean acidification, coral damage, biodiversity loss, migration of species, storm surges, frequent and intense rainfall episodes, etc. are all indicators of climate change. In recent years, climate change has resulted in some major disasters across the world.

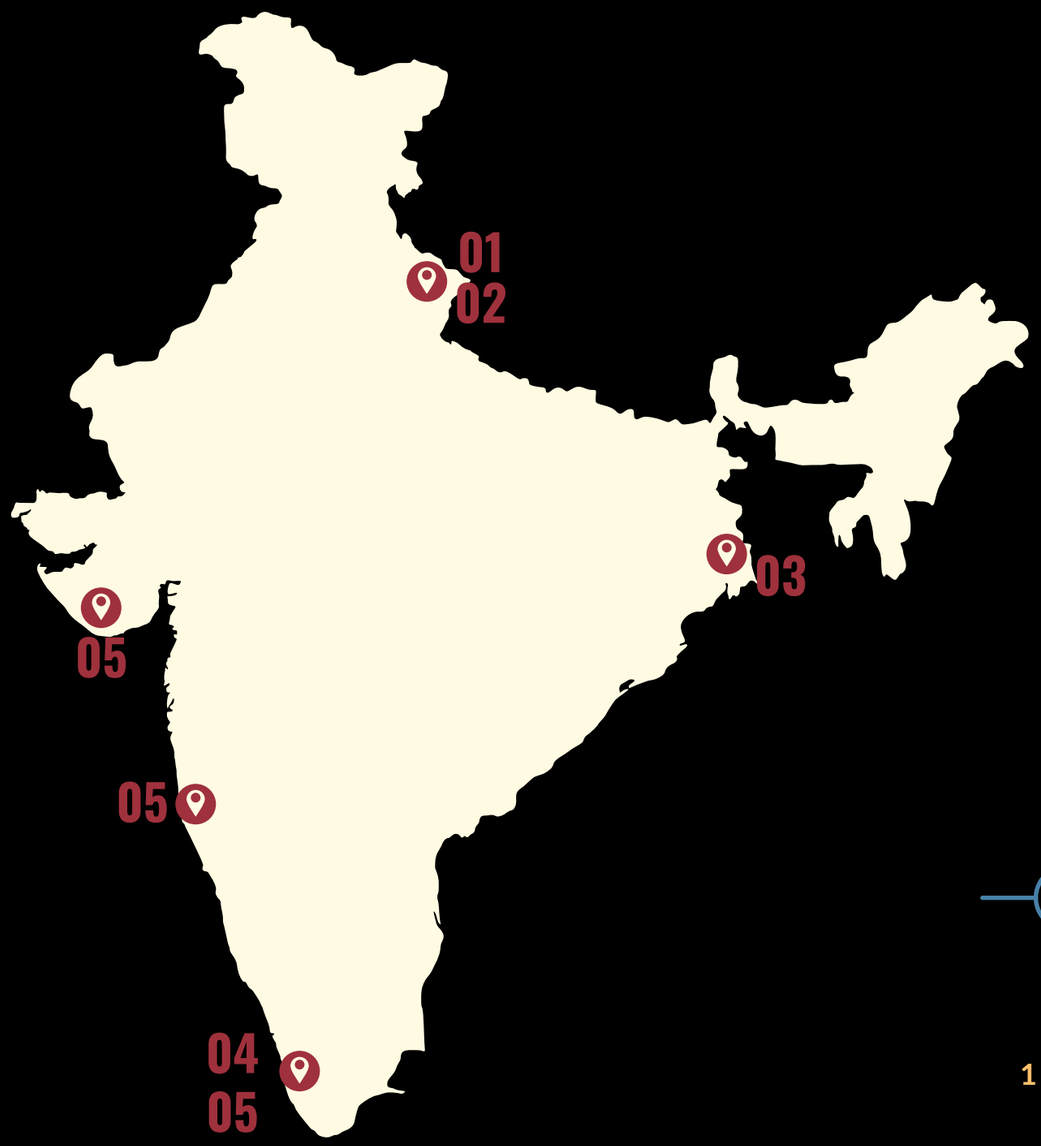
To quote a couple of most recent disasters, cities like Bengaluru are experiencing urban flooding in an unprecedented manner. The urban heat island effect is said to be the primary cause of the incessant rains leading to floods and heat waves in megacities. Sprawling concrete jungles and reduced green spaces have largely contributed to this effect.

Although Pakistan accounts for less than 1% of the global emissions, it is the 8th most vulnerable country to climate crisis according to the Global Climate Risk Index. Coupled with heavy monsoons, the Pakistan floods of 2022 are one of the most relevant examples of climate change-induced disasters. Record temperature rise leading to the melting of glaciers is said to have been a leading cause for the same.

The Intergovernmental Panel on Climate Change's 5th Assessment Report released in 2014, clearly establishes the fact of the influence of humans on the climate system. Failing to adopt suitable and timely mitigation measures is most likely to have a catastrophic impact leading to a severe and irreversible effect on the earth's systems.

Deciphering the Destructive Disasters in India

Given the geology of the nation, India has been prone to both natural and man-made disasters (including geological disasters like landslides, volcanic eruptions, avalanches, etc as well as wildfires) causing resource scarcity, destruction to property, fatalities, etc.



01 — 2013 — **UTTARAKHAND FLASH FLOODS**

- 5700+ **FATALITIES**
- 4500+ **VILLAGES AFFECTED, LAND LOST, BUILDINGS DEMOLISHED**
- 100,000+ **PILGIRMS STUCK IN KEDARNATH, SOME MISSING TILL DATE**

A cloud burst in Kedarnath led to massive landslides and flash floods. The trigger (cloud burst) was amplified by unsustainable anthropogenic activities, going on in the area and climate change.

02 — 2021 — **GLACIER BURST, UTTARAKHAND**

- 70+ **FATALITIES**
- 13.5MW **ESTIMATED LOSS FROM WASHING AWAY OF RISHIGANGA AND TAPOVAN HYDROELECTRIC PROJECTS**

Climate change has led to frequent formulation of water pockets or glacial lakes by almost 50% in the Himalayan region, causing a warning sign for the region of Uttarakhand.

03 — 2021 — **CYCLONE AMPHAN**

- 100+ **FATALITIES**
- 18,235 **LOSS TO WATER POINTS**
- 1252 **SHELTERS PARTIALLY DAMAGED**

Climate change caused the rise of the sea's surface temperature thus increasing the maximum potential energy of the storm. Rising sea levels caused the destructive effects of the cyclone, majorly in West Bengal.

04 — 2021 — **KERALA FLOODS**

- 483 **FATALITIES**
- 57,000 **HECTARES OF AFFECTED CROP AREA**
- 1000 **CRORES OF ESTIMATED LOSS TO CONSUMPTION SECTOR**

With a claimed flood-prone area of only 14.52%, these disastrous floods caused loss of lives and a sum of around 20,000 crores to the exchequer, which forms 15% of the state GDP. The floods were accompanied by a strange rainfall pattern in the state.

05 — 2021 — **CYCLONE TAUKTAE**

- 483 **174**
- 1,100,000 **PEOPLE AFFECTED, ACCROSS MULTIPLE STATES**
- $2.12 **BILLION DOLLARS OF DAMAGE**

A low-pressure system after going through multiple stages of intensification forms a cyclone, led by the warm waters of the Arabian Sea, further intensified due to climate change and anthropogenic activities.

Authored by Kriti Sharma and Gauranshi Chamoli

Designed by Riddhi Mukherjee, MSc Economics

IN CONVERSATION WITH

Abha Mishra

Head, UNDP Odisha

1. What should we perceive from the terms Disaster Risk Reduction and urban management as far as India is concerned?

First thing is to unpack the word disaster risk reduction because many times, a lot of people talk about disaster management and disaster risk reduction synonymously. The understanding of disaster risk reduction (DRR) is very crucial to have. DRR means that whatever the development work is to be carried out, it needs to be done through the lens of risk reduction. It is not just about a disaster per se but even if it is a small event and when it comes to urban area planning it plays a major role. Starting from the infrastructure that you are building specifically if you look at the housing or public buildings the design is the first and foremost thing that needs to be looked at for example the roads, bridges, and flyovers. The placement of these structures is also critical, so while urban managers understand urban planning a lot but they somewhere lose focus on how to look at it from the risk angle. The risk could be natural, it can be because of a geological event or it could be from social vulnerability because of the constitution and composition of the whole urban sector.

2. What help is UNDP providing the govt of Odisha in framing a natural disaster plan of action?

One must go back to history, a couple of decades ago. So, in 1993 the UNDP started working with the government of India (GOI), to support and even think about disaster management. UNDP took Indian delegates around the world, specifically to the United States and other places to start a disaster management dialogue. The dialogue started from there and there was some file movement in the ministry of agriculture because disaster management at that time was a part of the ministry of agriculture and that is because historically droughts and famine were more important and agriculture was the most important component of disaster relief.
In 1999, super-cyclone occurred in Odisha and that is where UNDP stepped in and started playing a major role. The whole disaster management activities were coordinated as part of the UN agencies. The first group of UN volunteers started working in Odisha after the super-cyclone in 1999. Initially, they started with relief response and a little bit of rehabilitation and setting up with the world bank and other agencies to support the Odisha state disaster management authority (OSDMA).


Supercyclone, Odisha, 1999

So even before the national act and policies came in this was UNDP's first intervention. Besides this, at the national level, they were working with the IIPA and the ministry of agriculture. After a time, this whole disaster management was moved to the ministry of home affairs because a lot of coordination activities were involved between the armed forces for search and rescue, evacuation, and transportation.

After this UNDP moved into a small project called community-based disaster management which was first initiated in Odisha. This is where the planning exercises at the lowest level started i.e., the village level. From the village level, it was taken to the panchayat level to the block level and further to the district level and that is where disaster management planning came into being. Before that, the government at the district level was preparing contingency plans that were basically for floods, droughts, and cyclones, not holistic plans and this is where UNDP intervention came in and helped the government.

Subsequently, the Gujarat earthquake happened and then the tsunami occurred and that is when the whole push for disaster management act happened and UNDP has been supporting it. So, in a way, if you look at it the State disaster management agency (SDMA) and National Disaster Management Agency (NDMA) initial setups the disaster management plans at different levels were all supported through different phases by UNDP to some extent. I will not give UNDP the whole credit but handhold support and experimentation were done by the UNDP. Even now in many of these states, UNDP

In 1999, super-cyclone occurred in Odisha and does support and also firmly believes that we need to have a sustainable institutional mechanism where all these plans are already taken care of. So, the disaster management plans are taken care of by the government itself if required UNDP is there to support them.
Currently, UNDP is moving through different stages. You asked me in the first question what is DRR? Before we only used to talk about disaster management then we moved into the DRR and then we realized after going into the fields that we need to mainstream the disaster risk into the ongoing developmental model. We realized if DRR is not mainstreamed we will not be able to achieve our goals. That is where we started working on Disaster Risk Reduction. That is why in today's scheme you find words like vulnerability index and vulnerability assessments. These assessments form the basis for any work on this front. These assessments are directly or indirectly done with the help of UNDP.

3. According to UNFCCC global climate risk index 2022, India was ranked 7th. What Disaster management model do you propose to have a climate change resilient growth?

It is going to be very difficult for anyone to propose a full-proof framework or even a way forward because we are not still clear on where and what will happen. I will just give you an example Since I started working in Odisha after the super-cyclone in 1999, I had not really thought of landslides happening in Odisha but after the Titli cyclonic storm, it all got changed. We had a major landslide in Odisha where we lost the lives of 65 people. Odisha is known in the world for disaster management because we are targeting zero casualties. Our casualties after a supercyclone have been mostly very limited to two digits which is not because of the event and mostly because of the people going and standing under the tree during a cyclonic storm. I mean the tree is weak and it can fall.
It is difficult to say what we need but what we need to do is to keep our early warning systems and especially our monitoring systems very strong. Now if we look at the temperature and precipitation systems, it is so important to counter the rare weather events, for example from last five days we are having rainfalls in Odisha during the puja vacations (Navaratri

> ***When you speak, speak it like a practitioner, do not speak like a preacher.***

vacations) which is unusual we do have some rainfalls during these puja vacations but not at this level. What consequences these rainfalls are going to come with we do not know until and unless we monitor our rivers and water bodies regularly.

Secondly, now in cities, you will find heat islands in many places until and unless you monitor you will not know. Surat and Ahmedabad cities are monitoring their temperatures. These monitoring systems become important because we do not know how concrete structures are going to behave if the heat, moisture, and temperature are high. We need to do modeling for the concrete structure behavior and for that we need data before framing any policy. But what do we need to do with whatever knowledge we have, let's say we know the sea water is rising. Can we monitor our costliness, I mean in Odisha we have a 480 km coastline we monitor our costliness well through GIS maps or ground truthing and see where erosions are taking place and what type of immediate needs are required to move the people out. We have a case study of a village called Satbhaya where the families are being moved out and it is going on for now a decade. We still have not been able to move all the families out but we have also found two or three new spots to relocate the families.

Satbhaya, Odisha
Source: Priya Ranjan Sahu, Deccan Herald

These are some of the things that we need to check. We also need to check the riverfronts because we are not giving any tags on the riverfront. Let's say, the Sabarmati riverfront has been made but what changes it is going to make on the soil due to concretization we do not know. Will it cause erosion, scoring, or change discourse? There are certain things that we need to think about. We are already talking about EVs and other things but what will happen when the batteries will come out and will it cause toxication in river bodies? There are lot of many things that we need to think about. But initially, I would say monitoring of the whole climate variable parameters and early warning mechanism need to be strengthened. These are two things which are very important along with the consumption pattern of the people needs to be changed.

4. What do you think about climate refugees and what intervention do you suggest to stop the migration due to climate change?

Migration is not bad. Of course, when we talk about climate refugees and people moving out in search of alternate livelihoods due to the disruption after any disaster. But the thing here to take note of is that it needs to be in a way that they are as near as their old settlements. In some cases that might not be possible. You must prepare people; you cannot stop the environment from changing because the environment is dynamic and will keep changing owning to some natural and anthropogenic effects. So, one needs to prepare people for it. So, monitoring finds hotspots and then starts with helping people to better adapt to the changing climate by providing information, awareness campaigns, behavioral change, talking about the alternatives, and planning for it. I would say the plans must be perfect or near perfect.

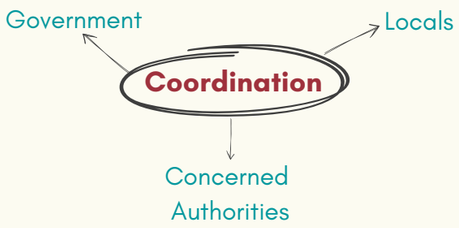
Message for the Vasundhara readers:

I would say that each one of you has a role to play. Be environmentally conscious, and look at every footprint that you are making, then only you will be able to convince others. If you do not become minimalistic yourself, no one will listen to you.

CIVIC VIRTUE

The involvement of the public in dealing with natural or man-made disasters is one of the most critical elements required to reduce their impact significantly. It has always been believed that Government authorities alone could not effectively manage disasters until and unless there is community participation. It is evident from the top-down approach being followed in various disaster-prone areas and their infamous failure episodes. Consequently, many strategists and scientists have proposed an alternative approach that is holistic in the sense of direct involvement of local communities. The rationality behind this is the very fact that locals are aware of their vulnerability and are capable of making the most appropriate way out to lessen the devastating impacts.

The newly introduced strategy promulgated in this line is Community Based Disaster Management (CBDM) which is the broader idea of unmitigated coordination between the locals, concerned authorities, and stakeholders.



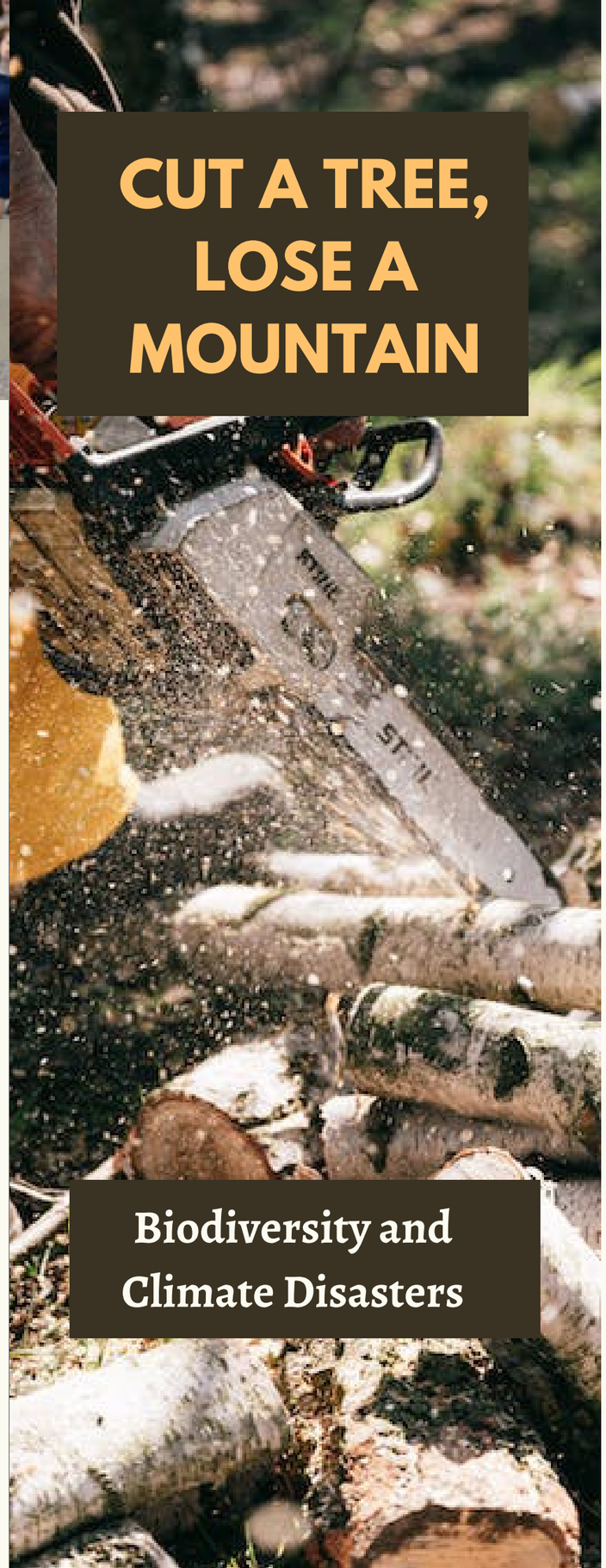
CBDM STRATEGY

The principles of equity primarily govern CBDM, heterogeneity, shared responsibility, and economies of scale. Various stages of it are preparedness, risk assessment, hazard mapping, pre, and post-disaster relief, and obviously, participatory evaluation aided by continuous monitoring. It follows the bottom-up approach by recognizing the substance of the local panchayats as an integral part of this decentralized process. With the proposition of having the disaster management continuum be safe, resilient, and inclusive, it prioritizes the equity of marginalized sections of society along with catering to the needs of disabled, pregnant women, and elders in particular.

To attribute to its success, let's delve a little deeper into the successful disaster risk reduction by the people of Odisha. As put out by the UN itself, the disaster preparedness story of Odisha is a potent model for other cities. Odisha has always set the goal of "zero casualties" but their CBDM has made it a giant success. Accommodating the displaced people in over 4000 shelters with the aid of local communities, and an establishing early warning system disseminated through an intricate network of the entire community is said to be an example of a wonderful community outreach system. Sensitization of locals towards the do's and don'ts for different hazards and their training for appropriate machinery has been proven to be meticulous yet empowering. Its wholesome coverage and utilization of institutional and financial regimes to deliver a community-centric, multi-dimensional attitude to community-based disaster management is a distinguished intervention to curtail the worst aftermaths of any of the disasters.

As for that matter, it would be prudent enough to agree on a point that engaging the locals for Disaster Risk Reduction (DRR) can be a cost-effective mechanism. In line with this, an appropriate capacity-building program catering to the ethos of human dignity and meeting the principles of DRR can be a penance to the government and the community during imminent disasters.

Authored by Isha Narayan



CUT A TREE, LOSE A MOUNTAIN

When some trees are removed from the slope of a certain mountain, their stability is somewhat compromised. Vegetation on mountains not only provides a cushion cover (facilitating proper infiltration and absorption of water) but also anchors the soil through roots, therefore, strengthening the stability of the slope. Removing a tree has the potential to cause a minute landslide, which might turn hazardous. When something as small as cutting a few trees has the potential to cause a severe hazard, imagine what excavating large parts of forests, diminishing landscapes – ecosystems, and species extinctions, can do to the environment – the climate of the area.

Biodiversity and Climate Disasters

We have been losing our biodiversity (genetics, species, and ecosystem) rapidly. Because of these, effects like prolonged-heavy rainfall, which have again intensified due to climate change, leading up to big disasters. In the discussions of disaster management, direct triggers get a lot of acknowledgment, while indirect piled-up causes get lost in the process. Furthermore, biodiversity loss is often overlooked during the aftermath of a disaster. For example, the Kerala floods of 2018 not only destroyed the biodiversity of the whole affected area but also facilitated the growth and distribution of invasive species, further worsening the biodiversity distribution of the region.

In recent times multiple disasters have been correlated with biodiversity loss. Urban floods are correlated with diminishing wetlands; excavating mountains with flash floods and landslides; deforesting mangroves with cyclones; and many more. Biodiversity loss has also been responsible for rapidly emerging disastrous zoonotic diseases which have severe impacts on human and environmental health.

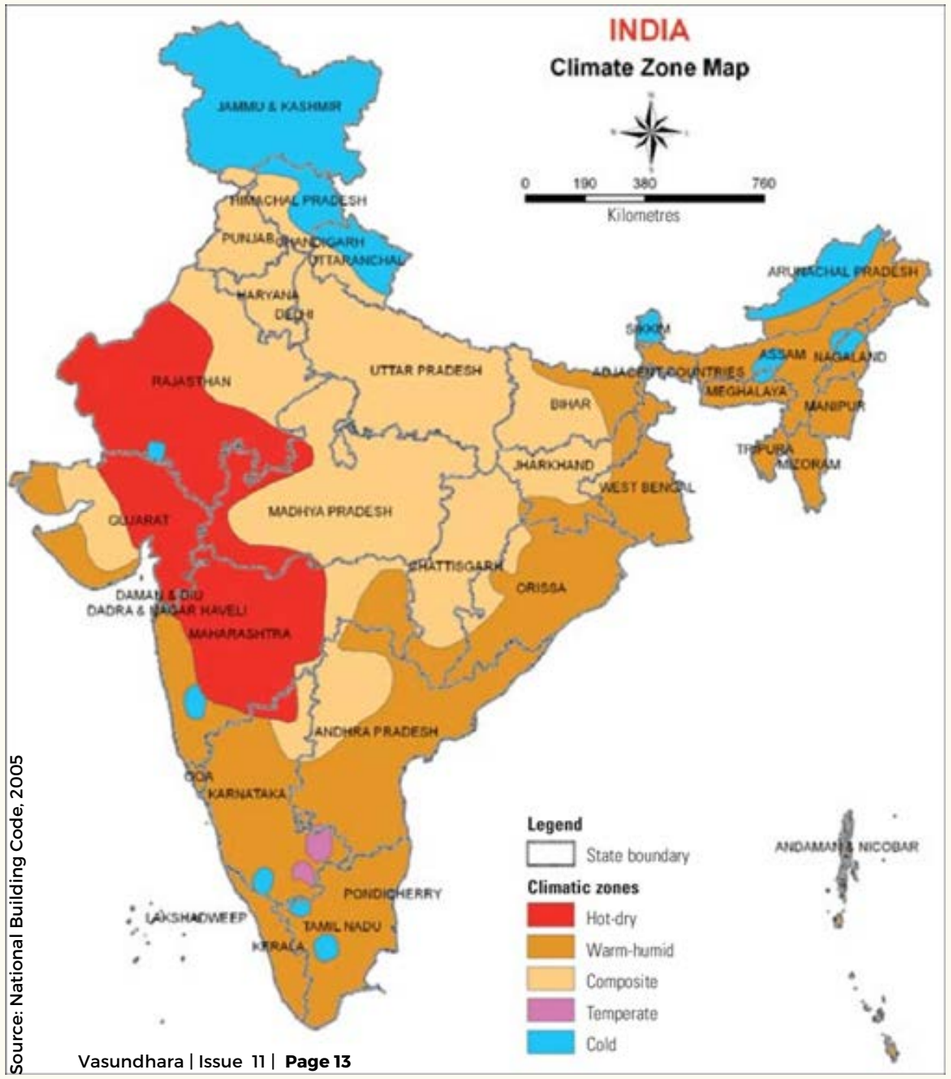
Biodiversity, at various levels, is essential for the maintenance of a healthy environment. Every species is an integral part of its ecosystem and play specific roles in maintaining them. Restabilising biodiversity is not an easy task and it cannot be attained in the course of a few years. We have already lost a significant proportion of our biodiversity leading to disastrous events. We must act now, or multiple disasters await us in the future.

Authored by Gauranshi Chamoli

THE INDIAN COMPOSITION FOR DISASTER MANAGEMENT AND MITIGATION

As there are two sides to a coin, nature also has its ups and downs. While we are blessed by its bountiful resources, it also has a healing mechanism or a reset button in the form of disasters. Mankind's evolution throughout the years has put a burden on the environment which has only acted as a catalyst for disasters. With our scientific achievements and the development of society, mankind should be prepared to handle them or mitigate their effects.

India being a subcontinent has diverse landscapes and cultures attributed to its five climatic zones. The people in these regions have different lifestyles. Throughout the years, they have acclimatized to natural disasters and their management. But climate change and anthropogenic activities are either causing unprecedented disasters or increasing the severity of the ongoing ones. It is the need of the hour for India as a country to be mobilized and prepared to effectively manage them.



Source: National Building Code, 2005

The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal body planning and coordinating India's environmental and forestry programs. They are also linked with International agencies like UNEP and UNCED, thus forming a medium of participation during climate disasters and providing relief. The Indian Constitution and Disaster Management allocate responsibilities to the center, state, and individuals towards the protection of the environment. .

The paradigm shift towards disaster management came in 2005 when the Parliament enacted the National Disaster Management Act, leading to creation of: -

Apart from the dedicated bodies for disaster management, community participation and capacity building are important long-term measures for India. NGOs are an important communication link between the agencies and the affected community. Local bodies can help in timely relief measures and rebuilding of the territory. They are also an ideal channel for NGOs or agencies to conduct programs on disaster management, from awareness to relief and recovery. As the proverb goes, "Prevention is better than Cure", the community itself has to emerge as one institution for undertaking precautionary measures, thereby mitigating the impact of the disasters.

Source: India Today

Community, NGO and Agency Participation during the Assam floods

Source: The Citizen

Relief Workers during the aftermath of cyclone Amphan in Kolkata

Technology plays a vital role in the prediction and management of disasters. The phases of technology and innovation can be broadly classified: -

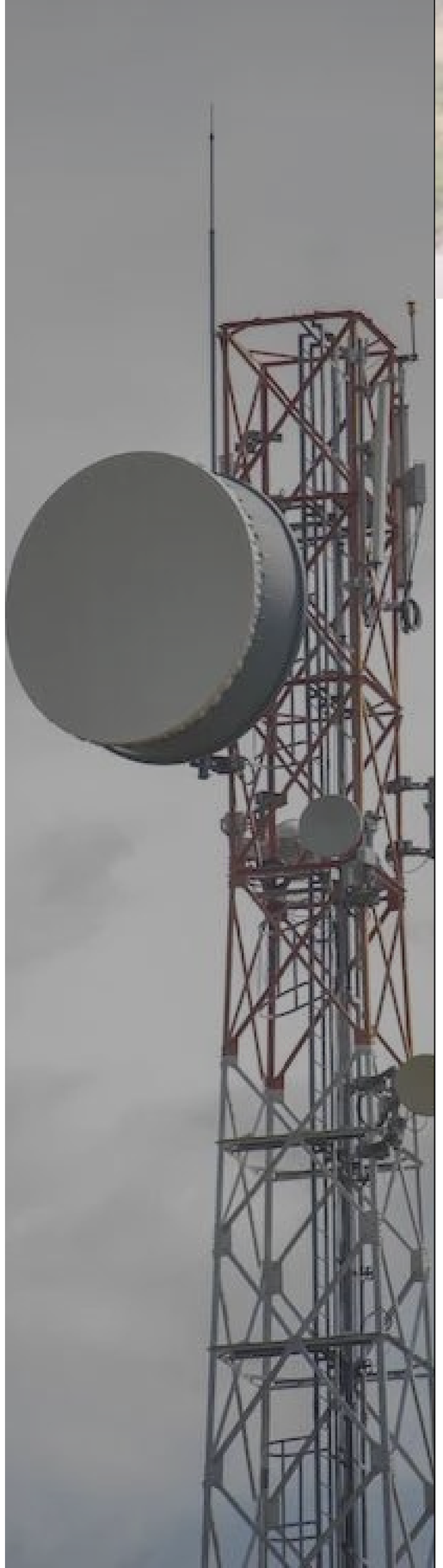
- Evaluation of disaster risks and communication with stakeholders and agencies
- Develop plans for mitigation, risk reduction, and quick response
- Developing both early warning and emergency systems

The India Disaster Resource Network (IDRN), initiated by the Ministry of Home Affairs (MHA) in collaboration with UNDP, is a nationwide electronic inventory of resources for disaster response and critical supplies. It helps in proper inventory control and resource allocation during the time of disasters. The MHA has also initiated a GIS based National Database for Emergency Management (NDEM) for providing a digital map to forecast and assess the scale of disaster. In addition to this, they have also developed a National Emergency Communication Plan to be executed in 2 phases.

Source: ICT for Disaster Risk Reduction

Although India has improved its planning and strategies for disaster management, as evident from the recent Odisha and Assam floods, it still has a long way to go. Expanding climate change and global warming effects are only going to accelerate the impacts of unprecedented disasters. More effective communication and response can be achieved through the use of advanced technologies like blockchain, IoT, and big data. An overall connection and network are required between government agencies, NGOs, and communities for optimal management and mitigation of disasters.

Authored by Saptarshi Kar



KNOWLEDGE UPGRADE

The comeback of the agile felines in India

After they went officially extinct in 1952, a group of 8 cheetahs from Namibia arrived in Madhya Pradesh's Kuno National Park on September 17, 2022. They were released by Prime Minister Narendra Modi as part of the national program of their reintroduction back into the wild. Currently under quarantine and monitoring through geo-location, they will have plenty of prey and area to run in the sprawling area of 289 acres. The reintroduction would boost the local economies and restore ecosystems supporting the big cats.

Paving the runway for sustainable aviation

Cochin International Airport in India has recently achieved a power surplus and a negative carbon footprint. Being the first green airport in the world, they are fully powered by solar energy. Their captive solar plant enabled them to achieve power neutrality way back in 2015. Being a trendsetter by installing rooftop PV in 2013, they have recovered their investments of 7 crore rupees from their savings of 7-8 lakhs of rupees in electricity bills per month. They are also working on scalable agro-photovoltaics, producing close to 90 metric tons of pesticide-free vegetables.

The lake of poison

Over the span of 25 years, the Salton Sea in California has lost more than one-third of its water. It is also the most polluted inland lake in that state. The drying up of the lake due to the reduced water flow of the Colorado flow has led to a mass extinction of fish and birds. In addition, the salty lakebed transforms into toxic chemical dust during the dry summer months, causing significant breathing problems for the locals. Climate change, agricultural practices, and irrigation systems are some of the factors contributing to this effect. Being an endorheic lake, enough water is not able to enter the lake from the sea accelerating the above effect.

Landscape development through agriculture

Rewilding landscapes through agriculture practices can help to restore ecosystems and improve food quality. It involves the introduction, management, and production of livestock with native breeds acting as analogs for their wild counterparts. According to researchers, this method helps to address some of the key concerns like the exclusion of people and agricultural workers from the land, and the reduction in food self-sufficiency. It can also support the production of high-quality and high-welfare meat that is environmentally, ethically, and financially sustainable. It also seeks to remove or reduce human intervention in a landscape in order to restore damaged ecosystems.

Awareness Zone

GUEST COLUMN

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Flooding is a common event in South Asia mostly due to the concentrated rainfall during the monsoon season. Bangladesh and India are the worst flood-affected countries in the world in terms of mortality and the affected area. The Global Climate Risk Index Ranking by German Watch depicts that all the countries in the South Asian region are at high risk. The impact of climate change is predicted to cause marked changes in seasonal water availability in the Himalayan Basin which is going to have a serious impact on the life and livelihood of people. Although advances in early warning systems and increased response capacity helped in saving human lives, the damages and losses are increasing exponentially. A study carried out by the National Institute of Disaster Management depicts that the mortality due to floods has been very high in the states of West Bengal, Uttar Pradesh, and Bihar, followed by Gujarat, Andhra Pradesh, Karnataka, and Kerala. During the year 2020, floods caused huge devastation in almost the entire country covering 25 states/UTs out of 36 (Gupta et al.,2021). Similarly, during the year 2022, extreme precipitation, floods, and landslides were reported in the State of Sikkim. In summary, the number of small and medium-scale disaster events is on an increasing trend and there is a need for mainstream climate risk factors and a component for addressing that in DRR strategies, programs, and projects.

MOVIE ZONE

STEPS TO FOLLOW DURING FLOODS

1. Move essential items to higher ground and secure your home.
2. Avoid walking through moving water.
3. Turn off switches and disconnect electrical appliances.
4. Avoid driving in flooded areas.
5. Stay updated on information through radio or community officials.

Source: National Disaster Management Authority

STEPS TO FOLLOW DURING EARTHQUAKES

1. Drop down onto your hands and knees.
2. Shelter below a sturdy desk or table.
3. Prepare yourself to move along with the shelter if there are shifts in the shelter due to shaking.
4. Do not use building lifts, and move away from the buildings, electric wires, fuel or gas lines, and windows.
5. Stay calm in case you feel trapped, and try to direct attention to yourself for rescue.

APPS TO LOOK OUT FOR

- Sikkim SDMA
- WB Disaster Management
- Disaster Management Information
- Disaster Alert
- 112 India
- Disaster Preparedness by OXFAM
- India Quake
- Sagar Vani

REFERENCES

In the Face of Catastrophe:

- The ‘Reduce, Reuse, Recycle’ Waste Hierarchy. Retrieved May 2022 from https://www.conserve-Nandi, J. (2021, October 27). India lost $87 billion to climate disasters in 2020: Report. Hindustan Times. Retrieved October 19, 2022, from https://www.hindustantimes.com/india-news/india-lost-87-billion-to-climate-disasters-in-2020-report-101635272896946.html
- The Third Pole. (2021, September 20). Climate change and disasters | Topic Hub. Retrieved October 19, 2022, from https://www.thethirdpole.net/en/hub/climate-disasters/

Gauging India's Stand in EPI:

- "India | Environmental Performance Index". 2022. Epi.Yale.Edu. https://epi.yale.edu/epi-results/2022/country/ind.
- Environmental Performance Index: An unscientific study or an opportunity to reflect and improve? Retrieved October 2022 from https://india.mongabay.cssssom/2022/06/environmental-performance-index-an-unscientific-study-or-an-opportunity-to-reflect-and-improve/

The Human Reaction:

- National Geographic 2022, Anthropocene, viewed 28 September 2022, Anthropocene | National Geographic Society
- Study.com 2021, Anthropogenic climate change factors and impacts, viewed 28 September 2022, < Anthropogenic Climate Change Factors, Impact & Examples | What is Anthropogenic Climate Change? - Video & Lesson Transcript | Study.com
- Kathleen Magramo 2022, ‘A third of Pakistan is underwater amid its worst floods in history, CNN, viewed 28 September 2022, Pakistan floods: What you need to know | CNN

Deciphering the Destructive Disasters of India:

- Tropical Cyclone Amphan - May 2020". 2020. https://reliefweb.int/disaster/tc-2020-000136-mmr.
- "Natural Disasters In India: Types & Causes Explained". 2022. Digit Insurance. Accessed October 12. https://www.godigit.com/guides/natural-disasters/types-of-natural-disasters.
- Venkatesh, Shreeshan, and Rejimon Kuttappan. 2018. "This Is Why Kerala Floods Were The Worst In A Century". Downtoearth.Org.In. https://www.downtoearth.org.in/coverage/climate-change/this-is-why-kerala-floods-were-the-worst-in-a-century-61491.
- "IMPACT ASSESSMENT OF KERALA FLOOD 2018 & 2019". 2019. Jctjournal.Com. http://www.jctjournal.com/gallery/20-nov2019.pdf.
- Koshy, Jacob. 2021. "Uttarakhand Glacier Burst | Experts Point To Climate Change Impact". Thehindu.Com. https://www.thehindu.com/news/national/other-states/uttarakhand-glacier-burst-experts-point-to-climate-change-impact/article61754014.ece.
- Kumar, A. (2013). Demystifying a Himalayan tragedy: a study of 2013 Uttarakhand disaster. Journal of Indian Research (Mewar University), 1, 106-116. https://www.researchgate.net/profile/Dr-Malagi/publication/357991591_Vol1_No3_139-145_July-September_2013_ISSN_No_2321-4155_Law_KEY_HUMAN_RIGHTS_AT_THREAT_UNDER_THE_INTELLECTUAL_PROPERTY_RIGHTS/links/61ea5ecb5779d35951c24953/Vol1-No3-139-145-July-September-2013-ISSN-No-2321-4155-Law-KEY-HUMAN-RIGHTS-AT-THREAT-UNDER-THE-INTELLECTUAL-PROPERTY-RIGHTS.pdf#page=114
- Keriwala, N., & Patel, A. (2022). Impact Assessment of Tropical Cyclone Tauktae on Coastal Region of Gujarat, India. ECS Transactions, 107(1), 6185. https://www.sciencedirect.com/science/article/abs/pii/S0029801821014219

Civic Virtue:

- Joerin, J., Shaw, R., Takeuchi, Y., & Krishnamurthy, R. (2012). Assessing community resilience to climate-related disasters in Chennai, India. International Journal Of Disaster Risk Reduction, 1, 44-54. https://doi.org/10.1016/j.ijdrr.2012.05.006
- Rheem, S., Choi, W., Kwak, C., & Oh, K. (2016). A Cooperative Emergency Response System based on the Disaster Response Activity Plan. Crisis And Emergency Management, 12(4), 1-15. https://doi.org/10.14251/crisisonomy.2016.12.4.1
- Bhagat, S. (2021). COMMUNITY-BASED DISASTER MANAGEMENT STRATEGY IN INDIA: AN EXPERIENCE SHARING. PDPU Journal Of Energy & Management, 11-17. Retrieved 25 September 2022
- Bose, S. (2020). Following the Odisha example for developing community-based disaster management in India. ORFonline. Retrieved 25 September 2022, from https://www.orfonline.org/expert-speak/following-the-odisha-example-for-developing-community-based-disaster-management-in-india/.

Cut a Tree, Lose a Mountain:

- Adikari, D., Tiwary, R., Singh, P. P., Suchiang, B. R., Nonghuloo, I. M. and Barik, S. K. (2020) Trees, Shrubs and Herbs for Slope Stbalaization in LAndlside Prone Areas of Eastern Himalaya. Springer links [online], https://link.springer.com/chapter/10.1007/978-981-15-4712-6_18
- Sutton-Grier, A. E., & Sandifer, P. A. (2019). Conservation of wetlands and other coastal ecosystems: a commentary on their value to protect biodiversity, reduce disaster impacts, and promote human health and well-being. Wetlands, 39(6), 1295-1302. https://link.springer.com/article/10.1007/s13157-018-1039-0
- Shinwari, Z. K., Gilani, S. A., & Khan, A. L. (2012). Biodiversity loss, emerging infectious diseases, and impact on humans and crops. Pak. J. Bot, 44(1), 137-142. https://www.researchgate.net/profile/Abdul-Khan-34/publication/230844950_Biodiversity_loss_emerging_infectious_diseases_and_impact_on_human_and_crops/links/09e4150532cfac7b3f000000/Biodiversity-loss-emerging-infectious-diseases-and-impact-on-human-and-crops.p
- Das, B. K. (2012). Losing biodiversity, impoverishing forest villagers: Analysing forest policies in the context of flood disaster in a National Park of Sub Himalayan Bengal, India. Institute of Development Studies. http://idsk.edu.in/wp-content/uploads/2015/07/OP-35.pdf
- Yoosuf N, Aleem & Tp, Unaisudheen. (2021). Impact of flood on biodiversity of Kerala: A case study from Malappuram district of Kerala, India. International Research Journal of Environmental Sciences. 10. 8-19. https://www.researchgate.net/publication/356981585_Impact_of_flood_on_biodiversity_of_Kerala_A_case_study_from_Malappuram_district_of_Kerala_India/citation/download

The Indian Composition for Disaster Management and Mitigation:

- Allan, J. (2021, July 26). How to Regulate Our Waste-Full World. International Institute for Sustainable Role of Technology & Innovation for Disaster Management. Retrieved October 2022 from https://ndma.gov.in/sites/default/files/PDF/Reports/IIT-Bombay.pdf
- Dr. V. Shaharban, “Climate Change and Disaster Management in India”, January 2018. Retrieved October 2022 from https://www.researchgate.net/publication/324666036_Climate_Change_and_Disaster_Management_in_India
- ICT for Disaster Risk Reduction - The Indian Experience. Retrieved October 2022 from http://sdmassam.nic.in/pdf/publication/undp/ict_for_disaster_risk_reduction_indian_experience.pdf

Knowledge Upgrade:

- Modi: India PM reintroduces extinct cheetahs on birthday. Retrieved October 2022 from https://www.bbc.com/news/world-asia-india-62899981
- Agriculture rewilding can help restore the environment and support the production of high-welfare food, researchers. Retrieved October 2022 from https://www.sciencedaily.com/releases/2022/09/220929204056.htm
- Cochin International Airport: India's champion in sustainable energy. Retrieved October 2022 from https://economictimes.indiatimes.com/industry/renewables/cochin-international-airport-indias-champion-in-sustainable-energy/articleshow/93857941.cms
- Why poisonous dust is being formed in the Salton Sea. Retrieved October 2022 from https://theprint.in/science/why-poisonous-dust-is-being-formed-in-salton-sea/1163867/

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