Mother Earth

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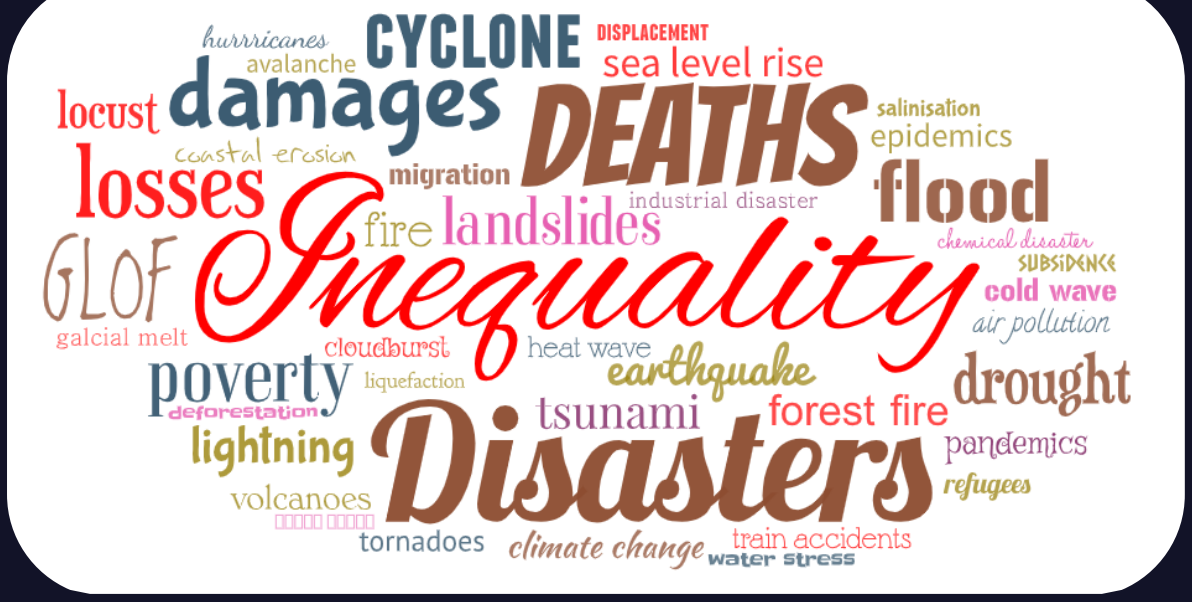
Special Issue

International Day of Disaster Risk Reduction 2023

"Disasters and Inequality"



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International Day for Disaster Risk Reduction

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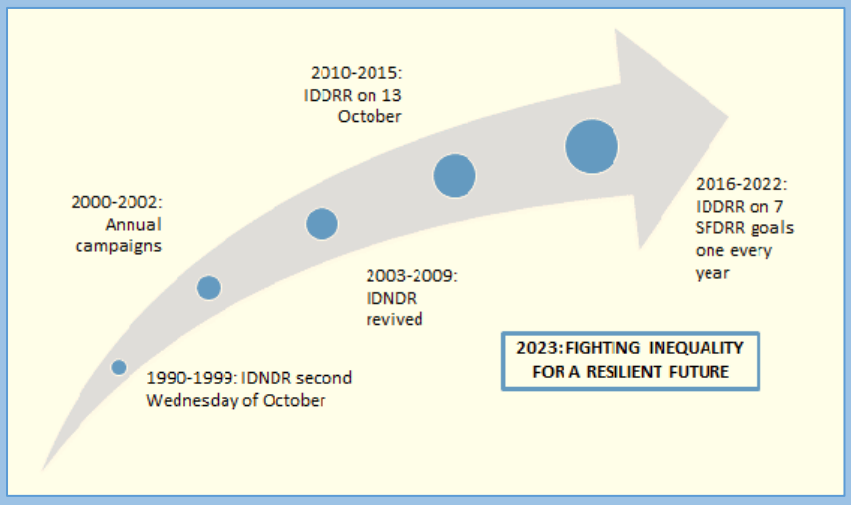
Concerns for rising disasters, deaths and economic losses around the world occupied center stage in global discourse on sustainable development in the late eighties with the publication of '*Our Common Future*' the celebrated report of the World Commission on Environment and Development. Dr Frank Press, President of US National Academy of Science came up with the idea that the decade of the nineties should be observed as the UN Decade on Disaster Reduction to create awareness about the measures for reducing the risks of disasters. Javier Pérez de Cuéllar, then Secretary General of the UN, constituted a Group of Experts, with Dr Press in Chair, to help prepare for the Decade. Based on their recommendation, the UN General Assembly by its resolution 44/236 adopted on 22 December 1989 proclaimed the International Decade for Natural Disaster Reduction beginning 1 January 1990 and decided to designate second Wednesday of October as the International Day for Natural Disaster Reduction (IDNDR), 'to be observed annually during the Decade by the International Community in a manner befitting the objectives and goals of the Decade'.

FROM IDNDR TO IDDRR



On the conclusion of the decade an International Strategy for Disaster Reduction (ISDR) was set up as the focal point within the UN System to ensure synergies among the disaster reduction activities of the UN system and regional organizations. The observation of IDNDR day was discontinued, but the ISDR started World Disaster Reduction Campaign every year on separate theme during 2000-2002.

In 2002, the General Assembly by resolution 56/195 dated 21 December, decided to revive the annual observance of the IDNDR on the second Wednesday of October, 'as a vehicle to promote a global culture of natural disaster reduction, including prevention, mitigation and preparedness'. In 2009 UNGA, by its resolution 64/200 dated 21 December, introduced two changes in the system – second Wednesday of October was changed to a fixed day of 13 October every year; and IDNDR was replaced by IDDRR (International Day for Disaster Risk Reduction) in realization that disasters are not natural, and that what needs to be reduced is the risks of disasters, heralding a paradigm shift from disaster management to disaster risk management.

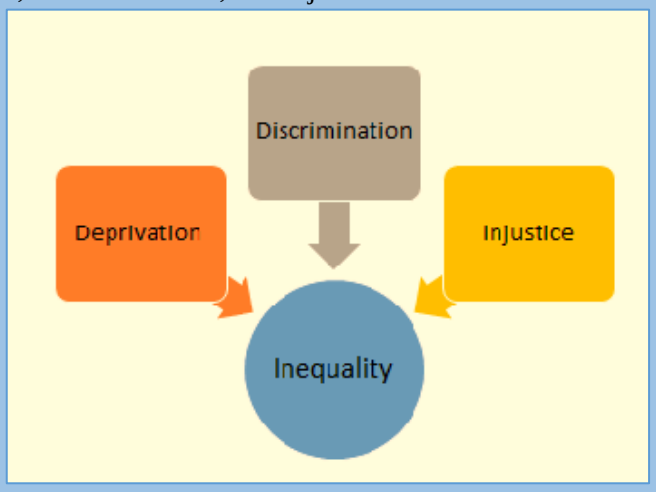
Since then 13 October is commemorated globally every year as the International Day for Disaster Risk Reduction. 2023 marks the 20th year of IDDRR, each year on a separate theme, Themes of first three years were standalone - 'Reducing the impacts of water-related hazards' (2003), 'Learning from today's disasters for tomorrow's hazards' (2004) and 'Reducing Risks using Micro Finance' (2005). Themes of next five years were linked with global campaigns - 'Disaster Risk Reduction Begins at School' (2006-2007), Hospitals safe from disasters (2008-2009), and 'My city is Getting Ready' (2010). Themes of subsequent five years focused on building resilience of various social groups and issues - 'Children and Young People are Partners of DRR' (2011), 'Women and girls: the invisible force of resilience' (2012), 'Living with Disability and Disasters' (2013); Resilience is for Life' (2014) and 'Knowledge for Life' (2015).

During 2016-2022 the themes of IDDRR matched with the seven goals of Sendai Framework for Disaster Risk Reduction (SFDRR) in sequential order – Reducing Disaster Mortalities (2016), Bringing Down Number of People Affected by Disasters (2017), Cutting Economic Looses in Disasters (2018), Building Resilience of Infrastructure and Service (2019), Increasing National and Local Disaster Risk Reduction Strategies (2020), Enhancing International Cooperation to Developing Countries (2021), and Increasing Access to Multi-Hazard Early Warning Systems (2022).

FIGHTING INEQUALITY FOR A RESILIENT FUTURE

The theme of IDDRR 2023 is Fighting Inequality for Building Resilience. The idea of fundamental equality of human beings was the motivating force behind the democratic movement around the world, starting from the French Revolution

of 1789 that ushered the principles of Liberté, égalité, fraternité inspiring the constitutions of many countries in the world, including India, and the Universal Declaration of Human Rights: All human beings are born free and equal in dignity and rights. Public policies in many countries encouraged affirmative action to address the root causes of inequalities. These have had their impacts in removing many inequities and creating eco-systems for unleashing latent energies of communities and countries that remained subdued for centuries; yet layers of inequalities still prevail. Broadly inequalities are manifested in three different forms: Deprivations, Discriminations, and Injustices.



Deprivation: Deprivations are wide ranging – from the basic needs of food, shelter and water to other primary needs of employment, health care and education. It is estimated that 9.3 percent population of the world (753 million) still live in abject poverty (earning less than 2 dollars a day). As per the World Bank Report on Poverty and Shared Prosperity, 39 percent of world population are multi-dimensionally poor. It is these poor people of Global south who suffer most in disaster as they live in unsafe houses in risk prone areas and have no insurance or social welfare measures to protect against natural or manmade hazards.

Discriminations: If the world of deprivations is mainly concentrated in developing countries, the world of discriminations and inequalities are spread out in every country among various groups along wealth, gender, age, ethnicity, religion and other divisions. Discrimination against women is pervasive in every society despite the constitutional guarantee and legal protection against such discrimination. There are huge gender gaps in education, health care, employment, and decision-making processes. Increasing violence against women around the world is symptomatic of the deteriorating standards of safety and security of women. There are age related discriminations against children, adolescents and old people. To these may be added discriminations based on disabilities, ethnicity, caste and religion. Every disaster in the world has demonstrated that it is these vulnerable sections of population who suffer most from disasters.

Injustice: Inequalities beyond income of individuals create an unjust social order in which wealth of communities and countries are not shared for the public good of all but for private benefit of few individuals and families. Inequalities create divisions within societies, and do not allow to common societal or community bonds. More than two thirds of the world's population today live in countries where inequality is growing and disparities between the rich and the poor is widening. In India top 10% of population holds 77.4% of total national wealth, while bottom 60% owns only 4.8% of national wealth. Highly unequal societies are less effective at reducing poverty, grow more slowly, make it more difficult for people to break out of the cycle of poverty, and close the door to economic and social advancement. Such societies are less resilient to disasters and climate change. Similarly, there huge inequalities among wealth of countries, which perpetuates domination of rich countries in all forms – economic, diplomatic, and military – prevents just international order. Climate change is accentuating such inequalities – the countries that have contributed least to climate crisis are suffering the worst.

Fighting inequality means fighting against these layers of deprivations, discriminations and injustices. Considering the importance of equality for establishing a just social and international order, one of the 17 UN Sustainable Development Goal (SDG 10) is: "Reduce Inequality within and among countries". This goal has seven outcome targets: Reduce income inequalities; Promote universal social, economic and political inclusion; Ensure equal opportunities and end discrimination; Adopt fiscal and social policies that promotes equality; Improve regulation of global financial markets and institutions; Enhance representation for developing countries in financial institutions; and Promote responsible and well-managed migration policies. While there has been some progress in global regulations and representations, inequalities have worsened both within and outside the countries. Gini coefficient which is a measure of income inequalities within countries have worsened in majority of countries including India, particularly after the Covid-19. Therefore, fighting against inequalities in all its forms and layers, both within and outside countries, must continue more vigorously if we have to build resilience against disasters and climate change.

Disaster Risk Reduction: Building Resilience for a Safer Future

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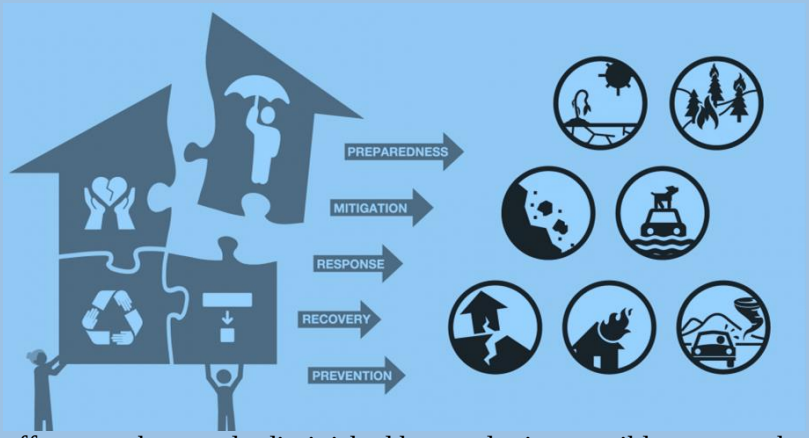
Hazards, both natural and man-made, have been a recurring challenge throughout the world. Earthquakes, cyclone, industrial accidents and pandemics are different types of hazards which could be devastating, resulting in loss of lives, livelihoods, and infrastructure and may be transformed into disaster. To mitigate these risks of hazards and to build a more resilient society, Disaster Risk Reduction (DRR) has become a common vocabulary throughout the globe.

DRR sought to lessen the effects of hazards and enhance societal resilience. It entails preventive actions that can be implemented at many scales, from the individual and community to the national and international levels. The fundamental tenets of DRR include risk assessment, mitigation, prevention, and increasing preparation and resilience. DRR is fundamentally dependent on knowing the type and scope of potential risks, vulnerabilities, and exposures. This involves mapping out locations vulnerable to particular disasters, doing vulnerability assessments, and reviewing historical data. This entails creating robust infrastructure, putting zoning and building laws into effect, and encouraging risk-reduction strategies in land use planning.

Developing early warning systems, running drills and simulations, and ensuring that communities and governments have the resources and procedures in place to respond appropriately when hazards strike are all part of being prepared against hazards. Building resilience entails enhancing a community's and an institution's capacity to quickly recover from disasters and adapt to shifting conditions.

DRR initiatives directly contribute to lifesaving. Reducing casualties during catastrophes has been successfully accomplished through the use of early warning systems, evacuation plans, and higher construction standards. Disasters can have a disastrous effect on economies by depleting resources, interrupting supply lines, and seriously damaging infrastructure. DRR investments lessen the financial damages brought on by disasters, hence preserving economic stability. DRR practices support environmental preservation. Planning for sustainable land use and restoring ecosystems can slow down environmental deterioration and lower the likelihood of catastrophes like landslides and floods. DRR increases societal well-being by lowering vulnerabilities and building community resilience. Communities can preserve their social fabric and provide support for one another through trying times when they are more equipped and prepared to handle threats.

The international community has made enormous efforts to solve DRR because it understands how important it is. A global road map for reducing disaster risk is provided by the United Nations' adoption of the Sendai Framework for Disaster Risk Reduction 2015–2030. It highlights the necessity of DRR multi-stakeholder approaches and urges greater funding for risk reduction and resilience-building initiatives.



Even while hazards are unavoidable, their effects can be greatly diminished by employing sensible catastrophe risk reduction measures. We can defend lives, safeguard economies, and conserve the environment by conducting risk assessments, putting prevention and mitigation measures into practice, and fostering resilience. It is our collective duty as individuals, groups, and countries to value DRR as a crucial investment in a more secure and resilient future.

DISASTER RISKS WITH CHANGING CLIMATE

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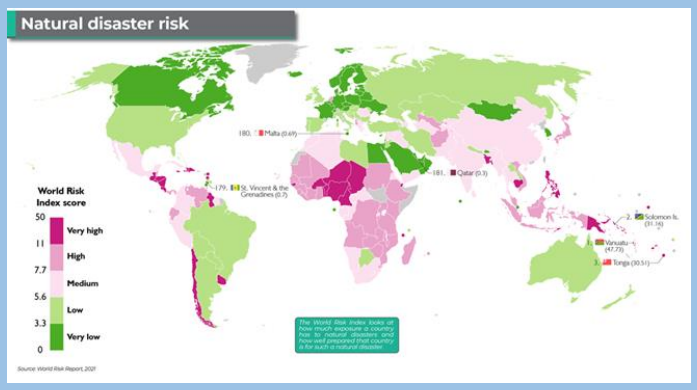
The likelihood of catastrophes has increased over the past several decades, and more extreme weather is expected to result in more and larger-scale disasters in the future. Disasters are the outcome of the interaction of an exposed, vulnerable, and underprepared people or community with a hazard event rather than natural hazards alone. Therefore, climate change will have an impact on disaster risks in two ways: first, by increasing weather and climate hazards and the effects of sea level rise; and, second, by making communities more vulnerable to natural hazards as a result of ecosystem degradation, decreased access to water and food, and changes in livelihoods. Thus, in addition to the stresses brought on by environmental degradation and fast, unplanned urban expansion, climate change will make it harder for communities to adapt to even the current levels of weather risks.

Due to the inherent uncertainty in climate predictions, the variety and quick change of community susceptibility, and the unpredictable character of individual severe events, it is challenging to make projections of all the disaster-related consequences of climate change. To assess the general likelihood of disaster-related outcomes, the following information from historical disasters can be extrapolated to the conditions predicted by the Intergovernmental Panel on Climate Change (IPCC):

- Increased drought in some areas is expected to result in degraded land, harmed or lower-yielding crops, more animal mortality, and a higher danger of wildfires. Risks for people who depend on subsistence farming will grow under such circumstances. agriculture, which can cause people relocating due to a lack of food and water, increased hunger rates, and water- and food-borne illnesses;
- More heatwaves will result in a greater number of fatalities, notably among the elderly, the very young, or those with chronic illnesses, those who are socially isolated, or those who are in other ways more vulnerable;
- There might be significant losses in life and property due to the increased frequency of excessive precipitation in some areas. These occurrences will disrupt communities, trade, and transportation, and they might put additional strain on infrastructure in both urban and rural areas.
- Coastal regions may see a rise in the frequency and severity of extremely powerful tropical cyclones, which might result in further significant losses of life and property;
- Sea-level rise will worsen the effects of storm surge and river floods as well as harm livelihood systems and protective ecosystems along with coastal storms. Low-lying communities might cease to be feasible, which could raise the possibility of population relocation and infrastructure destruction;
- Increased temperatures and glacier melting may result in glacial lake outbursts that might inundate towns downstream.

There is already growing evidences on how extreme weather conditions relate to the likelihood of disasters, such as the Arctic ice melting faster than anticipated, numerous long-term trends in temperature and precipitation variability across the world, including notable increases in eastern regions of North and South America, northern Europe, and northern and central Asia, as well as drier conditions in the southern Africa, the entire Mediterranean region, and some regions of southern Asia. Over the majority of land regions, the frequency of heavy precipitation events has risen, which is consistent with both reported increases in atmospheric water vapour and global warming. Since the 1970s, more regions have experienced droughts that are more severe and last longer, especially in the tropics and subtropics. The predominance of drier circumstances has grown due to higher temperatures and less precipitation, which have also altered the distribution of droughts. Changes in wind patterns, changes in sea-surface temperatures, and variations in snow cover and snow pack have also been related to changes in the frequency of droughts. There is also strong evidence that the more destructive tropical storm activity has increased in the coastal regions of tropics and sub-tropics. This rise is associated with an increase in tropical sea-surface temperatures.



The Global Assessment Report on Disaster Risk Reduction Risk and Poverty in a Changing Climate states that as a result of increasing exposure and susceptibility to weather and climate hazards, the frequency and cost of catastrophes are continuing to rise. Although climate change is already starting to make itself known, unplanned settlements and environmental degradation are the main causes of the rising disaster risk. Poor people, both as individuals and as nations, stand to lose the most in a disaster because they lack the knowledge, resources, skills, and social safety nets necessary to save their possessions and way of life.

Natural Protection Against the Natural Disasters in Indian Sundarban

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One of the most effective ways to protect the Sundarbans from the whims of nature is through natural protection against natural disasters. The events preceding and following the cyclonic storm, Yaas, have made the devastating evident. On 26 May 2021, Cyclone Yaas, which had formed in the Bay of Bengal, made landfall and inflicted havoc in Odisha and the coastal regions of West Bengal including the South and North 24 Parganas, East and West Midnapur. Before cyclone Yaas, West Bengal had widespread destruction from cyclones Amphan in 2020 and Fani and Bulbul in 2019. Additionally, inhabitants of North and South 24 Parganas are still healing from the effects of the powerful superstorm Aila (2009). Following Cyclone Aila in 2009, several publications and newspapers published stories on the role that mangrove forests play in averting even worse calamities. Mangroves in the Sundarbans are reported to have calmed the rage even in Kolkata. While protecting the people and their belongings, the mangrove forest nevertheless suffered terrible losses and lost much of its density. The Department of Forest and MGNREGA have made post-Aila attempts to revive the mangroves in the West Bengal Sunderbans. The Sundarbans were affected by the two significant cyclones Fani and Bulbul in 2019, each of which had a different severity. Although there have been real losses in terms of people's lives and property in the Sundarban region, it has been palpably seen how the mangrove ecosystem naturally protected inland populations from the powerful storm surges of Bulbul.

Role and significance of Mangrove eco-system to protect from various natural disasters:

- Mangroves also slow down the wind by absorbing some of its energy as it travels through the thick canopy of trees. In addition to storing carbon, they help protect against riverbank erosion by stabilizing the soil and sediments through organic depositions. They serve as natural barriers between the land and the sea.
- Mangroves prevent excessive salt from being deposited on low-lying areas near coasts during storm surges and flooding.
- The halophytic shrub species known as pneumatophores, which predominates in coastal mangrove forests, has long prop-roots that help to anchor the soil and shield the area from powerful tidal surges.
- The ability of Sundarban mangroves to absorb storm steam via the impenetrably thick cluster of prop-roots, relieving the cyclone of its worst effects, is what makes them special. The eastern peripheries of the islands, which typically have a dense cover, often experience less destruction from cyclones, although areas of the islands with less mangrove cover are severely affected.

While previous studies have shown how beneficial mangroves are in preventing erosion, storm surges, and cyclonic storms in coastal locations, human intervention in mangrove plantations typically deviates from a scientific pattern where the protection angle is prioritized. Through MGNREGA, the Panchayats or the Forest Department make the interventions involving the local communities. MGNREGA is determined to create employment prospects, whereas Forest is focused on enhancing the amount of green cover. Naturally, neither of the programs places a high priority on the science of coastal protection.

Presently, the Government has initiated various schemes on mangrove protection like the Mangrove Initiative for Shoreline Habitats & Tangible Incomes (MISHTI) which provides financial assistance to local communities for protecting the mangrove and mangrove protection. The scheme also includes public awareness initiatives to inform people of the value of mangroves and their contribution to environmental protection. To ensure sustainability and community ownership of the project, the plantation activities are carried out in a participatory way with the help of local communities and NGOs. Overall, the MISHTI program represents an important step in encouraging sustainable development and safeguarding India's vulnerable coastal regions.

Picture: Mangrove plantation with involvement of local community

Updates on Global Conferences on Environment and Disaster Management

June-September 2023

Bonn Climate Change Conference – 5 to 15 June 2023

A crucial gathering by IPCC's Sixth Assessment Report to tackle critical issues leading up to the 28th Conference of Parties in Dubai by the Intergovernmental Panel was held. The conference addressed the contentious issue of loss and damage which involves compensation for the impacts of climate change in vulnerable countries, funding commitments to support climate mitigation and adaptation efforts and the Global Stocktake under the Paris Agreement.

45th Meeting of the Open-ended Working Group of the Parties to the Montreal Protocol — 2 to 7 July 2023

It reaffirmed the critical role of science in this successful global environmental agreement. The focus area was on unbiased scientific assessments that have consistently guided decision-making, contributing significantly to the recovery of the Earth's ozone layer. At the 45th Meeting of the Open-ended Working Group of the Parties to the Protocol (OEWG 45), delegates reviewed quadrennial scientific reports addressing diverse challenges, including illegal equipment trade, geoengineering proposals, phase-down level adjustments, Hydrochlorofluorocarbons emissions, atmospheric monitoring gaps, and short-lived ozone-depleting substances.

High-Level Political Forum — 10 to 19 July 2023

High-level Political Forum (HLPF) serves as the primary United Nations platform for globally overseeing and assessing progress towards the 2030 Agenda and the Sustainable Development Goals (SDGs). It focused on the theme of "Accelerating recovery from the COVID-19 pandemic and achieving full implementation of the 2030 Agenda for Sustainable Development at all levels." During this session, there was an in-depth examination of the progress made for the implementation of SDG 6, 9, 11 and 17.

59th Session of the IPCC (IPCC-59) — 25 to 28 July 2023

The 59th IPCC meeting consigned complex elections due to the need for regional balance and competition for available seats, and the challenge of addressing urgent climate issues. Jim Skea was elected as IPCC Chair, emphasizing the need for timely action and diversity. With a surge in scientific research, the IPCC must adapt to maintain its crucial role in guiding global climate efforts.

7th GEF Assembly — 22–26 August 2023

Seventh Global Environment Facility (GEF) Assembly marked a significant moment for biodiversity conservation, with the unanimous approval of the Global Biodiversity Framework Fund (GBFF). The Assembly adopted amendments to the GEF's establishment instrument, discussed GEF-8 Trust Fund and GEF Trust Fund reports, and included events such as youth engagement discussions, dialogue with Multilateral Environmental Agreement (MEA) Secretariats, recognition of Indigenous and Local Knowledge, and Inclusive Challenge Program for community-based and civil society actors.

IPBES 10 Plenary — 28 August to 02 September, 2023

The tenth session of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES 10) took place in Bonn, Germany. One of the key documents discussed during this session was the "Summary for policymakers of the thematic assessment of invasive alien species and their control."

International Conference on Dam Safety — 14 to 15 September, 2023

The Ministry of Jal Shakti's Department of Water Resources, River Development, and Ganga Rejuvenation hosted the International Conference on Dam Safety (ICDS) in Jaipur. The conference, inaugurated revolves around the theme "Safe & Secure Dams Ensure Nation's Prosperity" and aims to convene global experts in dam safety. The event focused on advanced dam safety practices, highlighted Dam Rehabilitation and Improvement Project (DRIP) and included technical sessions, exhibitions, and cultural programs emphasizing the importance of water conservation and management.

UN Summits Week — 18 to 20 September 2023

The 78th session of the United Nations General Assembly featured the General Debate alongside two summits held at the UN Headquarters in New York. These events were focused on accelerating action towards achieving the 2030 Agenda for Sustainable Development, its SDGs and addressing climate change. The week began with the SDG Summit, a crucial "half-time" evaluation of progress towards the 17 SDGs set out in the 2030 Agenda since its adoption in 2015.

Global Disaster Updates

June to September 2023

The four month period intervening the last and current issue of our e-magazine, Mother Earth witnessed as many as 156 disasters, in which 10 or more persons were killed or 100 or more were affected. Of these 118 were natural and 38 technological disasters. Of the natural disasters, flood was the highest in numbers (48), followed by storms (36), landslide (17) and earthquake (3). India faced the maximum number of disasters (15), followed by China (10), Pakistan (6) and USA, Indonesia and Philippines (5 each). 14909 people lost their lives, 27.1 million people were affected and economic loss worth 16 billion USD was suffered. Worst disasters during the period were reported from North Africa - floods in Libya and earthquake in Morocco. The following is a brief summary of the major disasters during the period.

Libyan desert flood:

Storm Daniel struck central and eastern Mediterranean, causing disastrous flooding in Libya, after two old dams fell, and entire neighbourhoods in Derna vanished and their inhabitants were swept away by water, creating a catastrophic disaster that killed nearly 20,000 and displaced 40,000 people. This was the worst ever disaster of Libya.This is the worst disaster faced by Libya in its recent history.

Morocco earthquake:

On September 8, a strong earthquake occurred close to the town of Oukamedene in western Morocco. The shallow magnitude-6.8 quake and subsequent aftershocks resulted in more than 2,900 fatalities and 5,500 injuries. The earthquake severely damaged some of Marrakech's historic district and completely destroyed a number of outlying communities in the Atlas Mountains.

Syrian wildfire:

Syrian wildfire started in mid-June and continued for several months, intensifying in mid-July affecting the forest regions of Homs, Hama, and Latakia. The majority of the fires were in harsh, inaccessible mountainous terrain. 73 villages and around 50,000 people were affected by these fires. More than 5,000,000 m2 of built area were burnt, including 6 entirely ruined homes. The vast majority of displaced families opted to live in host communities.

Balasore train accident:

On 2 June 2023, the Coromandel Express, running at full speed, entered a loop instead of the main line, near Bahanaga Bazar railway station in Balasore district of Odisha and collided with a goods train. 21 coaches derailed and three of those collided with the oncoming SMVT Bengaluru–Howrah Superfast Express on the adjacent track. A total of 296 people were killed in the crash and more than 1,200 others were injured. It was India's deadliest railway crash since 1995.

Himachal Pradesh and Uttarakhand flood and landslide:

Incessant rainfall and cloudbursts caused number of landslides and submerged large areas in several districts of Himachal Pradesh and Uttarakhand. The worst affected was the Kullu district of Himachal Pradesh where several multi-storied buildings constructed on hill slopes slided on river. More than 600 people lost their and many more injured. More than 10,000 houses collapsed and roads and bridges were damaged disrupting communication system in the region

New York Flood:

The remnants of Hurricane Ida dumped ‘historic rain’ over New York City as many metro tunnels and basement apartments were suddenly filled with water and freeways and boulevards turned into rivers, submerging cars, damaging assets and killing 49 people in New York and surrounding Sates oon the east coast.

Vulnerability Vortex: Inequalities, Disasters, and Urgent Call for Resilience

Abhisek Kar

In a world marked by growing economic disparities, it is essential to recognize the disparate impact disasters have on different segments of society. The Vulnerability Vortex, a term coined to describe the intersection of inequalities and disasters, highlights how these two phenomena can amplify each other's effects. In this article, we delve into the inequalities that exist between various economic conditions and the distinct vulnerabilities faced by men and women during disasters, emphasizing the critical role of the Sendai Framework for Disaster Risk Reduction in addressing these issues.

Economic disparities play a pivotal role in determining the vulnerability of individuals and communities during disasters. Those in lower economic strata often lack access to resources, making them more susceptible to the devastating consequences of disasters. Limited access to quality healthcare, education, housing, poor economy, etc. compounds their vulnerability. For instance, in the aftermath of a hurricane or earthquake, marginalized communities often face prolonged recovery periods and heightened suffering. Another critical dimension of vulnerability during disasters is the gender inequality. Gender disparities often intersect with economic inequalities, creating a multifaceted vulnerability for women, especially in low-income communities. Traditional gender roles and discrimination limit women's access to resources and decision-making power, making it more challenging for them to cope with and recover from disasters. Women are more likely to suffer from the consequences of disasters due to various factors, including their role as primary caregivers, limited mobility, and unequal access to information. In post-disaster scenarios, women often face increased risks of violence and exploitation. Addressing these gender disparities is essential for achieving true resilience.

Recognizing the urgent need to address these disparities, the United Nations adopted the Sendai Framework for Disaster Risk Reduction in March 2015. This global initiative emphasizes the importance of reducing disaster risk and building resilience among vulnerable populations. It calls for inclusivity, gender sensitivity, and a focus on those disproportionately affected by disasters.

Resilience building initiatives and efforts to reduce vulnerability and enhance resilience should focus on addressing economic inequalities and gender disparities simultaneously. This includes:

- **Economic Empowerment:** Implementing policies that promote economic opportunities for marginalized communities, ensuring access to education and healthcare, and creating avenues for income generation
- **Gender Equality:** Promoting gender-sensitive disaster risk reduction strategies, ensuring women's participation in decision-making processes, and addressing cultural norms that perpetuate gender-based disparities.
- **Community Engagement**: Encouraging community participation in disaster preparedness and response efforts, recognizing that local knowledge and input are invaluable resources.
- **Education and Awareness:** Raising awareness about the differential impact of disasters on various groups and fostering a culture of preparedness and resilience.

In conclusion, the Vulnerability Vortex created by the intersection of inequalities and disasters is a pressing global concern. To break this cycle, it is imperative that we prioritize the principles outlined in the Sendai Framework, focusing on economic inequalities and gender disparities as key areas of action. By building resilience among the most vulnerable communities and ensuring equal opportunities and protection for all, we can begin to mitigate the devastating impact of disasters and work towards a more equitable and resilient world.

Disaster's Unfair Toll
Tackling the Socio-Economic Imbalances that Risk Our Future

Anamika Sarkar

Disasters, whether they be natural calamities or human-made, show no discrimination when they strike. However, the aftermath of these events reveals stark disparities among different socio-economic groups, magnifying the vulnerability of marginalized communities. The socio-economic disparities that exist within our societies become glaringly evident during times of crisis. Disasters have a disproportionate impact on people of low socioeconomic status (SES), who are more likely to live in hazard-prone areas, have less access to resources and services, and face greater challenges in recovering from losses and damages. Disasters also affect men and women differently, as gender roles and norms shape their exposure, capacities, and opportunities.

Layers of inequalities in socio-economic systems are bared open in disasters. Some of these are stated below:

- **Socio-Economic Imbalances:** Socioeconomic disparities serve as critical determinants in gauging the impact of disasters on different communities and influencing disaster vulnerability. These disparities can significantly exacerbate the vulnerability of certain groups, leaving them more exposed to the devastating consequences of such events, and bear the brunt of disaster impacts due to limited access to resources, healthcare, and education. Urban slum dwellers, lacking adequate housing and infrastructure, face heightened risks and often lack the financial means to recover.
- **Gender disparities:** Gender disparities compound the unequal impact of disasters, with women often at greater risk, as they are more vulnerable, socially and economically, with lesser means and capacities to protect themselves from disasters. Women die more in disasters and they also suffer more as burden of work on women increase after disasters as they have to earn bread for survival and further provide care for others.
- **Urban vs. Rural Disparities:** Urban areas generally boast superior infrastructure and better access to essential services, making them more resilient to disasters. On the other hand, rural communities may lack the resources and infrastructure needed to withstand and recover from disasters, rendering them more vulnerable.
- **Income Inequality:** The degree of income inequality within a society directly influences disaster vulnerability. Individuals with higher incomes typically have better access to resources, insurance, and housing options, affording them a higher degree of resilience when disaster strikes.
- **Access to Education and Healthcare:** Socio-economic conditions play a pivotal role in determining access to education and healthcare, two pillars of disaster preparedness and recovery. Communities with limited access to these vital services face an uphill battle when confronting disasters.

To address these disparities and align with the Sendai Framework's objectives, several crucial steps can be taken. These may include the following:

- **Invest in Vulnerable Communities:** Governments and organizations should prioritize investments in marginalized communities to enhance their resilience. This includes improving infrastructure, healthcare access, and educational opportunities to reduce their vulnerability to disasters.
- **Gender-Inclusive Policies**: Policymakers should implement policies that recognize and address the specific needs of women during disasters. This may involve providing safe shelters for women and children, ensuring access to reproductive healthcare, and actively promoting women's participation in decision-making processes
- **Community Empowerment**: Empowering communities, especially those in vulnerable socio-economic conditions, can significantly enhance their resilience and capacity to respond effectively.
- **Education and Awareness:** Disseminating disaster preparedness and resilience-building education, especially in vulnerable communities, is crucial. Knowledge empowers individuals and communities to make informed decisions, reducing their vulnerability.

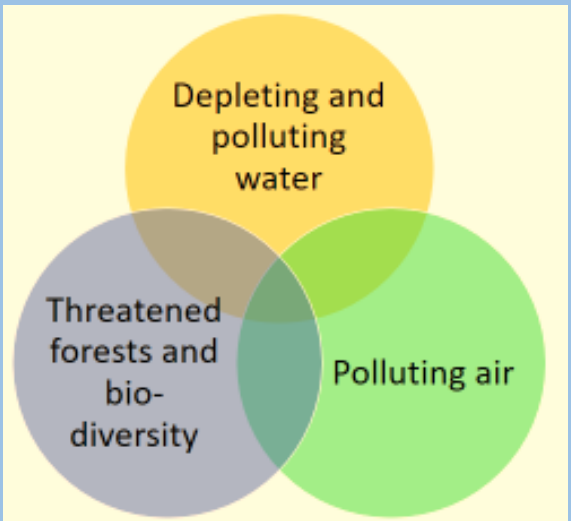
While disasters do not discriminate when they strike, they undoubtedly magnify existing socio-economic disparities in our communities. Addressing these disparities is not merely a matter of equity; it is an imperative step in building resilience and securing our collective future. The Sendai Framework for Disaster Risk Reduction provides a guiding light towards reducing these inequalities by advocating robust governance, community empowerment, inclusive approaches, and gender mainstreaming. By adhering to the principles, we forge a path towards a future where disaster's unfair toll is minimized, ensuring a more just, equitable and prosperous world for all.

Beyond Natural Disasters: Man-Made Environmental Hazards Taking Centre Stage in Indian Subcontinent

Anindya Haty

The Indian subcontinent, with its diverse climate and physiography, face a wide range of natural disasters, such as earthquakes, floods, cyclones, and droughts that have had devastating consequences. However, in recent years, man-made disasters have begun to take center stage, unveiling new and pressing threats that demands our immediate attention. What sets man-made disasters apart from the disasters of nature is that these are preventable, but the challenges of reducing the risks of these disasters are much more difficult and formidable.

Road accidents in the sub-continent kills more than two lakh people every year, more than all disasters put together. This is a silent disaster of the region, killing nearly 550 people daily and injuring many more. Other manmade hazards of the sub-continent include train accidents, industrial disasters, chemical, biological and radiological disasters, fires, collapse of buildings, dams etc. In this routine classification of manmade hazards three manmade environmental hazards are often overlooked. This short article highlights these hazards that have created crisis like situations.



Water Crisis-A Ticking Time Bomb: One of the most pressing man-made crises in the Indian subcontinent is the water crisis. Rapid urbanization, industrialization, and population growth have put tremendous pressure on the region's water resources. Mismanagement of terrestrial water resources, pollution of surface water and over withdrawal of groundwater have combined to create this alarming situation. Deforestation and landslides have increased the silt loads and reduced the carrying capacity of our rivers and reservoirs, contributing to both droughts and floods, threatening lives and livelihoods of millions of people. Discharge of urban and industrial waste are polluting our rivers and other water bodies, threatening human and aquatic lives. Aquifers in large areas of Indo-Gangetic plains that were naturally recharged for ages are getting depleting, challenging regular supply of water even for drinking in some places.

Air Pollution-Choking the Subcontinent: Air pollution is another man-made crisis that has reached alarming levels in the Indian subcontinent. Rapid industrial growth and an ever-increasing number of vehicles on the roads have led to hazardous levels of air pollution in many cities. Many urban centres of India, including Delhi, the national capital of India, have gained notoriety for having some of the worst air quality levels in the world. The health implications of prolonged exposure to such air pollution are dire. Respiratory diseases, cardiovascular problems, and even premature deaths have become commonplace, affecting millions of people, and putting a massive strain on healthcare systems.

Threatened Forests and Biodiversity: Persistent and harmful anthropogenic interventions within the reserves of nature in the sub-continent have caused environmental degradation, posing grave threats to the region's rich biodiversity. Deforestation, illegal wildlife trade, and habitat destruction have pushed several species to the brink of extinction. The Sundarbans, a UNESCO World Heritage Site and home to the Bengal tiger, faces encroachment from human activities, putting this majestic creature in peril. The delicate balance of ecosystems is under threat, and if not addressed urgently, the consequences for both wildlife and humans will be severe.

While natural disasters have historically captured our attention and elicited swift responses, it is imperative that we also focus on man-made crises in the Indian subcontinent. The water crisis, air pollution, and environmental degradation, are all interconnected challenges that require concerted attention and collaborative efforts. Governments, civil society, and individuals must come together to address these man-made crises, adopt sustainable practices, and promote responsible governance.

Disaster Resilience of Marginalized Communities

Soheli Saha

The disaster resilience of marginalized communities refers to their ability to prepare for, withstand, and recover from the impacts of disasters. Marginalized communities, such as low-income neighbourhood, indigenous populations, minorities, and socially disadvantaged groups, often face challenges and vulnerabilities that can significantly affect their resilience to disasters.

Some key factors that influence the disaster resilience of marginalized communities include:

1. Social and economic vulnerability: Marginalized communities have inadequate capacity to cope with disasters due to poverty, limited access of resources and services, discrimination and social inequality. The social vulnerability can increase community's exposure to hazards and reduce their ability to respond during and after disaster.

2. Physical vulnerability: Marginalized communities may be located in areas that are more prone to natural hazards or have inadequate infrastructure and housing conditions. Limited resources and lack of access to safe and resilient infrastructure can increase physical vulnerability, making it harder for these communities to withstand and recover from disasters.

3. Environmental vulnerability: Marginalised communities often live on the edges – in low lying areas, near the river banks, canal sides, railway lines, and garbage dumps, which expose them to adverse environmental conditions.

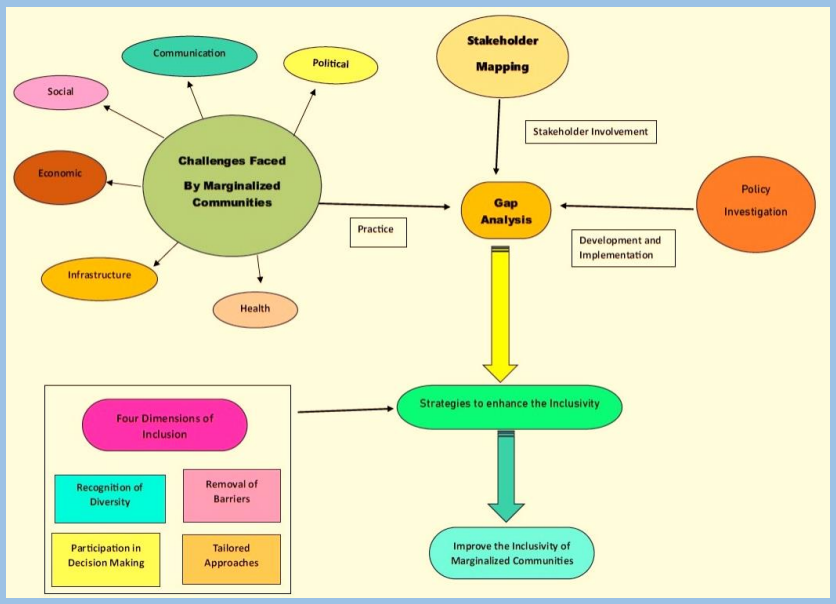
4. Limited access to information and resources: Marginalized communities have limited access to information and resources and accurate information about impending disasters emergency response procedure due to non-availability of TV/ radio/smart phone etc. Inadequate support services and communication channels can hinder their ability to make informed decision and take appropriate steps.

Ensuring that marginalized communities have equal access to support and recovery mechanisms is essential for their resilience. Adequate and inclusive disaster response plans, equitable distribution of relief resources, and culturally sensitive recovery programs can help address the specific needs and challenges faced by these communities.

Indigenous communities and other marginalized groups often possess valuable traditional knowledge and practices that have been developed over generations to cope with natural hazards. Integrating this knowledge into disaster risk reduction strategies can enhance the resilience of these communities and contribute to more effective and culturally appropriate responses.

Improving the disaster resilience of marginalized communities requires a comprehensive and inclusive approach that addresses the underlying social, economic, and environmental factors contributing to their vulnerability. This includes:

- Conducting vulnerability assessments and risk mapping to identify the challenges and needs of marginalized communities.
- Enhancing access to education, healthcare, social services, and essential infrastructure in marginalized communities.
- Strengthening social networks, community organizations, and local leadership to foster resilience from within.
- Promoting equitable policies and practices that address systemic inequalities and discrimination.



- Building capacity through training, education, and awareness programs tailored to the specific needs of marginalized communities.
- Establishing collaborations between government agencies, non-governmental organizations, and community-based organizations to support the resilience-building efforts of marginalized communities.

By focusing on the unique challenges and strengths of marginalized communities, it is possible to enhance their disaster resilience, reduce their vulnerability, and promote more equitable and inclusive approaches to disaster risk reduction.

Building Resilience to Disasters and Climate Change in Sundarbans

Riyanka Das

Sundarbans is one of the most critical global hotspots of disasters. Layers of hazards and vulnerabilities have combined to create multiple, complex and persistent risks of disasters in Sundarbans, which cover 10000 sq.km area in the deltas of Ganga, Brahmaputra and Meghna, inhabited by about 13 million people in India and Bangladesh.

The natural hazards of Sundarbans are both hydro-meteorological and geological. The hydro-meteorological hazards include extreme climatic events like cyclonic storms, floods and occasional droughts, and slow onset events are sea level rise, land subsidence and salinization of soil, sub-soil and water. Geological hazards include river bank and coastal erosion and earthquake, as the entire region falls in high-risk seismic zone. The vulnerabilities of Sundarbans are extreme poverty of people, living on subsistence agriculture, fisheries, poor conditions of housing, low level of education and nutrition, and high density of population that are also exposed to environmental degradation and man-animal conflicts. Climate change is compounding the hazards, vulnerabilities and risks of Sundabans with increasing frequencies and intensities of extreme climatic events, destroying lives, settlements and livelihoods, forcing poor people to migrate to cities in search of livelihood as climate refugees.

Building resilience of the people of Sundarbans to climate change and disasters is by no means an easy task. It has to be prolonged and sustained, and pursued with innovative application of science and technology and an inclusive approach, involving the communities in planning and implementing programmes for disaster risk reduction and climate change adaptation. Some of the key issues of building resilience include:

- ✓ **Assessment of hazards, vulnerabilities and risks of disasters:** Assessment of the dynamic process of hazards, vulnerabilities, exposures and risks on a continuing basis using the latest advances of science and technology, and communicating the risks to all stakeholders in appropriate format;
- ✓ **Structural and non-structural measures for risk mitigation:** Planning and implementation of structural and non-structural measures for reducing risks of disasters with participation of local communities;
- ✓ **Climate change adaptation of agricultural and fisheries:** Application of innovative and proven practices of climate adaptive agriculture and fisheries to withstand salinization of soil and water;
- ✓ **Hazard monitoring and early warning:** Assessing, monitoring, detecting hazards and issuing early warning for early action for saving lives and livelihoods;
- ✓ **Education and awareness**: Promoting awareness and understanding of local hazards and risks through educational programs, workshops, and public awareness campaigns;
- ✓ **Training and capacity building**: Providing training and capacity-building to empower community members with the knowledge and skills needed to respond effectively during emergencies;
- ✓ **Resilient design and construction**: Ensuring that housing and infrastructure are designed to withstand hazards
- ✓ **Public-private-people partnership**: Promoting Public-Private-People Partnership for innovating investments for sustainable agriculture, fisheries and tourism; and
- ✓ **International Collaboration:** Collaborating with neighboring countries and international organizations to share knowledge, resources, and best practices in disaster resilience and climate adaptation.

Anthropogenic Climate Change is not Gender Blind

V Rohit Kumar

Climate crisis is not gender-neutral. It affects women unequally and amplifies existing gender inequalities, posing threats to their livelihoods, health, and safety[1]. Work Participation Rate of women in formal economic sector is low in many developing countries including India, but their participation in informal and domestic economy exceeds that of women. It has been estimated that women do almost half of the works of agriculture, ninety percent in animal husbandry, eighty percent in handloom and handicrafts, and almost hundred percent in care economy. Despite these contributions, violence against women and girls remains most the pervasive human rights violation in the world, affecting more than 1 in 3 women—a figure which remained largely unchanged since last decade[2].

Various studies have indicated that climate change is impacting on women adversely. When crops on the field dry due to drought or submerged due to flood or when soil becomes unfit for cultivation due to ingress of saline water – all due to impacts of climate change - and the men folk migrate to cities in search of employment, burden of work on women multiplies. As limited natural resources grow even scarcer due to climate change, women and girls must also walk further to collect food, water or firewood, which heightens their risk of being subjected to gender-based violence[3].

Source: Why Climate Change increases Gender Inequality? (2020). World Economic Forum.

Threat Multiplayer

Climate Change is a "threat multiplier", meaning it escalates social, political and economic tensions in fragile and conflict-affected settings. As it drives conflict across the world, women and girls face increased vulnerabilities to all forms of gender-based violence, including conflict-related sexual violence, human trafficking, child marriage, and other forms of violence.

Source: How gender inequality and climate change are interconnected (2022). Official website of the UN Women.

To find sustainable and safer solutions, it is critical to recognize the contributions of women as caretakers, producers, stakeholders, experts and educators across all sectors. Women make families and help building communities after catastrophes. They also have the intimate knowledge and understanding of what is needed to adapt to changing environmental circumstances in order to determine practical solutions[4].

Pathways ahead for betterment of future –

- Country regimes must focus on gender mainstreaming and devise gender specific policies for welfare of vulnerable communities, as part of national action plans for adapting to climate change
- Climate financing must be done in a gender responsive manner
- Country regimes must have a national as well as provincial database to capture how climate change is affecting women adversely, for designing appropriate policies for mitigating these impacts.
- Capacity building mechanisms must be developed to enhance the coping capacity of vulnerable communities.

[1] How gender inequality and climate change are interconnected (2022). Official website of the UN Women.
[2] Push forward: 10 ways to end violence against women (2022). Official website of the UN Women.
[3] Environmental degradation driving gender-based violence (2020). International Union for Conservation of Nature (IUCN).
[4] Vaishali Sinha (2019). We can solve climate change – if we involve women. Official website of the World Economic Forum.

From RRR to PPP
The Evolution of Disaster Risk Reduction Strategy

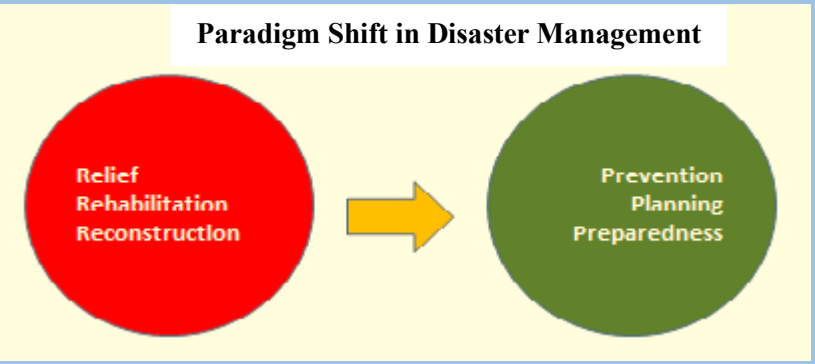
Kaberi Saha

Disaster Risk Reduction (DRR) is a systematic approach to identify, assess and reduce the risk of disaster. Risks of disasters can be reduced if we are able to identify the hazards, vulnerabilities and exposures that combine to create the risks of disasters, prevent the creation of new risks and exacerbation of existing risks, mitigate the risks by planning and implementing various structural and non-structural measures, and prepare for the residual risks that are neither prevented nor mitigated. DRR strategies aim to reduce the impact of disaster on individual, community, country or even region. These may now look apparently simply, but it is very complex and difficult to be implemented. It has taken years and decades for the DRR strategies to be developed, improved and practiced at global, national and local levels.

It all started fifty years back, in the late eighties, when number of disaster events around the world were counted, put together, analysed and trends of alarming rise in the number of disasters, deaths, and economic losses were reported from around the world. It was found that some of the advanced countries were able to reduce the risks of disasters by various measures, but developing countries of Asia, Africa and Latin America suffered these disasters routinely and accepted the sufferings as acts of God or as wraths of nature. It was realized that hazards of nature can be assessed scientifically to develop early warning of cyclones, droughts, floods etc. It was also realized that vulnerabilities of built up environment can be reduced by disaster resistant construction practices and people can be made better prepared to respond to disasters through education, awareness and capacity building.

The United Nations declared nineties as the International Decade of natural Disaster reduction (IDNDR), and convened the First World Conference on Disaster Reduction (WCDR) in Yokohama that adopted a ten year Strategy and Action Plan for a Safer World in 1994. Based on the experience gained the Second WCDR adopted another decadal Hyogo Framework of Action for Building Resilience of Countries and Communities to Disasters (2005-15).

This ushered a new era of DRR as countries around the world, including India, enacted Disaster Management Act, created new institutions at national, provincial and local levels for disaster risk management, prepared Disaster Management Plans at all levels, provided for funds for disaster risk management and developed capacities of communities for better preparedness of disasters. This resulted a paradigm shift in disaster management.



Earlier the focus of disaster management was to provide humanitarian relief and rehabilitation assistance to the affected people, and when the magnitude of disaster was very severe, such as earthquakes, and cyclones, provide assistance for reconstruction of houses etc. There were no efforts to assess the risks of disasters and much less to prevent the creation of new risks and mitigate the existing risks of disasters. There no Disaster Management Plans at national, state or district levels. There was no National Disaster Response Force, no National Institutes of Disaster Management, and no early warnings of cyclones, tsunamis, floods and droughts.

Over time the Disaster Risk Management (DRM) has replaced Disaster Management and pre–Disaster **Prevention, Planning and Preparedness (PPP)** has assumed more importance than post Disaster **Relief, Rehabilitation and Reconstruction (RRR).** Disaster prevention, planning and preparedness forms the core of Disaster Risk reduction (DRR).

The current approach is **All of Society** as cooperation with every segment of society, non-governmental organizations and local community are essential for effective measures for disaster risk reduction, and the current strategy is **Whole of Government** as every Ministry or Department of government has a role to play in reducing risks of disasters. Carrying all of society and whole of government is inclusive disaster risk management. It is a difficult and challenging task, but there is no short cut route for reducing the risks of disasters.

Inequality and Vulnerability as Drivers of Disaster

Sreelekha Saha

Inequality is a proven indicator of disaster vulnerability which drives inequal distribution of social variables such as wealth, health, education and other social rights on the basis of wealth, income, gender, caste, religion, ethnicity and other considerations, depending on how society and economy are constituted. According to the recent researches, the countries which experience the greatest loss from disaster are those who contributed the least to the risks of disasters. Similarly, the communities or segments of population suffer more in disasters that have less access to resources for survival and protection. Inequality facilitates the transfer of disaster risk from those who benefits from risk to those who bear the costs of risks.

Inequality on the basis of gender: As a post disaster effect, impact of the hazardous situation is very difficult to a woman than a man. It can be in terms of survival, deaths, injury, trauma or recovery. Generally, women have less skill or capacity to face a disaster and protect themselves. Actually, women are generally the last to be rescued. And it becomes very difficult when it affects a pregnant lady. Sometimes, women remain unaware of a disaster because of the burden of responsibilities in their family, that increases vulnerability before or after the disaster occurring.

Inequality on the basis of poverty: Impoverished people are more likely to live in hazard exposed areas like slums, street path, cyclone prone coastal areas etc. They are less able or sometimes unable to invest in risk reducing measures. They often have very low-quality buildings. On the other side, rich people's exposer tends to be buffered by insurance and coping capacity, while poorer people must often rely on their own funds, which can drive them into further poverty that impair their ability to recover from disaster. The loss of earning power of the poor people is affected significantly more than other classes. This loss of income, lack of ability to participate in the local economy can exacerbate existing inequalities over the long term.

Inequality on the basis of other forms of vulnerabilities: Inequalities are created on the basis of various other factors, such as age, disability, ethnicity, religion, place of residence etc. Children suffer more in disasters, so do aged, so are disabled. In many countries discriminations and deprivation are legally sanctioned on the basis of religion, ethnicity, place of residence, citizenship. Vulnerabilities are created on the basis of inequalities, discriminations and deprivations.

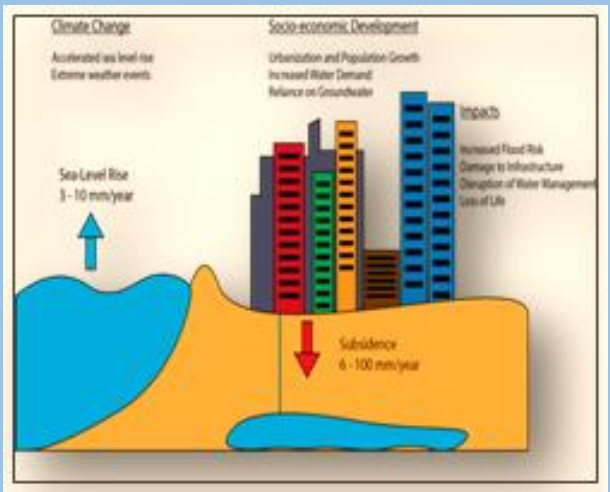
Sustainable Development Goals has promised a resilient future where no one will be left behind. The very first of the 17 Goals is the eradication of poverty in all its forms everywhere. While absolute poverty (earning less than 1.25 $ per capita per day) has been reduced in some countries, we are far from eradicating multi-dimensional poverty, which include addressing the basic needs of food, education, health, shelter, water, energy and sanitation. If we are able to truly achieve these goals, we will be firmly on our way to reduce vulnerabilities and risks of disasters to a large extent.

Groundwater depletion can cause land subsidence and create risks of disaster

Banashree Chakraborty

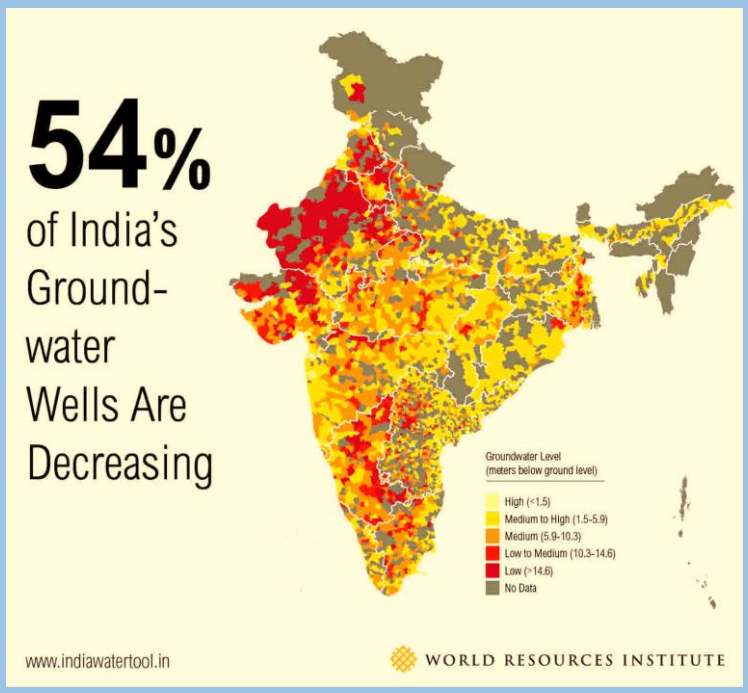
Ground water is the water that is present beneath the surface of the earth. The reservoir at which this ground water is naturally stored are known as aquifer and when we over exploit the ground water, we deplete the natural aquifer and create the risk of land subsidence. Land subsidence refers to the gradual sinking or settling of the Earth's surface.

Ground water depletion is taking place in many countries around the world, including India, due to a variety of factors. These include withdrawal of ground water for agricultural, industrial, drinking and other purpose much in excess of natural recharging of the aquifer. Such withdrawal is taking place as water demand from various sectors are increasing and both terrestrial and surface water resources are shrinking due to uncertain rainfall and increased evaporation due to changing climate. Rainfall which was staggered over the monsoon months are now concentrated over a shorter duration resulting in higher run off that do not percolate into the ground and are wasted. Higher temperature, on the other hand, is causing more evaporation of water from rivers, lakes, and ponds, as well as from soil. Climate change is further causing sea level rise and more frequent and intense cyclonic storms, resulting in saline water ingress into soil and water bodies, leading to higher demands on ground water. In many countries subsidised free electricity for farming has encouraged uncontrolled pumping of precious ground water for agricultural purpose.



Depleting ground water is putting pressure on the ground which is subsiding in many places threatening the foundation of above ground-built environment – houses, infrastructures, and human settlements.

Ground water resources in many parts of India, such as Haryana, Punjab, Western Uttar Pradesh, Rajasthan, Gujarat and Delhi are depleting very fast, mainly due to excess withdrawal of ground water for agricultural purposes, mainly due to free electricity and absence of any regulatory mechanism to control extraction of precious ground water. A recent study has shown that 54% of the natural ground water resources of India have depleted causing land subsidence in many places. India is withdrawing ground water more than USA and China combined. This is alarming by any count.



India has adopted national policies on water as well as on disaster management. While National Water Policy 2012 has prescribed judicious use and recharging of ground water to maintain a healthy ground water balance for sustainable development, the National Policy on Disaster Management 2009 and National Disaster management Plan of 2019 have both outlined series of measures for building a disaster resilient India.

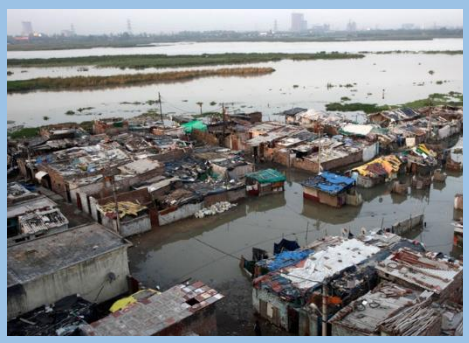
Unfortunately, there is a huge gap between our policies and practices. We adopt ambitious policies to declare our noble intentions, but we succumb to populist measures like free electricity and unregulated use of ground water to please present generation, only to create conditions for huge risks of disasters for future generations. This is not sustainable development. The future is looking grimly towards us and will very soon be realities of the present.

Rising Waters and Growing Threats
Exploring Intersections of Climate Change, Flooding, and Public Health in India

Arundhatii Aich

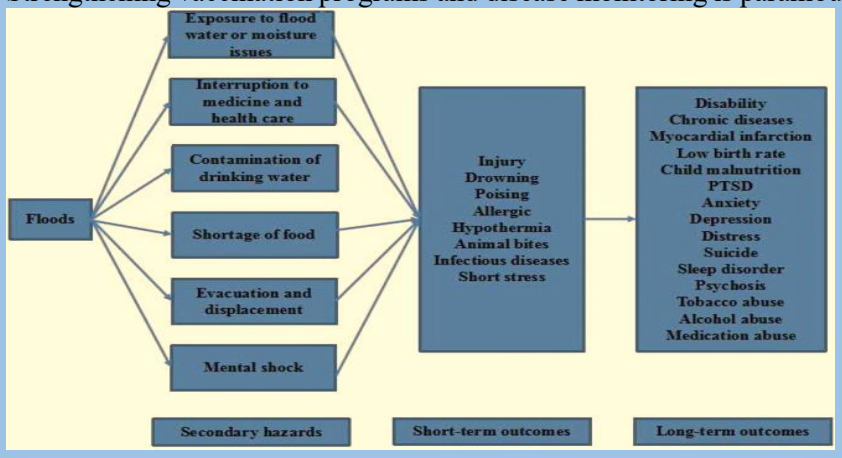
In recent years, various parts of India are witnessing a disturbing trend - climate change is increasing the fury of floods even in regions that had never seen any flooding. This is adding to the existing overloads of hazards and vulnerabilities and creating new levels of health risks. This nexus of climate, flood and health demands urgent attention and action.

Climate change is intensifying and altering flooding patterns worldwide. As global temperatures rise, the atmosphere holds more moisture, resulting in heavier rainfall in shorter duration. This increased precipitation, along with changing rainfall patterns and the accelerated melting of glaciers and snowpack, leads to higher volumes of water in rivers and water bodies, increasing the risk of riverine flooding. Moreover, rising sea levels caused by thermal expansion and melting polar ice caps are contributing to coastal flooding. Extreme weather events like hurricanes and cyclones, exacerbated by climate change, are bringing heavy rainfall and storm surges, causing alarming increase in coastal flooding. Glacial lakes in the Himalayas and trans-Himalayas are expanding during summer, causing floods in the mountains, from Indus valley in Leh to Kedarnath hills in Rudraprayag. Overall, climate change is amplifying the frequency and severity of floods, posing significant challenges for healthcare management and resilience.



Extreme flooding carries dire consequences that extend beyond immediate devastation. Loss of lives, displacement of communities, and destruction of infrastructure are immediate impacts, with long-term economic repercussions. Floods disrupt agriculture, leading to crop failures and food scarcity, amplifying food security issues. Critical infrastructure, such as power lines and transportation networks, is damaged, hindering recovery efforts. Hidden threats of flood include water contamination, vector-borne diseases, and mental health issues arise post-flood, further challenging public health systems. The mental trauma and emotional toll on survivors often result in anxiety, depression, and Post Traumatic Stress Disorder (PTSD).

Ensuring access to safe drinking water, sanitation facilities, and robust healthcare services is essential for public health. Strengthening vaccination programs and disease monitoring is paramount. Additionally, fostering community resilience to cope with disasters and providing vital mental health support to affected populations are crucial elements for achieving long-term recovery and resilience.



Building resilience of public health from floods

By placing a high priority on sustainable practices, building resilient health infrastructure, and implementing robust public health measures, India can chart a course toward greater resilience and offer its citizens a more promising and secure future in the face of escalating risks posed by rising waters and the associated threats.

Post Disaster Stress Management

Ditsa Maity

Disasters, whether natural or man-made, cause enormous devastation and human suffering to the community. Disasters leave a trail of human agony, including loss of human life and injuries, emotional trauma, loss of livestock, property and livelihood, resulting in long-term psychosocial and mental health problems.

Emotional Stress may occur before and after a disaster not only with the victims but also with their relatives, and relief volunteers. It is common to people to experience stress in the immediate aftermath of a disaster. Coping strategies include preparation, self-care and identifying support systems. Sometimes exposure to traumatic stressors can produce very intense arousal which may overwhelm the individual's coping mechanisms.

Adults, children and adolescents who are exposed to stress show a wide range of complex reactions. These reactions varies to their types and severity and also dependent on the individual affected. Indifference, resistance to evacuation, excessive substance use, despair and paralysis, panic, survival guilt, post-incident dependence etc are some of the possible psychological and behavioral syndromes associated with post disaster stress. The survivors of Indian Ocean tsunami showed a wide range of symptoms related to anxiety, depression and PTSD. The displaced victims showed more severe symptoms in respect to the non-displaced victims. The victims of Mumbai riots in 1992-93 were found in the state of fear, helplessness, obsessed thoughts and sexual inactivity. Man-made disasters significantly cause more stress than natural disaster. The Psychological effects have a massive impact on the individual victim and also on communities.

The victims fighting with stress may recover by their own or may need help from stress management team or some of them may require professional assistance to achieve maximum recovery. Most of those victims recover with time with minimum psychological assistance but some of them shows critical psychological symptoms which need a long time to recover.

Post Disaster Stress Management refers to comprehensive interventions aimed at addressing a wide range of psychosocial and mental health problems arising in the aftermath of disasters. These interventions help individuals, families and groups to build human capacities, restore social cohesion and infrastructure along with maintaining their independence, dignity and cultural integrity. Psycho-social support helps in reducing the level of actual and perceived stress and in preventing adverse psychological and social consequences amongst disaster-affected community.

Mental health services in disaster interventions are aimed at identification and management of stress related psychological signs and symptoms or mental disorders among disaster-affected persons and persons with pre-existing mental health problems. In addition, psycho-social support interventions are aimed at mental health and psychological well-being, promotion and prevention of psychological and psychiatric symptoms among disaster-affected community.

National Disaster Management Authority has issued comprehensive guidelines on Psycho Social Support and mental Health Services (PSSMHS), which include inter alia PSSMHS in the Response Phase, Psycho-Social First Aid, PSSMHS in Relief Camps, Referral System, Role of NGOs in PSSMHS, Integration of Community Practices with PSSMHS, PSSMHS during Recovery, Rehabilitation and Reconstruction Phases, PSSMHS for Care-Providers etc.

PSSMHS should be considered as an important component of general health services in disaster situations. The psycho-social support cover interventions required for promoting or protecting psycho-social well-being through relief work, meeting essential needs, restoring social relationships, enhancing coping capacities and promoting harmony among survivors. The mental health services comprise of interventions aimed at prevention or treatment of psychological and psychiatric symptoms or disorders. The overall goal of the Psycho-Social Support and Mental Health Services is healing and restoration of well-being of the disaster-affected community.

Strategies and Insights for Surviving Tornado

Akash Chakraborty

Tornadoes, also known as twisters or whirlwinds, are one of the most destructive and unpredictable hazards of nature. Tornadoes are vertical funnels of rapidly spinning air, which can rise up to 16 km above ground level moving with the maximum speed of about 45 km and a wind velocity that can reach up-to 450 km/hr. These often accompanied with ball sized hails. Tornadoes are detected by Doppler radar and measured in Enhanced Fujita (EF) Scale.

Tornadoes mainly occur in north central USA and adjoining region of Canada, also known as the 'Tornado Alley'. Tornado can occur in any region if the atmospheric conditions are available for such convective storms. South Africa, parts of Europe, Australia, New Zealand, Japan and Philippines face tornadoes. Bangladesh and adjoining West Bengal witness convective storm in summer, known as Nor'Wester or Kalbaisakhi, which is also a kind of tornado.

The most violent tornado in recorded history is Tri State Tornado of 18 March 1925 that stretched over 350 km across three States.in USA. It was an EF5 scale tornado that killed 1000 people and injured 3500 people within 3 hours. The Joplin Tornado on 22 May 2011 in Missouri caused a total damage of around $3.5 billion and is known as the most expensive tornado.

According to NOAA (National Oceanic Atmospheric Agency) 'there is no guaranteed safety during a tornado'. No one can predict strength of tornado until it touches the ground. The most important strategy for surviving tornado is preparedness. Being aware and understanding the local weather, staying informed during thunderstorm via local news or radio and aware of early warning system can help for surviving the hazard.

When tornado warning is announced, it is important to seek a safe shelter as fast as possible. In a house the ground floor and basement is safest or if someone is stuck in an open area, search for a nearby shelter or lie in a low lying area covering head can might save life.

In any disaster women, children and elderly people are most vulnerable. So, communication between family members and ensuring that everyone has battery powered radio or torch or mobile phone for communication is important.

In tornado prone area basement without windows ensures safety. Keeping emergency kit with packed food, water bottles, battery powered radio, torch etc. can help to survive after violent tornado disaster.

After tornado disaster has passed, it is important to be mindful of gas leakage, weakened structures and downed electric wire. Help people in surroundings especially those who needs and call emergency services.

Tornadoes are formidable forces of Mother Nature. Surviving tornado requires quick thinking, careful preparation and community awareness. A disaster happens when vulnerability got exposed to hazard and risks of disasters can be reduced if vulnerabilities are reduced and capacities are developed. So, by staying aware, informed and obeying the safety protocol can significantly increase the chances of survival.

Sundarban Mitigates Both Climate and Disaster Risks

Sonia Paul

Sundarban is the world's largest mangrove forest, which covers around 3% of the entire area of the world's mangroves. It lies on the delta of the Ganges, Meghna, and Brahmaputra rivers on the Bay of Bengal extending to approximately 10,000 square km area. Bangladesh and India share a total of 62% and 38% respectively. Indian Sundarbans was inscribed as a World Heritage site by UNESCO in 1987 due to its tremendous ecological richness and biodiversity importance, followed by similar inscription of Bangladesh Sundarban in 1997.

Sundarban is inhabited by nearly 14 million people, of which 9 million people live in Bangladesh and 5 million in India, surviving on subsistence agriculture and fisheries that are threatened by increasing frequencies and intensities of cyclonic storms, sea level rise and saline water ingress into soil, water and sub-soil. The region has historically contributed least to greenhouse gas emission, as it hardly burns fossil fuels and consumes electricity, but it is one of the worst victims of climate change. Every successive cyclonic storm has pushed the poor people further to the edges, many of them forced to leave their villages as climate refugees in search of livelihood. The conditions of the poor islanders of the Sundarban delta are worse than the people of 55 Small Island Developing States (SIDS) in the Pacific, Caribbean and Indian Ocean, as average sea level rise in the region is faster and levels of multi-dimensional poverty and density of population are also higher. These have made Sundarban probably the most delicate disaster and climate hotspots in the world.

Just as Sundarban is the worst victim it is also holds the unique potentials as well as promises of mitigating both climate and disaster risks. The mangrove forests have the highest rates of carbon sequestration compared with any ecosystems, marine or terrestrial. This feature makes mangroves one of the most carbon-rich biomes worldwide. As the world's largest mangrove forest Sundarbans is also the most efficient for carbon sequestration. The carbon sequestration capacity of mangroves ranges from 50 to 220 metric tonnes per acre. According to one estimate, Sundarbans have absorbed 4,150,000,000 tonnes of carbon dioxide, valued at around $79 billion in the international market.[5] There are scopes for planting mangroves in many new areas and enriching the existing mangroves through better protection measures, enabling additional sinking of CO2 from the atmosphere and thereby mitigating the effect of anthropogenic emission of greenhouse gases.

Due to their geographic position at the edge of the Bay of Bengal, Sundarbans faces maximum landfalls of cyclones. Here Mangroves act as a network of coastal defences and natural bio-shields against furies of cyclones. They dissipate and absorb much of wind and wave energy which protects the vulnerable coastal line from enormous damage. For example, the mangroves of Sundarbans reduced the wind of devastating cyclone Bulbul by 20 km an hour and saved the rest of southern Bengal from the fury storm. Also, their root systems trap and hold sediments and reduce coastal erosion. Most significantly Mangroves have water retention systems, they act as a natural sponge, absorbing and storing rainwater and contribute to flood mitigation, especially during heavy rainfall and storm events. According to one study, the global benefits of mangrove flood protection exceed US$ 65 billion/year. [6]If mangroves were destroyed, an additional 15 million people would be flooded annually around the world.[7] So, the plantation of mangroves is one of the most efficient and cost-effective mitigation strategies to reduce disaster risk. Integrating mangroves into disaster risk reduction can be more effective than building infrastructure to protect coastal communities during cyclones by reducing flooding.

[5] Menendez et al. (2020). The Global Flood Protection Benefits of Mangroves.
[6] Mahadevia and Vikas. (2012) Climate Change-Impact on the Sundarbans: A Case Study.
[7] Charles Nyanga. (2020). The Role of Mangroves Forest in Decarbonizing the Atmosphere.

Bridging Gaps between Science and Practice at Local Levels to Build Resilience

Pinanki Das

In this changing global risk landscape with increasing hydro-meteorological events and simultaneous crises like COVID-19, governments must translate global commitments into local action through improved strategies. The Sendai Framework for Disaster Risk Reduction, alongside other international agreements, emphasizes the role of science in identifying risks, informing strategies, and enhancing resilience. Local governments play a crucial role in reducing disaster risks and responding to emergencies. However, there's a gap between scientific knowledge and practical implementation, requiring more engagement and mechanisms for effective action. Addressing climate-driven risks in an evolving landscape needs a collaborative partnership with an improved understanding of local risk and help in designing appropriate responses with multiple co-benefits.

The gap between scientific knowledge and disaster risk reduction (DRR) actions is problematic, often due to inaccessible information. Improved communication and collaboration between scientists, policymakers, and practitioners are crucial. The COVID-19 pandemic highlighted the need for institutionalized scientific input in policy decisions. To shift towards preventing and managing risks, a systems approach with diverse scientific engagement is essential. Academic institutions should enhance knowledge dissemination, encourage collaboration, and recognize the role of "knowledge brokers" at the science-policy-practice interface to bridge the science-policy gap in DRR.

There are several good practices of harnessing science at the local level through collaborative partnerships for building resilience at local level. India Space Research Organisation (ISRO) has set up community centres in villages for disseminating scientific knowledge through satellite-based audio-video communication systems. Department of Science & Technology of Government of India supports setting up Community Resilience Resource Centres (CRRC) as collaborative partnership of national or state level scientific institutions with community-based organisations for building resilience at local levels. Many innovating partnerships have developed for combining scientific with traditional and indigenous knowledge for solving local problems.

Mérida, Venezuela faces significant earthquake, flood, and landslide risks. A multi-stakeholder partnership involving local government, universities, research institutions, and international organizations collaboratively assesses risks and develops a local disaster risk reduction strategy using the analytical tool of Hazus for risk assessment.

In Longchi Town, China, a cost-effective, science-based approach addressed landslide and debris flow risks after the 2008 earthquake. It prioritized early warning systems, agent-based evacuation modelling, and community training to minimize casualties effectively.

Local authorities, along with science institutions, should establish knowledge-sharing platforms for effective disaster risk reduction. Initiatives like "Making Cities Resilient 2030" and the "Building Information Platform Against Disaster (BIPAD) Portal" in Nepal exemplify the value of such networks. The BIPAD portal, supported by the Youth Innovation Lab, enhances DRR by providing accessible, scientifically sound data, and empowering local municipalities to make informed decisions and take early action.

Strengthening the science-policy-practice interface involves enhancing scientists' skills, building local government capacity, and promoting knowledge brokerage. Facilitators at the interface facilitate partnerships and share best practices. In Nepal, the EpiNurse project equipped local nurses with skills and technology to address disaster risks, enhancing community resilience. Universities and research institutions should promote training opportunities for students and scientists, particularly early career researchers, to develop skills supporting the co-creation and implementation of context-specific disaster risk reduction solutions. Networks like Periperi U and the U-INSPIRE Alliance empower young researchers and practitioners, fostering collaboration and knowledge sharing in DRR.

To advance disaster risk reduction local governments, funders, and research institutions should proactively allocate funding toward enhancing collaboration between scientists, youth, and local practitioners.[8]

[8] *Policy Brief: Closing the Gap between Science and Practice at Local Levels to accelerate Disaster Risk Reduction,* International Science Council (ISC), France

The Climate Crisis is a Child Rights Crisis

Chetana Tunga

The climate is changing everywhere, and uprooted children and young people – whether living in protracted displacement, refugee camps, urban slums, or booming megacities – are among the most exposed to its impacts. The climate crisis is the defining human and child's rights challenge of this generation and is already having a devastating impact on the well-being of children globally. Understanding where and how children are uniquely vulnerable to this crisis is crucial in responding to it.

The climate crisis is threatening children's rights in several ways, including:

- **Right to survival and development:** The climate crisis raises the risk of death and injury from extreme weather events like cyclones, floods, and heatwaves. It also disrupts food and water supplies, leading to malnutrition and disease.
- **Right to health:** The climate crisis worsens existing health issues like asthma, allergies, and diseases like malaria and dengue fever, with children being especially vulnerable.
- **Right to education:** The climate crisis is disrupting education by damaging schools, forcing children to be displaced, and making it difficult for teachers to teach.
- **Right to protection:** The climate crisis heightens the risk of violence and exploitation as competition for resources and migration increases, with children particularly susceptible.

United Nations Children's Fund's Children's Climate Risk Index is a comprehensive ranking system evaluating countries based on children's exposure to climate-related threats and their response capacity. It considers factors like extreme weather events, rising temperatures, water scarcity, and environmental degradation, all disproportionately affecting children. Alarmingly, the report reveals that globally, 820 million children (over one-third of children globally) face high exposure to heatwaves, 400 million (nearly 1 in 6 children globally) to cyclones, 330 million (1 in 7 children globally) to riverine flooding, 240 million (1 in 10 children globally) to coastal flooding, 920 million (over one-third of children globally) to water scarcity, 600 million (over 1 in 4 children globally) to vector-borne diseases, 2 billion (almost 90 percent of children globally) to air pollution, and 815 million (over one-third of children globally) to lead pollution due to exposures in contaminated air, water, soil and food. These findings underscore the urgent need for concerted efforts to protect children from the adverse impacts of climate change.

UNICEF's report sends a clear and urgent message: for immediate, decisive action on multiple fronts to address the climate crisis. This includes mitigating greenhouse gas emissions to limit global warming, government investments in infrastructure, global collaboration to find solutions and support vulnerable countries and communities, the implementation of child-centered policies and interventions that prioritize children's rights and well-being, ensuring their active participation in climate decision-making processes.

The climate crisis is not just about melting glaciers and rising sea levels; it is fundamentally a threat to the rights and future of our children. As the world races against time to combat climate change, we must act decisively to protect our planet and ensure that future generations can live in a world where their rights are upheld, and their well-being is preserved. It is our moral obligation to act now for the sake of our children and the planet they will inherit.

The Climate Crisis is a Child Rights Crisis: Introducing the Children's Climate Risk Index. New York: United Nations Children's Fund (UNICEF), 2021

Artificial Intelligence for Climate Risk Management

Arkadip Mondal

Climate change has emerged to be the most pressing global emergency issue that continues to threaten our generation and beyond and hence everyone, from varying fields of discipline, is wrapping their head around to give their best inputs to try and bring out new ideas to limit the damage to our planet. One such endeavour can be to leverage the power of Artificial Intelligence in managing the risks of climate change.

AI can effortlessly analyze vast volumes of data more rapidly and accurately than humans, making it possible to identify patterns and trends that can be used to guide decision-making in our quest to reduce emissions. Harnessing AI for climate change is not something new as many forward-thinking renowned organizations and institutions have been using super computers for developing their models of climate change projections.

The World Resources Institute (WRI) has used advanced Machine learning and computing to evaluate data on land use changes and deforestation. They have developed AI-based models that assist governments in creating deforestation prevention measures, and their work has helped pinpoint places where forests are losing ground quickly.

Carbon Tracker Initiative (CTI) is another such organization which uses AI to study emissions and their patterns. The European Space Agency's Destination Earth project intends to build an AI-based model of the Earth to track and forecast how climatic events like droughts and human activity interact. The vast quantities of intricate climate simulations produced by the field of climate modelling, which has only advanced significantly since the first system was developed at Princeton in the 1960s, can likewise yield fresh insights, all thanks to development in AI and Machine language.

Machine learning algorithms and AI are widely used to combine the predictions of various climate models generated by the Intergovernmental Panel on Climate Change (IPCC). Better forecasts can aid in the development of climate policy, enable governments to get ready for change, and possibly even reveal possible areas where climate change's consequences could be mitigated. UNESCO is actively encouraging novel methods to advance our learning of climate change and take steps in right direction.

Marielza Oliveira, Director for Partnerships and Operational Programme Monitoring at UNESCO says – "*Climate change is one of the biggest challenges humanity faces. UNESCO will assist in empowering countries to effectively use AI and emerging technologies to mitigate and adapt to climate change - from enhancing knowledge exchanges between countries to assessing the risks of natural disasters and monitoring the effects of climate change through open, inclusive, and multi-stakeholder processes.*" In the meanwhile, AI is demonstrating how it can be used to create new systems and procedures that place a strong emphasis on environmental responsibility and energy efficiency. A series of hydrodams destined for the Amazon basin, for example, are among the completely new green energy solutions being developed by AI, according to author and business adviser Bernard Marr. One development model that generated the best outcomes for carbon emissions was found by Cornell University researchers who ran a variety of AI engines through them. With older generations of analytics, this answer probably would not have been discovered.

However, both climate and informatics experts converge that our present understanding and utilization of AI is still in its infancy period, especially for a complex topic like climate change. For instance, Even in basic scientific assumptions and extrapolation AI can only give an accurate forecast of the short term using our most advanced models and difference begins to be very visible in the long term, as pointed out by Prof. Claire Monteleoni, a computer science professor at the University of Colorado and a co-founder of climate informatics.

Not to mention, AI itself have energy concerns with its utilization and is only going to rise up further. Also, the uneven deployment of AI could worsen disparities between affluent and poorer nations, with academic institutions and businesses in industrialized nations leading AI research. To address this, greater support is needed to ensure that developing nations have access to AI solutions and the resources to build capacity for policymakers, regulators, and practitioners. However, it should be acknowledged **mere machine analysis and silicon power cannot substitute the real work by humans that must be put together to tackle such a grave problem of climate change.**

Inequality and Urban Disasters

Shreya Mitra

"Urban disasters expose the deep-rooted inequalities in our cities. We must strive for inclusive urban governance and equitable resource distribution to prevent and mitigate the impacts of disasters"

Dr. Saskia Sassen, a Sociologist and Urban Theorist.

Urban areas are home to 56 percent of global population and produce more than 80 per cent of the global GDP. This trend is expected to continue, with the urban population more than doubling its current size of 4.4 billion by 2050, at which point nearly 7 of 10 people will live in cities. Most of the growth of urban population in recent decades have taken place in the developing countries of Asia and Africa due to migration of poor people from the rural areas in search of livelihood. This has not only put pressure on already stressed urban infrastructure like housing, water, sanitation, transport etc. this has further exacerbated existing deep-seated poverty and inequality in urban areas.

Inequality within cities has economic, spatial and social dimensions. Various studies have indicated that economic inequality is generally greater in urban than in rural areas - the Gini coefficient of income inequality is higher in urban areas than in rural areas in. The opportunities that cities bring are unevenly distributed in space, preventing entire neighbourhoods and groups of population from accessing proper health care, good schools, sanitation, piped water, employment opportunities and adequate housing among others. Slums are the most notable extreme of the spatial concentration of urban poverty and disadvantage

Urban areas are also more prone to disasters as all the components that combine to create risks of disasters – hazards, vulnerabilities and exposures - are much more pervasive and intense in urban areas. Most of the large cities in the world are located either on the coasts or on bank of rivers and therefore cities face the hazards of flood and cyclonic storms which have become more frequent and intense in urban areas due to climate change. Many large cities of the world are located in high-risk seismic zones. Cities are also more prone to fire and other technological disasters. Cities have layers of social, economic and environmental vulnerabilities. Exposure

of both population and economy are also very high in urban areas. Therefore, urban areas inevitably result in higher mortalities and more economic losses. Inequalities compound the adverse consequences of disasters. Inequality amplifies the vulnerabilities of marginalized populations in urban areas, making them more susceptible to the impacts of disasters. Marginalized populations including, low-income individuals, racial and ethnic minorities, and informal settlements, face disproportionate risks due to limited access to resources, inadequate infrastructure, and social exclusion. As a result, they experience higher mortality rates, loss of livelihoods, and prolonged recovery periods.

There are various challenges in equitable risk management for urban disasters, such as —

- Inequality restricts **access to essential resources** (such as, information, emergency shelters, healthcare facilities, insurance coverage, and financial assistance) and services critical for disaster preparedness, response and recovery.
- **Socio-economic disparities** can increase susceptibility to health impacts, such as inadequate access to healthcare or pre-existing health conditions, disadvantaged neighbours often suffer from poorly constructed buildings, and inadequate drainage systems.
- Inequality perpetuates **social exclusion**, limiting the participation of marginalized communities in decision-making processes and hindering their abilities to influence policies and resources allocation for disaster management.
- Urban disasters disproportionately affect women and girls due to existing **gender inequalities**. Traditional gender roles and norms often limit women's mobility, additionally, their reproductive health needs, including access to menstrual hygiene products and maternal healthcare, are often overlooked in disaster response efforts, further compromising their well-being.

We should address these issues systematically by proactive measures to manage the risks of urban disasters more equitably. Some of these measures may include:

- Prioritising **inclusive urban planning ensures** equitable distribution of essential infrastructure, housing and clean water services promote resilience and reduce disparities in exposure and vulnerabilities.
- **Proactive community engagement** promotes participatory approaches that ensure their voices are heard, their needs are addressed, and their knowledge is integrated into planning and response strategies.
- Implementing **social safety net programs**, such as targeted financial assistance, insurance schemes, and livelihood supports, help mitigate the impacts of disasters and reduce inequalities and promoting equitable recovery.
- **Collecting disaggregated data** on vulnerabilities and inequalities help policymakers identify and address disparities in disaster management.
- At first **create and improve preparedness plans**, then strengthen an early warning system and upgrade the city’s emergency response services.
- **Recognising and addressing the specific needs** and experiences of women and girl is crucial.

Equitable risk management in urban disasters requires addressing social disparities through inclusive planning, community engagement, social safety nets, and data-driven policies are crucial for reducing vulnerabilities and building a more equitable and resilient urban future. By recognising the challenges posed by inequality and capitalising on opportunities for inclusive approaches, we can build resilient communities that are better prepared to face and recover from urban disasters.

Urban E-Waste Risk Management

Sujan Mandal

E-waste, often known as electronic garbage, is emerging as a global issue, particularly in urban areas. Discarded electronics like computers, televisions, mobile devices, and other electrical appliances are included in this e-waste. Despite the increasing generation of electronic garbage, many urban areas lack efficient system of e-waste management. As a result, the need for effective e-waste management techniques has emerged as a critical issue that needs to be addressed by all stakeholders, including manufacturers, sellers, users, and waste management authorities at all levels.

- **Risks Associated with E-waste**

The environment and human health are at risk from improper e-waste management in a number of ways. Carelessly discarding electronic gadgets can result in the release of dangerous compounds like lead, mercury, and cadmium into the land, water, and air that have an impact on the health of living things including plants, animals, and people. Toxins in e-waste can harm humans' hearts, skin, and respiratory systems. The poor treatment of e-waste also adds to climate change by spewing out a lot of greenhouse gases into the environment.

Another issue is the risk to data security. Sensitive information, such as personal information, financial data, or organizational data, can be at danger of being accessed by unauthorized people as the number of electronic devices rises. This may result in financial fraud, business espionage, or even identity theft. Therefore, before disposing of electronic equipment, it is crucial to make sure they take the necessary precautions to secure their data.

- **Effective Techniques for Urban E-waste Management**

In order to stop additional environmental damage as urbanization grows, it is essential to build efficient urban e-waste risk management systems. Effective methods for managing urban e-waste include proper waste collection, transportation, and disposal; promoting electronic product refurbishment and reuse; putting incentive programs in place to encourage recycling; strengthening regulatory frameworks; and public awareness campaigns.

- **Recycling and Refurbishing**

Reusing electrical materials and products is a part of recycling. On the other hand, refurbishing entails fixing and modernizing electrical goods. These also support resource conservation, which is essential for lowering the need for new electronic goods. Reusing and recycling electrical items boosts the economy, creates jobs, and lessens their environmental impact.

- **Proper Disposal Methods**

E-waste releases dangerous substances that endanger the environment and human health. Donating or bringing in functional electronic gadgets to e-waste collection facilities is one of the most efficient ways to get rid of e-waste. To protect the privacy of user data, it is crucial to remember to wipe any personal information before disposing of electronic equipment.

- **Policy Implementation**

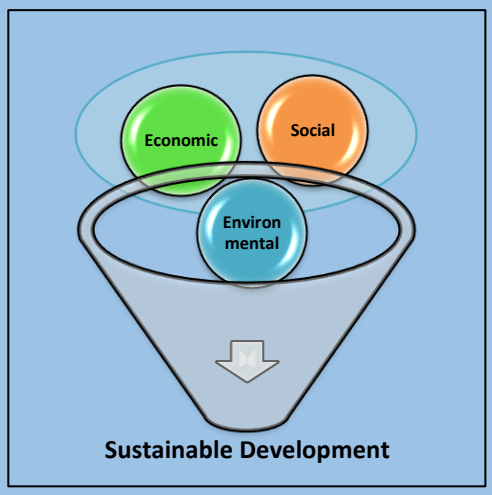
It entails putting the laws and policies designed to solve the problem into practice. Effective communication among all stakeholders, including governmental agencies, waste management companies, consumer electronics companies, and the general public, is crucial to the success of policy implementation. To achieve successful execution, sufficient resources, including funding and human capital, must be allocated. Collaborations between the public and commercial sectors can be crucial for putting policies into action since the private sector can offer the required technical know-how and resources. Monitoring and evaluation are essential for determining how policies are being implemented and whether their intended objectives are being met.

In conclusion, we may considerably lessen the risks caused by e-waste by effectively implementing solutions including e-waste disposal and recycling, regulation and policy enforcement, awareness and education, and improving consumption patterns. In addition to the government, producers, customers, and the electronic sector all share responsibility, since cooperation is key to achieving a sustainable future. We can have a positive impact on the environment and help to build a world that is more sustainable and healthier by appropriately handling e-waste.

Disaster and Development

Rasmoni Karak

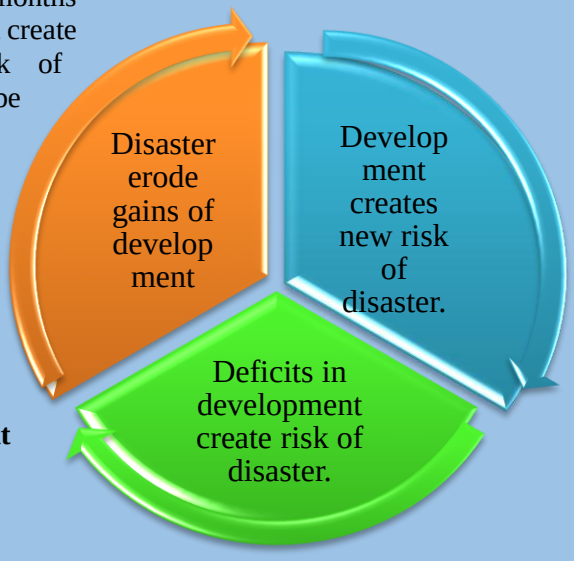
The concepts of growth and development were introduced as lexicons in economics. It meant economic growth of a country through developmental initiatives in primary sector of agriculture and allied activities, secondary sector of mining, manufacturing etc. and tertiary sector of services such as banking, trade, transport, communication, tourism etc. Economic development is measured in terms of growth in GDP. Economic growth does not necessarily ensure development of human and social development such as provisions of food, shelter, water, sanitation, education, health and other basic necessities of life. Thus came the concept of social development that create conditions for people to develop their capacities and enjoy life, what Amartya Sen described 'Development as Freedom'. Social development is often measured in terms of Human Development Index, Gender Development Index etc. Economic and social development must not take place at the cost of environment and hence environmental development emerged during the seventies as the third pillar of development, which means judicious use of resources endowed by nature in atmosphere, hydrosphere, lithosphere and biosphere. Environmental development is measured by Environment Performance Index. Sustainable development is the balanced development these three pillars of development – 'a development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.



In simple term, risks of disasters are created when vulnerable social, economic and environmental conditions are exposed to hazards - natural or anthropogenic. For reducing the risks of disasters, we have to assess how layers of physical, social, economic, and environmental vulnerabilities interact with the hazards; reduce the vulnerabilities and enhance the capacity of institutions, communities and individuals to deal with the risks of disasters. Therefore, disaster risk management includes pre-disaster risk assessment, risk prevention, risk mitigation and disaster preparedness, and post-disaster response, relief, rehabilitation, reconstruction and recovery.

Disaster risk means the potentiality of losses of life, injury or destroyed or damage assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.

To effectively reduce risks of disasters we need to understand the complex three three-dimensional relationship between disaster and development. Disasters erode hard earned gains of development in few seconds (earthquakes), few days (cyclones), few weeks (flood) and few months (drought). Deficits in development create vulnerable conditions and lack of capacities, which can only be addressed by all round inclusive development. But development also creates new risks of disasters such as unplanned mining, manufacturing and infrastructure in environmentally sensitive zones can create more disasters, as is being witnessed in Uttarakhand, Himachal, Sikkim and other areas. Therefore, development alone can reduce vulnerabilities, enhance capacities, and reduce risks, but development must always be risk sensitive so that it does not create new risks of disasters. **Before starting any development project, every development sector must necessarily know what they should not do before knowing what they should do.**



Tourism's Toll: Unearthing Dark Side in the Sundarbans

Kasturi Datta

The Sundarbans, nestled along the border of India and Bangladesh, holds the prestigious title of a UNESCO World Heritage Site. Renowned for its unique ecosystem, lush mangrove forests and being the natural habitat of the majestic Bengal tiger, this region has enchanted visitors from across the globe. However, the rapid and unchecked growth of tourism in the Sundarbans has raised significant concerns about the detrimental impact on the fragile environment. This article delves into the hidden consequences of tourism in the Sundarbans, with a particular focus on the escalating disasters and environmental degradation streaming from these burgeoning industries.

As tourisms continues to flourish in the Sundarbans, a perilous transformation unfolds. Unplanned construction of hotels, resorts and infrastructure in fragile biosphere without any carrying capacity analysis and environmental impact assessments are already having adverse consequences on vital habitats of the delta. Naturally grown mangroves outside the reserved forests that provided natural shield to delicate human settlements have been felled for construction of hotels exposing the people and their livelihood to storm surges and coastal erosion. Unregulated excursions of steamers carrying hordes of tourist into reserved areas are disturbing the peace and tranquillity of the region that are so important for the unhindered movement of animals including aviator and aquatic species.

In addition to habitat destruction, the tourism industry has unleashed a torrent of pollution upon the Sundarbans. Reckless wastewater discharge, the proliferation of plastic waste, and incessant noise pollution burden this fragile ecosystem beyond its capacity. Local flora and fauna, including the critically endangered Irrawaddy dolphin, bear the brunt of these consequences while water quality plummets to alarming levels.

The unrestrained surge of human activity, fuelled by tourism, exacerbates the overarching menace of climate change. The Sundarbans, already grappling with the impacts of rising sea levels and increasing unpredictable weather patterns, now finds itself further beleaguered by the carbon footprint of the tourism industry. The emissions generated from these activities intensify the region's precarious situation.

Furthermore, the Sundarbans, naturally prone to calamity, faces heightened vulnerability in the wake of tourism boom. Cyclones, floods and storm surges, recurring threats in region, pose grave dangers to infrastructure and settlements dotting the landscape. The devastating aftermath of Cyclone Amphan in 2020 demonstrated the extensive damage inflicted upon tourism facilities and the precarious situation it posed to visiting tourists.

The relentless influx of tourists into the Sundarbans strains its already limited resources. Overfishing, deforestation and excessive extraction of freshwater resources to meet tourist demands threaten the region's long-term sustainability.

To combat this ominous trajectory, embracing sustainable tourism practices is imperative. Stringent regulations must be enforced to critical unrestrained construction, mitigate waste generation, and silence the cacophony of noise pollution. Simultaneously, tourists should be educated about responsible tourism, emphasizing the importance of respecting and preserving the local environment.

The unique biodiversity of the Sundarbans must take centre stage in conservation efforts. Stringent regulations should protect critical habitats from further degradation and halt the relentless destruction of mangrove forests.

While tourisms in Sundarbans offer economic opportunities, it casts a long shadow of escalating disasters and environment degradation on the very ecosystem it seeks to showcase. A nuanced and balanced approach is imperative, emphasizing sustainable tourism practices, rigorous conservation efforts and robust disaster preparedness measures. The Sundarbans must not become yet another cautionary tales of peril borne from unbridled tourism growth.

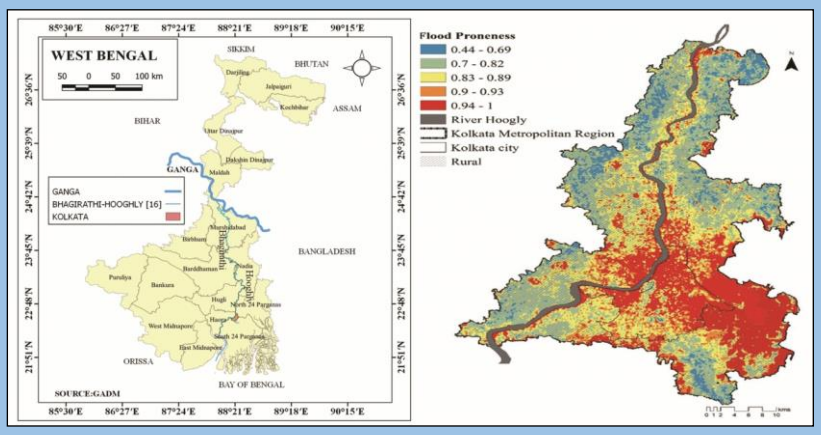
Climate Change and Riverine Flood in Kolkata

Abhijit Pal

The IPCC identified heavily urbanized megacities like Kolkata as one of the vulnerable urban centers to climate risks (AR6 2022). Kolkata is already vulnerable to several natural hazards that lead to water-logging and flooding, such as cyclones, tidal upsurges, storms, and intense local precipitation. Climate change will most certainly increase the frequency and intensity of these extreme climatic events through a combination of more intense local precipitation, riverine flooding in the Hooghly, and coastal storm surges.

A number of factors have contributed to the recurring incidences of floods in Kolkata Metropolitan Area. These include the following:

1. Natural Factors: The topography of Kolkata is such that rain water are not naturally drained into the river Hooghly which pass through Kolkata Metropolitan Area. The gradient of city surface is towards the east on the eastern and west on the western bank of the river. Other physiological conditions of the city such as low relief and natural subsidence, and hydro-meteorological factors like high-intensity rainfall, storm surges and cyclonic storms create conditions of flooding in the city.



2. Developmental factors: Unplanned developments on the East Kolkata Wetlands and West Hooghly and Howrah have blocked natural drainage systems. Horizontal and vertical growth of city have far outpaced the growth of city drainage and sewer infrastructure that are antiquated, ill-maintained and inadequate.

3. Governance factors: Siltation loads on city drains and canals, encroachments, and dumping of garbage into open drains are symptoms of poor municipal enforcement and governance that have reduced the effectiveness of the drainage systems in the city.

Every study indicates that the city of Kolkata will bear the brunt of climate change as rise in temperature and humidity will create conditions of wet-bulb temperature which will compound the effect of urban heat island. Increasing cyclonic storms will put pressure on the eco-system of Sundarbans affecting the East Kolkata Wetland which is connected with this ecosystem. Before climate change worsens the flood situation in Kolkata, it is necessary to improve flood management system of the city through the following measures:

- Proper operation and maintenance of pumping station, and silt clearing from gully pits.
- Regular desiltation of the canals and drains
- Enhancing functional efficiency of the Lock Gates for flood control and management
- Augmentation of the capacity of the pumping stations and slumps.
- Laying of sewer line in unsewered areas.
- Improvement of sanitation facilities especially in slum areas.
- Minimization of contamination of the local ponds by preventing overflow of raw sewage.
- Efficient collection of solid waste and wastewater to reduce the flow of such waste materials to the Canals and city drains.

Adapting to Extreme Climate Events: Europe's Heat Wave Challenge

Bhagyasree Chatterjee

A heat wave is a protracted period of unusually hot weather that may also include significant humidity. It occurs when the daily maximum average temperature exceeds by 5^0 Celsius for more than 5 consecutive days. Europe has experienced a significant increase in extreme climatic events over the past few decades, with heat waves becoming more frequent and severe.

Climate change is the driving force behind the increasing frequency and intensity of heat waves in Europe. Rising global temperatures, altered weather patterns, and prolonged periods of extreme heat have become a recurrent phenomenon. The southern half of the continent is being covered by a "heat dome," causing some of the warmest temperatures of summer in recent years, with temperatures rising above 40°C in portions of Greece, eastern Spain, Sardinia, Sicily, and southern Italy. Rise in temperature create high-pressure systems causing air to compress and warm in addition to reducing cloud cover, which increases the amount of solar radiation that reaches the ground. Summer's lengthy days and brief evenings increase this heating impact.

Heat wave in Europe has had several adverse impacts. These include:

- **Health risk-**Hospitals reported a surge in heat-related illnesses, including heat exhaustion and heatstroke. Old age homes reported upsurge in mortalities during summer months. Heat wave in 2022 summer caused deaths of more than 61000 persons, which account for more than 80 per cent of all disaster mortalities in Europe.
- **Infrastructure strain-** The heat waves strained infrastructure systems, including power grids and transportation networks. Overheated rail tracks led to train cancellations, and power outages became more frequent as air conditioning use surged. This demonstrated vulnerability of critical systems to extreme heat.
- **Agricultural drought-** The drought conditions resulted in crop failures and water shortages, impacting food production and prices.

As the incidences of heat waves are projected to be more intense and frequent with the changing climate, Europe must adapt to reduce heat wave related mortalities, losses and damages. Some of the effective adaptation measures include

- **Early Warning Systems**: Meteorological agencies provide timely heat wave alerts, allowing authorities, healthcare systems, and individuals to prepare and respond proactively.
- **Heat Action Plans**: Local authorities should develop comprehensive heat action plans, with provisions for opening cooling centres, monitoring vulnerable populations, and coordinating emergency response.
- **Infrastructure Resilience**: This includes upgrading power grids to handle increased demand during heatwaves and improving urban planning to reduce the urban heat island effect.
- **Green Spaces and Shade in cities**: Trees, parks, and green roofs can help to reduce temperatures and provide safe havens for residents.
- **Water Management**: Developing sustainable water management strategies is crucial. This includes efficient water use practices, water recycling, and long-term planning to ensure water availability during droughts.

All these strategies and measures should be integrated and implemented to prevent and combat emerging heat wave events. Europe's experience can serve as a valuable lesson for other regions facing similar challenges.

Impact of Disaster on Economic Growth in India

Ashis Sarkar

Economic losses due to disasters can be either direct and indirect, tangible and intangible. Direct loss refers to damage of houses and buildings (residential, commercial, institutional), infrastructure (roads and bridges, highways and railways, sea ports and airports, power and telecommunication systems, water, sanitation and sewerage systems etc.), production system (agriculture, animal husbandry, industries etc.), and services (tourism, transport etc.). These damages can be assessed and quantified easily. There are other direct losses like deaths and injuries that can be quantified in numbers, but not in economic values, as it is unethical to put a cost tag on deaths.

There are indirect losses or opportunity costs of disasters, such as costs of delayed treatment of diseases due to damage to health care institutions, or cost of education that suffered due to damage of educational institutions, or increased costs of travel due to damages to roads and bridges, or losses suffered due to tourists who could not arrive, or costs of production loss suffered due to disruption in supply chain systems etc. There are advanced methodological tools to quantify such indirect losses due to disasters as well.

Direct and indirect damage and losses that can be quantified are tangible, but there are intangible losses such as losses of natural cultural heritage or damages to environment or eco-system services or mental trauma of persons who lost their near and dears. Such intangible losses cannot be quantified easily as no price tag can be attached to ecology, or heritage or to grief and trauma.

In India there are no established systems and mechanisms to quantify the economic damage and losses due to disasters. Number of deaths and injuries and damage of houses are counted in numbers, and direct costs of damages to infrastructure and productive systems are assessed by the line departments. No consolidated assessments of damage and losses are made for most of the disasters. Such consolidated damage and loss reports are prepared only in respect of major disasters for which the State Governments such Memorandums to Central Government for special financial assistance under National Disasters Response Fund. Even in such memorandums the indirect or opportunity costs of disasters are hardly assessed. Intangible losses due to disasters are never assessed.

Therefore, it is very difficult to correctly estimate the total economic damage and losses due to disasters. It is even more difficult to estimate the impact of disasters on economic growth of India. When three mega disasters struck India during 1999-2004 (Orissa Super Cyclone 1999, Gujarat Earthquake 2001 and Indian Ocean Tsunami 2004), the World Bank had estimated that the country might have lost close to 2 percent of the GDP. This might look an exaggeration today for two reasons. First, the country has not faced a mega disaster like these since the Indian Ocean Tsunami, even though there have been major disasters like drought of 2009, cyclone Phailin in Odisha, cyclone Amphan in West Bengal, floods in Uttarakhand, Kashmir, Kerala, Mumbai and Chennai, landslides in Himachal Pradesh, Uttarkhand and Sikkim etc. Secondly, GDP has gone up much higher and therefore potential economic loss in relation to GDP will be much less. As per the Global Assessment Report on Disaster Risk Reduction (GAR) prepared by the United Nations Office for Disaster Risk Reduction, the Average Annual Loss (AAL) from multi-hazard disasters in India is approximately USD 9.8 billion per year. This works out to 0.26 percent of GDP. Therefore, disasters in India are unlikely to have any major impact either on the GDP of India or on the growth of GDP.

However, Covid-19 had much more devastating impacts on the economy as the whole country came to a standstill due to stringent lockdown imposed by the government. Average economic growth of 6.6 percent pre Covid nosedived to minus 23.9% during the peak of the pandemic. This was an unprecedented disaster for which the country was not prepared.

India's disaster preparedness has improved considerably over the years. Country now boasts of early warning systems for hydro-meteorological disasters like drought and cyclones that save lives and property. India has also developed early warning system for tsumami that are among the best in the world. Country has also 12 battalion strong dedicated National Disaster Response Force that is the largest in the world. But our level of preparedness is far below the residual risks that are neither prevented, nor mitigated nor transferred through market mechanisms like insurance. Therefore, any future mega disaster is bound to have some impacts on the economy and its growth, but its impacts will never be as disastrous as the Covid-19.

WILDFIRE WARRIORS
Battling Blazes in the Face of Climate Change

Pritthish Rauth

Wildfires are becoming increasingly devastating across the globe, leaving a trail of destruction in their wake. In the battle against these infernos, there are unsung heroes who risk their lives to protect communities and natural landscapes. They are the Wildfire Warriors, a dedicated group of firefighters, first responders, and volunteers who stand on the front lines of these raging blazes. This group, originally called the Steve Irwin Conservation Foundation, is a conservationist organization that was established in Australia in 2002 by Steve Irwin and his wife Terri, to involve and educate people for the protection of injured, threatened or endangered wildlife. Steve died in 2006 while shooting a documentary, but Terri continues as patron of Wildfire Warriors, with branches around the world, to protect forest and wild lives from increasing incidences of wild fire due to global warming and climate change.

When the alarm sounds, Wildfire Warriors are ready to respond. They undergo rigorous training, learning to handle complex equipment, read fire behaviour, and execute daring rescues. These brave men and women dedicate their lives to a cause that demands unwavering commitment.

Wildfires are merciless. They can spread at an astonishing rate, fuelled by dry conditions and high winds. Wildfire Warriors face towering walls of flames, choking smoke, and scorching heat. Their protective gear, including flame-resistant clothing and helmets, becomes their second skin.

One key to their success is teamwork. Wildfire Warriors work seamlessly as a unit, each member relying on the other. Communication is paramount, as they must coordinate their efforts to control and contain the blaze. Their ability to adapt and make split-second decisions can mean the difference between life and death.

Wildfire Warriors have a battle plan, but wildfires are unpredictable. They strategically set controlled fires, known as backfires, to deprive the main blaze of fuel and create firebreaks. These tactics require precision and nerves of steel. It's a constant battle of outwitting an elemental force.

These warriors don't just protect forests and wilderness; they shield entire communities from the flames. Evacuating residents, providing emergency medical care, and safeguarding homes are all part of their mission. They become pillars of strength in times of crisis. Wildfire Warriors also play a vital role in preserving ecosystems.

Some wildfires, when managed correctly, can be beneficial to the environment by clearing out dead vegetation and encouraging new growth. Wildfire Warriors carefully consider the ecological impact of their actions. In a world where wildfires are becoming more frequent and ferocious, Wildfire Warriors are the embodiment of courage and resilience. They confront nature's fury head-on, protecting both human lives and the environment.

As we witness the growing impact of wildfires, let us remember and honour these dedicated individuals who stand as the bulwark between civilization and the flames.

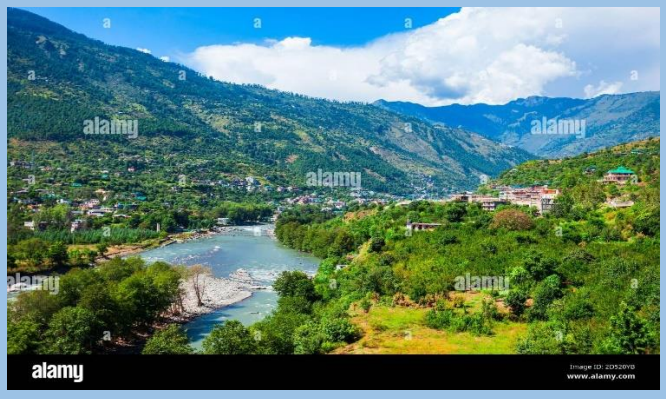
Devastating Landslides of Kulu

Sneha Mistry

Kullu is a valley formed by the river Beas between Mandi and Manali in Himachal Pradesh This valley is known for its temples and its hills covered with pine and deodar forest and sprawling apple orchards. Together with the river Beas running through the valley, Kullu offers truly magnificent views that attracts tourists from all around the world.

This valley of Kullu, also known as the 'Valley of God', received the wrath of God, as many locals believe, when incessant rainfall triggered a series of landslides causing enormous loss of lives and property. In the first phase of the downpour on July 9 and 10 communication links were disrupted due to erosion and submergence of roads and destruction of bridges. Subsequent rains and landslides caused more damages, with a total of 12,000 houses damaged, 2200 completely, 367 peoples killed, 340 peoples injured and 40 missing - unprecedented in the history of this district.

The rainfall and land subsidence caused cracks in as many as eight multi-storied commercial buildings constructed on the hill slopes of Anni town. The buildings were declared unsafe by the local administration and got vacated. The buildings - housing banks, shops and other commercial establishments - collapsed like a pack of cards on 24 August, causing losses, but no casualty was reported due to timely evacuation of the people at risks.



Unscientific constructions in the ecologically fragile Himalayas, depleting forest cover, and structures near streams blocking the flow of water are the main causes behind these landslides. Extensive cutting of hill slopes for construction and widening of roads, blasting for tunnels, and hydro projects destabilized the fragile hills. According to experts, slopes in Himachal have become highly vulnerable to landslides due to cutting of rocks at the foothills and the lack of proper drainage system, and high intensity rainfall is making the things worse.

Himachal Pradesh receives about 730 mm of rains on an average during the whole monsoon season from June to September, but according to the Met department the state has received 742 mm rainfall till mid-August, most of these taking place in short spans. The high rain intensity coupled with high temperatures lead to landslides due to loosening of the strata in places that have undergone cutting downstream on the foothills.

As per the State Emergency Operation Centre, Himachal witnessed 113 landslides in 55 days since the onset of monsoon. The Public Works Department (PWD) suffered a loss of ₹2,491 crore and the National Highways Authority of India (NHAI) about 1,000 crore. According to data compiled by the disaster management department, an alarming six-time increase had been witnessed in incidents of major landslides since 2022 which saw 117 major landslides as compared to 16 in 2020.

The tragic landslide of Kullu was caused by natural as well as by human causes. Nature takes revenge when humans fail to live according to the design of nature. The immediate cause of these landslide is excessive rainfall, but the main culprit is climate change, which is caused by human greed, recklessness and indiscriminate destruction of the environment in the name of economic growth and development. As a result, nature assumes the form of a giant and inflicts damages to warn us about the impending dangers of more catastrophic damages. Kullu landslides is one such warning of nature.

An Insight into the Libya flood, 2023

Sanchari Roy

Libya is a North African country - the fourth largest in Africa with an area of 1.8 million km^2 and a coastline of 1770 km bordering the Mediterranean Sea. Libya faced the deadliest flood in its history on 10 - 11 September, 2023, when Storm Daniel, brought high velocity wind and incessant rainfall that caused the collapse of two 50 years old dams: Derna (45 m height, 1.5 million m^3 capacity) and Abu Mansur (75 m height, 22.5 million m^3 capacity). The Abu Mansur dam collapsed first and the released water rushed 12 km towards the sea and overwhelmed the Derna dam which also had rising water levels in its reservoir. This allowed a water wall to gush through the port city of Derna along the dry riverbed Wadi Derna leading to inundation and collapse of a large number of structures.

According to the Deputy Mayor of Derna, the dams were not built to withstand high water volumes, and these had not been maintained properly despite allocation of funds for this purpose. Researchers had warned a high potential risk of flood and the urgent need for maintenance of the dams.

Anthropogenic climate change is considered to be a major driver of Storm Daniel. According to Spanish Research Centre CEAM, the temperature of the Mediterranean Sea has increased by almost 2ºC in the last 40 years and hit a record of 28ºC in the current year's July and August. IPCC in its 6^{th} assessment report mentioned that the characteristics of medicanes and tropical cyclones are the same, i.e., they are fewer but stronger.

According to the U.N. Office for the Coordination of Humanitarian Affairs, 11,300 people have lost their lives due to the flood, and another 6000 people missing in Derna and Abdulmenam Al-Ghaithi. Death toll may exceed 20000. More than 2200 buildings were inundated. The city was also facing risks of epidemics from the spreading of infections by dead bodies due to shortage of body bags.

The Tripoli Health Ministry arranged a plane carrying 14 tons of medical aid and body bags. Prime Minister Abdulhamid al-Dbeibah alloted $515 million to rebuild Derna and Benghazi. $ 2 billion was allocated by the House of Representatives for relief efforts. An investigation will be opened for the disaster. Derna Port reopened on 14 September for delivering humanitarian aids and electricity was restored to the western part of the city.

Deployment of military forces, Civil Protection, and 8 Ilyushin-76 aircrafts for humanitarian aids were organised by Egypt, Algeria and Italy respectively. Aids were also sent by France, Germany, Finland, Romania, Qatar, Iran, Turkey, and United Arab Emirates. WHO sent 40 tons of aid shipment and UN allocated $10 million for disaster relief.

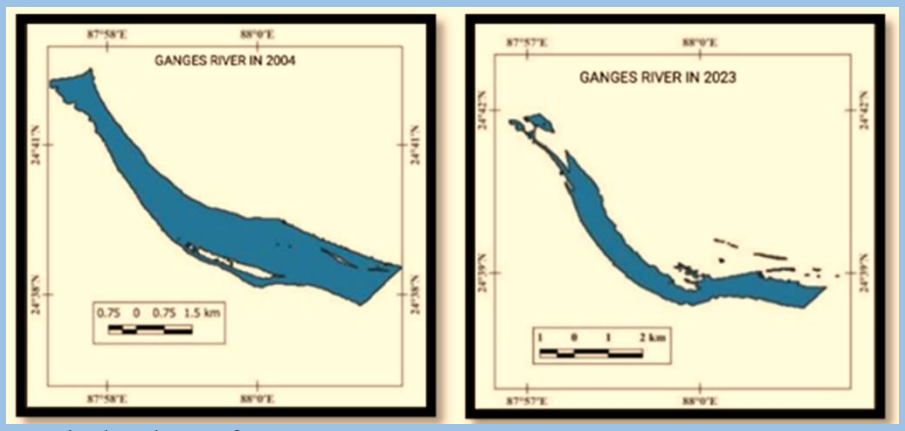
The Libyan flood awakened many countries about several collapse-prone dams around the world and highlighted the needs for dam safety and protection measures. Floods arising from dam collapse are not hazards of nature; these are completely manmade hazards. It is possible to prevent such hazards through regular safety audit of dams and implementation of appropriate structural measures for protection of dams.

Dealing with River Bank Erosion in Murshidabad

Tazmin Sultana

Murshidabad, the capital of Bengal during the Mughal rule, is situated on the eastern bank of the river Bhagirathi, a distributary of the Ganga, 209 km north of Kolkata. It is vulnerable to multiple hazards, the most important being the erosion of the river bank.

River bank erosion had always been an issue of critical concern for the district. According to government reports between 1931 and 1977, the district lost 26769 hectares of lands to the river and many villages have been fully submerged. Dhuliyan, Akheriganj, and Jalangi are some of the large settlements that have completely vanished from the district map due to river erosion. The problem has become very acute in recent years, as is shown in Quantum GIS maps of the river in the district of 2004 and 2023 that I have developed from remote sensing imageries.



Samserganj block of the district is now the most vulnerable to river erosion. As per the District Disaster Management Plan of Murshidabad of 2020-21, nearly 65000 households of this block are vulnerable to flood, water logging and erosion.

According to a news report nearly 1200 acres of land of land along 2.7 km of the river bank was completely washed away in 2020, displacing more than 3000 people of 627 families, most of them marginal and poor farmers.

River erosion of Murshidabad has been caused by multiple factors, both natural and manmade. The natural factors include meandering nature of the river, loose alluvial soil, decreasing depth of river due to increasing silt load from upstream locations and heavy rainfall. The manmade factors including deforestation, depletion of bio-shields, and most important, the construction of the Farakka barrage and subsequent changes in river management plan following agreement with Bangladesh.

Complete prevention of river erosion in Murshidabad is almost impossible, considering the complexities of the issues, but the risks of river erosion can be mitigated through various structural and non-structural measures, which may include the following:

- Constructing reinforced river bunds in selected places to protect valuable infrastructure and assets
- Increasing vegetation, such as vertiver grass along selected areas the river bank with protective shields
- Avoiding construction of buildings along the bank.
- Using coir fibre and geotextile for river bund protection as these can last in water for a longer period
- Using soil erosion mats or blankets for soil fortification.
- Creating awareness about river erosion
- Starting regular campaigns for better disaster preparedness.

River erosion is destructive, but it has a constructive side as well. Just as river erodes in one bank, it accretes in another bank. It is estimate that more than 15,000 hectares of chars (Flood Plain Sediment Island) have developed in many places, which are largely inaccessible from the Indian side but can be reached easily from Bangladesh. Although these are in the flood pain of the river these can be used for cultivation, if not for settlement. Surely, these options should be explored with better access, if necessary, with proper border arrangements with Bangladesh.

Revisiting the devastating flood in Kedarnath

Sangita Saha

Kedarnath is one of the sacred pilgrimage centres of India, situated on the bank of river Mandakini in the Rudraprayag district of Uttarakhand, at an altitude of 11,755 ft. above the sea level. It is visited by thousands of pilgrims from all over the country during the summer months.

Devastations:

On 16th June 2013 four interrelated hazards of nature combined to create an unprecedented disaster in Kedarnath that devastated the infrastructure of the temple complex and killed more than six thousand people with another five thousand still missing and presumed to be dead. These hazards were: first, continuous and excessive rainfall in the hills from 15 June onwards; second, landslides in Kedarnath hills and surrounding mountains that blocked roads and communication systems; third, cloudburst in Chorabaari glacier, 6 km from the temple complex causing further landslides; and a finally, Glacial Lake Outburst Flood that caused massive flow of water with huge boulders sweeping down the hill slopes destroying the temple complex. But the temple of Lord Siva stood erect by as a testimony of devastations all around Uttarakhand. Heavy rainfall, cloudbursts and landslides in affected 12 districts out of 13 districts of Uttarakhand - Rudraprayag, Chamoli, Uttarkashi and Pithoragarh being the worst affected.

Before

After

These hazards of nature could not be prevented, but the massive loss of lives, mostly of the pilgrims, and huge destruction of assets and infrastructure, mostly roads, bridges, and structures on hill slopes, could be prevented, if warnings were issued to the pilgrims, arrangements made for their shelters en route, and construction of roads and buildings conformed to the norms and specifications prescribed for hilly slopes.

Reconstructions:

The devastation was followed by massive efforts for response, relief, reconstruction and recovery. The State Government constituted Uttarakhand Rehabilitation and Reconstruction Authority which implemented a Disaster Recovery Project with financial assistance from the World Bank amounting to USD 350 million to restore housing, rural connectivity, build resilience of communities, and increase technical capacity of the state entities to respond promptly and effectively to disasters. Separately, Government constituted Shri Kedarnath Utthan Charitable Trust which mobilised resources from various sources to redevelop the temple complex to accommodate more pilgrims for their smooth pilgrimage.

Lessons:

Utttarkhand and Kedarnath reconstruction projects are often cited as successful recovery projects implemented on the basis of the globally accepted principle of Build Back Better. The twin projects were expected not only to reconstruct the damaged assets but also to build a disaster resilient Uttarakhand. While damaged assets have no doubt been reconstructed and the State is definitely better equipped to respond to disasters, but it is doubtful if the State has become more resilient to disasters. Continued construction of highways and hydro-electric projects on the hills despite concerns of the experts and objections of environmentalists probably show that we have not learnt lessons from past disasters and are still pursuing our arrogant pursuits of conquering nature. The sinking of Joshimath, ten years after the debacle of Kedarnath, does not augur well for the future.

Earthquake in Morocco 2023

Dipayan Laha

On 8 September 2023, an earthquake with a magnitude of 6.9 on the Richter scale and Mercalli intensity of VIII struck Morocco's Marrakesh–Safi region. The epicenter of the earthquake was located 73.4 km southwest of Marrakesh, near the Oukaïmeden ski resort in the Atlas Mountains. The earthquake sent shockwaves through the nation, both literally and figuratively. It is the strongest instrumentally recorded earthquake in Morocco, the deadliest in the country since the 1960 Agadir earthquake and the second-deadliest earthquake of 2023 after the Turkey–Syria earthquake. In this article, we explore the impact of the earthquake on Morocco, the response from authorities, the ongoing efforts towards reconstruction and recovery, and preparedness for future seismic events.

The Impact: The earthquake primarily affected the northern region of Morocco, with cities like Al Hoceima and Nador bearing the brunt of its force. At least 2,960 people were killed and 5,674 were injured. 59,674 houses in 2,930 villages were damaged either completely or partially. Besides vital infrastructure, educational, health and other community facilities were damaged, affecting nearly 3 million people. Many heritage and historic buildings and monuments were also damaged.

Response and Relief Efforts: Morocco's government were initiated a comprehensive response plan. Emergency services were deployed to affected areas to provide medical care, rescue operations, and support to survivors. Temporary shelters were established to accommodate displaced individuals and families. The international community, including neighboring countries and relief organizations, offered aid and expertise. Volunteers and locals joined forces to provide assistance, distribute essential supplies, and offer emotional support to those in need.

Rebuilding and Reconstruction: As the immediate relief efforts stabilized the situation, the focus shifted towards rebuilding and reconstruction. Moroccan authorities launched initiatives to assess the extent of damage and develop a comprehensive plan for reconstruction. The reconstruction process prioritizes not only physical infrastructure but also social and psychological recovery, aiming to restore a sense of normalcy to the affected communities.

Preparedness and Mitigation: The earthquake of 2023 served as a stark reminder of Morocco's vulnerability to seismic activity. In response, the government has redoubled its efforts to enhance earthquake preparedness and mitigation measures. This includes strengthening building codes, conducting public awareness campaigns, and investing in early warning systems to provide advance notice in case of future seismic events.

International Collaboration: Recognizing the transnational nature of seismic risks, Morocco has actively engaged in international collaborations and information-sharing initiatives with neighboring countries and international organizations. This cooperation aims to better understand earthquake risks in the region and develop strategies for joint preparedness and response.

The earthquake in Morocco in 2023 was a significant natural disaster that had a profound impact on the region. Its effects underscore the importance of preparedness and resilience in the face of such events, as well as the need for continued efforts to mitigate the risks associated with earthquakes in vulnerable areas.

Deforestation in Amazon Rainforest

Swyatya Biswas

Deforestation refers to decrease in forest areas that are lost for other uses, such as agricultural croplands, urbanization or mining activities. The most concentrated deforestation occurs in tropical rainforests, Amazon Rainforest standing out as the biggest example. Amazon rainforests cover an area over 5.5 million square kilometers in Brazil and is the largest forest area in the world. They provide habitat for wild life, sequester carbon dioxide from the atmosphere, protect biodiversity and provide valuable resources for nearby communities. It is famously known as the 'LUNGS OF THE WORLD', producing 20% of the Earth's oxygen and playing a crucial role in regulating the planet's climate.

Deforestation in the Amazon is one of the biggest ecological crises of our time. The main causes are the following:

1. **Agriculture and grazing:** Cattle ranches and soybean production are the largest drivers of deforestation in the Amazon. Amazon is a prime location for growing soybean globally due to its fertile soil. Brazil is also one of the world's largest beef exporters, and to raise their cattle, ranchers need huge tracts of land.
2. **Logging:** Logging for commercial purposes is another major cause of deforestation. Trees are cut down for timber used in furniture, paper, and other products.
3. **Mining:** The demand for minerals like gold and iron ore drives mining in the Amazon. Mining activities are causing widespread destruction to the rainforest, including water pollution and soil degradation.
4. **Human activity:** Growth of human populations in and around Amazon is increasing pressure on rainforest. Development works, such as roads, dams, and hydropower projects, are also contributing to deforestation.

Deforestation of Brazilian Rainforest has created a wide range of environmental, socio-economic problems, such as:

1. Indigenous communities of Amazon living within forests for centuries are facing existential crisis as their homes, livelihoods, and culture are threatened.
2. An incredible array of species – animals, plants, birds and micro-organisms - which maintain the delicate balance of Amazon eco-system are threatened with extinction, with devastating ecological consequences.
3. Deforestation also leads to soil erosion, which affects the quality of the soil and its ability to support plant and animal life, leading to a loss of productivity and economic opportunities for traditional communities.
4. Perhaps the most significant impact of deforestation in the Amazon is its effect on the climate. Trees are natural carbon sinks, and when they are cut down, large amounts of carbon dioxide are released into the atmosphere. This exacerbates the effects of climate change, contributing to increasing temperatures, rising sea levels, and more frequent natural disasters.

While it will be challenging to retrieve the forest areas that have been lost, it is possible to prevent further degradation of forests and improve the quality of degraded forests through various measures. One of the most practical ways to lessen deforestation in the Amazon is for the government to strictly enforce laws that govern it. For example, the Brazilian government can create laws and regulations prioritising sustainable agriculture activities and forestry practices. Nature-based solutions are a promising pathway towards mitigating deforestation in the Amazon Rainforest. This involves planting a diverse range of native tree species and allowing them to grow and regenerate over time. This can help prevent further deforestation by creating a barrier between remaining forests and areas susceptible to land-use change. With the right combination of government regulations, nature-based solutions, initiatives of local communities and non-profit organisations, and individual action, deforestation in the Amazon can be addressed and reversed.

Forest Fire

Sravana Chanda

Uncontrolled and unplanned burning of forests, grasslands or tundra over a large area is known as Forest Fire or Wildfire or Bushfire. Forest Fire can be caused both naturally and by anthropogenic activities. Forest fires are natural when lightning strikes a tree or dry vegetation ignited due to extreme heat and spread over a large area by wind. Also High atmospheric pressure and low humidity works in favour for the initiation of fire. Anthropogenic activities are mostly due to carelessness, such as discarded remains of lit cigarette butts, lit fireworks or campfire. Sometimes forest fires are also caused by forest dwellers or grazing communities who use fire for cooking and warming. Also, deforestation and land use change of the forest are also responsible for forest fire outbreaks. However, the greatest of all anthropogenic activity is greenhouse gas emission in atmosphere resulting to global warming and climate change.

Impacts of Forest Fire: Forest Fires have ruinous effects upon the environment. As the fire disrupts and destroys the flora, fauna along with their habitat, so biodiversity is threatened and thus the whole natural balance of the ecosystem is disturbed. There is also loss of carbon sink as forests play a major role in carbon sequestration which in turn increases the amount of carbon dioxide in the atmosphere. Also burning of the forest areas releases huge smoke with high concentration of carbon dioxide and monoxide that contribute to the global warming and climate change by increasing the overall average temperature of our mother earth. The soil quality of the ground also deteriorates after the loss of the vegetation cover and the ground becomes hydrophobic in nature which prevents the absorption of water.

Forest Fire causes substantial economic losses which include the damage incurred to homes, buildings, infrastructure, agricultural and grazing lands. The price of on-site firefighting is quite high and so is the post disaster recovery and restoration of the forest lands. It is estimated that annual economic loss due to forest fire of USA and Australia, two most affected countries in forest fires, is around 140 and 5 billion USD respectively.

Forest Fire Risk Management and Mitigation Techniques: Risks of forest fires can be mitigated and managed through a combination of measures that may include the following:

- Early Detection Systems and advanced technologies should be deployed, such as satellites and drones, to detect fires in their initial stages which will facilitate a quicker response by the firefighting teams.
- There should be proper identification and mapping of fire hazard prone zones conducted through remote sensing and GIS technology.
- Regular controlled burns should be conducted to intentionally set on fire dry vegetation to reduce the chance of buildup of combustible materials and thereby decreasing the risk of catastrophic Forest fire outbreaks.
- Communication networks should be installed in place for ensuring the timely flow of forest fire information, manpower and materials to fire sites.
- Public Awareness and proper education about the risks and vulnerabilities of forest fires and their mitigation practices should be conveyed to the local community
- Regular training and mock drills should be conducted by the forest staffs and other fire protection committee members with the involvement of the local people.

With a blend of responsible human behaviour, advanced technologies, and sustainable forest management, we can together work towards reducing the devastating impacts of forest fires and maintain the health of our mother earth and our forests.

Impact of Amphan on Sundarban

Ashmita Rakshit

The Sundarban region extends over ten thousand sq. km in India and Bangladesh on the northeast coasts of Bay of Bengal. It is the largest mangrove eco-system and the largest delta in the world and is home to 300 species of flora and 425 species of wildlife, including the endangered species of royal Bengal tiger, Irrawaddy dolphins and estuary crocodiles. It was declared a 'UNESCO World Heritage Site' in 1987 in India and in 1997 in Bangladesh and as a 'Ramsar site' in 1992. Sundarban delta is inhabited by nearly 12 million people, of which 4.5 million in India, struggling to survive in a fragile and hostile ecosystem through subsistence farming, fishing and collection of honey from the mangroves.

Cyclone Amphan hit the Sunderban region on May 20 with heavy rains, a massive storm surge and sustained winds of 170 kilometers (105 miles) per hour and gusts of up to 190 kph (118 mph), devastating lives and livelihood of the people, ravaging their houses and infrastructure.

Impact of cyclone Amphan was compounded by the Covid-19, as disaster response and relief operations were seriously disrupted due to restrictions on movement of people. The cyclone shelters and relief camps could not function properly increasing the distress of the people.

Cyclone Amphan also damaged almost the entire length of the 100-kilometer (62-mile) nylon fence that had been erected to prevent tigers from straying into human habitations, exposing people living on the edge of forests to the dangers of attacks of wild animals.

But it is the breaking of 3000 km long embankments at more than 100 locations, resulting in salt water pouring onto the land, which created the most durable impact on livelihoods of people. Saline water kills freshwater fish in ponds in a day, most sources of drinking water disappear, and land can’t be used for cultivation for up to five years.

A comparative study of Land Use and Land Cover (LULC) changes in Sunderban, based on satellite imageries before and after the cyclone Amphan, revealed a significant rise in the waterlogged area (40% from 342.24 km to 482.36 km), open vegetation (3%), and water bodies (0.5%) and a significant decrease in dense vegetation/mangrove after the cyclone. Cyclone Amphan devastated 13.4% of the mangroves in the Indian Sundarban region, which will have serious impacts on the environment, ecosystem and ecosystem services, in the long run.

দুগ্গাদের দুর্দশা

নিদ্রোত্থিতা মোদক

দুর্গাপুজো বলতেই সবার মনের ক্যানভাসে ভেসে ওঠে আলোর রোশনাই,ঢাকের আওয়াজ আর একরাশ হাসিমুখের সমাগম।হবেই তো বছর পর মা আসছে বলে কথা | কিন্তু এই চিত্র সর্বত্র এক নোই। বাঁকুড়ার ছোট গ্রামের একরত্তি দুগ্গার মুখটা কেমন যেন কালবৈশাখীর মেঘের ঘনঘটা ভিড় করে রেখেছে এই বুঝি বৃষ্টি নামলো। দুগ্গার মন আবার ভীষণ খামখেয়ালি এই রোদ ঝলমল তো এই মেঘমল্লার ঠিক বর্তমানের আবহাওয়ার মত। দুগ্গার ইস্কুলের বন্ধুটির এ বছর পুজোয় একটা ঝলমলে ফ্রক আর এক জোড়া লাল জুতো হয়েছে যেমন দুগ্গা মনে মনে চেয়েছিলো ঠিক তেমন। সেই দেখা মাত্র থেকেই দুগ্গার মুখ ভার,কারণ তার ভাগ্যে এবছর কিছুই জোটে নি। গরিব চাষীর মেয়ে দুগ্গা, এ বছর খরার কারণে ফসলের অপূরণীয় ক্ষতির মাসুল গুনতে থাকা বাবাকে নিজের শখের কথা বলবেই বা কিভাবে। তাদের এমনিতেই নুন আন্তে পান্তা ফুরায় অবস্থা। অন্যদিকে সন্দরবনের আর এক দুগ্গার ভাগ্যেও এ বছর ঝলমলে ফ্রকখানা জোটেনি। গতবছর আমফান এ দুগ্গাদের চাষের জমিতে লবনাক্ত জল ঢকলো আর ঝড়ের তান্ডবে ঘরবাড়ি ভাঙলো সেই থেকে তার বাবা বাইরে শ্রমিকের কাজ করে সামান্য যা পায় সে দিয়ে দুগ্গার মায়ের কঠিন ব্যামোর ওষুধ কিনতেই চলে যায় ফ্রকটা আর হয়ে ওঠে না।অন্যদিকে দক্ষিণ কলকাতার দুগ্গা তো পুজোর এই কয়টা দিন মানুষ প্লাষ্টিক আর বিভিন্ন আবর্জনা যত্রতত্র যা ফেলবে সেটাকে যথাস্থানে পৌঁছে পরিবেশকে কালিমামুক্ত রাখবে,তার আর নতুন জামা পরে কি বা হবে!

এ কি! এই সব মানবী দুগ্গাদের পাশাপাশি মা দুগ্গার মুখটা অমন ভার কেন? হবেই তো রাজ্যে যে এ বছর দেরিতে বর্ষা এসেছে তাই এই ভর শরৎকালেও বর্ষাকালের না হওয়া বৃষ্টির শোধ দিতে আকাশ একবারে লেগে পরে উঠেছে তাই কেউ মা কে দর্শন করতে আসতে পারছে না। সন্তানদের না দেখলে মায়ের মন তো ব্যাকুল হবেই।রাজ্যের তথা দেশের এই বিভিন্ন প্রান্তের দুগ্গারা প্রতিনিয়তই লড়াই করে চলেছে দুর্যোগের সাথে | দেশের বিভিন্ন প্রান্তের খরা ,বন্যা ,আবহাওয়ার পরিবর্তন এই সব তো মানবসৃষ্ট এক একটি অসুর যার জন্য ভুক্তভুগি গোটা দেশ। তবে এই অসুর রক্তবীজ এ পরিণত হওয়ার আগেই আমাদের নিজের স্বার্থে পরিবেশের প্রতি ভুল গুলো শুধরে পরবর্তী প্রজন্মের দুগ্গাদের মুখে হাসি ফোটাতে দৃঢ়প্রতিজ্ঞ হতে হবে এক জোট হয়ে তবেই প্রতিটি উৎসব সবার জন্য আনন্দের হয়ে উঠবে।

বন্যায় কবলিত গ্রামের সাধারণ মানুষ

সৈকত দত্ত

বন্যা! এই শব্দটা আমাদের কাছে অত্যন্ত পরিচিত একটি শব্দ। পাকা বাড়িতে বসে খবরের চ্যানেলে বহুবার এই শব্দটা আমরা শুনেছি কিন্তু বন্যার ভয়াবহতা হয়তো গ্রামের অসহায় মানুষগুলোর মত করে কেউ উপলব্ধি করতে পারবে না। নিজের জমানো আমানত ও স্বজন হারানোর বেদনা তারা যেভাবে উপলব্ধি করতে পারে তা আমাদের পক্ষে বোঝা সম্ভব নয়। গ্রামের সাধারণ অসহায় মানুষ যারা সামান্য খাদ্যে যোগানের জন্য জীবনের সাথে লড়াই করে তাদের জীবনে বন্যার মত প্রাকৃতিক দুর্যোগ তাদের লড়াইকে আরো কঠিন করে তোলে। আর বন্যা যদি হয় আকস্মিক তাহলে তো আর কথা নেই নিজের সাজানো সংসার পরিজন ভেসে যায় চোখের সামনে।

আমরা যারা শহরে বাস করছি তাদের নানান কর্মকাণ্ড প্রকৃতির ওপর বিরূপ প্রভাব ফেলে তার ফলস্বর বন্যার মত দুর্যোগ ঘটে। আমরা আমাদের নিজেদেরই নানান কার্যকলাপের কারণে সেই দুর্যোগকে বিপর্যয়ের রূপ দি। যার ফল স্বরূপ গ্রামের সাধারণ মানুষেরা হয়ে পড়ে স্বজন হারা গৃহহীন। প্রকৃতির এই নির্মম পরিহাসের ক্রাশ থেকে মুক্তি পাওয়ার পরেই তাদের জীবনে নেমে আসে খাদ্যাভাব নামক আরও একটি বিপর্যয়। নিজেদের সবকিছু হারিয়ে সেই মানুষগুলি দুমুঠো অন্যের জন্য তাকিয়ে থাকে সরকারের দিকে, সেই সরকার যারা তাদের জীবনের এই দুর্যোগকে নিজেদের ক্রিয়া-কলাপের তরুন আরো কয়েকগুণ বাড়িয়ে দিয়েছে।

আমাদের কেন্দ্রীয় সরকার পরিচালিত নানান বিপর্যয় মোকাবেলা সংস্থা এই অসহায় মানুষগুলোর জন্য যেসব ত্রাণ সামগ্রী খাবার পাঠায় তা নিয়ে ব্যবসা করে কিছু ক্ষমতাশালী বর্বর। তাদের এই দরিদ্র অসহায় মানুষগুলোর খাবারে ভাগ বসাতে বিন্দুমাত্র লজ্জা বোধ হয় না। এ ধরনের কিছু মানুষের কারণে বন্যায় কবলিত ওই মানুষগুলোর জীবন আরো দুর্বিসহ হয়ে ওঠে। গ্রামের মানুষের এই দুর্ভোগ আটকানোর জন্য সরকার বিভিন্ন ধরনের পদ্ধতি গ্রহণ করেছে যাতে খুব সহজে বন্যার পূর্বাভাস তাদের কাছে পৌঁছে দেওয়া যায় এবং বন্যা আসার পূর্বেই তাদের নিরাপদ আস্তানায় পৌঁছে দেওয়ার ব্যবস্থা করা যায়। এবং বন্যার সময় আটকে পড়া অসহায় মানুষদের যাতে খুব তাড়াতাড়ি উদ্ধার করা যায় তার জন্য সরকার বিভিন্ন ব্যবস্থা নিয়ে থাকে।

শুধু এই ব্যবস্থাগুলো নিলেই হবে না এই ব্যবস্থাগুলো সঠিক সময়ে সঠিক জায়গায় উপস্থাপন করা হচ্ছে কিনা তার দিকে সরকারকে কড়া নজর রাখতে হবে। সবার আগে সরকারের উচিত সমস্ত প্রক্রিয়াটিকে স্বচ্ছ করা যাতে সরকার সাধারণ অসহায় মানুষগুলোর জন্য কি কি ব্যবস্থাপনা গ্রহণ করছে সেই খবরগুলো যাতে সেই মানুষগুলোর কাছে আগে পৌঁছে যায়। বন্যা কবলিত অসহায় মানুষগুলোর জন্য পাঠানো ত্রাণ সামগ্রী তাদের কাছেই যেন পৌঁছয় এই দিকে সরকারের হস্তক্ষেপ অত্যন্ত বাঞ্ছনীয়। গ্রামের এই সাধারণ মানুষ গুলোই আমাদের মুখে অন্য তুলে দেওয়ার জন্য ফসল ফলায় সেই অসহায় মানুষগুলোকে এই দুর্যোগের হাত থেকে রক্ষা করা আমাদের কর্তব্য। শুধুমাত্র সরকারের দিকে না তাকিয়ে আমরা যদি নিজেদের উদ্যোগে তাদের পাশে গিয়ে দাঁড়ায় তাহলে তাদের এই বিপদের দিনে আমাদের এই ভরসার হাত তাদের এই লড়াই কে সহজ না করলেও তাদের লড়াই করতে অনুপ্রেরণা দেবে।

বিপর্যয় পরবর্তীকালে তাদের জীবনকে আবার মূল স্রোতে ফিরিয়ে আনার জন্য সক সরকারের সক্রিয় ভূমিকা থাকা কাম্য। তাদের নতুন করে ঘরবাড়ি তৈরি থেকে শুরু করে তাদের হারিয়ে যাওয়া প্রয়োজনীয় নথিপত্র আবার নতুন করে তৈরি করে দেওয়ার দায়িত্ব সরকারের উপর বর্তায়। আমাদের অর্থনীতির মূল ভিত্তি হল গ্রাম। আর এই গ্রামকে বিপর্যয় মোকাবিলার প্রয়োজনীয় যে ব্যবস্থাপনা গুলি নিতে হবে তা সম্পর্কে তাদেরকে অবগত করতে হবে। বিপর্যয়ের পূর্বে এবং পরে নির্দিষ্ট কিছু ব্যবস্থাপনা থাকে যা বিপর্যয়ের ভয়াবহতা কে একটু হলেও কমায়, সেই সম্পর্কে গ্রামের সাধারণ মানুষের সচেতন থাকা অত্যন্ত প্রয়োজনীয়। কিছু সামান্য ব্যবস্থাপনা একটি ভয়াবহ দুর্যোগকে বিপর্যয়ের রূপ ধারণ করতে বাধা দেয়। সবার আগে আমাদের করা প্রকৃতির উপর অত্যাচার গুলোকে কমাতে হবে। প্রকৃতির যত্ন নিতে হবে যেভাবে সন্তানেরা নিজের মায়ের যত্ন নেয় ঠিক সেই ভাবে। কারণ প্রকৃতির ওপর করা আমাদের বিরূপ আচরণ যখন প্রকৃতি আমাদের উপর ফিরিয়ে দেয় তখন তার ভার ধারণ করার ক্ষমতা আমাদের থাকে না।

অকাল বৃষ্টি

যুবরাজ রায়

বর্ষাকাল যখন নিয়েছে বিদায়,
শরৎ মেঘে আগমনী গায়,
নিদীর ধারে কাশ দুলে বেড়ায়,
তখনই এসেছে বৃষ্টি।
অকালে এসেছে বৃষ্টি, একি অনাসৃষ্টি

ভানুর প্রতাপ নাই গগনে,
মেঘ ঘনেছে আকাশ পানে,
অভিকর্ষ বলের টানে,
আবার এলো বৃষ্টি
অকালে এসেছে বৃষ্টি, একি অনাসৃষ্টি।

ঊষা হইতে প্রারম্ভ হলেও, গোধূলি তেও নেই তার বিরাম,
স্কুল, কলেজ, অফিস, সবেতেই, সময় মেটায় তার দাম।
কলেরা, ডেঙ্গি সবার পেছনের কাঠামো এই বৃষ্টি।
অকালে এসেছে বৃষ্টি, একি অনাসৃষ্টি।

রাতভর ভীষণ বৃষ্টির পর, পথ গিয়েছে তল।
সকাল বেলা যানজটে, তখন বাঁধে হট্টগোল।
মাঠ,ক্ষেত, শস্য, জলা সবি জলে পূর্ণ।
চাষীর ভাগের লাভের অংশ, করে দিয়ে যায় শূন্য।
এই দুর্যোগের মুলে রয়েছে -বৃষ্টি,
অকালে এসেছে বৃষ্টি, একি অনাসৃষ্টি।

যদিও চারিদিকে এত দাবদাহের পর, যখনই আসে এই বৃষ্টি,
প্রাণীকুল তখন নিশ্বাস নেই, যেনো বাঁচার আশ্বাস পায়।
তবুও জন জীবন ভীষণ দুর্বিষহ, অসময়ের একনাগাড়ে বৃষ্টি।
অকালে এসেছে বৃষ্টি, একি অনাসৃষ্টি।

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