

Oct - Nov 2020



KNOW DISASTERS



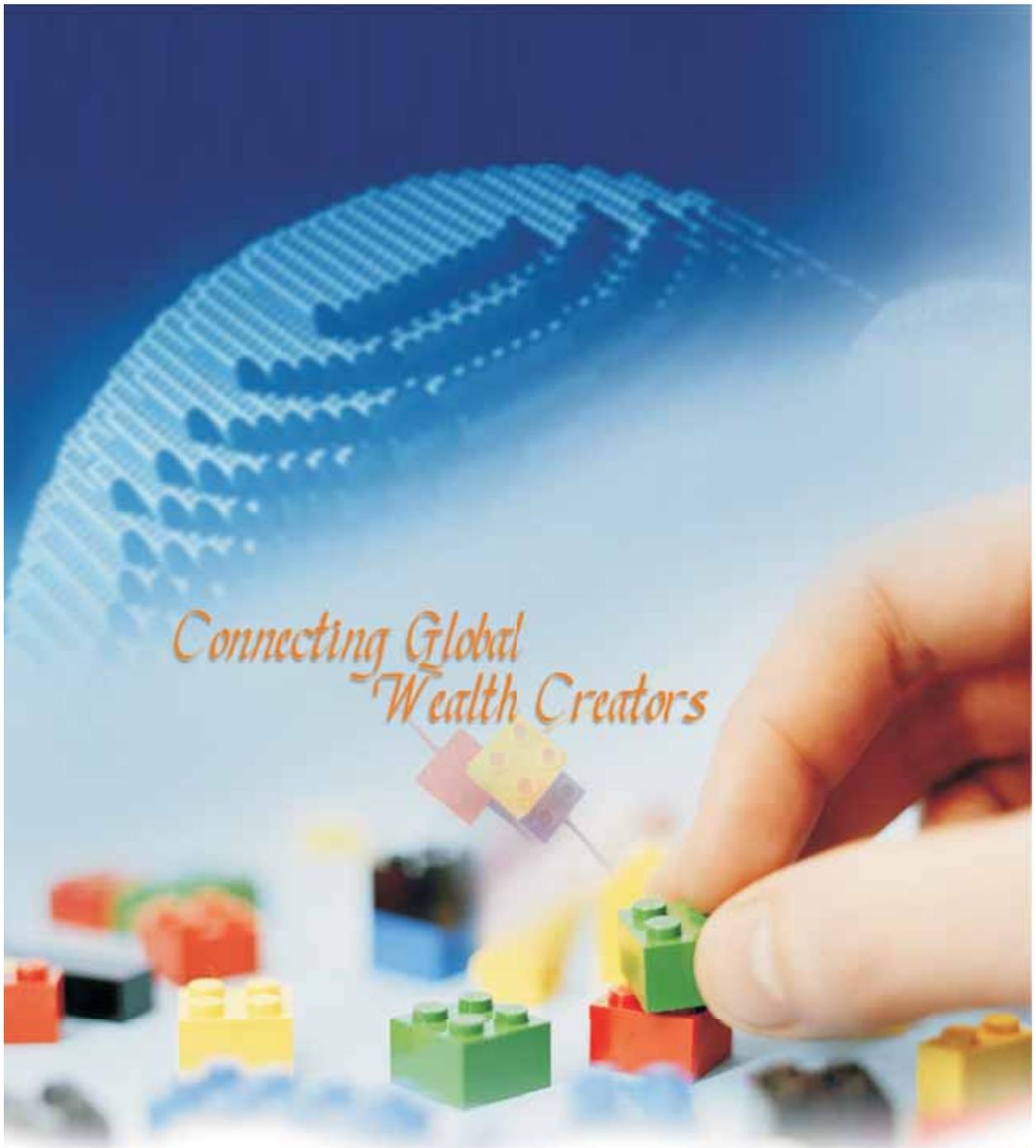
Making Disasters Everyone's Business

OCTOBER 13-2020
INTERNATIONAL DAY FOR
DISASTER RISK
REDUCTION



THEME:
“IT’S ALL ABOUT GOVERNANCE”





Connecting Global Wealth Creators

India's largest bilateral trade magazine publishing house

- Export Advisory Services
- K.P.O.
- Outsourced Publishing
- Online Publishing
- Content Creation
- Illustrations
- 3D Printing
- 2D/3D Animation
- Mobile Applications
- Multimedia Services
- Events...

To know more about our services: enquiry@newmediacomm.biz

Follow us on:

 [Newmediacomm](#)

 [Nmediacomm](#)

 [New Media Communication Pvt Ltd](#)



New Media House, 1 Akbar Villa,
B.R. Sakpal Marg, Off Marol-Maroshi Road,
Andheri (E), Mumbai-400059 India.
Tel: +91-22-29250690, Fax: +91-22-29255279

In This Issue



06

Talking Point

There is No Natural Disasters

Study

Paradox on Vulnerability and Risk Assessment for Climate Change and Natural Hazards



12

Interview

Disaster Risk Governance: Building a Resilient Future



20

Insight

Doubling of Extreme Rainfall Events in the Himalayas



26

Inroads

Guwahati Gets an Experimental Flood Warning System



32

Analysis

Polar Disaster Risk Reduction



38

Mitigation

Helping People Affected by Natural Hazards with Technical Knowledge to Construct Safer Houses



40

Founder Chairman
Late Shri R.K. Prasad

Distributed by:
New Media Communication Pvt. Ltd.

Founder-Chairman: Late Shri R.K. Prasad
Managing Editor: Satya Swaroop
Directors: B.K. Sinha, Kamaljit Swaroop
Hony. Editor-in-Chief: Anil Kumar Sinha, IAS (Rtd.)
Executive Editor: Asif Shahab
Contact No.: +91-8789059295
Email: asif@newmediacomm.com

Editorial Team: Suresh Vasudevan & Atula Imchen
Coordinator: Arvinder Kaur Sethi, Mohit Naik
Marketing Services: Veerendra Bhargava
Admin & Finance: Vrunda Gurav
Art Director: Santosh Nawar
Associate Art Director: Hemant Kolambe
Circulation: Jawaharlal, Santosh Gangurde, Vijay W.
Photographer: Kishen Singh

For Subscriptions Contact:
subscription@newmediacomm.com

BRANCHES:

Kolkata:
Anurag Sinha, Regional Head,
Mob: 09830043339 / 09051112019
Tel: 033-22640070/71
Email: anurag@newmediacomm.biz

Patna:
Rajesh Naraen, Vimmi, V.P. Tulsi
173 - B, 2nd Floor, S.K. Puri, Patna 800001. Bihar
Email: rajeshnaraen@newmediacomm.com
Mob: 09334390988

New Media Communication Pvt. Ltd.,
New Media House, 1 Akbar Villa, Near Old State Bank,
Marol-Maroshi Road, Andheri (E), Mumbai - 400 059
Tel: +91-22-2925 0690. Telefax: +91-22-2925 5279
E-mail: enquiry@newmediacomm.biz
www.newmediacomm.com

Printed & Published by
Satya Swaroop, published from New Media House,
1 Akbar Villa, Marol-Maroshi Road, Andheri (East),
Mumbai 400 059. India

Editor: B.K. Sinha
The news items and information published herein have
been collected from various sources, which are
considered to be reliable. Readers are however
requested to verify the facts before making business
decisions using the same.



Dear Readers,

Greetings!

Following the successful launching of the first edition of “Know Disasters” magazine in August 2020, it gives me immense pleasure in presenting before you the second edition of this magazine.

The first edition attained a resonating success thanks to the articles contributed by noted authors and organizations, and most importantly, the overwhelming response from the readers. I will like to reiterate and emphasize that Know Disasters magazine works on the philosophy of Making Disasters Everyone's Business, and hence, seeks to reach out to and involve everyone. The overall philosophy, objectives and approach of “Know Disasters” magazine is grounded on 3 Cs (Community, Common Man, and Common Citizens), to demystify and simplify so as to reach out to them. This is a highly ambitious and noble task with a humble beginning. Within this approach, we seek to promote knowledge transfer and dissemination of information by means of demystifying and simplifying disaster risk reduction (DRR) to the common citizens. It represents a cornerstone of our commitment of educating the common people about the DRR in their own language.

We dedicate this second edition to the International Day for DRR 2020 theme related to 'Disaster Risk Governance'. We believe that States have a key role in reducing disaster risk as per the Sendai Framework. Within this Framework, the accountability, however, should be shared with all stakeholders, including local governments and the private sector. As the global COVID-19 death toll has crossed one million, this pandemic, accompanied by a climate crisis, has given us a wake-up call about the significance of disaster risk governance.

We are bringing a few articles and interview with Dr. Nathaniel Matthews of Global Resilience Partnership concentrating on 'Disaster Risk Governance'. This second edition also carries articles on “Looking Backwards, Looking Forward-1980-2030: Evolution in Advancing Resilience to Disaster Risks” by Loy Rego. Equity is Crucial for Reducing Disaster Risk in Cities by Aaron Ginsberg, Disasters are not Natural, by Kevin Blanchard; Disaster Risk Assessment: A Step towards Disaster Risk Reduction by Girish Joshi; Paradox on Vulnerability and Risk Assessment for Climate Change and Natural Hazards by Bapon Fakhruddin; “Is Urban India Going Underwater Again?” by World Resource Institute, India. A simplified research article in an easy-to-read language on “Helping People Affected by Natural Hazards with Technical Knowledge to Construct Safer Houses” by Eefje Hendriks, will help us understand the methods that can be adopted globally to build back better. In this sequence, we also look forward that the next edition would continue to bring these kinds of articles.

We are also trying to ensure that COVID-19 articles continue to remain as one the key features of all the editions of the magazine. In this regard, check out an article by Mukesh Kaplia, Professor of Global Health and Humanitarian Affairs at the University of Manchester. We are sure you would find great interest in reading the Global and India Disaster News and Trends topics such as the “Clock in New York Counts Down the Time Remaining to Avert Climate Disaster” and also about the newly released “World Risk Index (WRI) 2020” report.

We trust the Know Disasters magazine would be able to promote knowledge transfer and dissemination of information about the key aspects of disaster risk management.

Wishing you happy reading and safer days ahead!



Anil Kumar Sinha, IAS (Rtd.)

Hony. Editor-in-Chief, “Know Disasters”

Founder Vice Chairman, Bihar State Disaster Management Authority

Email: anilsinha.k@gmail.com

Contact No. +91- 9871616360

There is No Natural Disasters

Kevin Blanchard, a Fellow at the Royal Geographical Society (FRGS), is an M.Sc in Environment, Politics & Globalisation. He is a Senior Policy Advisor (Disaster Risk Reduction) and Communication Lead #NoNaturalDisasters, UK.



2020 has already witnessed various natural as well as human-made disasters. However, the severity and losses due to these events vary from place to place based on the preparedness level. It indicates that losses due to disasters are not always inevitable. Hazards and risks, if properly reduced and mitigated along with proper preparedness through multi-stakeholder participation, can be minimized to a great extent. #NoNaturalDisasters, with a similar aim, is gaining momentum and extending its reach throughout the disaster risk reduction, humanitarian and climate change communities of academics, practitioners and policy-makers.

2020 has seen its fair share of newsworthy disaster or emergency events, from the bushfires in Australia, flooding in Kerala, the catastrophic industrial explosion in Beirut, Lebanon, or the global pandemic - COVID-19. All of these events have made headlines around the world and have required national and international action by governments, Non-Governmental Organisations (NGOs) and other actors (the media, private sector, etc.).

However, somewhat concerning is how these events have been reported in mainstream media through government, NGOs and international organizations' press releases and briefings. The way information is disseminated through these documents and articles could lead public members to see these events' impacts as entirely out of control. Indeed,



Kevin Blanchard

the deaths, injuries and economic disruption are all too often reported as an inevitable result of these hazards and that there was little or nothing that could have been done to stop them. Of course, as disaster risk reduction and emergency management practitioners,



policy-makers and academics know this is not the case. Hazards, irrespective of their classification (natural, technological, biological etc.), do not have to turn into disasters, and their impacts can and have been mitigated, are often predicted, and we as a society very often have the tools to reduce the risks and impacts associated with them.

If we look at the examples listed

above, all of those hazards need not have become disasters or emergencies at the scale they were. A well-developed and widely adhered-to planning policy in Australia could have lessened the bushfires' impact and reduced the hazard's risk impacting so many populated areas. It has been suggested that the explosion in Beirut might not have happened if correct procedures for chemical

storage had been observed, and even COVID-19 (at the time of writing) has been linked to actions taken by humans and the processes and procedures at the Wuhan Wet Market that lead to a "pathogen spillover event" caused by mixed containment of animals likely to have been a reservoir and host populations.

If we accept a widely-used definition of what a disaster is, then our involvement in its impact is undeniable:

"A ... sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its resources."

This definition clarifies that a hazard can only become a disaster once it impacts society or the community. People need to be impacted by a hazard before we can consider it a disaster. Therefore, the point at





which the hazardous event interacts with human society is when a disaster can occur, especially if that society, or sections of it, are vulnerable to the effects of that hazard. Indeed, vulnerability is the core factor in creating disasters, and similarly, elimination of vulnerability reduces the risks associated with those hazards.

The campaign #NoNaturalDisasters campaign started back in the 1700s when there was an initial recognition that the cause of a disaster might be something other than a natural process. In a letter between Jean-Jacques Rousseau and François-Marie Arouet (a.k.a. Voltaire) in 1756 discussing the 1755 earthquake in Lisbon, Portugal, Rousseau states.

'... nature did not construct twenty thousand houses of six to seven stories [...], and that if inhabitants of this great city were more equally spread out and more lightly lodged, the damage would have been much less and perhaps to no account...'

Indeed, the idea that disasters are not natural but are, in reality, caused by human decisions, is gaining momentum.

Fast forward to the present day and the #NoNaturalDisasters consolidated online campaign using social media as a platform for sharing the evidence, background and message that disasters are not natural are gaining momentum throughout the disaster risk reduction, humanitarian and climate change communities of academics, practitioners and policy-makers.

The way these disasters have been reported within mainstream media, and within many governments, briefings affect public perception of the risks associated with the

hazards we face daily. It also defines and limits the discourse associated with these events, making it critical that the correct terminology is used. This means that the reporting of these events is vital because it shapes public perception of how disasters are related to issues such as climate change, rapid urbanization, environmental degradation and global population growth.

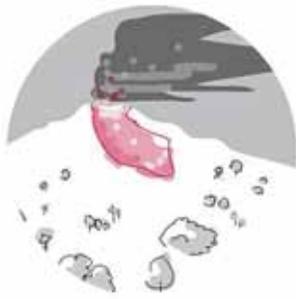
Our research has shown that this incorrect use of terminology is particularly common in organizations focused on responding and recovery from

The
#NoNaturalDisasters

campaign aims to effect real change, including:

<p>Increase recognition within the media, academia & policy sectors that disasters aren't natural & ensure acceptance of our own responsibility in creating risk.</p> <p>Draw greater attention to societal inequalities before, during & after disasters.</p>	<p>Influence policymakers to develop more effective decisions around DRR spending strategy, focused on vulnerability reduction rather than event-specific response.</p> <p>Hold powerful people and organisations to account for overlooking risks that force marginalised and vulnerable communities to live in areas prone to natural hazard based risk.</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

This isn't just about semantics.



There is no such thing as a **natural disaster**, only **natural hazards**



We make **choices** as to where we inhabit, how we build and what research we do



Risk is the combination of **hazard, exposure and vulnerability**



Death, loss and damage is the function of the context of hazard, exposure and vulnerability

disaster events. As such, the latest phase of the #NoNaturalDisasters campaign has been to focus on the workplace. Ensuring the correct use of terms within the disaster risk reduction or humanitarian sector is vitally important. Many of the issues discussed or communicated within our workplaces are often complex and multi-faceted with numerous historical inputs and nuances that may or may not be applicable in contemporary language.

The phrase 'natural disaster' is one such example of this. The term has been used by DRR and humanitarian professionals, policy-makers, the media and even the dictionary for decades, and, as such, it is widespread and often ingrained

into the day-to-day workings of the majority of workplaces.

In many of those settings, the use of 'natural' to describe the impacts of a hazard or emergency event is being used incorrectly. The reinforcement of that word through daily conversations, emails, presentations, and other workplace communication fails to reflect that the disaster (e.g., the impact of the naturally-occurring hazard) is not natural and is instead caused by anthropogenic decisions through planning, policy and research.

This lack of awareness becomes even more pronounced when discussed in externally-facing communication. Whether through

external publications, job titles or social media, the use of 'natural' to describe disasters, when consumed by people not working in the sector, only reinforces the message that disasters are an inevitable part of life.

As such, part of the wider #NoNaturalDisasters discussion will now begin to focus on the workplace and how the description of disasters is framed both on internal and external-facing communications. Covering communication from conversations, emails, job titles and presentations, the #NoNaturalDisasters in the Workplace campaign aims to educate through the provision of tool kits, online resources, evidence and discussions to allow anyone wanting to spread the #NoNaturalDisasters message to do so within their place of work, to colleagues or elsewhere.

The campaign around #NoNaturalDisasters is growing in terms of its visibility, the resources and tools it offers for people to start to a discussion around why disasters are not natural, and it also continues to grow and adapt to the complex and often multi-sectoral background of disaster risk reduction and preparedness building we experience in modern times. ■



Will the Independent Panel for Pandemic Preparedness and Response restore the world's trust in the fractured post COVID-19 global health system?

Dr. Mukesh Kapila is Professor of Global Health & Humanitarian Affairs, University of Manchester, UK

WHO has done well in tackling COVID-19, despite its in-built constraints. That story deserves to be recognized more widely, and the shortcomings tackled so States can unite behind a strengthened WHO. The panel could perform a great public service to enable that to happen by behaving independently and being seen to be independent.

Some ten months after the first case was reported from Wuhan, and as the world COVID-19 meter clicks on relentlessly towards 30 million confirmed SARS-COV-2 infections, the Independent Panel For Pandemic Preparedness and Response meets for the first time on September 17, 2020.

Its leisurely gestation has not matched the rapid evolution of the pandemic, and it was almost still-born as the World Health Organization, China, and some poorly-performing nations tried to kick it into the long grass. The initial argument was that it was not the time to conduct reviews because countries and institutions were too busy managing the emergency and, therefore, could not be distracted. There would be time enough to learn lessons from "after-action reviews."

However, it was quickly obvious that there would be no after-action phase as such: the wily coronavirus was becoming a feature of our lives and would require permanent action. Meanwhile, a fearful world, much frustrated by highly disruptive public health measures with immense social and economic impacts, had to find someone to blame. This was combined with deliberate misinformation, mischief-making, malice, and conspiracy theories around COVID-19 multiplied. These cost lives even as they squeezed WHO and its Director-General Dr. Tedros, impacting their influence and effectiveness at a crucial moment for the world.

Under such contentious circumstances, it is not surprising for national and international public affairs to seek investigations. However, motivations are often mixed with some genuinely sincere quests to seek honest answers and others seeking another opportunity to push particular partisan perspectives. This was evident in the virtually-conducted 73rd World Health Assembly in May that finally asked the WHO Director-General to initiate an "impartial, independent and comprehensive evaluation" to examine WHO's actions as well as the adequacy of global disease control mechanisms such as the



Dr. Mukesh Kapila

International Health Regulations. However, the crucial question of an enquiry into the origins of the novel coronavirus and its initial handling by China was fudged.

WHO appointed the former Liberian President, Ellen Johnson Sirleaf, and Helen Clark, the former New Zealand Prime Minister and UNDP Administrator, as Co-chairs of the Independent Panel. In turn, they have appointed 11 other diverse and distinguished members from a list nominated by governments (many of which are themselves deserving of critical scrutiny for their COVID-19 responses). WHO is also providing an 'independent secretariat' headed by one of its former senior staff, Anders Nordstrom, Acting Director-General of the organization, which focuses on scrutiny. The Secretariat – technically, WHO employees – can, no doubt, control access to all information that panellists get or not.

The personal integrity and competence of Panel Members or its Secretariat are, *prima facie*, not in doubt. However, none are genuine outsiders to the global system under the microscope, and their route to panel membership has come via their good standing with their governments. Most of them also have direct or indirect links with the multilateral system, including WHO and UN, and could be viewed as architects or pillars, or even beneficiaries of the same system that is seen – justified or not – as having let the world down badly in its hour of greatest need. How conflicted will the panel be? Not because they are not honest, caring people – which they undoubtedly are – but because there are too many insiders with strong personal stakes in upholding the system they seek to examine with objectivity.

Robustly countering the concern that the Panel may not be perceived as impartial and independent is crucial. If that is not done, the Panel's conclusions will be seen as a whitewash and do little to change the broad public and political mood of cynicism and mistrust in global institutions and multilateral co-operation.

Previous WHO - commissioned 'independent' reviews, such as after its generally-acknowledged disastrous performance on Ebola in West Africa in 2014, have had mixed results. There is general weariness with selectively implemented reviews because they fall foul of internal WHO or Member-state politics. There are also parallel mechanisms such as the Oversight and Advisory Committee for the WHO Health Emergencies Programme -purportedly also independent - set up after earlier criticism. These risks are tripping over each other. Meanwhile, others have already moved on with their enquiries, such as The Lancet COVID-19 Commission, which will



produce their reports.

Thus, the much-vaunted new Independent Panel enters a crowded space – and late. Nevertheless, it should be given a chance to succeed, not least for the sake of a world that must be made more secure in facing future pandemics.

How could the panel be seen as credible? Essentially, by how it conducts its business. It has made a confidence-boosting start by affirming that it is financed only from WHO's assessed budget (i.e., by all governments) and will not accept additional contributions in cash or kind. It has its own branded identity, website, and its Secretariat will not be on WHO premises.

The Panel should also set its own transparent rules for evidence-taking. This could involve written submissions in response to a global call, setting out the questions to which answers are sought and supported by evidence. A representative list from those submitting could be invited to oral hearings. A list of those who will give oral evidence should be finalized before the hearings start, but not published to reduce lobbying of

those who will attend, and lobbying for attendance by those not invited. Oral hearings should be recorded but not broadcast live. This is to stop prejudicing subsequent 'witnesses' or generating premature public and media debates. The written submissions and the transcripts from the oral submissions would be part of the official record to be published afterwards to see the basis on which the Panel made its conclusions.

The WHO Director-General should see the draft report in confidence and offer any factual corrections, and make any responses. The Panel Report and WHO reaction can then be published together as a public document for discussion by the World Health Assembly and other stakeholders.

WHO has done well in tackling COVID-19, despite its in-built constraints. That story deserves to be recognized more widely, and the shortcomings tackled so States can unite behind a strengthened WHO. The Panel could perform a great public service to enable that to happen by behaving independently and being seen to be independent.

Paradox on Vulnerability and Risk Assessment for Climate Change and Natural Hazards

Dr Bapon (SHM) Fakhruddin is Technical Director - DRR and Climate Resilience. He is an international disaster risk reduction and hazard modelling expert who is a regular adviser to the United Nations on Natural Hazards and Climate Change.

In general, climate change scientists frame vulnerability and risk in a wider spatial context. This means that most climate risk studies are carried out at a national or regional scale. Due to the nature of the processes studied by the climate change community, it is not feasible and even senseless to assess vulnerability at detailed scales, something that is quite common in the natural hazards community.

Assessments of vulnerability and risk of extreme weather or climate events are essential to inform and implement appropriate prevention, adaptation and mitigation strategies. Due to the complex nature and uncertainties of future climate change projections, it is not feasible to assess vulnerability at detailed scales for extreme weather events. When aiming to understand the assessment of hazard, exposure, vulnerability and risk, there are two extreme operating scales, a global (e.g. in terms of climate change) and a local (e.g. in terms of natural hazards). Different approaches and methods exist for conducting hazard, exposure, vulnerability and risk assessments, but often they are notable to address all aspects of physical science, engineering, and social science research.

Vulnerability and risk terms have different definitions explaining their meaning and are used differently in many assessments. Looking at the IPCC AR5 (IPCC, 2014) and AR4 (IPCC, 2007) approach, there is a difference in explaining vulnerability and risk. In AR4 and in AR5, only the combination of all components allows us to draw a complete picture leading to the final results called 'vulnerability' in AR4 and 'risk' in AR5. Whereas both concepts identify components leading to negative consequences caused by the effects of climate change and climate-related extremes on natural or social systems. Exposure has been removed from the definition of 'vulnerability' in AR4 as it is included in the definition of 'risk' now in AR5. Looking at another perspective, for example, natural scientists and engineers tend to apply the term in a descriptive manner associated with a quantitative outcome, whereas social scientists tend to use it in the context of a specific explanatory model. Sovacool et al., (2012) defines vulnerability as the consequences of the impact of a natural force, and not to the natural process or force itself. Social vulnerability includes the demographic issues that social groups carry with them and that makes them susceptible. Biophysical vulnerability is the distribution of hazardous conditions that stem from "initiating events" – like hazards.



Dr Bapon (SHM) Fakhruddin

The IPCC AR5 framework does not specify how to operationalise a climate risk assessment. Therefore, there is no one standard approach or formula for assessing risk resulting from the consequences of climate change. That is why there are countless approaches to risk assessment. Nevertheless, risk can be considered as a dynamical process concerning time, and it can be derived basically from the convolution of three main components (UNDRR, 2019; IPCC, 2014; UNISDR, 2016; UNU-EHS, 2006) (equation 1)

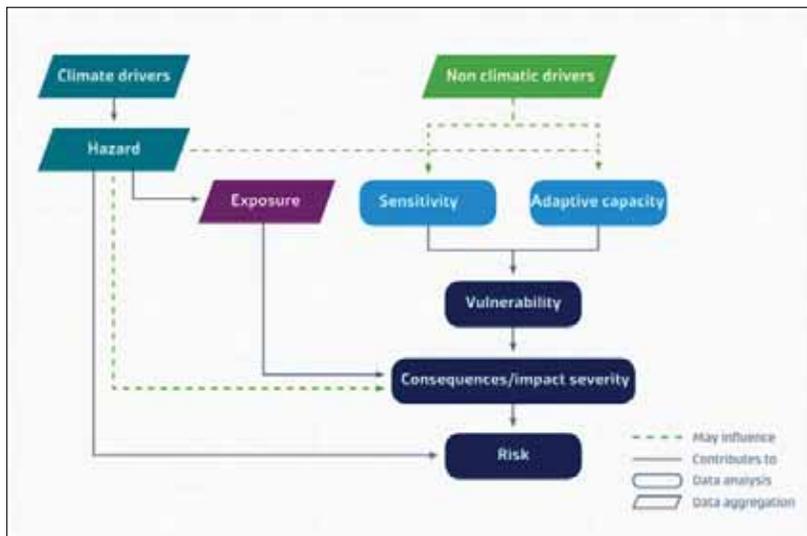
$$\text{Risk (R)} = f(\text{Probability of a Hazard (p)}, * \text{Exposure (E)}, * \text{Vulnerability (V)}) \text{ -----(1)}$$

- Hazards are considered as 'process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage,

social and economic disruption or environmental degradation’ (UN, 2016).

- Exposure is ‘presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected by natural hazards and climate change’ (IPCC, 2014, Annex II).’
- The vulnerability term represents ‘The predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm or damage, and lack of capacity to cope and adapt (adaptive capacity) (IPCC, 2014, Annex II)”.
- The term “risk” has different meanings: (a) as a synonym for probability of a harmful effect occurring and (b) as a synonym for the mathematical expectation of the magnitude of the undesirable consequence (even as a quasi-synonym of consequence, whereby risk has a similar meaning to an undesirable outcome) (UNDRR, 2019).

Being aware of exposure and vulnerabilities, researchers can better predict the degree of potential consequences or impacts. There is no consensus on how to measure



Conceptual illustration of a climate risk assessment framework based on the different underlying elements: climate drivers, hazard, exposure, sensitivity, adaptive capacity, vulnerability, and consequences/impacts severity. The arrows depict the relationship between these concepts (Fakhrudin et al., 2019)

and combine the various intrinsic components of risk, but whatever model is used to represent it, the result should be the same in the end.

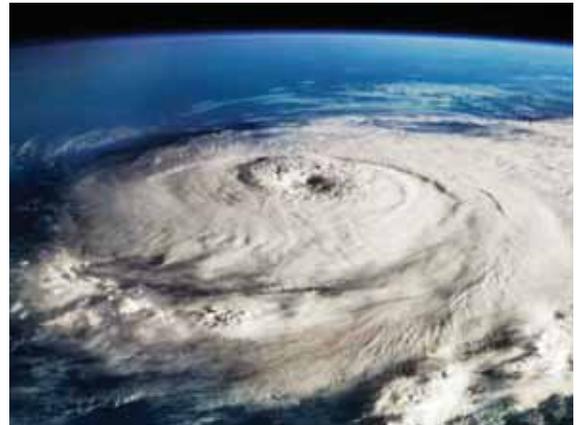
Assessing the risk of potential hazards from climate change drivers on a community is vital to understanding how to adequately prepare, cope, adapt or mitigate. There are many different approaches and methods readily available for performing a risk assessment. A risk assessment should take consideration of hazard, exposure and vulnerability into account; however, these elements are often challenging to quantify and define. Risk assessments utilising hazard-

exposure-vulnerability framework enable consideration of the inherent vulnerability of infrastructure or population, rather than only focusing on the potential impacts of an event. At the same time, climate risk assessment has a valuable aspect of adapting and building resilience and acknowledging and addressing uncertainty.

Tools, Approaches and Methods for Climate Risk and Vulnerability Assessment

Research from the past two decades indicates that innovative tools are required for hazard, exposure and vulnerability assessment to support understanding and assessing vulnerability and risk (Erich et al., 2018; IPCC 2014; McEntire, Gilmore, & Peters, 2010; Susman, O’Keefe, & Wisner, 1983). Although different tools currently exist for running an integrated and dynamic assessment of risk and vulnerability, the choice of such tools is important as it directly relates to the aims of the assessment itself. McEntire, et al.,(2010) suggested a vulnerability





model that incorporates physical science, engineering, and social science research and also concluded that a “more complete view of vulnerability is more appropriate to generate inclusive and integrated disaster policies”. Climate risk assessments provide a picture of prioritized risks based on different scenarios, connection to existing adaptation and resilience processes, enabling available response capacity and resources to be targeted more effectively and addressing uncertainty. The overall climate or natural hazards risk assessment scheme is shown in the image below.

Certain principles could be set-up for risk assessment approaches, such as qualitative or quantitative approaches, stakeholders’ engagement, estimation of consequences/impacts and their knock-on effects (second, third order, etc.) and also cross-

sector engagement, dealing with uncertainty, transparency in decision making, etc.

Risk assessment should take into account all the elements: hazard, exposure and vulnerability, but, it is challenging to quantify and define all these features. Furthermore, the mutual interaction between each element is not linear and well-known, and all these dimensions are emphasized in the risk management of extreme weather because they are related to low-probability events with potentially high consequences. For probabilistic disaster risk assessment, the vulnerability of exposed elements is assessed using functions that relate to the intensity of the hazard phenomenon to the mean damage ratio or direct physical impact. The probability and severity of the hazard are not the only factors that affect risk. Risk also depends on the exposure to the hazard and how vulnerable it is to damage.



Conclusion

In general, climate change scientists frame vulnerability and risk in a wider spatial context. This means that most climate risk studies are carried out on a national or regional scale. Due to the nature of the processes studied by the climate change community, it is not feasible and even senseless to assess vulnerability at detailed scales, something that is quite common in the natural hazards community. This poses an interesting paradox: ‘On the one hand reducing the vulnerability of local communities to natural hazards needs to take into account climate change, on the other hand, the most effective vulnerability reduction often takes place locally’ (Schipper & Pelling, 2006). When aiming to understand the operation of vulnerability concepts, these two extreme operating scales, global (mostly in climate change) and local (mostly in natural hazards), are not so adequate. The key, in our opinion, is to aim for an intermediate scale of complexity. ■

Reference:

This is a synthesis of a paper published in “Climate Extremes and Their Implications for Impact and Risk Assessment” (2019). Edited by Jana Sillmann, Sebastian Sippel and Simone Russo. Paper on Bapon Fakhruddin, et al. (2019), Assessing Vulnerability and Risk of Climate Change, Climate Extremes and Their Implications for Impact and Risk Assessment.

Disaster Risk Assessment: A Step Towards Disaster Risk Reduction

Dr Girish Chandra Joshi is a Senior Consultant, Uttarakhand State Disaster Management Authority, Government of Uttarakhand.

A pro-active approach towards disaster management and focus on reducing and managing the risk rather than managing the disaster has brought global attention towards Disaster Risk Reduction (DRR). Multi-stakeholder inclusion in all stages of the disaster management cycle provides a platform for interaction and differentiated responsibilities for all sections of society. Risk quantification involves assessment and quantification of hazard, vulnerability and exposure. Overlapping the probability of any hazard, type and level of vulnerability and extent of exposure results in a spatial risk. Special attention to socio-economic factors is required for reducing vulnerability and exposure.

A risk-free world does not exist, and our society must learn to cope with and minimize the impact of hazards in the course of our development. During the past 70 years, risk management practices have changed from initially focusing on engineering solutions to a modern complex framework that employs various measures to manage risk. This buffet of measures includes planning to gradually move or improve critical infrastructure, attempts to control the hazards, e.g., by building river embankments, and financial measures to transfer the risk. Thereby, it is practical to understand risk as being the function of hazard, vulnerability and

exposure.

Accurate quantification of the risk allows us not only to deliver accurate assessments of the current risk but also enables decision-makers to drive development in the desired direction to minimize risk, assessing which of the main constituents of risk (hazard, exposure and vulnerability) drive the risk.

The basis of proper management of risk is first to study and quantify the risk. Through risk analysis, it will be possible to answer questions such as: What is the influence of urbanization on the social vulnerability towards hazards? Do traditional coping mechanisms effectively address the increased intensity of hazards? How can we achieve the maximum effect of risk mitigation through changes in exposure, coping capacities, susceptibility and adaptive capacities? What are these interactions between different social groups?

These questions and many more are of key importance to understand "risk area" and especially to develop and apply risk mitigation strategies.

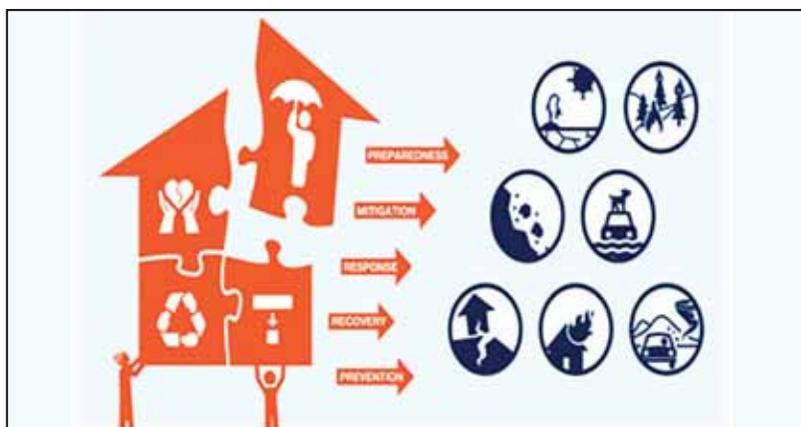


Dr Girish Chandra Joshi

However, finding answers to these challenges is anything but simple. One cannot solely focus on examining current risk patterns or the lessons learned from past disasters. As is especially true of a nation under rapid development, it is necessary to consider future trends since the risk is increasingly shaped by the interaction of two megatrends: urbanization and climate change.

Risk Assessment

Investigation of the Centre for Research on the Epidemiology



of Disasters (CRED) data, which supposedly is incomplete for India, shows that the major disasters in India, in terms of economic loss and life, relate to floods, drought, storm, earthquakes and epidemic disease (viral, bacterial and parasitic diseases). The risk posed by a specific hazard can be described as a function of the magnitude of the hazard, the vulnerability towards the hazard and the exposure (severity) of the impact:

Risk = f (hazard, vulnerability, exposure)

- **Hazards:** Quantitatively defined by the likely frequency of occurrence of different intensities for different areas, derived from historical data sets and covering events including earthquakes, landslides, flash floods and industrial hazards.
- **Exposure:** People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses; with options for disaggregation of incidence by income level (i.e., impact on the poor), geographic area (i.e., to identify areas for urgent intervention), and sector (e.g., government/public, commercial/ industrial, residential), and,
- **Vulnerability:** Quantitative and qualitative (proxy) measures of the damages and losses incurred to the exposed elements-at-risk (e.g., people, property, systems) by different intensities of the various hazards considered.

The relationship between these three aspects of understanding risk is illustrated in Figure 1.

Hence, development of risk maps requires aggregation of spatial analysis of hazard, vulnerability and exposure. Risk-modelling can integrate various dynamic parameters of hazard, vulnerability and exposure.

Specifically, the different modules of any risk assessment are:

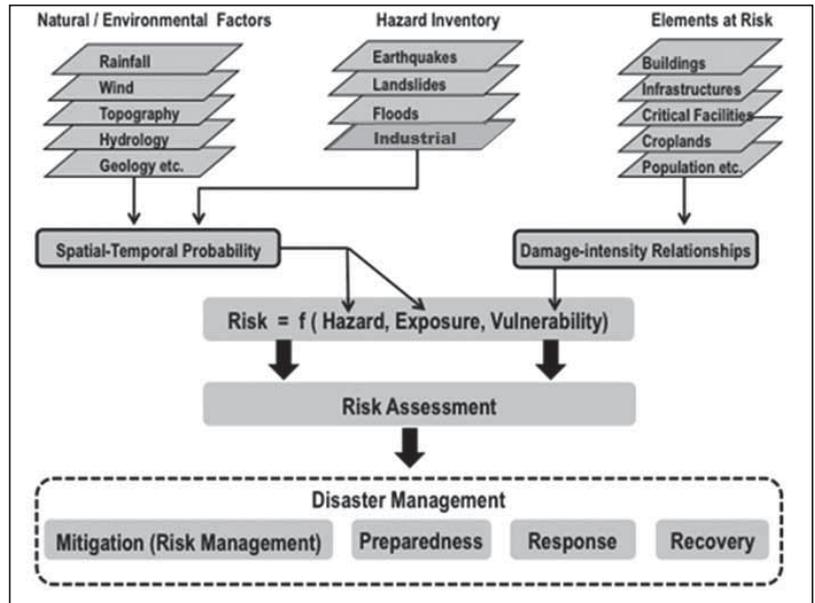


Figure 1- Framework for risk assessment, illustrating the relationship between hazard, exposure and vulnerability to derive risk

- **Hazard Modules:** It links to data of historical data, hazard extent and models to predict hazard frequency and intensity.
- **Exposure Data:** Accurate, up-to-date topographic maps, land-use maps, asset maps, classification, valuation and location of critical infrastructure can be used by the system.
- **Vulnerability and Damage Module:** The vulnerability module includes software tools for developing physical vulnerability functions for each hazard and class of asset considered. The vulnerability module can also be used to assign specific vulnerability functions to the exposed elements.
- **Loss Module:** This module describes and processes probabilistic losses at various user-defined return periods for selected hazards.
- **User-added Modules:** Examples are (a) Climate Change Scenarios – to process the probable loss characteristics over a modelled future climate change scenario; (b) rapid near real-time loss estimation – to

estimate probable damage modelled on a specific hazard event such as a cyclone track or avalanche.

Risk Management

Risk management is the process through which risk is evaluated before strategies are introduced to manage and mitigate the threat (Smith and Petley, 2008). As Crozier (2005) noted, the key drivers for the successful management of risk must be an awareness of the threat, a sense of responsibility, plus a belief that the threat can be managed or at least reduced.

In an ideal world, the risk management procedure follows a clear set of priorities in which the highest levels of risks are addressed first. However, to develop such a priority list, a detailed quantitative risk assessment of all relevant factors and processes is required.

This is a difficult task, not least because of the need to balance the relative significance of losses from high and low-frequency events. Carter (1991) showed that, in most cases, the activities contained in hazard management could be



Figure 2: The cyclical nature of effective disaster management; the time-scales needed for the activities shown may range from hours (emergency evacuation) to decades (rebuilding damaged infrastructure)

represented as a cycle (Figure 2). Risk management itself is often considered to be focused upon the prevention, mitigation and preparedness elements of this cycle, although the other elements are also important. Prevention, which forms part of this cycle, is only achievable to a limited extent.

Risk management focuses on the aspect of pre-disaster protection in the risk reduction cycle. However, this does not mean the other half of the cycle will be completely neglected. Therefore, the basis of a risk management system will be developed and be expanded to act as a basis for post-disaster recovery. For example, the information generated for pre-disaster protection can be used (perhaps after adaptation) for pinpointing areas that most urgently require post-disaster recovery and for the selection of effective and efficient post-recovery measures. Besides, due to the modular approach of the system, decision-making and action protocols for pre-disaster protection can be supplemented with protocols for post-disaster recovery. As shown in Figure 2, pre-disaster protection consists of risk assessment,

mitigation, preparedness and emergency plans.

As shown above, the primary elements of pre-disaster protection are:

- **Risk Assessment:** Involves the identification of a hazard, the accumulation of data and the preparation of loss estimates.
- **Mitigation:** Measures are taken in advance of disaster strikes, aimed at decreasing or eliminating the loss. Various long term measures, such as the construction of engineering works, insurance and land-use planning are used.
- **Preparedness:** Reflects the extent to which a community is alert to disaster and covers short-term emergency planning, hazard warning and temporary evaluation procedures, plus the stockpiling of supplies.

The capabilities of the risk assessment and associated management systems will allow for expansion in the future, including, amongst others, functionalities facilitating other mitigation strategies, such as the construction of engineering

works, insurance schemes and land-use planning.

Disaster Risk Reduction

There is a paradigm shift underway in disaster management (and the allocation of associated government/donor funding), both in India and worldwide, moving from a primary focus on recovery and reconstruction to an emphasis on disaster risk reduction (DRR). This requires a detailed and holistic assessment of the risks present in a given geographical and socio-economic context, which may then be used to inform a process of risk management, reducing the impact of potential disasters in the future.

However, although risk assessment and risk management processes are increasingly being used by government agencies to estimate and manage risks associated with natural hazards, these tools have many inadequacies and may not optimally serve all countries. Holistic and optimized risk assessment and management requires a thorough understanding, among others, of the societal needs and perceptions, the political system, development plans, hazards, vulnerability towards hazards and change in the climate. The importance of socio-economic factors in choosing the right risk management strategies is an important reason for strongly basing the current study on empirical data. Holistic management of risk identifies actions to be taken to reduce the impact of extreme events before, during and after extreme events, and include preventive technical/structural measures and socio-economic aspects to reduce vulnerability to hazards. It is important to note that disaster risk management and management of climate change impacts share the same objectives, therefore, presenting a major challenge and opportunity to bridge current disaster risk management efforts with climate change adaptation measures. ■

Equity is Crucial for Reducing Disaster Risk in Cities

Dr. Aaron Clark-Ginsberg is a social scientist at the RAND Corporation (USA), a nonprofit, nonpartisan institution that helps improve policy and decision-making across the world through research and analysis.

Unevenness is there not only in terms of resource distribution; rather, it is in terms of vulnerability and exposure to risk too. The ones with the lowest share of resources are (poorer and marginalized) the most exposed and vulnerable to various risks in urban areas. A common but differentiated responsibility amongst the different sections of society is needed to bring an equity-centred DRR approach. To ensure “Protection (of all) from disaster is a right and not a privilege,” reforms in policy, laws, regulations and ideologies need to be brought.

Poorer and more marginalized city dwellers rarely have access to concentrated opportunities that cities provide. Instead of being able to participate in urban systems fully and access the economic, health, educational, political and social resources found in cities, poorer city dwellers tend to be relegated to the margins of urban life, often living in slums and other locations with minimal services and a great deal of risk. This leaves many city dwellers stuck in a vicious cycle of poverty and vulnerability, exposed to various shocks — including intensive hazards such as hurricanes, floods, and earthquakes and daily disasters of violence, pollution and fires

whose cumulative impact is often greater than intensive hazards — and lacking resources with which to cope with and recover from disasters’ impacts. Thus, instead of being able to use the resources found in cities to prosper and thrive, many urban dwellers remain highly precarious, with disasters repeatedly compromising development gains.

Organizations must tackle issues of equity in their DRR (Disaster Risk Reduction) programmes to make a difference in the lives of poorer residents. By facilitating equal access to essential services and holding



Dr. Aaron Clark-Ginsberg

risk producers — the polluters, corporations, state agencies, and other organizations that are





creating hazards and exacerbating vulnerability — accountable for the risks that they create, organizations can help marginalized city dwellers more fully participate in urban life and move a position of risk to one of opportunity.

Yet organizations rarely make issues of equity central to their DRR programming. Instead, DRR interventions typically entail small scale technical activities designed to improve local capacity and mitigate localized hazards, often under a community-based DRR. While these interventions can address some of the localized and immediate hazards that

marginalized city-dwellers face and often offer a lifeline for escaping some of the worst impacts of disasters, they do little to change the underlying forces of inequality and vulnerability, maintaining risk and limiting opportunity. Rather than breaking the cycle of poverty and vulnerability, these interventions maintain (and in worst cases, even support) the underlying structures creating risk.

An equity-centred approach to DRR looks different than a traditional approach to DRR. It is more explicitly political, using advocacy channels to reform the laws, regulations, ideologies, and other institutional

and social systems perpetuating risk and allowing some to prosper at the expense of others. Since these systems are deeply rooted in the fabric of society, changes are often only able to be made slowly, with success often being realized gradually over decades rather than years. DRR thus requires a long-term commitment beyond typical short-term project cycles. Lastly-and most importantly-equity-centred DRR must be driven by recognizing that protection from disaster is a right rather than a privilege. This demands solidarity with marginalized and at-risk people, and with them as equals rather than placing them in positions of subservience.

This way of working can be difficult as it requires political resources, time, and forms of solidarity that organizations typically have a difficult time accessing. However, the risks that marginalized city dwellers face are related to equity at their core - an equity-centred approach to DRR is the only way to escape from poverty and vulnerability truly. Therefore, organizations must rise to this type of work to help city dwellers move from precarity to opportunity. ■



Disaster Risk Governance: Building a Resilient Future

Meet Dr Nathaniel Matthews. As Program Director and member of the Senior Management Team, he leads the technical element of Global Resilience Partnership's (GRP) offering, provides oversight and leadership of the programmatic features and technical input into GRP's investments. He is responsible for defining and executing the overall strategy related to GRP's technical work streams and leading the teams in implementing markets and innovative financing, technology and infrastructure, policy and influence. Dr Mathews gives insight into some of the complexities facing the world today and the role GRP is doing in creating a resilient, sustainable and prosperous future for vulnerable people and places.

The Global Resilience Partnership was founded by The Rockefeller Foundation, USAID and SIDA, to help millions of vulnerable people in the Sahel, the Horn of Africa, and South and Southeast Asia to better adapt to shocks and chronic stresses and invest in a more resilient future.

COVID-19, climate-driven disasters: 2020 has been a year of suffering. As we recover economically also from COVID-19, how can disaster risk governance play an important role as we rebuild our communities to be more resilient with the challenge of rising climate shocks?

The combined impacts of COVID-19 and climate-driven disasters this

year have been devastating to many. We must recognize that while we hope to find a vaccine for COVID-19 soon, climate-driven disasters will continue to increase and have profound impacts over the coming decades. We must recognize that the collision of the climate crisis, ecosystem collapse and our deeply-connected societies and economies have resulted in a much more turbulent world. As a result, we should expect more disasters, and their impacts will reach further. These disasters will be especially devastating for the most vulnerable, including women. As we recover from COVID-19, our political, social and economic leaders have the responsibility to build resilience to these disasters and to develop sound risk governance. For governance to be effective, this must be done in an inclusive way that involves the voices of all the stakeholders. The



Dr Nathaniel Matthews

type of recovery we choose now will have far-reaching implications on everyone's future. Disaster risk governance plays a critical role in building for a resilient future because it helps us to prepare for and mitigate both slow and quick onset shocks and stresses.

With this year's theme "Disaster Risk Governance" for the Sendai Seven on International Disaster Risk Reduction Day, why is the role of disaster risk governance becoming important for achieving the SDGs and the Paris Agreement on climate change?

COVID-19 has exposed the fragility of many gains we have made towards achieving the SDGs and the Paris Agreement. Over





the past two decades, there have been great increases in reducing poverty, reaching the Sustainable Development Goals and the Paris Agreement, but this pandemic has set us back significantly. The World Bank estimates, for example, that an additional 150 million people may shift into extreme poverty by the end of 2022. The setback that this pandemic has caused in reaching these critical goals is a clear demonstration of the need for disaster risk governance and resilience. With climate change and conflict likely to increase disasters in the future, we need strong governance and frameworks in place and strong political leadership that responds to and prepares for disasters and builds resilience.

How well is the Global Resilience Partnership (GRP) placed in addressing the COVID-19 biological disaster within the framework of GRP's approach to resilience?

GRP is a partnership of over 60 public and private organizations joining forces towards a resilient, sustainable and prosperous future for vulnerable people and places. GRP believes that resilience underpins sustainable development in an increasingly unpredictable world. Since the beginning of the COVID-19 pandemic, GRP has

been working across its partners to organize the Voices from the Frontline initiative. Voices from the Frontline is a joint initiative with GRP, International Centre for Climate Change and Development (ICCCAD) and Climate and Development Knowledge Network (CDKN) to support communities across the globe in sharing their stories on the challenges of and the responses to the pandemic and the consequent lockdown. By accumulating and disseminating stories from different communities, we hope to build resilience for the vulnerable in future emergencies.

Are there some examples of good practices related to disaster risk governance that countries around the world might want to learn from the experiences of the Global Resilience Partnership?

The Voices from the Frontline Initiative documents over 20 good practices that communities are taking to improve disaster risk governance and build resilience especially in the face of COVID-19. This includes providing accurate information on the pandemic through community media, including radio, that can help to dispel myths around the virus such as that it impacts some people differently depending on their religion, or that drinking hot

water with turmeric will improve immunity. A common theme across these good practices is the focus on building social resilience through sharing of information, providing early warning systems and supporting community groups. GRP has also worked extensively with community organizations like Mahila Housing SEWA Trust that has worked effectively with women's groups in informal housing to provide access to the immediate needs of the community, including food and essentials, and to equip the community with relevant information to help them fight health-related, social and economic effects of the pandemic.

What will be the main drivers to ramp up advocacy opportunities to highlight how good disaster risk governance can build resilience?

I believe that the increasing impacts from climate change will continue to push disasters to the front of the political, economic and societal agendas. Sharing and building on the efforts that communities are already undertaking in disaster risk governance is a critical step to demonstrate that building resilience is an investment that will pay significant dividends into the future for everyone. ■

Is Urban India Going Underwater Again?

Sahana Goswami is Manager - Sustainable Cities, World Resource Institute
Samrat Basak is Director - Urban Water, World Resource Institute

Water-prudent urban development coupled with integrated green and grey infrastructure can significantly increase a city's resilience to urban floods. Neglecting such hybrid approaches and constructing only grey (stormwater) infrastructure to resolve urbanization and climate change-driven stormwater issues will frequently bring Indian cities underwater.



India is in the middle of the 2020 monsoon season and the Indian Meteorological Department has forecast a normal monsoon. But regional rainfall variations have already flooded rural and forest regions in Assam and Bihar. With heavy rains also occurring across many cities, the tension is ripe in

urban areas. Will Urban India go underwater again?

Grey stormwater infrastructure such as drains, pumps and outfalls are frequently overwhelmed by extreme rainfall events or high levels of



Sahana Goswami



Samrat Basak



Figure 1: New urban development between 2000 and 2015 over various categories of groundwater recharge potential areas (0-20 km region).

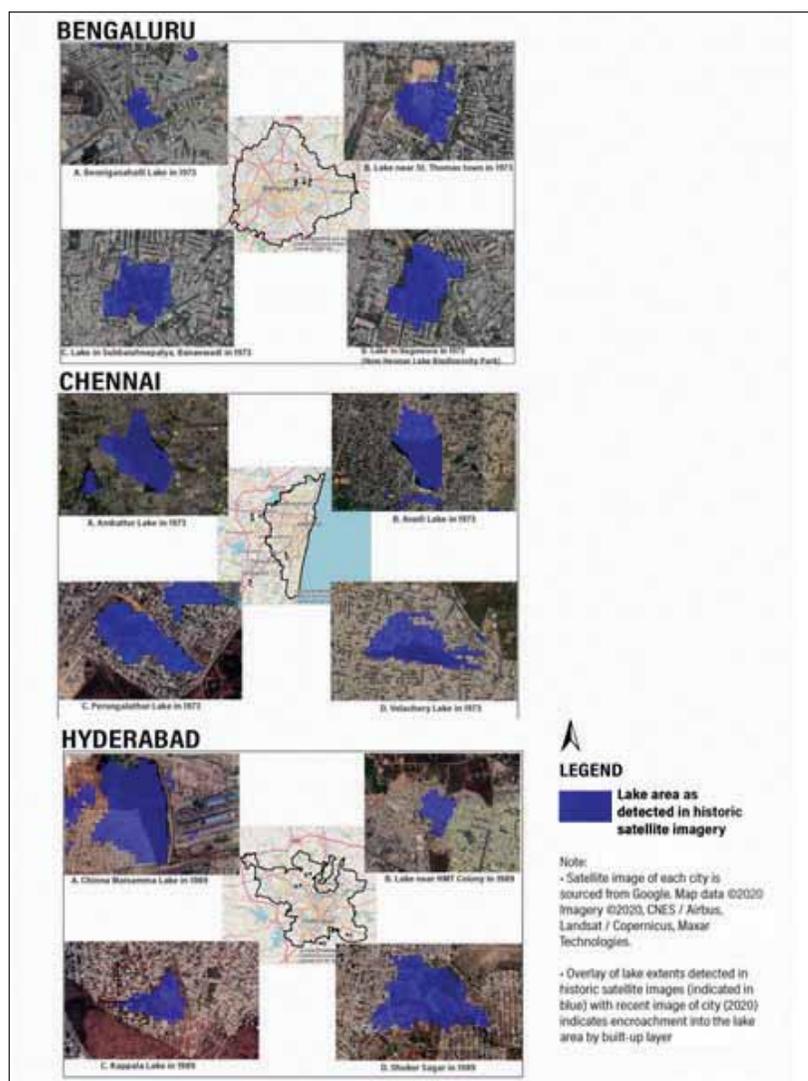


Figure 2: Historic satellite images of select lakes overlaid on built-up cover from 2020. Data source: Lake area detected from satellite imagery of Landsat 1 MSS collection.

stormwater runoff from roads and streets. Not just Indian cities like Bengaluru, Delhi, Hyderabad, Mumbai, and Surat, but many cities in the global South are flooding frequently. With multiple, recurring failure of grey infrastructure globally, alternatives are now being sought. Natural ecosystems such as lakes, floodplains or parks, forests are nature-based solutions (blue-green infrastructure) offering flexible, low-cost solutions for flood mitigation and management and with multiple co-benefits.

Urban flood management in India continues to focus only on improving grey infrastructure, rescue and relief, instead of building sustainable solutions to increase resilience. Cities continue to extend/expand stormwater networks, clean/de-silt channels and separate sewage and stormwater drains. These are all necessary activities and cities bear high costs to build stormwater (grey) infrastructure, but repeated floods indicate that these actions are insufficient. Three factors are identified here as major reasons for persistent urban flooding across India.

1. Building in the Path of Floods

During the monsoon, urban development including public infrastructure (bus depots, roads, metro rail, airports, etc.) located on low-lying areas (floodplains, lake beds) face increased flood risk. Such areas are typically high-recharge zones as water drains into these vegetated, low-lying locations, following the gradient of the land.

Preliminary findings from an on-going research project at WRI India indicate that in India's 10 most populous cities (study cities are: Ahmedabad, Bengaluru, Chennai, Delhi, Hyderabad, Jaipur, Kolkata,



Figure 3: Flooded - A road in Mumbai (above) and parking lot in Bengaluru (below).

Mumbai, Pune, Surat). 35% (428 sq.km) of new urban development added between 2000 and 2015 (within 20 km of the city centre) has been on (low-lying, vegetated) high and very high recharge potential zones (Figure 1). All these cities have seen multiple flood events in the past five years.

Space like lakes, wetlands, forests functions as natural infrastructure absorb stormwater, reduce runoff volume and speed, thus, reducing flood risk. Destruction and encroachment of these spaces deteriorate the natural flood defense of cities. Analyzing satellite imagery of select locations (Bengaluru, Chennai, and Hyderabad) shows that between 1970 and 2020, lakes

have shrunk, or are replaced by roads, residential neighbourhoods or playgrounds. Such locations routinely flood as stormwater drains into these low-lying areas.

2. Paving the Way for Floods

Rainwater infiltrates into the ground, flows as surface runoff and evapotranspirates into the atmosphere. Urban areas with impervious surfaces eliminate infiltration, reduce evapotranspiration, thereby, drastically increasing surface runoff. A study in the United States indicates that for every 1% increase in impervious surface area, there is a 3.3% increase in urban flood magnitude.

Urban India is continuously adding buildings, roads, flyovers for urban dwellers, often without adequate stormwater infrastructure. Large volumes of stormwater stagnate on these impervious surfaces causing repeated flooding.

WRI India’s ongoing research indicates that built-up cover has increased by 47% in 0-20 km of the city centre (9% in Mumbai to 127% in Surat); built-up cover has increased by 134% in 20-50 km from the city centre (30% in Kolkata/Mumbai to 412% in Pune). Most of the ten cities have flooded repeatedly over the last five years (2015-2020) and paved spaces like large parking lots, roads, underpasses are particularly prone to frequent and severe waterlogging.

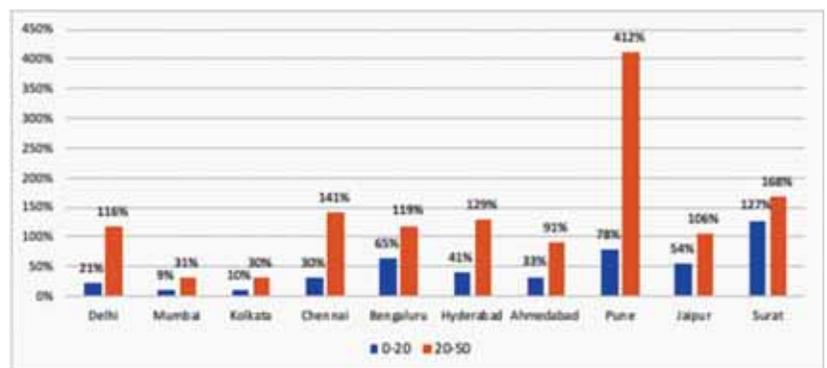


Figure 4: Increase in built-up cover within 0-20 km and 20-50 km of city centre between 2000 and 2015. Data source: Urban built-up layer from EC-JRCs Global Human Settlements Layer (GHSL).

3. Storms of Uncertainty

Climate-change driven rainfall variability is increasing with rainfall equivalent to monthly/seasonal averages falling within a few days. This year (2020), Mumbai received 80% of its average July rainfall in eight days. The devastating 2018 floods in Kerala were triggered by rainfall over 200% of the State's seasonal average, most of the rain falling within a week. The Chennai floods in 2015 were preceded by 345mm of rainfall recorded on December 1 (average December rainfall for Chennai is 191mm).

Floods have high economic and social costs. Damage from the Kerala floods is estimated at USD 3.56 billion (INR 27,000 Crore) and Chennai flood losses around USD 3 billion (INR 22,000 Crore). WRI Aqueduct Platform's Flood Analyzer Tool estimates that by 2030, 34 million Indians will be at risk from riverine flooding (up from 12 million in 2010).

From Reacting to Building Resilience

Alongside infrastructure expansion and upgrades, the official response to floods now seeks to build robust rainfall and flood-warning systems like in Chennai and Mumbai. Cities are also creating interactive maps of flood-prone zones (Bengaluru). These measures are still reactive; at best, they enable evacuation of people and support effective deployment of rescue and relief



Figure 5: How cities integrate nature-based solutions for adaptation in urban planning.

measures. While undoubtedly essential measures, these do not proactively prevent floods and mitigate against loss to life, property and physical and social infrastructure.

An urgent reassessment of stormwater and cloudburst management is required in India. Depending solely on last century's inflexible expensive grey infrastructure is insufficient to manage extreme weather events of today and those expected in the future.

Globally, grey infrastructure alone is unable to manage stormwater; cities are choosing green (or

grey+green) infrastructure to manage urban flooding. Studies indicate green infrastructure measures for stormwater management are cheaper and offer more co-benefits than upgrading, expanding or retrofitting traditional grey infrastructure systems. Urban planning is shifting towards water-prudent urban development, and cities are adopting a hybrid approach of integrated green and grey infrastructure solutions at the (local) street, neighbourhood and (larger) city scale to build flood resilience.

Floods cause significant life, livelihood and economic loss and erode developmental dividends that city authorities/government accrue through decades of hard work. Water-prudent urban development, coupled with integrated green and grey infrastructure, can significantly increase a city's resilience to urban floods. Neglecting such hybrid approaches and constructing only grey (stormwater) infrastructure to resolve urbanization and climate change-driven stormwater issues will frequently bring Indian cities underwater. ■



Doubling of Extreme Rainfall Events in the Himalayas

Joydeep Gupta is South Asia Director, The Third Pole. He has been writing on environmental issues ever since he covered the Bhopal Disaster in 1984. For his contributions to environmental journalism, he won the 2012 Green Globe Award at the Delhi Sustainable Development Summit.

There has to be space in the foothills and plains where the water can spread and be quickly absorbed into underground aquifers. Unless we stop encroaching on the flood plains, stop building constructing embankments and stop building over wetland ecosystems along rivers, how can we mitigate the impacts of floods?



New studies show that the chance of sudden, catastrophic river flooding in the Western Himalayas has doubled as climate change leads to an increase in extreme rainfall events.

The horror of June 2013 is etched on Rajendra Singh Negi's mind. On June 12, he travelled a few kilometres from his village to the town of Rudraprayag in Uttarakhand for some work. Heavy, incessant rainfall started the next day, and water levels rose alarmingly in the Garhwal Himalayas at the confluence of the Alaknanda and Mandakini rivers, the headwaters of the Ganga.

"On the morning of June 17, at around 7.30 am, I saw a wall of water more than 20 feet high rush down the Mandakini," Negi remembered. "It looked like the end of the world."

Days of extreme rainfall had dumped billions of litres of water over the Western Himalayan region. Between June 13 and 19, the Mountain State of Uttarakhand received excess rainfall of nearly 850%. As a result of the unprecedented deluge, India's National Institute of Disaster Management estimated that more than 6,000 people died in Northern India and parts of Nepal, and property worth billions was damaged.

The impact of floods in the Western Himalayas is compounded by the hazard of landslides [Image by AFP/Indian Army]

On June 17 alone, Uttarakhand received 340 millimetres of rainfall – 375% more than the normal daily rainfall during the southwest monsoon that occurs between June and September. The Western Himalayas is no stranger to cloudbursts – sudden, extremely heavy downpours – but such extreme rainfall over large areas was rare even 50 years ago.

Rainfall patterns in the Indian Sub-continent are changing, partly due to climate change. The chance of



Joydeep Gupta

extreme precipitation has increased significantly in the past few decades, recent research shows.

Increase in Extreme Rainfall

In the first scientific analysis of observed data, a team of researchers from the Indian Institute of Technology Bombay (IITB) and National Institute of Hydrology (NIH) found that between 1980 and 1991, and 1992 and 2003, extreme rainfall events in the Sutlej River Basin in Himachal Pradesh and the Ganga Headwaters in Uttarakhand, have more than doubled.

The deluges were inevitably followed by "extreme streamflow" and flooding in the foothills and plains, said the study, which was published in July.

In another study at the Indian Institute of Technology Kharagpur (IITK), hydrologists found that there has been a significant increase in extreme rainfall over South India and the Himalayas during the southwest monsoon.

Rainfall extremes are increasing "almost everywhere, with a maximum increase in the Western Ghats [a mountain range in Southwest India]," said Rajib Maity, an Associate Professor at IITK, and co-author of the study, published in April. "The Himalayan foothills also distinctly exhibit an increase. We expect floods, particularly flash

floods, will increase in the future if short-duration spells of extreme rainfall increase," Maity said.

The IITB-NIH study correlated data from six river gauges – two on the Sutlej River at Suni and Rampur, and four on the Upper Ganga at Mandakini, Alaknanda, Uttarkashi and Devprayag – with observed rainfall data.

The study found that "extreme flow events" have "doubled with an increasing trend in annual maximum streamflow". The analysis showed that this streamflow change was due to increased precipitation extremes during both the summer monsoon and the winter.

Such studies are rare because India closely guards data on water flow in trans-boundary river basins such as the Indus and Ganga, citing national security concerns.

Subimal Ghosh, a Professor at IITB and Co-author of the study, said the trend continued beyond the study period of 1980-2003. He pointed to five catastrophic floods between 2010 and 2019: 2010 in Pakistan, 2013 in Uttarakhand, 2014 in Kashmir, 2017 in Nepal and 2019 again in Kashmir.

The IITK study estimates that by 2100, rainfall in South India and the Western Himalayan foothills could increase by as much as 16.5 millimetres per day on average.

Floods can be Mitigated

"Scientific research is now validating what we have been seeing in the past few decades," said Somnath Bandyopadhyay, Associate Professor at the School of Ecology and Environment Studies at Nalanda University. "We will have to brace ourselves for more such events of sudden river flooding in the future." Maity added that since increased extreme rainfall cannot be avoided, "we need to adopt flood mitigation strategies".

Negi said there was no warning of the deluge in Rudraprayag in 2013. "Many lives could have been



saved if the people knew what was coming," he said. To avoid future damage, Maity recommended both structural and non-structural measures. "Structural measures include the construction of dams and river dykes, flood-control reservoirs, stormwater detention basin, flood-ways, channelisation including deepening, widening and improving conveyance capacity and bank protection. Non-structural measures include flood forecasting and warning, floodplain management and flood insurance."

Ghosh said it is possible and necessary to design early warning systems for extreme rainfall and flooding in the Himalayas. "India has taken huge strides in weather forecasting in recent years. Our early warning system for cyclones,

for instance, has minimised loss of lives among coastal communities," Ghosh said. "It is time we set up an early warning system for the Himalayas as well."

A flood forecasting system in the Western Himalayas would benefit more than 17 million people. It would also prepare the ground for better ecosystem services to mitigate increasing flood hazards.

While a technological fix through real-time forecasting is well within reach, managing and mitigating the impact of the floods is more complicated. "Our main problem is to view floods as a problem," said Bandyopadhyay. "These are a natural phenomenon that human populations have to learn to live with."

Managing the Surge

Overflowing rivers need to be able to absorb the surge in water. "In mountainous regions, the floodwater does not have space to spread. It will overflow banks and rush down at great speed. The heavy rains also cause landslides in areas with steep slopes," said Ghosh. "In such a scenario, care must be taken where we build." Imprudent construction will get washed away or be smothered under landslides, causing recurring losses.

In the foothills and plains, there has to be space where the water can spread and be quickly absorbed into underground aquifers. Bandyopadhyay signs off by saying, "Unless we stop encroaching on the floodplains, stop building constricting embankments and stop building over wetland ecosystems along rivers, how can we mitigate the impacts of floods?"

Policy action will have to be directed at reducing the economic value of such activities through levies, taxes and penalties so that river basins are not further hemmed in and degraded, experts said. Live experiences and scientific analysis now show that there will be many more incidents of extreme rainfall and river flooding in the Himalayas. How we adjust to these changed circumstances remains to be seen. ■



Promoting Ecosystem-based Disaster Risk Reduction in Bihar

Dushyant S. Mohil is Country Lead - Program Manager - Partners for Resilience, Wetlands International

Integrated approaches such as Eco-DRR can provide a rich base of natural resources in the district, can serve as opportunities for reducing the economic vulnerability of the communities, which in turn would positively impact the social, physical and environmental vulnerabilities.

There is increased awareness about the role ecosystems play in reducing the impacts of hazards and climate change. These include restoring and protecting forests on steep slopes to reduce mountain hazards such as avalanches, landslides and rockfall; wetlands for absorbing excess floodwaters; coastal ecosystems such as dunes, coral reefs, seagrasses and mangroves to reduce coastal hazards and erosion. Ecosystem-based Disaster Risk Reduction and Adaptation (Eco-DRR) approaches include more inclusive natural resources management with risk reduction across broader landscapes such

as Ridge-to-Reef, Integrated Water Resources Management, Integrated Coastal Zone Management, which recognize the connectedness between human activities and natural resources management across landscapes or watersheds while including disaster risk reduction and climate change adaptation activities such as early warning and preparedness. In parallel, ecosystem degradation is closely linked to decreased resilience, especially in regions vulnerable to climate change impact.

Wetlands International South Asia has been leading the Partners for Resilience (Pfr) programme for the last ten years promoting Integrated Risk Management approaches such as Eco-DRR. As part of the programme, we are working with district administration and with the support of Panchayat leaders to implement Eco-DRR approaches in Mahishi block, Saharsa, Bihar, which is part of the Kosi Basin.



Dushyant S. Mohil

Landscape Settings

The landscape is drained by Kosi notoriously known to change its course (records suggest the river was flowing 160 km east of its present course), subjecting large areas to prolonged inundation and resulting damage to crops and assets. The Kosi starts its journey at about 7,000 metres in the Himalayan range. Its upper catchment is located in Nepal and Tibet. It has a large catchment area, and the hills are mostly loose soil. When it rains, this soil is easily eroded and quickly carried down steep slopes, which is why the river carries heavy silt load. After reaching the plains, the Kosi bed widens drastically and spread the silt and sand in the shape of a huge fan. This megafan, about 180 km long and 150 km wide, is the floodplain. Saharsa district is part of the floodplain.

Intermittent wetlands, colloquially called Ahar-Pyne, act as natural buffers of the landscape – absorbing excess rain and river overflows during the monsoon months and discharge the same during dry months to meet the irrigation needs



Case Study



of the communities. A recently conducted ecosystem services assessment concludes the cultural significance of wetlands in addition to the other ecosystem services that the people depend.

Growing Pains

A considerable portion of land in Bihar is waterlogged. The condition in the landscape of the entire Saharsa district, including that of Mahishi Block (intervention site for PFR:SP) has been exacerbated due to development: construction of embankments, rail and roads

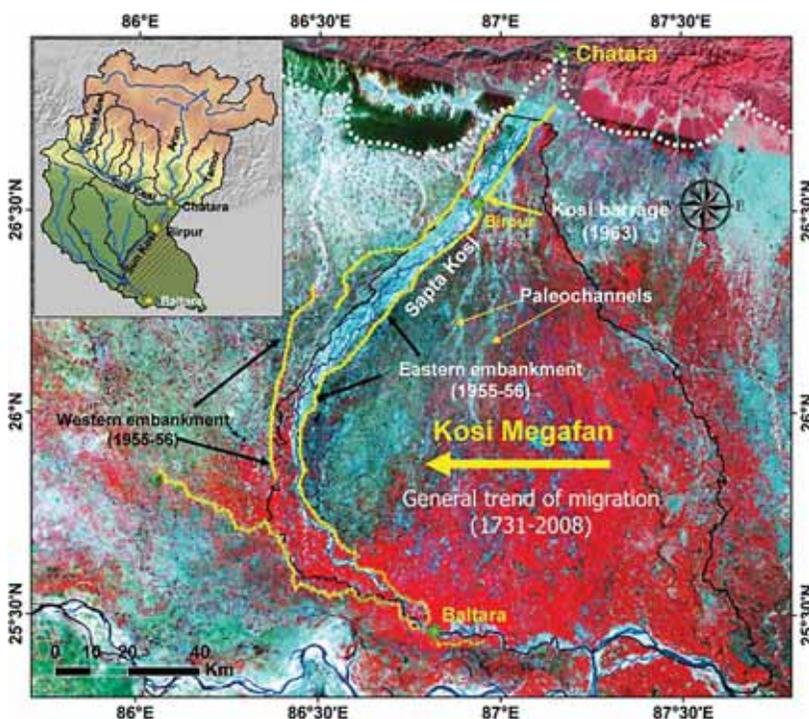
networks, reclamation of the river bed, development on floodplains and convergence of wetlands for agriculture altering the natural drainage. Since the creation of flood protection measures (embankments) from the 1950s till 2003 and the creation of the Kosi barrage in 1962, a considerable portion of the land is waterlogged; impeding the river's natural ability to drain the area. The condition has worsened due to the creation of canals, roads and railways.

Besides floods, the landscape in recent times faces an acute

shortage of water in the summer months, primarily due to excessive groundwater extraction and reduced recharge for wetlands. The impact of the changing landscape and nature of floods has been immense. People's livelihoods, mostly related to agriculture, is adversely affected due to increase in waterlogging and sand casting (due to silt deposition). High poverty rates and seasonal migration remains significantly high for this region.

Floods were never seen as a disaster in North Bihar; they were a blessing. Almost everyone aligned their crops with the annual floods to reap good harvests. However, since the creation of embankments, that is not possible.

In recent years, the intensity and frequency of floods have increased significantly. The Himalayan River has one of the highest annual sedimentation loads in the world, making it highly prone to flooding; with de-siltation as another option being considered by locals living around. Further, climate change-induced glacial melting leads to dangerously high-water levels in Kosi, and potentially more silt, leading to catastrophic floods like the one in 2008. From the embankments, it is evident to the naked eye that the river is flowing at a higher level. As a result, the river water seeps outside through the embankments, while rainwater and streams outside cannot enter





the river. Rather than draining the area, the Kosi is sending its water back into it. The groundwater is also unfit for drinking; hence, the dependency on ecosystems such as wetlands is greater than ever.

Solutions

With the gradual intensification of agriculture and fragmented connectivity of river channel with wetlands, these changing water regimes are creating multiple vulnerabilities.

Since 2016, PFR, through its partner – SEEDS, has been conducting interactions with community members and carrying out assessments to understand risk

drivers in the landscape. These assessments are carried out using hazard vulnerability and capacity tools and ecosystem services valuation, using participatory exercises techniques for identifying gaps and major issues and concerns to be addressed concerning the ecosystem services, infrastructure and livelihoods.

GIS is further used to understand the extent of change in land use and land cover. Resource maps, social maps, and crop and seasonal calendars are regularly drawn up after transect walks with community elders to familiarize them with their environment and plan accordingly. Further, community capacities on Eco-DRR are built for

assessing local water contexts to understand vulnerabilities, monitor wetlands and prepare for extreme hydrological events.

Integrated approaches such as Eco-DRR can provide a rich base of natural resources in the district, serving as opportunities for reducing the economic vulnerability of the communities, which in turn would positively impact the social, physical and environmental vulnerabilities. The fertile soils of the floodplains and availability of freshwater for the communities mean an increase in agricultural productivity, allowing the communities to engage in multi-cropping techniques. The wetlands also provide opportunities for fish and fox nut cultivation.

Prevention measures such as sustainable management and restoration of wetlands can mitigate the increasing risks of floods and droughts. Restoration of wetlands can regulate hydrological regimes in a landscape, thus preventing the excess build-up (floods and waterlogging) as well as recharging groundwater for dry conditions (droughts). Eco-DRR remains a cost-effective approach and offers multiple solutions in a changing climate. ■





Guwahati Gets an Experimental Flood Warning System

The Third Pole is a multilingual platform dedicated to promoting information and discussion about the Himalayan watershed and the rivers that originate there. The project was launched as an initiative of China Dialogue, in partnership with the Earth Journalism Network. It is a registered non-profit organisation based in New Delhi and London, with editors also based in Kathmandu, Beijing, Dhaka and Karachi.

Flood Early Warning System (FEWS) has been designed in a way that it can be replicated to predict urban floods in any part of the country. "The main challenge of developing such a system is the availability of required datasets. Most of the river tributaries of the Brahmaputra in Guwahati do not have a gauge for discharge and level measurement.

A pilot project in Assam's largest city could start a new trend for the rest of India. As the problem of urban flooding grows across India, Guwahati – an important political and economic hub in the country's northeast – is piloting a new flood warning system. In August, the Energy and Resources Institute (TERI) in New Delhi, along with the National Disaster Management Authority (NDMA), launched a fully automated web-based flood warning system for Guwahati. Every

year without fail, flash floods ravage the capital city of the Indian state of Assam. It has been a perpetual occurrence for decades, with no solution in sight.

Currently, at an experimental phase, the Flood Early Warning System (FEWS) has been designed to alert local authorities about flash floods, heavy rainfall and waterlogging, which will help them take measures to prevent untoward incidents and prepare for flood conditions. If

successful, the tool will be replicated by other cities across India.

How will FEWS work?

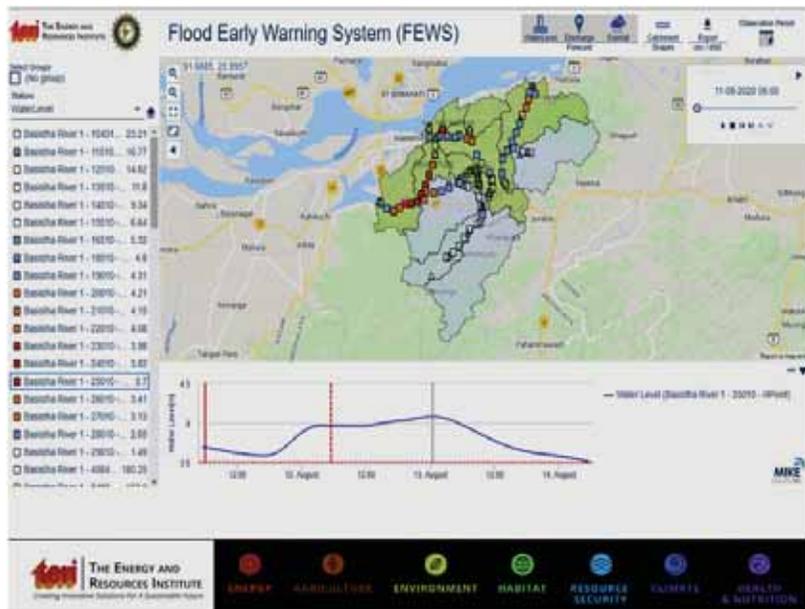
FEWS has been developed to deal exclusively with urban drainage, river and overland flow combined. It uses advanced hydrological models to provide warnings with a lead time of 72 hours. It uses the India Meteorological Department's (IMD) hourly forecast data of precipitation to simulate a hydrodynamic model to predict the water level, and generate spatial flood maps.

For this study, 11 sub-catchments were created, based on the 11 streams of Guwahati's river system, vis-à-vis tributaries of the Brahmaputra. Based on the forecast precipitation, the model calculates the run-off volume and hydrodynamics of the flow from these river channels and predicts the water level. Once the water level crosses its threshold, the system sends out alerts through text and email to the concerned authorities. The urban stormwater drainage setup of the system has been linked with the river modelling system to provide the water level in the stormwater drains and on the road networks.

"The system is developed with inbuilt urban drainage to predict flood at street-level accuracy. The flood level and hotspot areas can be visualised over Google Maps which will help in identifying flood-affected areas, disaster preparedness and management of urban flooding-related issues such as traffic disruption, providing relief and recovery and managing stormwater," said Prasoon Singh, the Project Lead of FEWS, and an Associate Fellow of the Earth Science and Climate Change Division at TERI.

Why Guwahati?

"Guwahati was selected for the project after consultation with the



State and the NDMA since it is one of the important economic and commercial centres in the North East, and it experiences flooding every year," said Singh.

People living along the banks of the Brahmaputra River fall victim to these flash floods. They get marooned in their homes, some losing their lives and property. The flood also causes accidents and severe damage to infrastructure. A bout of heavy rainfall, particularly during the rainy season, is enough to clog the natural and artificial drains, leading to flooding of areas of the city and bringing life to a screeching halt.

Research Work

To develop such a warning system, one needs to understand the urban hydrology, historical evidence of flood issues, geography and topography of the area, land use/land cover of the city, developmental activities and urban growth pattern, demography and urban water management infrastructure of the location in focus.

"It was evident that the city does not get flooded from the main channel of the Brahmaputra, but from its

tributaries. These assessments provide a background to design a system which can model a complex and dynamic nature of interactions altogether," Singh said, adding that TERI has also signed a Memorandum of Understanding with the IMD to be a partner institute, as it is the only authorised agency to provide forecasts.

"The forecast is the most important parameter in this study as the results depend on the accuracy of the forecast. We consulted the IMD as it was crucial to select the best suitable forecast model which provides good spatiotemporal coverage, and we selected the Weather Research and Forecasting (WRF) for this experiment," said Singh.

The Assam State Disaster Management Authority (ASDMA), Guwahati Municipal Corporation (GMC), and North Eastern Space Applications Centre (NESAC) are also collaborative partners in the study.

Biren Baishya, GIS expert at ASDMA said, "We suggested that they put in place the project for at least two seasons on a pilot basis, and provide us with alerts so that we can physically verify them. Only then

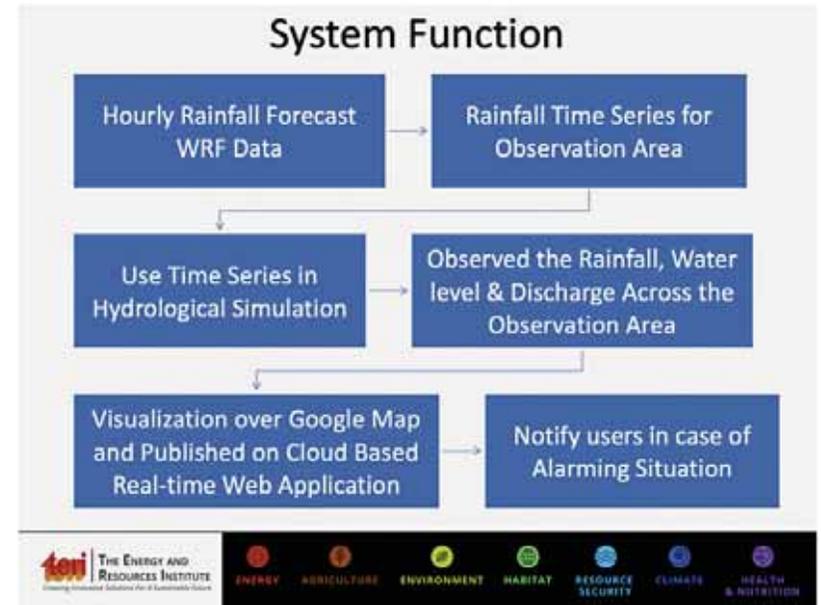
Inroads

we can assess whether the model is producing accurate results. The biggest challenge will be the Digital Elevation Model (DEM) – the digital representation of the land surface elevation – as the accuracy of the system will depend on it. If FEWS is successful, then a mobile application can be developed in the future which can be accessed by the public.”

TERI is also developing a similar warning system, with the support from Royal Norwegian Embassy, for the city of Jorhat in Upper Assam. The system is expected to go online by the end of September.

Flood Management Problems

Deforestation and destruction of the hills surrounding Guwahati is a major contributor to urban floods. Talking about the hurdles faced by the municipality in containing the flash floods, Devajyoti Hazarika, former GMC Commissioner (who has recently been appointed as the Secretary to the Government of Assam, Public Enterprises Department, and as State Enquiry Officer), said, “Illegal encroachments in these hills are rampant. The hills are cut down and rainwater flows downhill to



the urban settlement, causing waterlogging. The rainwater coming from the surrounding hills causes major clogging of the drains, heavy siltation and waterlogging, resulting in artificial floods.”

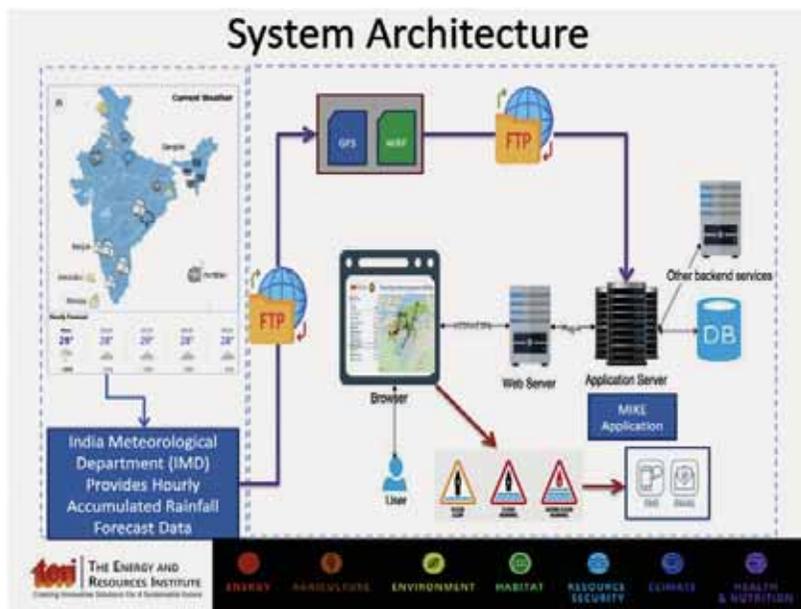
Plastic pollution is another pressing issue in the management of urban floods. Despite a ban on plastic, the continuous use and improper disposal of plastic products by citizens have overwhelmed the municipality authorities.

“Citizens need to be conscious about the use and disposal of plastic bottles, tetra packs, and all other single-use plastics. Our city drains get choked with plastic, thereby, leading to floods. We need the cooperation of the citizens in helping us curb the plastic problem. It has to be a two-way process. We cannot do this alone,” Hazarika added.

Warning System to be Replicated in other Cities

FEWS has been designed in a way that it can be replicated to predict urban floods in any part of the country. “The main challenge of developing such a system is the availability of required datasets. Most of the river tributaries of the Brahmaputra in Guwahati do not have a gauge for discharge and level measurement. Similar challenges lie ahead in any location of future development, specifically for urban areas,” said Singh.

Earlier in June, a similar system was launched in Mumbai. According to The Indian Express, Mumbai is the second city in the country after Chennai to get this system, and similar systems are being developed for Bengaluru and Kolkata.



Beyond Vulnerabilities, Towards Resilience – Children as Active Members in Resilience Building

Rama Rao Dammala is Senior Manager – Disaster Risk Management at ChildFund India.

The inclusion of children in risk reduction approach in the local developmental planning not only contributes to a more robust response mechanism of a country, it realizes global development goals at the local level because sustainable development is only realized when all members of the society are allowed to live, contribute and thrive, children included.



India is among the world's most disaster-prone countries - almost 85% of India's area is vulnerable to hazards such as cyclones, earthquakes, landslides, droughts, etc., and at least 75% of the coastline is prone to cyclones, tsunamis, and storm surges. In 2019, disasters affected India the hardest globally – the country recorded nearly 20% of the 11,755 deaths and 24.5% of the 95 million people affected.

As the global average temperature gradually increases along with environmental degradation, India will only witness an increase in devastating floods, cyclones, and prolonged droughts, further exacerbated by the human-induced conflicts and other elements of discrimination such as race, caste, gender, poverty, and disability.

Amidst an actual disaster, more than 50% affected population

comprises children – they are the most vulnerable section of society. However, their voices and concerns are missing from the policies and disaster risk reduction plans in most cases. They are reduced to being passive receivers of solutions that may not be optimal for them.

A disaster changes a child's life within a few moments, especially for those living in poverty or vulnerable situations. They receive a disproportionate share of the burden, both in the near and long term. Children are directly affected by death and injuries, and disasters exacerbate diseases related to malnutrition, poor water, and sanitation. Children abandoned by, separated, or orphaned from their families are also vulnerable to trafficking, exploitation and abuse. Despite the colossal impact of a disaster on their lives, children are

left out of the community level's resilience-building processes and beyond.

However, ChildFund India believes that children can be more than passive victims of disasters. The organization's child-centred Disaster Risk Reduction (CCDRR) Program recognizes children's right to participate in processes affecting their lives, the leadership roles they can play, increased resilience, and a greater sense of control security can be achieved through Child Centred DRR.

ChildFund India helps deprived, excluded, and vulnerable children develop the capacity to improve their lives and the opportunity to become young adults, parents, and leaders who bring lasting and positive change in their communities. The promotion of CCDRR is essential for ChildFund

Viewpoint

India as part of Child Rights since, under the UN Convention on the Rights of the Child (CRC), children have inalienable rights in all circumstances – disasters included. The Sendai Framework for Disaster Risk Reduction to emphasize the inclusion of children in DRR planning, recognizing that they, along with the youth, are agents of change who need to be supported to contribute to disaster risk reduction, in accordance with legislation, national practise and educational curricula.

We, therefore, build the resilience of children and communities living in disaster-prone areas by imparting awareness, building capacity and facilitating convergence with local governance across eight States - Odisha, West Bengal, Andhra Pradesh, Tamil Nadu, Karnataka, Uttar Pradesh, Rajasthan, and Madhya Pradesh. Here, the children lead the resilience-building processes; and the adults by giving inputs from a child's perspective often overlooked by adults. Together, they create DRR mechanisms by leveraging local support and resources that can be activated to respond to any emergency and



increase resilience during normalcy through disaster risk reduction planning and implementation.

Children also participate in the Village Disaster Management Committees (VDMC), a community-level structure that governs disaster management activities before, during, and after a disaster at the community level. They bring children-related issues and also influence government disaster management practices especially at the local governance level.

Children, along with the youth, mothers, and male adults of the community, are included in the

response structures. They are trained on specific task force skills – Early Warning, Search and Rescue, First Aid, Relief and Shelter Management, and Psychosocial Task – that are required during an emergency, as per the National Disaster Management Authority guidelines. They have very clear roles and responsibilities in pre-disaster, during, and post-disaster, honed over time by executing mock drills, training, and conducting quizzes at community levels. Youth and adolescent girls are among the key members of the task forces and they play a vital role at the time of disasters.



Schools and other learning centres form a very important part of a child's life since these are the epicentre of their social interaction and learning. Therefore, children are trained in school safety program; making their school and neighbourhood safe. They lead the school risk assessment plan, prepare school safety plans, and oversee its implementation with support from School Management Committees (SMCs). They also undergo training in first aid, basic evacuation skills, and psycho-social support to deal with school-level emergencies; these skills prove handy during disasters too. For children who are too young and thus most vulnerable to disasters, mothers are engaged

in the Integrated Child Development Service (ICDS), aka Anganwadi-level safety exercises where mothers lead the safety building measures at the ICDS to ensure their ward's safety and ICDS surroundings in consideration.

For instance, in 25 villages in the Mahakalpara Block in Kendrapara District, Odisha, ChildFund India has been engaged in CCDRR activities since 2016 because the District is one of the most disaster-prone areas in the State; it is riddled with cyclones, floods, storm surges and agricultural losses every year, causing damage to life and economy.

The ChildFund India team has trained over 1,000 volunteering children and other members of the district in CCDRR. Children identify and analyze various risks at the community level using a participatory approach along with adults and prepare the plan to mitigate and/or reduce the risks. When a disaster is in progress or a warning is announced, the volunteers gather in different taskforces. They use megaphones with sirens, drum, flag, and bell to warn villagers, take the most vulnerable people to the evacuation sites, undertake rescue and first-aid operations, and use radio communication equipment to inform authorities.

While children are key players at the community level during the DRR



planning and execution, ChildFund India views their inclusion in local governance development is a key to sustainability and prolonged success. Children and youth are trained and encouraged to participate in local government-level planning to ensure cohesiveness in their community-level plans and that of the government, demand resource allocation where needed, demand greater accountability and development service delivery.

To ensure that children's viewpoints and contributions are brought to the government officials' notice, ChildFund India encourages children to share their experiences on Disaster Risk Reduction Planning and Risk Governance at the district, State and national level platforms.

Our experiences working with children has proved time and again that if given a chance, children can assume leadership roles in the resilience-building process if they are provided with opportunities and requisite capacity. For example, children can provide leadership to identify micro-level risks at a village to share their experiences at the national/global level platforms. They understand their issues better and can develop a plan to address the issues with clear timelines.

Disasters are a continuous occurrence, and therefore resilience-building needs to be a continuous process too. Newer members of the community need to be continuously trained as per their shifting roles. This requires sustained interventions and resource allocations as part of our developmental planning. The inclusion of children in risk reduction approach in the local developmental planning not only contributes to a more robust response mechanism of a country, it realizes global development goals at the local level because sustainable development is only realized when all members of the society are allowed to live, contribute and thrive, children included. ■



Polar Disaster Risk Reduction

Ilan Kelman is Professor of Disasters and Health, University College London, UK, and Professor II, University of Agder, Norway. His overall research interest is linking disasters and health, including the integration of climate change into disaster research and health research.

Inaccessibility and environmental conditions are contextual considerations, but are part of life in the Polar Regions, so must be embraced rather than feared for disaster risk reduction. Disaster risk reduction is a long-term process, involving learning from and supporting the peoples who live in the locales. Starting immediately is always better than waiting until we must ask why nothing was done before it is too late.

The Arctic and Antarctic conjure up stereotypical images of isolation, inhospitality, and danger. The environmental conditions are labelled as being unforgiving, harsh, and unsurvivable. These descriptions are not wrong given that the continual hazards in both regions include freezing temperatures, tumultuous seas, damaging ice, and vicious storms. The Arctic brings the predator of the polar bear while large areas of Antarctica are at high elevation.

This story of a polar hazard is nonetheless incomplete. Many people live and thrive around the Arctic and have done so for millennia, developing rich cultures living off the resources of the land and water. Antarctica has been dedicated to science, with many people overwintering in the scattered research stations and others using the continent for exploration and testing endurance. Many see the hazardous traits as being positive and attractive, making the regions exciting, endearing, and worth living in.

Polar Disasters

Yet death and disaster remain common—as they are around the world. Crises at the high latitudes, as with anywhere, relate stories covering a variety of circumstances and outcomes ranging from an exciting tale to tell back home to horrible tragedy from which those affected never return alive. These happen at the individual and collective levels.

The often-told of the race to be the first known person at the South Pole ended in 1911-1912 with the death of five British explorers who arrived there second and the safe return of the successful Norwegian team. The leader of the latter, Roald Amundsen, died 14 years later with five others in the Arctic's Barents Sea when his plane crashed during a mission to find other Arctic explorers who had gone missing.

Aircraft crashes feature among more recent disasters in both locations. In November 1979, a tourist flight to Antarctica hit the volcano Mount Erebus killing all 257 people on board. In August 1996, 141 died when an aeroplane crashed into the mountain Operafjellet in the Norwegian High Arctic territory of Svalbard/Spitsbergen.

The sea has witnessed its share of catastrophes. From the Maxim Gorky sinking north of Norway in 1989 to the MS Explorer going down in Antarctic waters in 2007, tourist ships are an ever-present concern when people look for recreation but find hardship. No one died in these two, but the three crew members of the Norwegian yacht – Berserk - were not so lucky



Ilan Kelman

when they entered the Antarctic territory illegally and disappeared in 2011 in McMurdo Sound after setting off an emergency beacon.

Hazards which have killed or could kill in the Arctic and Antarctic include avalanches, storms, cold air and oceans, animals, disease, volcanic eruptions, droughts, earthquakes, tsunamis, oil spills, and chemical leaks. Terrorism, violent conflict, social unrest, and supply shortages remain scenarios. The Arctic experiences vegetation fires, landslides, and floods, none of which are necessarily entirely out of the question for the Antarctic (although building fires are far more likely than vegetation fires), especially as it continues to warm due to human-caused climate change. Disaster scenarios which are being considered include a large cruise ship sinking, Arctic settlements such as Murmansk or Iqaluit losing freshwater or electricity, and a large, shallow earthquake shaking Alaska or northern Finland.

Polar Disaster Risk Reduction

Since disasters happen in the polar regions, what does this mean for disaster risk reduction there? The principles are similar everywhere, but as always, the practice must be contextualised.

Both Arctic disaster risk reduction and Antarctic disaster risk reduction must contend with low temperatures alongside days, weeks, or months (depending on the exact latitude) of almost complete darkness. Particularly in the winter, people who end up outdoors without adequate clothing and equipment—perhaps due to evacuation or because their vehicle or building was damaged—have limited prospects for survival. Swift and effective rescue can never be guaranteed on land or water due to the ever-changing and often unsafe environmental conditions.

Consequently, before response or rescue would be needed, disaster risk reduction must plan for these situations under the assumption that people could be in difficulty, on their own, for some time. So, rather than preparing for prompt rescue, evacuation, and medical treatment, instead, preparation must be ready for their absence. The disaster risk reduction mantra remains: prevention is better than cure.

This means adjusting for individual circumstances.

Cases in Antarctica include:

- In 1961 when a Russian station's doctor diagnosed himself with acute appendicitis and—without any possibility for evacuation or incoming support—had to operate on himself to remove his appendix, in an operation called an auto-appendectomy.
- In 1999 when the South Pole station's doctor diagnosed herself with breast cancer and, again, in the absence of any hope of evacuation for months,

self-treated until she could be flown out.

- In 2003 when a leopard seal attacked a scientist, pulling her underwater and she could not be revived.

In each instance, where each were very much disasters for the local context and the people involved, protocols were adhered to as much as possible, but improvisation was needed to avoid further adverse consequences.

Such approaches are necessary for collective situations as well. In the Arctic, community centres, schools, offices, and other such buildings would be important for sheltering disaster-affected people; for instance, passengers and crew rescued from a sunk ship or crashed aircraft. Many Arctic communities do not have these options and sheltering in people's homes would not be easy if the number of rescued people far exceeds the community's population or where large numbers of houses are damaged.

Disaster risk reduction must account for this situation long before it happens; planning and preparing for shelters, supplies, and evacuations for large numbers of people suddenly in trouble anywhere in the Arctic. The standard approaches of identifying and tackling vulnerabilities over the long-term are needed, typically focusing on people who have the least and who are most marginalised.

Everyone in Antarctica is a visitor, so they already possess a strong baseline of resources to draw on. These resources should always be used for continual vulnerability reduction, damage mitigation, readiness, and emergency planning and preparedness so that difficult situations do not become disasters, among the many other actions of disaster risk reduction. The Arctic, with its long-established peoples and

settlements, also displays long-established inequities, oppression, and injustices which feed into vulnerabilities causing disasters. Disaster risk reduction means considering how people live, where they live, the resources they can obtain, the choices they are permitted, and the opportunities they have to improve their situation from ever-present vulnerabilities.

Act for Polar Peoples

The Polar Regions and Polar peoples are not alone. Plenty of analogies exist which could and should inform the implementation of polar disaster risk reduction. Mountain settlements experience some similarities in terms of cold and isolated traits, with settlements often impassable for days or weeks. Locations such as the Balkans and Afghanistan have gone through frigid winters with large conflict-affected populations trying to survive despite limited supplies, inadequate shelters, and limited opportunities for external aid. The Arctic has known similar struggles, including northern Finland, Norway (including Svalbard), and Russia during World War II.

In these circumstances, the key would have been to avoid the conflict. During peacetime, the key to disaster risk reduction is for people to have knowledge, resources, choices, and opportunities for understanding disasters, disaster potential, vulnerabilities, and reducing vulnerabilities. Inaccessibility and environmental conditions are contextual considerations but are part of life in the polar regions, so they must be embraced rather than feared for disaster risk reduction.

Disaster risk reduction is a long-term process, involving learning from and supporting the peoples who live in the locales. Starting right away is always better than waiting until we must ask why nothing was done before it is too late. ■

Helping People Affected by Natural Hazards with Technical Knowledge to Construct Safer Houses

Dr. Eefje Hendriks is a Lecturer and Researcher at Avans University of Applied Science and Eindhoven University of Technology in the Netherlands.

Knowledge adoption is not only important during direct reconstruction but should be retained within the community. Therefore, community learning is important to enhance. In this line, it is important to limit the conditions for aid. People show that they can make those decisions. Finally, it is essential to align communication to local habits, culture, cognitive levels and local skills and financial limitations.

Experiencing a disaster is a reality for many. Yearly, 210 million people are affected by a natural hazard, 14 million become homeless, 68 thousand get killed, from which, 93% in low-income countries - primarily in poorly constructed houses, 26 million are pushed back into poverty, and there is yearly 142 billion USD damage, from which, 70% can be linked back to housing. These staggering numbers show how serious this problem is. Earthquakes, typhoons, floods often recur in the same areas and repeatedly affect the most vulnerable groups living in low-income countries. During reconstruction, many affected households do not apply construction techniques that protect them from recurring hazards, such as earthquakes or hurricanes.

There is a limited theoretical and empirical understanding of what motivates or limits people to apply technical knowledge that protects their house from these recurring hazards. Too often, people reconstruct inadequately, and communication tools are often inadequate to support people to build back safer. The rising number of people in need due to natural hazards restricts the funding that can be spent on the second phase after a disaster that includes the reconstruction of houses, let alone on research and innovation of humanitarian assistance. Therefore, there are many aspects of post-disaster reconstruction that remains under-explored.

The vast majority of affected populations reconstruct their house without humanitarian technical assistance. They do it on their own. It is crucial to understand how this group reconstructs their houses. Yet, it is seldom described in empirical studies. Understanding their process could potentially enhance the efficacy of the aid that is given.

To reduce safety risks for affected communities, I aimed in my doctoral study to understand what influences decision-making in housing reconstruction to enhance the effectivity of reconstruction assistance. This study adapted the adoption theory to compare decision making of self-recovering



Dr. Eefje Hendriks

households with those that do receive humanitarian aid. I have developed a theoretical model to study knowledge adoption in practice based on an extensive literature study. This model links different actors and networks, their knowledge awareness, needs, and communication. Based on empirical findings and theory, I developed a method for audience-specific communication strategies.

Reconstruction in the Philippines and Nepal

I studied the reconstruction after the 2013 Typhoon Haiyan in the Philippines and after the 2015 Gorkha Earthquake in Nepal. Field research assessed disaster-affected communities that received different

intensities of humanitarian technical assistance. The approach was to explore in situ barriers, drivers and outcomes of decision-making before suggesting interventions aiming to build resilience and reduce disaster risks.

In the Philippines, people were left without humanitarian assistance and little governmental assistance to reconstruct their houses on the West Coast 3.5 years after the typhoon. To reflect upon the reconstruction, I collected a large mixed-method dataset in six communities. To gain insights into the communities affected, 220 households were interviewed, 13 carpenter interviews and focus group discussions were conducted in six communities. To gain insights from institutional stakeholders, 20 interviews with government officials, builders, and humanitarian organizations were conducted over two years.

In the second part of this study, I looked at reconstruction three years after the Gorkha Earthquake in Nepal in two districts. This study compared two disaster-affected districts, of which, one had received significantly more humanitarian technical shelter assistance than the other. This was a far larger study, including a mixed method in 25 communities. Again, stakeholder



perspectives were assessed using a total of 1453 household interviews, 1456 structural assessments of houses, 25 focus group discussions with community members, and 61 key stakeholder interviews.

Lessons Learned About Build Back Safer

The study has resulted in many lessons that cannot be individually addressed in this article. I will share a few lessons learned.

First of all, technical knowledge to build back safer housing does not reach everyone. The communities in this study in the

Philippines did not gain access to the basic concepts of typhoon-resistant construction techniques. They did not have access to online or printed resources, and if they were, they experienced difficulties in understanding these abstract technical drawings. I explain in this study that this is partly due to the lack of clear responsibilities of knowledge dissemination between important classes of stakeholders.

Secondly, a safe house is not always a priority. For example, in the communities in the Philippines, access to clean drinking water was indicated as a crucial aspect for the resilience of communities. People depend largely on fishery as a livelihood. Boats were lost or heavily damaged. Being able to replace them is essential as a starting point in their recovery.

Thirdly, the people in both countries - the Philippines and Nepal, were strongly motivated to protect their family and build back safer housing. They generally understood steps that enhance their resilience. In both cases, people experienced limited opportunities to do so.

In Nepal, one of the most surprising outcomes was that humanitarian assistance is not always crucial to enhance the safety of structures. In Nepal, both districts in this study





showed high compliance with earthquake-resistant construction techniques. The Government of Nepal provided financial support if people follow earthquake-resistant construction techniques. This study showed that the successful application of safety features can be linked back to the guidance of governmental engineers. People with humanitarian assistance had a better understanding of the techniques, which can help to retain knowledge in the communities in the long run.

Finally, low satisfaction with designs can become problematic long term. Governmental designs in Nepal did not always align with the needs of households. Some wanted a bigger house to store their crops or multiple rooms for their family and religious needs. Many intended to make changes to the safe house they constructed. If households start to make changes, it could impact safety.

Recommendations to Build Back Safer

Based on this empirical study, I have formulated practical implications, apart from the theoretical

implications. These mostly align with an earlier research.

- It is important to define success based on local values for resilience. It is important to give ownership to affected populations to make decisions for their resilience.
- Support informed choices instead of standardized designs to enhance satisfaction and let people balance safety with other needs.
- Respect local priorities even if it does not directly lead to safer structures.
- Invest in exchange of knowledge in which households can develop satisfactory designs based on technical knowledge. In the long term, these households are expected to be more successful in creating satisfactory and safe designs.
- Develop trust to create an effective exchange of knowledge and avoid power relationships.
- People often need to restore their livelihood as the first step towards resilience. They are often willing and capable of investing in their safety later.
- It is crucial to adjust the timeframe of aid to local processes. Sometimes, aid slows down or

accelerates reconstruction causing negative side effects.

- Safe designs should think about the future of the household and include an incremental strategy. Knowledge adoption is not only important during direct reconstruction but should be retained within the community. Therefore, community learning is important to enhance. In this line, it is important to limit the conditions for aid. People show that they can make those decisions.
- It is essential to align communication to local habits, culture, cognitive levels and local skills and financial limitations. In my study, I developed a method to do so. I propose to adapt communication to the motivation, ability and opportunity of affected households. Research has shown that people can be grouped based on these perceptions and learn from each other's differences.
- Strengthen the knowledge of community-based carpenters in both the Philippines and Nepal as they are the main source of information for the affected households and they often remain present in the communities over long periods. ■

Looking Back and Ahead - 1980-2030: Evolution in Advancing Resilience to Disaster Risks

Loy Rego is a Practitioner with 39 years of leadership and technical work on governance, program development and implementation on Disaster Preparedness, Risk Reduction (DPRR), Resilience and Adaptation. He worked for 15 years with the Asian Disaster Preparedness Center in Bangkok (1996-2011) as Director and later Deputy ED. Since 2011, he has served as Technical Advisor and volunteer in the US, Myanmar, Egypt and India on DPRR, Rio+20, the Sustainable Development Goals (SDGs) and other international agendas. He worked to establish the MARS Practitioners Network (2012) and VERVE Volunteers Program(2014).

Not only must we pay attention to health risks and outbreaks, but we must take an overall integrated approach to sustainability and resilience, focusing on addressing the SDGs, the Paris Agreement and the SFDRR and other global commitments in an integrated manner. We are in a new era, with bold visions, and special challenges and we need to address them in an integrated manner.

The ongoing half decade (1980-2030) has been a significant period of transformative change and advancement of disaster preparedness and risk reduction in the sustainable development context.

Assisting Countries in Natural Disasters and Strengthening Response Capacities of UN Agencies

Natural disaster response has been practised since time immemorial.



Loy Rego



Analysis

During the 60s, 18.5 million were affected by drought and 5.2 million by floods annually. During the 1970s and 80s, three million died, over 800 million people were affected and US\$ 23 billion damage were caused by natural disasters (General Assembly (GA) Res/43/202), twice more than the 1960s. The number of cyclone-earthquake victims shot up as poor people built unsafe houses on dangerous ground. The worst disasters: Sub-Saharan African droughts and Southeast Asian floods, each claiming several hundred thousand victims were directly associated with environment/development mismanagement.

The World Commission on Environment and Development (WCED 1987): "Our Common Future" highlighted that "35 million were affected by African drought, tens of millions by better managed, thus less-publicized Indian drought. Floods poured off the deforested Andes and Himalayas with increasing force. The 1980s seem destined to sweep this dire trend into a crisis-filled 1990s."

In 1970, when the catastrophic Bangladesh Cyclone struck, the UNSG recommended assistance in natural disasters, including applying technology/scientific research for natural disaster prevention and mitigation, including effective dissemination of research on causes, early manifestation of disasters and improvement of early warning systems (EWS) (Res 2717/70). The next year, UNGA asked the UNSG to create a permanent UN Disaster Relief Office (UNDRO), appoint a Disaster Relief Co-ordinator to promote natural disaster prevention, control and prediction, and advise Governments on pre-disaster planning and national disaster EWS improvements" (Res 2818/71). Eight years later, the GA welcomed UNDP's Governing Council decision to include technical



UN World Conference on Disaster Risk Reduction 2015 Sendai Japan

co-operation activities for disaster relief, preparedness and prevention nationally and regionally; and "requested the New International Development Strategy Preparatory Committee to consider these issues, (Res 34/55/79). In 1981, the UNGA stressed strengthening UN natural disaster response systems and coordinating all relevant EWS." (Res 36/225/81)

Origins of Natural Disaster Reduction in the 1990s

The idea of an International Decade for Natural Disaster Reduction (IDNDR) was first suggested by Dr Frank Press, President, US National Academy of Science, at the 8th International Congress of Earthquake Engineering in 1984, taken up by bodies in the international scientific community, resulting in the 1987 UNGA Resolution designating the 1990s as IDNDR, recognizing the importance of reducing natural disaster impact on people, particularly in developing countries and fostering NDR co-operation in the international community under the UN. The UNSG appointed an ad-hoc international Group of Experts, chaired by Dr Press to help the UN prepare for IDNDR, and

a UNGA resolution was adopted during December 1989. IDNDR began on January 1, 1990.

The IDNDR goals were to:

- i) Improve each country's ability to mitigate ND impacts.
- ii) Devise guidelines and strategies to mitigate these effects.
- iii) Foster scientific and engineering endeavours to reduce loss of life and property.
- iv) Disseminate existing/new information about ND assessment, prediction, prevention and mitigation.
- v) Promote technical assistance and technology transfer programmes, demonstration projects, education and training on specific hazards in location.

Since IDNDR's start, a framework for the first five years was:

- a) A ten-member Special High Level Council (SHLC), including serving and former Presidents and Prime Ministers.
- b) 25 international expert Scientific and Technical Committee (STC) (principally research scientists), and,
- c) National IDNDR Committees (NC) network.

Both SHLC and STC are serviced by

the IDNDR Secretariat in Geneva, responsible for carrying forward the programme of work agreed by the STC, and working with the UN Department of Humanitarian Affairs (DHA), reporting to the UNSG through USG for HA. The Secretariat started with three staff and increased to 15 in the Yokohama Conference run-up.

IDNDR activities undertaken or planned prior to Yokohama were:

- 1) Development of techniques and mechanisms for improved warning of tropical cyclones.
- 2) Comprehensive monitoring of high-risk volcanoes.
- 3) Programmes for reducing earthquake vulnerability.
- 4) Improvement of international statistical ND databases.
- 5) Educational and training activities.
- 6) Mapping health emergency preparedness and response in Africa.
- 7) Studies on disaster impact in large cities.

Till early 1994, 130 countries established NCs. The more active NCs commenced activities described in their papers at the Yokohama Conference. In addition, numerous international and regional meetings of IDNDR Committees and technical specialists were held. The IDNDR Secretariat and Osseratorio

Vesuviano (Italy), produced a Newsletter-Stop Disasters-every two months, distributed free to anyone with an interest in IDNDR's programme.

IDNDR certainly increased awareness of the need for and ways of achieving disaster mitigation among UN agencies, scientific community and multilateral/regional lending institutions: World Bank (WB) and Asian Development Bank (ADB).

IDNDR's first half focus and biases were seen in:

- a) Origins in the scientific and engineering communities reflected in activities in the Yokohama run up and beyond, with social sciences greatly under-represented, a bias partially corrected in its second half.
- b) Emphasising mitigation of sudden impact natural hazards (cyclones, floods, earthquakes, etc.), with focus on slow impact hazards like drought, somewhat ambiguous.
- c) With UN emphasis on member governments and IDNDR on scientific and engineering solutions, the NGO community was not been closely involved, except in some National Committees. Consequently, potential NGO contribution for community-level disaster

mitigation initiatives was not adequately explored.

- d) The Decade's start coinciding with the end of the Cold War was unfortunate, with international community's attention and humanitarian resources largely focused on conflicts in Africa, Eastern Europe and the former Soviet Union, IDNDR's focus on 'natural' disaster PMP had limited relevance. Many STC selected international programmes/demonstration projects experienced difficulty in getting sufficient funding.

The Yokohama Conference of May 1994

The Conference adopted the 10 Point Yokohama Strategy and Action Plan for a Safer World (YSSW), on 'natural' disaster prevention, preparedness, mitigation and reduction (DPPMR).

Key principles were:

- i) Risk assessment key for DR
- ii) DPP reduces disaster relief
- iii) DPP integral to development policy and planning nationally, regionally, bilateral, multilaterally and internationally
- iv) Capacity Development (CD) and Strengthening DPPMR beyond a decade
- v) Early warning (EW) and effective dissemination using telecom and broadcasts
- vi) Prevention measures are most effective with participation from local community, national government, regional and international levels
- vii) Vulnerabilities can reduce by proper development patterns and appropriate community education
- viii) Share DPPM technology freely and on time
- ix) Ensure environmental protection and poverty alleviation for



Analysis

- sustainable development
- x) Each country bears primary responsibility to protect its people, infrastructure and assets against NDR, with the international community mobilising NDR technologies and finance.

The Strategy and its Action Plan for 2000 and Beyond mandates:

- a) Global culture of prevention essential for DR.
- b) Self-reliance in each vulnerable country and community, comprising efficient capacity building (CB) and resource use.
- c) DPMM Education and training.
- d) HR and CB of DRM R&D institutions.
- e) Networking of existing DPRM centres of excellence.
- f) Active role of media in DR.
- g) Improved DPPR awareness and involvement.
- h) Active community based approaches (CBA) to vulnerability reduction
- i) Improved risk assessment, monitoring, and forecasts/warnings communication.
- j) Integrated PPR policies for natural, environmental and technological disasters.
- k) Improved inter disciplinary research at universities, scientific/technical institutions, regional and sub-regional organisations.
- l) Effective national legislation, political decision making and administrative actions.
- m) Promoting cooperation/information exchange/joint activities, regionally and sub-regionally including regional/sub-regional centres establishment.
- o) Using existing DR technology.
- p) Integrating private sector,

- promoting business opportunities.
- q) NGOs involvement in natural hazards management.
 - r) Strengthening UN system capacity for natural/technological (NaTech) hazard loss reduction.

Linking Relief, Rehabilitation and Development (LRRD) as well as Conflict Resolution

The 80s saw an active effort to Link Relief to Rehabilitation and Development (LRRD) approach, where natural hazards were seen as major causes of emergencies, with reduction an intrinsic part of making recovery processes sustainable. This first entered the aid debate during the African food crises of mid-to-late 1980s calling for 'prevention rather than cure' and relating LRRD processes through more appropriate land-management and agricultural systems.

Drought, the principal natural hazard in Sub-Saharan Africa, largely bypassed by IDNDR, with limited National IDNDR Committees and low activity by those established, was accorded higher priority by IDNDR's STC, a TC session at Yokohama and a joint OAU/ECA/WHO IDNDR African regional DM initiative.

The poor performance of some programmes, emergence of higher-profile political conflicts growing in number and intensity, absorbing aid, perceived as disrupting development, decreased interest in LRRD and was redirected in late 1990s to rebuilding collapsed States. New approaches were needed to ensure 'better development' would reduce emergency relief needs, and better 'relief/rehabilitation' contribute to development; easing transition between the two.

The conflict discourse overshadowed

LRRD processes. Natural disaster response was seen as a linear RRD continuum since the 'disaster', caused by a specific, time-bound hazardous event. When applying this model, conflict-related, political emergencies were more protracted than natural disasters, and post-conflict transition a complex, extended process, with risk of violent conflict re-igniting. This distinction has since been challenged by widespread coincidence and convergence of both natural disasters (NDs) and conflict-related weakness in governance and social structures with underlying conflicts aggravated by NDs, leading to LRRD and risk-reduction initiatives recognising their mixed nature. Opportunities arise when NDs affect a conflict-ridden society, seen in tsunami impacts in Indonesia and Sri Lanka, and the 2005 earthquake in Pakistan and Indian Kashmir.

LRRD approaches have addressed conceptual gaps, but other emerging knowledge was not yet reflected:

- a) Rebuilding markets and market relationships.
- b) Transcending the 'yeoman farmer/fisher fallacy' that assumes own production is best to follow.
- c) Finding a supportive and effective relationship with local government and policy/programming synergies to take advantage of economic boost post disaster.
- d) Confronting HR capacity gaps in the aid industry, and,
- e) Closing gaps between rhetoric and reality in DRR.

2000 to 2015: Growth of UNISDR and the Hyogo Framework for Action (HFA)

The "IDNDR International

Programme Forum: Towards Partnerships for Disaster Reduction in the 21st Century” was the decade’s closing event. UNSG Kofi Annan stressed: “We must, above all, shift from a culture of reaction to a culture of prevention. Prevention is not only more human cure; it is also much cheaper, but above all, let us not forget, is a moral imperative, no less than reducing risks of war.” The Forum’s joint participants’ statement: the “Geneva Mandate”, focussed on longer term DR action. The International Strategy for Disaster Reduction (ISDR) was launched in December 1999 by the UN’s Economic and Social Council (ECOSOC), endorsed by UNGA as the successor international framework to IDNDR.

The “Safer World in the 21st Century: Disaster and Risk Reduction” strategy, developed after the 1999 Forum had four goals:

- a) Increase public awareness of risks of natural, technological, and environmental hazards.
- b) Obtain public authorities commitment to reduce risks to people, their livelihoods, social and economic infrastructure, and environmental resources.
- c) Engage public participation at all implementation levels to create disaster-resistant communities through increased partnerships and expanded networks.
- d) Reduce economic and social losses caused by disasters, measured by gross domestic product.

A global Inter-Agency DR Task Force (IATF) was established in January 2000. ISDR, re-established in December 1999 as an inter-agency secretariat with an expanded mandate as coordination focal point of the UN system and regional organizations with representation from UN bodies, STC members and regions for NDR work, defining strategies for multi-level



international cooperation, while ensuring complementarity of action with other agencies. The existing inter-agency NDR secretariat function and coordination of IATF work continued, under direct authority of USG for HA with finance from extra-budgetary resources through a specific trust fund. ISDR was mandated to promote public awareness, commitment, expand networks and partnerships. (IDNDR Successor Arrangement, A/54/497)

The World Summit on Sustainable Development (WSSD) 2002, recognized DRR as prerequisite to achieve SD. Member States agreed on: “An integrated, multi-hazard, inclusive approach to address vulnerability; disaster risk assessment, prevention, mitigation, preparedness, response and recovery, essential elements of a safer world in the 21st century, and endorsed actions to: (a) Strengthen ISDR’s role and encourage provision of financial resources; (b) Support effective regional, sub-regional and national strategies and DM institutional use of traditional and indigenous knowledge and promote CBDM planning by local authorities, including training and public awareness; (WSSD Chapter IV: A/CONF.199/20): Protecting and managing the natural resource base of economic and social development)

These references were improvements in recognising DR compared to UNCED at Rio-de-Janeiro 1992. Climate negotiations were linked for the first time and used until today: “encourages UN Conference of Parties (CoP) to UN Framework Convention on Climate Change (UNFCCC) and parties to the Kyoto Protocol to UNFCCC to address adverse CC effects, especially in vulnerable developing countries, and encourages Intergovernmental Panel on CC (IPCC) to continue assessing adverse CC effects on socio-economic and NDR systems of developing countries; (A/RES/58/215)

The YSSW Review (2004) in preparation for the World Conference for DR-Jan 2005 provided disillusioning findings: i) Since YSSW adoption, there were 7,100 ‘natural’ disasters worldwide, killing over 300,000 people and causing over US\$ 800 billion losses. The UN USGHA indicated “on average, the over 200 million people annually affected by ‘natural’ disasters since 1991, is seven times more than the 30 million affected annually by conflict.” (Para 14), ii) While 11% of people exposed to natural hazards live in low human development countries, they cause more than 53% of recorded deaths. (Para 22), c) Disaster sociology and human dimensions’ highlight vulnerability



in conditioning people's risk exposure. (Para 79)

ISDR's comprehensive global report 'Living with Risk' (LwR, 2004), identified lessons from past DM work, arguing for increased action to reduce risk and vulnerability to hazards, to meet tomorrow's challenges, showing people at risk because of their social, economic and environmental vulnerability, which must be factored in to achieve sustainable development. DRR concerns everyone, from villagers, heads of states, bankers, lawyers, farmers, foresters, meteorologists to media chiefs and argued for action to build sustainable societies.

The Second World Conference on Disaster Reduction (WCDR) in January 2005 in Kobe city, Hyogo Prefecture, Japan, adopted the "Hyogo Framework for Action (HFA) 2005-2015: Building Resilience of Nations and Communities to Disasters", to use DRR as a foundation for sound national, regional and international development agendas to achieve substantial reduction of lives, disaster losses, and community/country assets.

WCDR took place on the 10th anniversary of the 1995 earthquake, still under the impact of the December 2004 Indian

Ocean Tsunami, getting attention of politicians and international media. 168 Member States represented by 4,000 people participated in Kobe. They agreed on HFA for 2005–2015 with three strategic goals and five Priorities for Action (PFA). The goals were:

(a) More effective DRR integration into multi-level SD policies, planning, and programming, emphasising disaster PMP, and vulnerability reduction.

(b) Strengthening institutions, mechanisms, and capacities at all levels to systematically build resilience.

(c) Systematic incorporation of DRR into design and implementation of emergency preparedness, response, recovery and reconstruction of affected communities. HFA had five PfAs, i) Ensure DRR is a national and local priority with strong institutional implementation, ii) Identify, assess and monitor DR and enhance EW; iii) Use knowledge, innovation and education to build a multi-level culture of safety and resilience, iv) Reduce underlying risk factors; and v) Strengthen disaster preparedness for effective multi-level response.

The HFA Midterm Review (MTR) was done in 2010. In her foreword, the UNSG's Special Representative (SRSG), Ms Margareta Wahlstrom

said, "We are still far from having empowered individuals adopt a DRR approach in their daily lives and demand that development, environmental and humanitarian policies and practices be based on sound DRR measures." (HFA MTR Suggestions for accelerating HFA implementation, p 9)

"In five years since HFA's adoption, significant DRR progress was made across international, regional and national agendas, but strongly driven by the DRR community, not fully internalized in how international development assistance agencies, some government institutions, and UN agencies are institutionally and financially organized to manage DRR." (HFA MTR, p 55) The conclusions, recommendations and way forward address "measuring DRR implementation progress, ask for targets to be set, standards to ensure delivery quality and international, national and local level accountability mechanisms developed to measure action taken /progress achieved." (HFA MTR, p 70)

Key Actions During HFA

A thrust of ongoing work of member countries, ISDR Secretariat, UN Organizations and partners were continuing public awareness campaigns, and observance of 13th October (its second Wednesday) as International Day for Disaster Reduction (IDDR). The regularisation of this day beyond the decade and continuance till today, 35 years later is testimony to its value in propagating the global DRR culture and practice around common themes, through diverse action nationally and locally.

Campaign themes since 2000 were focussed on:

- Disaster Prevention, Education and Youth (2000)
- Countering Disasters, Targeting Vulnerability (2001) in poorer

- countries who lack DPP capacity
- c) Sustainable Mountain Development (2002) in vulnerable mountain communities
- d) Turning the Tide (2003) during the International Year of Freshwater not just to preserve water resources to sustain life, but reduce its capacity to take life away
- e) Today's Disasters for Tomorrow's Hazards (2004) better preparing communities work together when hazards strike again
- f) Microfinance and DRR (2005) recognising from the 2004 Tsunami, US's Hurricane Katrina and the Pakistan earthquake that the poor usually suffer most, and microcredit is a useful tool for poverty reduction, and potentially disaster reduction
- g) Disaster Risk Reduction Begins at School (2006) - the theme of ISDR's first campaign in the HFA decade in partnership with UNESCO
- h) Challenging the World's Education Authorities (2007): Education Ministries, authorities, teachers and parents
- i) Disaster Risk Reduction is Everybody's Business (2008)
- j) Hospitals Safe from Disasters (2009) - the theme of UNISDR's second campaign with WHO and World Bank
- k) My City is Getting Ready! (2010) - the Safer Cities theme of the third UNISDR campaign - addressing local governance, urban risk, and sustainable urbanizations developed in UN-Habitat World Urban Campaign.

Since Hyogo, UNISDR took up key sectors, schools, hospitals and cities, to do a sustained long term campaign in partnership with relevant UN Agencies: UNESCO, UNICEF, WHO and UN Habitat.



The first World Disaster Reduction (WDR) Campaign 2006-07 theme, led by ISDR and UNESCO, was: "Disaster Risk Reduction Begins at School". Aligned to HFA Priority 3 - Use knowledge, innovation and education to build multi-level safety and a resilient culture. Schools are best venues for forging durable collective values to building a prevention and resilience culture. The WDR Campaign promoted safety of school buildings and DRR mainstreaming into school curricula and activities has now matured into continuing, multi-agency program led by the Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector (GADRRRES) on Comprehensive School Safety (CSS) with a targeted effort led by countries and agencies called the Worldwide Initiative on Safe Schools. WISS held international meetings in Turkey, 2014 and Iran, 2015. WISS's three components: a) Advocacy and Policy Support, b) Technical Support among Safe Schools Leader countries, technology transfer, twinning opportunities, good practice exchanges, developing education DRR and resilience plans; child-centred risk assessments, and three CSS technical pillars: delivery, c) Progress Monitoring and Reporting delivered through: annual Safe Schools Leaders meetings, related Working Groups' annual reports

and submission of government national reports.

DRR is indispensable to protect people and countries' health, welfare and assets. In 2008-09, UNISDR and World Health Organization (WHO) launched the second biennial campaign: Hospitals Safe from Disasters, working with governments, international and regional organizations to better protect health facilities and hospitals to function both during and after disasters. Key essentials are implementing national policies and programs to make health facilities safer, selecting safe sites, designing/constructing safely, protecting health workers, equipment, medicines and supplies, ensuring health facilities receive essential services, developing partnerships between facilities and community, emergency risk management programmes for each facility; test and update response plans with drills/exercises, and train health workers on emergency response. During 2008/09, a lot was done on hospital safety. Health task forces with all stakeholders were established (e.g. Asia Pacific Task force on Safe Hospitals), workshops held (e.g. Kathmandu Declaration on Protecting Health Facilities from Disasters) and projects to implement building codes and train staff carried out (e.g. PAHOs Hospital Safety Index

Analysis

adopted in Latin America, Oman, Sudan and Tajikistan). Despite the campaign end, safer hospital work continues, with more initiatives: a WHO Global Programme on Safe Hospitals; a pledging campaign on safer hospitals and schools in the Asia Pacific region; and a thematic platform on DRR for Health.

The third campaign by UNISDR - Making Cities Resilient (MCR): "My City is Getting Ready!" was launched in May 2010, addressing local risk governance, urban risk and resilience, raising awareness and commitment of local governments and political leaders on urban DRR; institutionalised as the longest serving campaign. More than 4,300 cities joined MCR, demonstrating commitment to act on ensuring safety and well-being of citizens from disasters.

The ten MCR essentials developed in 2010 serve as a reliable guide to cities in fulfilling their HFA commitment. A handbook developed in 2011 provided implementation guidance to City Mayors and officials, helped reporting and monitoring and was revised in 2016 after SFDRR. The ten essentials are:

- 1) Organize for Disaster Resilience
- 2) Identify, Understand and Use Current and Future Risk Scenarios
- 3) Strengthen Financial Capacity for Resilience
- 4) Pursue Resilient Urban Development and Design
- 5) Safeguard Natural Buffers to Enhance Natural Ecosystems' Protective Functions
- 6) Strengthen Institutional Resilience Capacity
- 7) Strengthen Societal Resilience Capacity
- 8) Increase Infrastructure Resilience

- 9) Ensure Effective Urban Disaster Preparedness and Response, and,
- 10) Expedite Recovery and Build Back Better.

Two key documents were adopted by government and international stakeholders: the Local and Sub-National Governments Declaration at WCDRR 2015 in Sendai, and "The Florence Way Forward" at the High-Level Forum on Implementing SFDRR at the Local Level in Italy, June 2016.

A focus of subsequent UNISDR annual campaigns was specific at risk groups. During 2011-15, the 'Step Up' campaign, dedicated each year to a particular vulnerable group - children and youth, women and girls, people living with disability, older people and indigenous peoples, highlighting their special strengths and positive contributions made to DR. These themes covered a) "Making Children and Young People Partners for DRR" (2011), b) "Women and Girls: the Invisible Force of Resilience" (2012), c) Living with Disability and Disasters (2013), d) Older persons (2014), both their needs and contributions to understanding, planning and community DP action, e) Indigenous people's Knowledge for life (2015) highlighting traditional, indigenous and local knowledge/practices complementing scientific knowledge.

Overall, this campaign focussing on significant contributions made by each of the vulnerable group contributed greatly to the inclusion of important SFDRR Section 36a, highlighting their leadership and positive role played in their communities and society.

During HFA, the Global Assessment Reports 2007-2015 were institutionalised around specific themes, documenting risk patterns in regions and nations globally, released at the Global Platforms on DRR held in 2007, 09, 11 and 13.

The 2007 Global DRR Review compared risk trends with HFA progress, identifying intensive risk scenarios (where people and economies are likely to experience catastrophic impacts from large-scale events) and extensive risk scenarios (dispersed populations experiencing highly localised, low intensity, cumulative impacts from small-scale, mainly climatic hazards); and examined how HFA will reduce mortality and economic loss from earthquake and climatic hazards in both scenarios.

2009 institutionalised the Global Assessment Report (GAR) every two years on a specific theme. GAR 2009 "Risk and Poverty in a changing climate" showed DR disproportionately concentrated in weak governance, lower-income countries, communities and households; exploring underlying risk drivers like badly planned and managed urban development, vulnerable rural livelihoods, environmental degradation, poverty and inequality.

GAR 2011 "Revealing Risk, Redefining Development" identified effective public policies to address the disaster risk-poverty nexus and political/economic constraints for increased DRR public investment. Using innovative hybrid probabilistic risk models, GAR11 produced risk profiles for several countries to demonstrate how a risk-layered approach to DRM could maximize benefits while reducing costs.

GAR 2013 "From Shared Risk to Shared Value" made the business case for DRR, exploring the nexus with private investment, showing how businesses can invest in DRM to reduce costs and interruptions from disaster losses/impacts; and enhance performance and reputation by minimizing uncertainty and unpredictability.

GAR 2015, "Making Development Sustainable: the Future of DRM"

released at Sendai's WCDRR, questioned whether the way HFA approached DRR was really fit for purpose and reinterpreted DRR in a world threatened by catastrophic DR increases, showing why DRR needs to move from managing disasters to managing risks to contribute to making development sustainable

Six Frameworks: The SDGs, Paris Agreement, SFDRR and AAAA in 2015, and World Humanitarian Summit and New Urban Agenda 2016

2015-2016 was a major turning point in adopting a cluster of six major International agreements: framed by the Sustainable Development Goals: 2015-2030 (Sept 2015), the Paris Climate Change Agreement 2015, the Sendai Framework for Disaster Risk Reduction; the Addis Ababa Action Agenda on Financing for Development; the Istanbul World Humanitarian Summit's Agenda for Humanity and the Quito New Urban Agenda 2016.

The Sendai Framework for DRR 2015-2030

SFDRR was the firstpost-2015 development agenda agreement adopted at the Third UN World Conference on DRR in Sendai, Japan, on March 18, 2015, an outcome of Member-State and stakeholder consultations initiated in March 2012 and inter-governmental negotiations from July 2014 to March 2015 endorsed by the UN General Assembly of 2015.

SFDRR works with the above-mentioned 2030 Agenda Agreements and aims over 15 years to achieve the outcome of "Substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural

and environmental assets of persons, businesses, communities and countries." To attain this outcome, the SFDRR goal adopted was "Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience."

SFDRR built on work done by States and stakeholders under HFA, introducing innovations emphasising DRM instead of DM; disaster risk reduction as outcome; goals focused on preventing new risk, reducing existing risk and strengthening resilience; guiding principles, including primary responsibility of states for DRR; all-of-society, all-of-State institutional engagement; definition of seven global targets; and broadened DRR scope to cover natural, man-made, environmental, technological and biological hazards/risks. Health resilience is strongly promoted, especially significant in the current pandemic.

As Margareta Wahlstrom, UN SRSG for DRR said in 2015, "SFDRR articulates: a) improved DR understanding covering exposure, vulnerability and hazard characteristics; b) strengthening of disaster risk governance, including national platforms; c) accountability for DRM; d) preparedness to "Build Back Better"; e) recognition of stakeholders roles; f) mobilization of risk-sensitive investment to avoid creating new risk; g) resilience of health infrastructure, cultural heritage and work-places; h) strengthening of international cooperation and global partnership, and g) risk-informed donor programs, support and loans from

international financial institutions. The Global Platform for Disaster Risk Reduction (GPDRR) and regional platforms for DRR is mechanisms for coherence across agendas, monitoring and periodic reviews supporting UN Governance, with UNDRR supporting implementation, follow-up and review of SFDRR."

SFDRR Targets and Indicators

SFDRR addressed three dimensions of disaster risk (exposure to hazards, their characteristics, vulnerability and capacity); prevents new risk creation, reduces existing risk and increases resilience. SFDRR's seven global targets and four priorities for action assess and guide progress. These targets are measured globally, complemented by appropriate indicators. National targets and indicators aim to contribute to achieving SFDRR outcome and goals.

SFDRR's Seven Global Targets are to

Substantially reduce

- Global disaster mortality by 2030, lowering average per 100,000 global mortality rate in the decade 2020–2030 compared to 2005–2015;
- The number of affected people globally by 2030, lowering average global figures per 100,000 in the decade 2020–2030 compared to 2005–2015;
- Direct disaster economic loss in global gross domestic product (GDP) by 2030;
- Disaster damage to critical infrastructure and disruption of basic services, including health and educational facilities, through developing their resilience by 2030;

Substantially increase

- The number of countries with national and local DRR strategies



The Sendai Framework Monitor, an online tool captures self-reported (by member states) progress against a set of 38 Global SFDRR Indicators towards seven global targets

- by 2020;
- (f) Enhanced international cooperation to developing countries through adequate, sustainable support to complement their national actions for SFDRR implementation by 2030;
- (g) Availability of and access to multi-hazard early warning systems (MHEWS) and disaster risk information and assessments to people by 2030.

SFDRR’s Four Priorities for Action are:

- 1: Understanding disaster risk in its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and environment used for risk assessment, prevention, mitigation, preparedness (PMP) and response.
- 2: Strengthening disaster risk governance nationally, regionally and globally for PMP, response, recovery, and rehabilitation, fostering collaboration and partnership

- 3: Investing in DRR for resilience, publicly and privately through structural and non-structural measures; enhancing economic, social, health and cultural resilience of persons, communities, countries, their assets and environment
- 4: Enhancing disaster preparedness for effective response and Building Back Better in recovery, rehabilitation and reconstruction requires strengthening response preparedness, acting in anticipation, ensuring multi-level capacities in place and helps integrating DRR into development.

Each call for action is at four levels, the national and local, (Sections 24, 27, 30 and 33) and the global and regional levels (Sections 25, 28, 31 and 34). SFDRR recognizes the primary role the State has for DRR with responsibility shared with local government, private sector, community and other stakeholders.

The Sendai Framework Monitor, an online tool captures self-reported (by member states) progress

against a set of 38 Global SFDRR Indicators towards seven global targets, which measure progress and determine global trends in risk and loss reduction with customised nationally defined targets and indicators to measure progress against four SFDRR priorities based on national priorities reflected in their national DRR reports.

SFDRR’s Part V: ‘Role of Stakeholders’ effectively articulates the concept of shared responsibility and role of non-state stakeholders as enablers, providing support to States as per national policies, laws and regulations, in SFDRR implementation locally, nationally, regionally and globally, through commitment, goodwill, knowledge and experience. SFDRR recognizes the need for allocating national resources and mobilising additional resources.

Civil society, volunteers, organized voluntary organizations and community-based organizations are recognized collaborators of public institutions, providing knowledge and pragmatic guidance in normative DRR framework and plan implementation; engaging in local, national, regional and global strategy implementation; contributing/supporting public awareness/education, DRR prevention culture, advocacy for resilient communities and inclusive, all-of-society DRM across groups.

Six specific civil society sectors, normally seen as especially vulnerable, requiring special attention, are boldly recognized in SFDRR Section 36

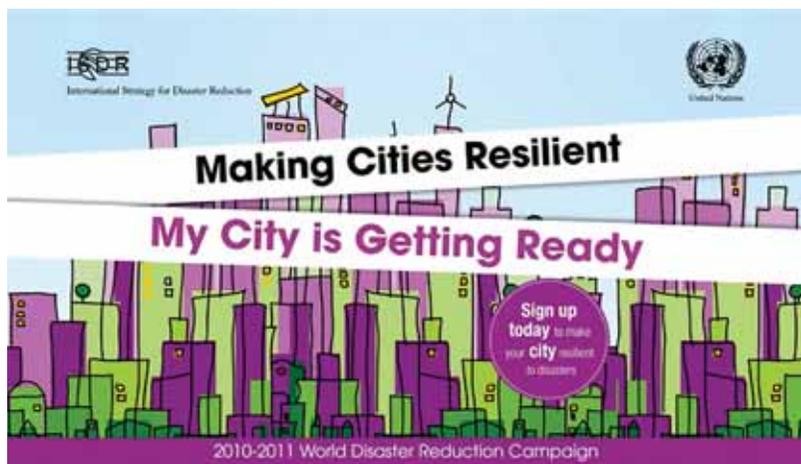
- a) i) to vi) for their evocative contribution:
 - (i) Women’s participation is critical to effective DRM; design, resource and implement gender-sensitive DRR policies, plans, programmes; and capacity building to empower women for preparedness and

- secure alternate means of livelihood post-disaster;
- (ii) Children and youth are change agents and should be given the space and modalities to contribute to DRR, in accordance with legislation, national practice and educational curricula;
- (iii) Persons with Disabilities (PwDs) and their organizations are critical to DRR assessment, design and plan implementation, tailored to specific requirements, using principles of universal design;
- (iv) Older persons have years of knowledge, skills and wisdom, invaluable assets to reduce DR, and should be included in design of policies, plans and mechanisms, including EW;
- (v) Indigenous peoples, through their experience and traditional knowledge, importantly contribute to development and implementation of plans and mechanisms, including EW;
- (vi) Migrants contribute to resilient communities and societies, and their knowledge, skills and capacities are useful in DRR design and implementation.

Valuable guidance on other sectors is given in Sections 36

- (b) Academia, scientific and research entities and networks;
- (c) Business, professional associations, private sector financial institutions, regulators, accounting bodies and philanthropic foundations, integrating DRM into business models, and,
- (d) Media as an active, inclusive partner contributing to public awareness raising, disseminating accurate DR information, simply, transparently, accessibly and easy-to-understand.

A third Sendai outcome is the



commitment to establish a system of voluntary actions by civil society, private sector, member states and UN organizations. 188 commitments were made in the run up to SFDRR, many of these now publically announced in 31 revised Sendai Framework Voluntary Commitments (SFVC) launched in May 2019 at the Global Platform on DRR in Geneva, with an updated link on the current UNDRR website, including an Indian VC.

Since SFDRR, two rounds of regional platforms on DRR have been held in 2016 and 2018. The First Regional Platform in Asia was held in New Delhi, India in November 2016, and the second in July 2018 in Ulaanbaatar, Mongolia. Five regional and sub-regional platforms were held in 2018, hosted by the Governments of Armenia, Colombia, Italy, Mongolia and Tunisia. The Third Asia Pacific Regional Platform was scheduled for late June 2020 in Brisbane, Australia, but was rescheduled due to the COVID-19 crisis and travel restrictions.

The New Delhi Declaration, 2016, resolved to mobilise governments and partners to deliver the Asian Regional Plan for SFDRR implementation in the next 15 years till 2030, and called on all major and stakeholder groups to deliver their 'Voluntary Statements

of Action' (VSAs). The regional plan covers broad policy directions for SFDRR and SDG implementation; a 15 year long-term roadmap, broken into segments, with percentage-wise targets for 2016, 2018, 2020, 2022 and 2030; and the two-year action plan (2016-18) aligned with the road map. ASEAN, SAARC, ECO, SCO, APEC, BIMSTEC and APDIM help act regionally. The Asia Regional Plan and all VSAs from stakeholder groups constitute two principal regional instruments for tracking progress.

Two post-SFDRR Global Platforms (GPDRR) were held; the first in 2017 in Cancun, Mexico and the second in Geneva in May 2019. The GPDRR 2019 was preceded by the Second Multi-Hazard Early Warning Conference, the fourth session of the World Reconstruction Conference, the Stakeholder Forum and the Science-Policy Forum.

The GPDRR 2019 Co-chair summary entitled, "Resilience Dividend: Towards Sustainable and Inclusive Societies". Ninety-one countries reported national DRR strategies developed, but admitted that the implementation pace, especially at the local level, was not fast enough for the 2020 deadline for Target (e), thus delaying further progress on other targets.

Commitments towards an inclusive DRR approach, recognizing

Analysis

the indispensable role of disproportionately-affected groups, including women, displaced people (DP), PwDs, elderly, and children have not sufficiently translated into action. Achieving the “Resilience Dividend” will require countries, communities, enterprises, and individuals to increase capacities to prevent and reduce risks. Addressing governments and stakeholders needs for SFDRR implementation in coherence with other global frameworks requires a strategic approach to CD supported by adequate funding. DRR risk assessments, strategies, and programmes, should target drivers of inequality and exclusion, and legislation and governance mechanisms should prioritize needs of the most-at-risk and marginalized. Regional DRR approaches should address transboundary risks and inform national strategies for coherent implementation. Regional/sub-regional platforms facilitate exchange of experiences and forge networks. Governments should accelerate DRR strategy implementation, aligned with SFDRR Target (e) i) and ii) by 2020, coherent with National Adaptation Plans (NAPAs), Nationally Determined Contributions (NDCs) and National Development Plans (NDPs). Countries must step up systematic reporting to the Sendai Framework Monitor.

GPDRR reiterated that locally-led DRR plans are necessary to ensure national strategy implementation and urged national governments to enable local plan development and implementation to inform revision of national strategies. Local plans should be guided by community knowledge, build on local solutions, city-to-city learning, long-term, integrated urban-rural planning, sustainable financing frameworks and cooperation of all levels of government and other stakeholders.



Disaster-resilient infrastructure is key to risk-informed development. We must capitalize on co-benefits of nature and ecosystem-based solutions (NBS), leverage their complementarity across blue, green and grey infrastructure and help achieve the resilience dividend. GPDRR stakeholders are committed to engage with NBS, resilience and adaptation tracks of the Climate Action Summit.

Ministries of finance and planning, central banks, regulators, and credit rating agencies were urged to ensure financial and development plans/decisions are risk-informed. Private sector is a strategic partner to achieve resilient economies and communities, and public-private partnerships (PPPs) essential to scale-up innovations and investments needed, with standards developed on DRR responsibilities of private sector investors, medium, small, and micro enterprises (MSMEs) in PPPs.

The interplay between disasters, climate change, environmental degradation, and fragility, including water-related risk, should be recognized. GPDRR underscored the security implications of CCD and encouraged context-specific DRR and resilience-building strategies in conflict-affected and fragile contexts, based on risk assessments that integrate CCD and conflicts.

GPDRR 19’s overarching message was ‘Resilience pays off’, strongly calling leaders at all levels to ensure resilience dividends and make risk-informed investments, essential for sustainable development and inclusive societies.

Key Ongoing and Planned Actions

Post SFDRR, the Sendai Seven Campaigns (2016-2022) promotes awareness and actions needed for achieving the Seven SFDRR Goals, one per year, over seven years. It involves national and local governments, community groups, civil society organizations, the private sector, international organizations and the UN family to promote good practice internationally, regionally and nationally and in various sectors, to reduce disaster risk and losses.

The campaign, now in its fifth year focuses on SFDRR Targets (a) 2016 :Target (a): Reduced Global Disaster Mortality b) 2017 Target (b): Reduced Number of People Affected by Disasters Globally by 2030; c) 2018:Target (c): Reduce Direct Disaster Economic Loss; d) 2019:Target (d): Substantially Reduce Disaster Damage to Critical Infrastructure and Disruption of Basic Services; e) 2020 Target (e): Substantially Increase the Number of Countries with National and Local Disaster Risk Reduction Strategies by

2020; f) 2021: Target (f): Substantially Enhance International Cooperation to Developing Countries; g) 2022 :Target (g): Substantially Increase the Availability and Access to MHEWS and Disaster Risk Information and Assessments.

The Campaign has evocatively supported awareness and action on the targets and showcased good practice in different parts of the world.

The MCR campaign's first phase (2010-2015) 'From awareness to implementation and beyond', was valued by partners and participating cities. Post SFDRR, it focused on implementation support, city-to-city learning/cooperation, local action planning, progress monitoring, advocacy for widespread local government action and national government support to cities implementing SFDRR locally. Cities are seeking capacity development in strategic planning, effective implementation of risk-informed urban development and finance for resilience; engaging multi-sectoral, multi-stakeholder communities, vulnerable populations, private sector; using nature-based resilience solutions; and reducing climate risks through actions.

The MCR campaign will continue well beyond 2020, supporting local governments in strengthening disaster and climate resilience locally to achieve SFDRR, the New Urban Agenda, the Paris Agreement and the SDGs by 2030 with more collaboration among local partners. The inputs from 2018-19 consultations informed its successor: Making Cities Resilient 2030 (MCR2030), shared publicly at the World Urban Forum on 9th February 2020 in Abu Dhabi, United Arab Emirates, with a clear commitment from partners including United Cities and Local Governments (UCLG), ICLEI, World Bank, UN-Habitat, World Council on City Data (WCCD), Global Resilient Cities

Network (Rockefeller Foundation), International Federation of Red Cross and Red Crescent Societies (IFRC) and United Nations Office for Disaster Risk Reduction (UNDRR).

MCR2030's main strategic objectives are increasing: 1) Understanding of risk and commitments to Risk Reduction and Resilience (DRRR), 2) Capacities to plan for DRRR, 3) Capacities to implement DRRR actions. A cross-cutting objective is to increase vertical links with national governments and horizontal links amongst local partners, mainstreaming resilience throughout and between partners, functions and services, and foster city-to-city partnerships and sharing of experience.

Since SFDRR, two more Global Assessment Reports (GARs) were published in 2017 and 2019. GAR 2022 is being planned.

GAR Atlas 2017 "Unveiling Global Disaster Risk" presented risk associated with hazards (earthquakes, tsunamis, riverine flooding, cyclonic winds and storm surge) observed globally with a national level of resolution. Using the same methodology, arithmetic and exposure model for all hazards, GAR Atlas provided globally comparable multi-hazard risk metrics, enabling risk comparisons between countries and regions, enabling estimation of order-of-magnitude of probable losses country-wise, and from different hazards.

GAR 2019 updated progress on implementing SFDRR outcome, goal, targets and priorities and disaster-related SDGs. It analysed changing risk science, explored managing systemic risk and presented innovative practice for pursuing risk-informed SD.

GAR 2022 will focus on how worsening social inequalities and potentially irreversible ecosystem damage are increasing systemic risks, cover how to assess them, focusing

on vulnerability and exposure within and between systems and approaches to prevent creation of systemic risk, limit their propagation or mitigate consequences when realised, how risk perception drives decision-making and how to live more comfortably with uncertainty. GAR 2022 will enable increasing coherence and integration across the aligned intergovernmental agendas.

Conclusion

As Mami Mizutori, Secretary-General and Special Representative for DRR since 2018 said, "I doubt that any of us, when we rang in the new year on 1st January, 2020, had any sense we were ringing in a disaster, the scale of which the world has not seen. We have witnessed the darkest and brightest of hours, with selflessness on a grand display in thousands of health workers braving the frontlines. The world is paying the full price now after years of ignoring warnings about the need for improved pandemic preparedness, while pointing out those biological hazards were included in SFDRR at the insistence of Member States, following earlier disease outbreaks including Ebola, SARS and H1N1. COVID-19 will not be the last such "black swan" event, and is a reminder that the greatest single driver of disaster risk is weak governance and lack of leadership, and that scenario planning, risk profiling and mapping, and effective risk governance need to be achieved. It's time now to walk the talk."

Not only must we pay attention to health risks and outbreaks, but we must take an overall integrated approach to sustainability and resilience, focusing on addressing the SDGs, the Paris Agreement and the SFDRR and other global commitments in an integrated manner. We are in a new era, with bold visions, and special challenges, and we need to address them in an integrated manner. ■

Tsunami Preparedness in the Indian Ocean Continues to Progress



With enthusiastic responses from 21 Member States of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS), the Capacity Assessment of Tsunami Preparedness Status Report 2018 highlighted considerable progress across all components of the IOTWMS, including the operational tsunami service framework in the Indian Ocean comprising of three Tsunami Service Providers (Australia, India, Indonesia) and National Tsunami Warning Centres of 25 Member States.

Substantive progress has also been made in developing risk assessment guidelines, enhancing monitoring networks, organizing biennial tsunami drills and creating

public awareness material. Tsunami response capacities continue to be enhanced through regional capacity development workshops focused on the development of tsunami evacuation maps, plans and standard operating procedures, as well as the recent piloting of the Tsunami Ready community recognition programme.

Nonetheless, the IOTWMS is not a static system but must improve, evolve and adapt to serve the needs of its Member States. In this context, the 2018 assessment identified capacity gaps and future support requirements in the broad areas of a) policies, plans and guidelines; b) risk assessment and reduction; c) detection, warning and

dissemination; and d) awareness preparedness and response. The detailed Capacity Assessment of Tsunami Preparedness Status Report 2018, together with the responses of Member States, as well as a succinct Executive Summary, has been prepared for a wide communication with all stakeholders.

The 2018 assessment was conducted through an online survey more than 13 years after the initial assessment of the state of tsunami preparedness in Indian Ocean countries following the Boxing Day tsunami (IOC/INF-1219), which provided critical inputs to the eventual design and development of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS). ■

51.6 Million People Doubly Hit by Climate-Linked Disasters, COVID-19 - IFRC Report



At least 51.6 million people globally have been affected by floods, droughts or storms and also the ongoing coronavirus pandemic, the International Federation of Red Cross (IFRC) said in a report.

“COVID-19 is directly affecting and increasing the needs of persons affected by climate-related disasters,” said the report, which demonstrated the huge scale of combined impacts of climate-related disasters and the pandemic.

The analysis, which quantifies the overlapping vulnerability of communities, showed that out of

132 identified unique extreme weather events that have occurred so far in 2020, 92 have overlapped with the pandemic. The largest impact disasters of this type have occurred in India and Bangladesh with almost 40 million people across the two countries have been affected by both the pandemic and floods or storms.

The analysis also indicated that at least a further 2.3 million people have been affected by major wildfires, and an estimated 437.1 million others in vulnerable groups have been exposed to extreme heat; all while contending with the direct

health impacts of COVID-19 or measures implemented to curb its spread.” The climate crisis has not stopped for Covid-19, and millions of people have suffered from the two crises colliding,” IFRC President Francesco Rocca said. “We have had absolutely no choice but to address both crises simultaneously. COVID-19 has exposed our vulnerabilities like never before and, as our preliminary analysis shows, compounded suffering for millions of people affected by climate-related disasters,” said Julie Arrighi, Climate Advisor with the Red Cross Red Crescent Climate Centre. ■

Melting Antarctic Ice Will Raise Sea Level by 2.5 metres – Even if Paris Climate Goals are Met, Study Finds

Melting of the Antarctic Ice Sheet will cause sea level rises of about two and a half metres around the world, even if the goals of the Paris Agreement are met, research has shown. The melting is likely to take place over a long period, beyond the end of this century, but is almost certain to be irreversible, because of how the ice cap is likely to melt, the new model reveals.

Even if temperatures were to fall again after rising by 2°C (3.6F), the temperature limit set out in the Paris Agreement, the ice would not regrow to its initial state because of self-reinforcing mechanisms that destabilise the ice, according to the paper published in the journal - Nature.

“The more we learn about Antarctica, the direr the predictions become,” said Anders Levermann, co-author of the paper from the Potsdam Institute for Climate Impact Research. “We get enormous sea level rise [from Antarctic melting] even if we keep to the Paris Agreement, and catastrophic amounts if we don’t.” The Antarctic Ice Sheet has existed in roughly its current form for about 34 million years, but its future form will be decided in our lifetimes, according to Levermann. “We will be renowned in future as the people who flooded New York City,” he told the Guardian. Temperatures of more than 2°C were recorded for the first time in the Antarctic earlier this year. Jonathan Bamber, a professor of glaciology at the University of Bristol, who was not involved with the research, said:



“This study provides compelling evidence that even moderate climate warming has incredibly serious consequences for humanity, and those consequences grow exponentially as the temperature rises. The committed sea-level rise from Antarctica even at 2°C represents an existential threat to entire nation-states. We’re looking at removing nations from the map of the world because they no longer exist.” Earlier this week, the earth’s northern ice cap also showed the impacts of the climate crisis. Arctic sea ice reached its annual minimum, at the second-lowest extent seen in four decades. On September 15, 2020, the ice was measured at 3.74m sq km, which marked only the second time that the extent has fallen below 4m sq

km in the current record, according to the US National Snow and Ice Data Center.

Scientists said the melting ice was a stark sign of how humans are changing the planet. Twila Moon, a research scientist at the University of Colorado at Boulder, said: “It’s devastating to see yet another Arctic summer end with very less sea ice. Not only is there a very small area of sea ice, but it is also younger and more vulnerable overall. The Arctic is a changed place. All hope rests on humans to act on climate and slow this alarming pace of ice loss.” While the Antarctic Ice Sheet will take centuries to melt in response to temperature rises, the new Nature paper showed how difficult it would be to reverse. ■

Indigenous Knowledge and Resilience in a COVID-19 World

It is increasingly clear that human health and our relationship with nature are inescapably intertwined. This holds true across many dimensions of health, including the potential for the transmission of disease – just as we are seeing with the current COVID-19 pandemic. While the exact origins of COVID-19 have not yet been confirmed, the link between environmental damage and pandemics is well known; as highlighted by leading research organizations and even the UN Secretary-General. But there is yet another group of experts who have been worrying about the threat of a pandemic even before COVID-19: indigenous peoples. Thanks to their traditional knowledge and their relationship with the natural world, they have long known that the degradation of the environment has the potential to unleash diseases. As we fight the spread of the pandemic, it is more important than ever to safeguard these peoples and their knowledge.

Indigenous Peoples' Unique Role

Indigenous peoples across the world play a unique and valuable role in sustainably managing a significant share of the world's lands and ecosystems. Their territories are home to 80 per cent of the world's biodiversity – and indeed, safeguarding nature is a fundamental part of their cultures. It is therefore not surprising that environmental outcomes are far better in territories collectively controlled by indigenous peoples. For example, in the Brazilian Amazon, the rate of deforestation in indigenous peoples' territories is less than 10 per cent of the rates throughout the rest of the region.



Indigenous peoples can teach us much about how to rebalance our relationship with nature and reduce the risk of future pandemics. But their communities already face a host of challenges, and the unfortunate present reality is that the effects of the COVID-19 pandemic are worsening these challenges further still.

In some places, the pandemic is even contributing to violations of indigenous peoples' rights to land and territories, as well as increasing local conflicts.

"Amidst the COVID-19 outbreak, indigenous peoples are facing threats [including] encroachment of their traditional territories during lockdown [and] security forces misusing lockdown rules to oppress and crackdown indigenous rights defenders," says Mai Thin Yu Mon, Program Director for the Indigenous Peoples Development Program of the Chin Human Rights Organization. "All these human rights violations have made indigenous peoples more vulnerable during the pandemic."

Resilience in Challenging Times

At the same time, indigenous peoples have been using their traditional knowledge and practices to find solutions to the challenges the pandemic brings them. As they have done for centuries, their communities continue to adapt to change while maintaining their cultures and traditions. In Brazil, for example, the Juruna people had been providing culturally appropriate school meals for local children – and now that schools are closed, they are delivering food for free to vulnerable members of their community. In Colombia, the Calicanto Indigenous Association and the Inga community are mitigating the restrictions on movement by organizing the distribution of their harvests based on families' exact locations. These examples, as well as other traditional practices of solidarity – including ways of organizing, such as mingas (also known as faenas), ayni and manovuelta – display the reciprocity and mutualism with which these peoples safeguard the food security of their community members. These

traditions practised widely amongst many different indigenous peoples' communities, are key to these communities' resilience and ability to maintain their traditional cultures while adapting to the restrictions brought about by the pandemic.

Indigenous peoples' communities are also strengthening their efforts to protect their livelihoods and traditional ways of life in the face of the pandemic. The Asia Indigenous Peoples Pact, for example, has been leading a platform called the "Response and Communication Network on COVID-19" that shares information and recommendations in dealing with the crisis. Similarly, in Peru, indigenous peoples' organizations

have published guidelines to assist native communities in managing the COVID-19 health crisis.

Working with Indigenous Peoples in a Post-COVID World

The COVID-19 pandemic shows us that we need to rethink the way we interact with nature, as well as the ways we produce and consume food: our unsustainable agricultural practices, such as encroaching on forests and other sources of biodiversity, are precisely what has brought us into closer contact with the virus that causes COVID-19. Indigenous peoples have long warned of the consequences of exactly these kinds of practices.

And IFAD has long recognized them as key partners in achieving the Sustainable Development Goals and moving towards a more resilient future.

In this time of crisis, their communities need our help to protect them from the effects of the pandemic – both the direct health impacts and the knock-on socio-economic impacts. As we work together to craft a global response to COVID-19, it will be crucial to support these communities' initiatives to respond to the crisis and preserve their traditions. They deserve our support – and we need indigenous peoples and their unique knowledge to build a better, brighter post-COVID-19 world. ■

Scientists Use the Indian Ocean Earthquake Data to Tell How Fast it is Warming

Scientists have developed a novel method to determine how fast the Indian Ocean is warming by analysing the sound from seabed earthquakes, an advance that may lead to a relatively low-cost technique to monitor water temperatures in all of the oceans. According to the researchers, including those from the California Institute of Technology (Caltech) in the US, as much as 95 per cent of the extra heat trapped on the Earth by greenhouse gases like carbon dioxide is held in the world's oceans; making it vital to monitor the temperature of ocean waters.

In the current study published in the journal - Science, the scientists used existing seismic monitoring equipment as well as historic data on earthquakes to determine how much the temperature of the ocean has altered and continues changing, even at depths that are normally out

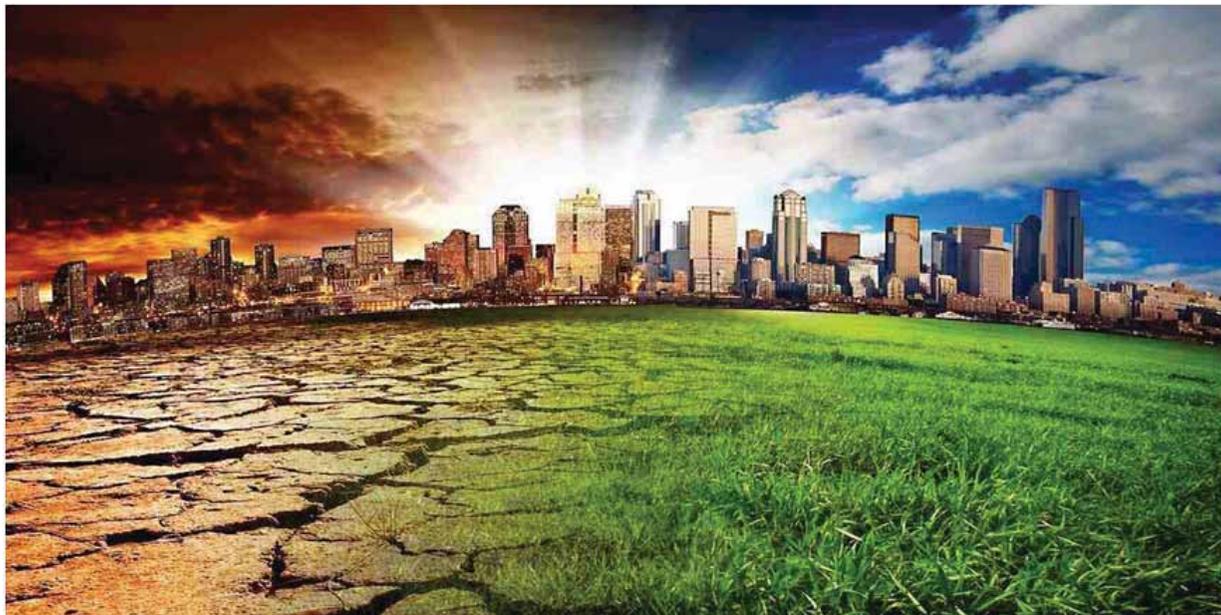


of the reach of conventional tools. They assessed a 3000-kilometre-long section in the equatorial East Indian Ocean, and found temperature fluctuations between 2005 and 2016, with a decadal warming trend that "substantially exceeds previous estimates."

"The ocean is the main reservoir of energy in the climate system, and

the deep ocean, in particular, is important to monitor," he added. Since undersea earthquakes happen all over the world, the researchers said the system can be developed to monitor water temperatures in all of the oceans using existing infrastructure and equipment at a relatively low-cost. ■

World Risk Index (WRI) 2020 Released



Released annually since 2011, World Risk Index (WRI) indicates which countries are in the greatest need to strengthen measures for coping with and adapting to extreme natural events. It is calculated on a country-by-country basis, through the multiplication of exposure and vulnerability and describes the disaster risk for various countries and regions.

It is part of the World Risk Report 2020 released by the United Nations University Institute for Environment and Human Security (UNU-EHS), Bundnis Entwicklung Hilft and the University of Stuttgart in Germany. Among continents, Oceania is at the highest risk, followed by Africa and the Americas.

Oceania: Small island States, especially in the South Pacific and the Caribbean, are disproportionately represented among high-risk countries. Vanuatu (South Pacific Ocean) is the country with the highest disaster risk worldwide. It is followed by Tonga (South Pacific Ocean) and Dominica (Caribbean Sea). They are at a high exposure to extreme natural events which

include the rise in sea level as a result of global warming. The small island States have limited financial resources and have made small contributions to climate change, but are affected the most by its consequences. They are needed to be compensated for the climate damage and losses already incurred. Merely providing financial resources for adaptation to climate change is not sufficient.

Africa: It has been identified as a hotspot of vulnerability. More than two-thirds of the most vulnerable countries in the world are located on the continent. The size of semiarid regions in Africa is expected to increase, with over half of Africa's land area vulnerable to desertification. Large areas of Africa are marginalized and already under significant financial stress. The Central African Republic is the most vulnerable country, followed by Chad, the Democratic Republic of Congo, Niger and Guinea-Bissau.

South Asia and India: India has ranked 89th among 181 countries on the WRI 2020 and is fourth-

most-at-risk in South Asia, after Bangladesh, Afghanistan and Pakistan. Sri Lanka, Bhutan and the Maldives have fared better than India in their abilities to cope with extreme disasters. India also lags behind these three neighbours in terms of lack of adaptive capacities or the preparedness to deal with extreme events.

A comparison with the WRI 2019 shows that all South Asian countries have slipped on their ability to adapt to the reality of climate emergency. Countries with a score above 52.73, are 'very poor' in their adaptive capacities for extreme natural disasters. India has also slipped on strengthening adaptive capacities which are concerning as it highlights the inability of systems, institutions, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. It becomes more important given that India's first-ever comprehensive climate change assessment report highlighted the impacts of the climate crisis. ■

Google Expands AI-driven Flood Forecast to all of India and Bangladesh

For several years, the Google Flood Forecasting Initiative has been working with governments to develop systems that predict when and where flooding will occur and keep people safe and informed. As floods wreak havoc in South Asian countries, Google said it is expanding its Artificial Intelligence (AI)-powered flood forecasting to all of India and Bangladesh to provide greater details on timing and water depths in alerts in nine new local languages. Google launched a new forecasting model that will allow it to double the lead time of many of its alerts providing more notice to governments in India and Bangladesh and giving tens of millions of people an extra day or so to prepare.

For several years, the Google Flood Forecasting Initiative has been working with governments to develop systems that predict when and where flooding will occur and keep people safe and informed. The Company said it has been expanding its forecasting models and services in partnership with the Indian Central Water Commission. "In June, just in time for the



monsoon season, we reached an important milestone: our systems now extend to the whole of India, with Google technology being used to improve the targeting of every alert the government sends," the Company said in a blog post. It means more than 200 million people across more than 250,000 square kilometres can be benefitted. "To date, we've sent out around 30 million notifications to people in flood-affected areas," in India, Google said.

In addition to expanding in India, said Google, it has partnered with

the Bangladesh Water Development Board to bring their warnings and services to that country. "We currently cover more than 40 million people in Bangladesh, and we're working to extend this to the whole country," the Company said. In addition to improving its alerts, Google.org has started a collaboration with the International Federation of Red Cross and Red Crescent Societies. "This partnership aims to build local networks that can get disaster alert information to people who wouldn't otherwise receive smartphone alerts directly," Google said. ■

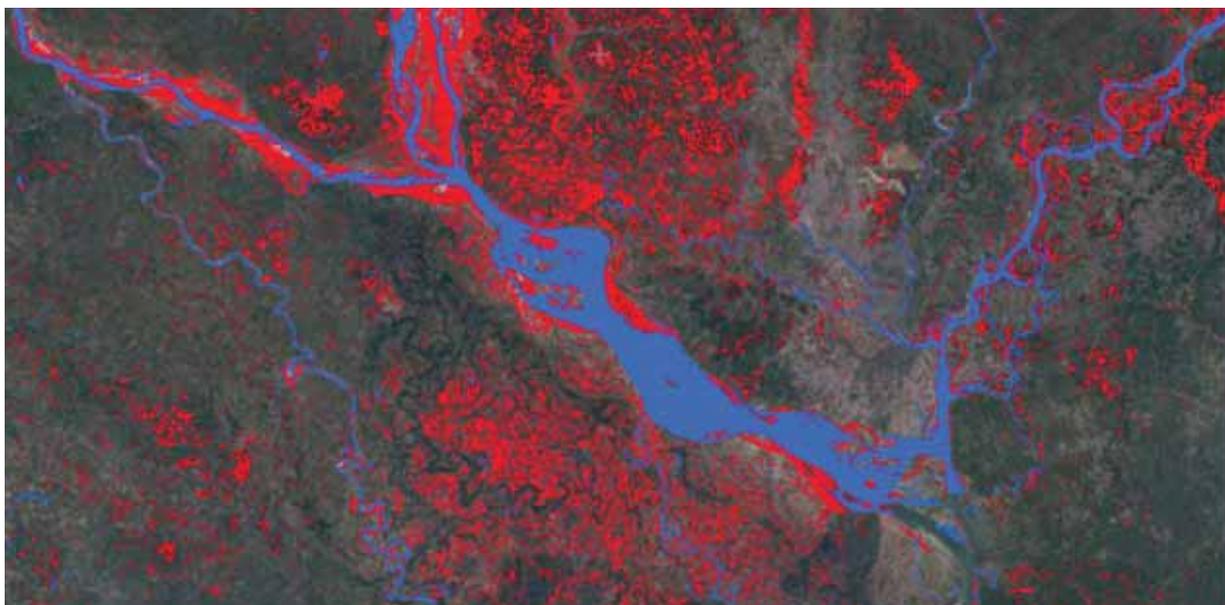
Japan Court Orders Government, TEPCO to Pay for Fukushima Disaster

A Japanese court found the government and the operator of the wrecked Fukushima nuclear plant negligent for failing to take measures to prevent the 2011 nuclear disaster, ordering them to pay some 1 billion yen (\$9.5 million) in damages to thousands of residents for their lost livelihoods. The Sendai High Court found fault with the government in

the meltdowns of three reactors, saying the regulatory agency at the time could have predicted a major tsunami way before the disaster, according to lawyers representing the more than 3,600 plaintiffs. The ruling was a major victory for the plaintiffs and could set a precedent for similar lawsuits pending across the country, according to the plaintiffs' head lawyer,

Izutarō Managi. So far, 13 lower court decisions were divided over government responsibility in the disaster. The Court also ordered the government and the plant's operator, Tokyo Electric Power Co., to pay damages to the plaintiffs, doubling the amount that a lower court had ordered TEPCO to pay in 2017. ■

UNOSAT Introduces AI in its Flood Rapid Mapping Operations for the Benefit of National Disaster Management Authorities



Over the summer, UNOSAT introduced an Artificial Intelligence (AI) based method in its operational emergency mapping service by reducing the process to a fraction of the time normally needed.

Thanks to its extensive experience in rapid mapping, UNOSAT has collected a vast library of historical flood datasets, which are extremely useful to develop machine learning-based methods. By using AI, satellite-based analysis and related mapping are completed in considerably less time. The process is almost fully automated. This not only informs the decision-making process to help optimize the disaster response, but it also has the potential to significantly reduce the loss of life and mitigate structural damage, particularly in the context of humanitarian operations, thus

supporting both national authorities and international emergency management organizations for the benefit of local populations.

During the past year, UNOSAT's team, in collaboration with Wuhan University and UN Global Pulse, trained machines extensively to process satellite images and detect water much more rapidly in comparison to semi-automatic methods. With this new approach, radar images from the European Space Agency (ESA) [1] are automatically downloaded, orthorectified and processed by UNOSAT's AI model to output disaster maps, with limited need for human intervention.

In recent months, UNOSAT's Rapid Mapping Service has been monitoring the situation related to seasonal rains and potential

floods in the Asia-Pacific region with a particular focus on countries potentially affected by the southwest monsoon season that runs from June to September 2020. In this context, we ran the AI algorithm for the first time in July 2020 for operations in Bangladesh.

UNOCHA, in close coordination with other UN entities and the Bangladesh authorities, contacted UNOSAT on July 13, 2020, to assess the needs after monsoon rains flooded a large part of the country, in particular along the Brahmaputra River and in the northeastern parts of the country in the Sylhet district. To respond to this activation, UNOSAT decided to trigger the International Charter: Space and Major Disasters, and apply both automated and semi-automated analysis methods. ■

Scientists Using Machine Learning and Satellite Imagery to Map Poverty

Locating people living in poverty, such as through door-to-door surveys is sometimes difficult. Therefore, scientists are now turning to satellite images. In a study published in the US journal *Science*, researchers from the Stanford University used machine learning - the science of designing computer algorithms that learn from data - to extract information about poverty from high-resolution satellite imagery, Xinhua news agency reported.

They found the newly developed approach was able to "make fairly accurate predictions" of impoverished areas across five African countries: Nigeria, Tanzania, Uganda, Malawi, and Rwanda. "Our method, which requires only publicly available data, could transform efforts to track and target poverty in developing countries," the researchers said in their paper.

According to World Bank data from 2000 to 2010, 39 out of 59 African countries conducted less than two surveys, from which nationally-representative poverty measures could be constructed.

Overall, surveys are costly, infrequent, and cannot always reach countries or regions within countries, for instance, due to armed conflict. Recent studies showed that satellite data capturing nightlights can be used to predict wealth in a given area. However, nightlight data alone is not effective at differentiating between regions at the bottom end of the income distribution, where satellite images appear uniformly dark.

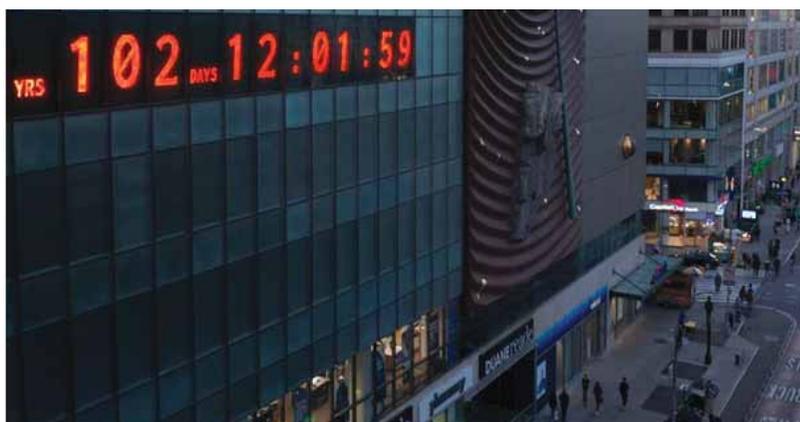
To circumvent this problem, the new study turned its attention to daylight imagery, which offers higher resolution and can capture features such as paved roads and metal roofs, markers that can

help distinguish poor and ultra-poor regions. The researchers then developed a sophisticated learning algorithm that categorises these features and found that this method did a surprisingly good job predicting the distribution of poverty. Compared with nightlight models, the new model was 81 per cent more accurate in predicting poverty in regions under the poverty line, and 99 per cent more accurate in areas that are two times below the poverty line. "We demonstrate an accurate, inexpensive, and scalable method for estimating consumption expenditure and asset wealth from high-resolution satellite imagery," the study said. "It also demonstrates how powerful machine learning techniques can be applied in a setting with limited training data, suggesting broad potential application across many scientific domains." ■

Clock in New York Counts Down the Time Remaining to Avert Climate Disaster

The installation began its countdown on September 17, 2020, with seven years, 103 days, 15 hours, 40 minutes and seven seconds. A giant clock in New York City used to tell the time, but now it will tell you how much time the world has left to stop the devastating damage of climate change.

In honour of Climate Week, a coalition of scientists and activists reset the digital clock with red numbers seen on the side of a building in Union Square and changed it into a "Climate Clock." The numbers now count down the years, days, hours, minutes and seconds the Earth has left to take action to stop global warming from going over 1.5°C more than the pre-industrial levels.



According to the organization, who aims to put the countdown clock in cities across the world, the clock's calculation is based on the world's current rates of emissions and the amount of CO2 that can still

be released into the atmosphere. The clock simply counts down to when the carbon budget runs out. If the world manages to lower its emissions, more time will be left on the clock. ■

Using Techniques Learnt in Astrophysics, Researchers Can Now Forecast Drought up to Ten Weeks Ahead



Researchers at the University of Sussex have developed a system which can accurately predict a period of drought in East Africa up to ten weeks ahead.

Satellite imagery is already used in Kenya to monitor the state of pastures and determine the health of the vegetation using a metric known as the Vegetation Condition Index. These are conveyed to decision-makers in arid and semi-

arid regions of Kenya through drought early warning systems.

However, these systems, operated by the National Drought Management Authority (NDMA), only allows organisations and communities to intervene when the impacts of drought have already occurred. By that point, such extreme weather would already have had a devastating effect on the livelihood of local people.

Instead, a team of researchers from the University of Sussex and the NDMA have developed a new system called Astrocast. Part-funded by the Science and Technology Facilities Council, the project allows humanitarian agencies and drought risk managers to be proactive when it comes to dealing with the impacts of extreme weather by forecasting changes before they occur.

In a research paper published in Remote Sensing of the Environment, they explain how an interdisciplinary team of data scientists (astronomers and mathematicians) along with geographers, used techniques from astronomy science; processing data directly from space telescopes before using advance statistical methods to forecast extreme weather. ■

Yes, Climate Change has Almost Certainly Fuelled California's Massive Fires

Thousands of lightning strikes have sparked hundreds of fires across California in recent days, producing several major clusters burning around the San Francisco Bay Area. The blazes quickly ripped through hundreds of thousands of acres, forcing thousands to evacuate, filling the skies with smoke, and raining down ash across much of the region.

The fires followed a bone-dry winter in Northern California and a stretch of record-setting summer heatwaves across the State; conditions that effectively turned grasslands and forests into tinder. The infernos come on the heels of

several of the most destructive and deadly fire seasons in California history; all of which raises the question, once again: Is human-driven climate change to blame? Did it make the latest fires more likely or more severe? Climate scientists, who long resisted linking global warming to any specific extreme event now say its influence is all but certain.

But so-called extreme weather attribution studies have clearly and repeatedly found that climate change exacerbates heat waves, which help create the conditions for wildfires to burn intensely and spread rapidly.

"The answer is always that climate change plays a large role in the severity or likelihood [of heat waves]," he says. Over the last four decades, the combined forces of higher temperatures and lower precipitation levels have already doubled the risk of extreme wildfire conditions in California during the fall, according to a recent paper in Environmental Research Letters that Swain co-authored. And unless the world begins cutting emissions significantly and soon, the odds could double again in the coming decades, the researchers found. ■

India Disaster

New Landslide Zones Activated on Char Dham Road: Experts

Experts have warned that new landslide zones have been activated in the ecologically-sensitive areas in Uttarakhand since work began on the construction of the 900km Char Dham road four years ago for all-weather connectivity to four Hindu pilgrimage centres of Kedarnath, Badrinath, Gangotri and Yamunotri. The experts have said the project, which will facilitate the rapid movement of armed forces to areas adjoining India's border with China, would destabilise the fragile mountainous ecosystem.

Geologist Navin Juyal said earlier there were one or two landslide locations on the highway stretch from Rishikesh to Chamba, over 560-km away, but they have now



increased significantly. "Kunjapuri has become a chronic landslide spot, which is a new zone that has been created due to road widening. In Alaknanda Valley, Saknidhar is another chronic landslide zone. As we keep moving upwards in

the valleys, the landslide zones keep increasing," said Juyal, who is also a member of the Supreme Court-appointed High-Powered Committee (HPC) formed last year to review the environmental impact of the project. ■

1950 Assam Quake Sets Trend?

If Wesnousky is right, the Arc may be ready to rupture in multiple locations, which could result in a series of great earthquakes similar to a recent earthquake sequence in Alaska where damaging earthquakes occurred in 1906, 1946, 1957, 1964 and 1965.

The 1950 magnitude -8.7 earthquake in Assam on August 15 may have begun a similar sequence

in the Himalayas, says Wesnousky. The quake was destructive in both Assam and Tibet, killing 4,800 people. It was also notable for the loud noises reported throughout the region.

"Sufficient stress has been accumulating in the Himalayas along the Main Himalayan Thrust for years," Wesnousky adds. He says this pent-up stress could

produce a sequence of megathrust earthquakes, with multiple events greater than magnitude 8.5 (M8.5).

Warrants Deeper Research

"As horrible as it sounds, we should expect a great magnitude 8.5 (or larger) megathrust earthquakes to occur again in the Himalayas," says Roland Burgmann, Professor, University of California, Berkeley, who was not part of this study. But Roger Bilham, a research scientist at the University of Colorado, Boulder, US, says that weakness in studies like Wesnousky's is that available data only record one large earthquake. Researchers may want to see the paleoseismic record extended back 10,000 years — multiple earthquake cycles — at each location to determine the intervals between great quakes. ■



Not very far another big earthquake in the Himalaya region

For some ranges, the time is past; for others, it could be 1,000 years from now, says a new study. The next big quakes along the Himalayan Ranges should happen approximately 500 to 1,000 years after the most recent event at each location.

Quoting Steven Wesnousky, a paleoseismologist at the University of Nevada, Akash Kharita of IIT-Roorkee writes that the finding is based on a study of earthquake data at 30 sites along the Himalayan Arc. Build quake-resistant infra Wesnousky's study has been published in the *Seismological Research Letters*. "When will (these earthquakes) occur? No one can tell exactly," says he. However, damage can be minimised by building quake-resistant infrastructure and drawing up emergency response plans.

1950 Assam Quake Sets Trend?

If Wesnousky is right, the Arc may be ready to rupture in multiple locations, which could result in a series of great earthquakes similar to a recent earthquake sequence in Alaska where damaging



earthquakes occurred in 1906, 1946, 1957, 1964 and 1965.

The 1950 magnitude -8.7 earthquake in Assam on August 15 may have begun a similar sequence in the Himalayas, says Wesnousky. The quake was destructive in both Assam and Tibet, killing 4,800 people. It was also notable for the loud noises reported throughout the region.

"Sufficient stress has been accumulating in the Himalayas along the Main Himalayan Thrust for years," Wesnousky adds. He says this pent-up stress could produce a sequence of megathrust earthquakes, with multiple events greater than magnitude 8.5 (M8.5).

Warrants Deeper Research

"As horrible as it sounds, we should expect a great magnitude 8.5 (or larger) megathrust earthquakes to occur again in the Himalayas," says Roland Burgmann, Professor, University of California, Berkeley, who was not part of this study. But Roger Bilham, a research scientist at the University of Colorado, Boulder, US, says that weakness in studies like Wesnousky's is that available data only record one large earthquake. Researchers may want to see the paleoseismic record extended back 10,000 years — multiple earthquake cycles — at each location to determine the intervals between great quakes. ■

Centre's Rs 460 Crore Cyclone Risk Mitigation Plan for Maharashtra

Following Cyclone Nisarga hitting the Konkan Region, the Central Government has drafted a Rs 460 Crore National Cyclone Risk Mitigation Project (NCRMP) for the 700 km coastline along Palghar, Thane, Raigad, Ratnagiri and Sindhudurg districts. The Centre

proposes to release Rs 367.8 Crore while the State will have to share Rs 91.72 Crore. It is proposed to construct 11 multi-purpose cyclone shelters, 471 km of underground cabling and 26.26 km of saline embankments. When Nisarga hit the Konkan in the first week of June

2020, 71 lives were lost and 2,391 houses were completely damaged. Total damages were estimated at Rs 1,000 Crore. The NDRF deployed 17 teams and rescued 1,221 persons while evacuating 1,490. ■

300 Million Delta Dwellers Exposed to Cyclones, Flooding

More than 300 million people in low-lying river deltas, mostly in poorer nations, are exposed to flooding from tropical storms made more deadly and destructive by global warming, researchers. One in ten live on floodplains hit by once-a-century cyclones that can generate 350-kilometre (200-mile) per hour winds and up to a meter (40 inches) of rain per day, they reported in *Nature Communications*. Warmer oceans and more moisture in the atmosphere mean these powerful storms may become more frequent, including in regions rarely touched by their terrible power in the past.

Densely populated deltas where rivers meet the sea are especially vulnerable to flooding caused by such warm-weather monsters, which crisscross the world's major oceans in summer and fall. As the reality of climate change sinks in, policymakers must figure out not only how to slow rising temperatures but also prepare for inevitable climate impacts already in the pipeline.

But up to now, the population of the world's cyclone-exposed river deltas was not precisely known, making it difficult to plan ahead. "The big question we are trying to answer is how many people live on river deltas and what is their vulnerability to coastal flooding," lead author Douglas Edmonds, a geomorphologist at Indiana University, told *Agence France-Presse*. To find out, Edmonds and colleagues combed through 2017 data for 2174 deltas across the globe. They calculated that 339 million people lived within their boundaries, all but 10 million of them in developing and least developed countries.



Not Enough Sediment

More than three-quarters reside in only ten river basins, including the Ganges-Brahmaputra, with 105 million people, and the Nile Delta with 45 million. All but a few delta dwellers are potentially in the pathway of tropical storms, with exceptions such as Saint Petersburg, Russia, built at the mouth of the Neva River. Deltas, the researchers discovered, occupy just over 0.5 per cent of Earth's landmass, but are home to nearly five per cent of the planet's human population. "We were surprised to learn that most of the deltas with a large number of people living in the 100-year tropical cyclone floodplain are sediment-starved," Edmond said. That, he added, is very bad news in the face of rising seas and ever bigger storm surges.

"Delta landforms exist at the

coastline because sediment is deposited near the shore," he explained. "When sea level rises, the delta can respond by either shrinking in size or by filling the space with sediment." But much of the silt and sediment that once enriched agricultural land and built up natural defences against ocean tides and surges have been blocked by dams upstream in virtually all major river systems.

"That means natural mitigation through sediment deposition is not possible," Edmond said, noting that the problem is often compounded by subsidence-cities sinking under their own weight and due to depleted water tables. A third of Greater Jakarta, home to 30 million people, could be submerged by 2050, according to experts. The only option left to combat coastal flooding is "hard engineering measures," Edmond added. ■

We are delighted to share a few insightful views received as feedback about the first edition of our magazine from different parts of the world. We take note of these suggestions and will try to ensure that they are incorporated in the forthcoming issues.



Congratulations on an informative publication - a lot of great findings and information in 'Know Disasters'. As we face a future of compound disasters, there has never been a more important time to drive greater understanding of disaster risk, preparedness and resilience. I look forward to future editions and hope we can work together and share learnings between Australia and India soon.

Renae Hanvin

*Founder & Director - corporate2community
Lead in Doing Disasters Differently
Melbourne, Australia.*

The Know Disasters magazine is simply an awesome initiative in terms of building a close association with the non-disaster management professionals and educating them about disasters. It certainly builds a connection with the common man and sensitizes them about disaster events and the measures being taken to limit the impact of disasters at various levels.

Niti Vidyarthi

*Probationary Officer
State Bank of India, Patna.*



Our reader's responses



Thank you for publishing the very informative and fulsome Know Disasters magazine. With multi-layered disasters occurring around the world, understanding our global pandemic from a variety of perspectives as is shown in your August-September edition is appreciated. It adds greatly to the growing collection of knowledge that those who work in emergency management fields need to respond effectively. Being able to share it online is so important in our global search for solutions for all.

Deb Borsos

*Trainer & Consultant - Community Recovery
Columbia Basin Trust - Non Profit Advisors Program
Columbia Basin, British Columbia, Canada.*

Congrats! The magazine is quite comprehensive with a wide range of topics written by leading experts. Few quick reflections:

- (a) It will be good to have some Q&A sessions covered by interviewing experts or lead personalities so it becomes lively
- (b) Invite some photos from the field that we can also make a strong case
- (c) Sharing DRR-related experiences as of now, the focus is a bit on the response side
- (d) If available, include disaster-related statistics for the period
- (e) Snapshot of key events organized, or upcoming ones
- (f) Similar to humanitarian experiences from the field, it will be good to have some experiences from the field related to DRR/Resilience
- (g) Snapshot of some recent global or national publications, including any book review.

Best wishes for your upcoming publication.



Jaiganesh Murugesan

*Disaster Risk Management
Specialist/ TA Coordinator -
Consultant
Asian Development Bank (ADB),
Pyi Taw, Myanmar.*



The first edition of Know Disasters magazine deeply enlightens about the close linkages between disaster management and COVID-19. In a simplified language, this edition gave me a profound understanding of the importance of bringing close coordination and integration of efforts between the pandemic and disaster management.

*Neha Tiwary
Homemaker
Ranchi, Jharkhand.*



GFDR

GLOBAL FORUM FOR
DISASTER REDUCTION

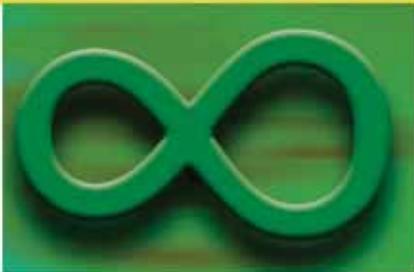
Global Vision, Local Action



**GLOBAL FORUM
FOR
DISASTER REDUCTION
Since 2005**



GFDR Secretariat: 1-Akbar Villa, Near Old State Bank, Marol Maroshi Road, Andheri (E),
Mumbai-400 059, India Phone: +91 22 2925 3086, Fax: +91 22 2925 5279.
Email: connect@gfdr.org www.gfdr.org.



towards resilient risk reduction...

WORLD'S **1st**
FORENSIC
SCIENCES
UNIVERSITY

GFSU



Gujarat Forensic
Sciences University
Knowledge | Wisdom | Fulfilment

NAAC ACCREDITED 'A' GRADE

Education through Investigation

World's first and only university dedicated to Forensic and Allied Sciences

Established by the Government of Gujarat
and recognized by UGC with
NAAC Accredited "A" Grade.

Gujarat Forensic Sciences University (GFSU) provides highly specialised courses in forensic and allied sciences to fill the acute shortage in the country and the world, and to strengthen the criminal justice delivery system, thus helping to make the world a better and safer place.

SPECIAL FEATURES

- Notified by the State Government as "Centre of Excellence"
- Notified by the State Government as "Institute of Strategic or Security Related Interest."
- "Centre of Excellence" for Narcotic Drugs and Psychotropic Substances granted by Ministry of Home Affairs, Government of India
- State of the Art Cyber Defence Centre
- Asia's first Ballistics Research Centre and Testing Range (ISO 9001:2015 Certified)
- International Centre for Humanitarian Forensics
- International Student Exchange Program
- Centrally Air-conditioned ICT-enabled Classrooms, Auditoriums and Rich Resource Centre
- On Campus Hostel Facilities for Girls and Boys with Mess Facilities
- Highly secured campus having Wi-Fi connectivity with CAT 7A Network
- Hi-tech green campus with excellent infrastructure
- Certified under Clause (ii) of Sub Section (1) of Section 35 of Income Tax Act 1961 entitling the donor Institution of 150% rebate in Tax Liabilities for Promoting Research Activities.

Contact

Gujarat Forensic Sciences University, Sector 9, Gandhinagar - 382007, Gujarat, India. Tel: +91 79 2397 7103/102 Email: registrar@gfsu.edu.in Website: www.gfsu.edu.in