CARE for South Asia

Climate Adaptation and Resilience for South Asia Project

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The CARE for South Asia project is a partnership between ADPC, RIMES, and the World Bank to support informed decision-making for protecting development gains in South Asia

Dear Readers,

Imagine you open a water tap in your kitchen and it starts to pump air… or nothing! A quick fix for the majority of people in urban areas would be to refill their water tanks, but if wells in rural areas run dry, farmers are not able to water their crops; there may be a long journey involved in finding the next fresh, clean water source.

Almost all freshwater in the world is groundwater; we use it for drinking, washing, growing food, industry, construction, and manufacturing. Globally, South Asia is the most extensive user of groundwater resources, with irrigation accounting for 80 percent of groundwater extraction. However, even though the region hosts several of the high groundwater-producing aquifers, it is running short of water.

In the 4th issue of the CARE for South Asia newsletter, refresh your knowledge of the key problems and priorities laid out in the Intergovernmental Panel on Climate Change's (IPCC) recent cycle of assessment reports through our exclusive interview with Dr. Hoesung Lee, IPCC Chair. Be sure to fill up on the significance of groundwater and its link to disaster and climate risks in our expert discussions with Mr. Hans Guttman, Executive Director of ADPC, and Dr. SK. Subramanian, former Group Director at Indian Space Research Organisation (ISRO).

Next, learn about the many ways that climate change and Integrated Water Resources Management (IWRM) impact our daily lives: from inclusive water governance for transboundary rivers to tracking delta investments in Bangladesh.

Be sure not to miss the various innovations and initiatives being implemented and supported by the CARE for South Asia project, such as portable water dams and open-data platforms to assess the right amount of water required by different communities in the region.

We are excited to share new additions to our 'Cli-Fi' and 'Breaking the Jargon' sections, which blur the lines between fantasy and reality in one instance and give clear answers to the questions you may have about climate change terminologies.

We plan to bring you more exciting stories in the future, so do please watch this space.

For contributions and feedback, please contact:

Vidya Rana
Senior Communications Manager, ADPC
nusrat.rana@adpc.net

In This Issue

A water well in Kathmandu, Nepal
Cover photo by jakubtravelphoto / Shutterstock.com

Lead Story

Interview with *Dr. Hoesung Lee*

Dr. Hoesung Lee is Chair of the Intergovernmental Panel on Climate Change (IPCC).

ADPC recently held an exclusive 'Climate Talks' discussion with this esteemed expert on IPCC's 6th Assessment Cycle Reports, which range from physical evidence, adaptation and vulnerability, to mitigation of climate change impacts. Watch the full interview here.

The question to lower-income countries would be: 'How much adaptation is possible?'

Dr. Hoesung Lee, IPCC Chair (left) talking with Vidya Rana, Senior Communications Manager, ADPC (right)

You set out on this cycle of reports with the objective of highlighting the consequences of climate change and offering ways to help prevent it. Have you succeeded in reaching those goals so far?

First of all, we need to be realistic about what we have achieved and what we wish to achieve. Our studies and assessments have clearly indicated that we are not on track to limit warming by 1.5 degrees Celsius. Emissions are now at their highest in human history, and cumulative emissions expected from the existing infrastructure, mostly electricity production, are way over the cumulative emissions permissible to limit warming.

Secondly, to limit warming to 1.5 degrees, global emissions must peak before 2025 and then reduce to about 43 percent of this amount by 2030, relative to 2019 levels. If we want to limit warming to 2 degrees Celsius, then by 2030, the rate of reduction should be about 27%. But in both cases, net zero has to be achieved by mid-century for 1.5 and the 2070s for 2 degrees.

These modeled scenarios imply that carbon dioxide removal will be unavoidable to achieve net zero. This is to counter the emissions from the hard-to-eliminate sectors such as aviation, agriculture and some industrial processes. We are in a phase of both challenge and opportunities.

This third report highlights the pressing issues that need to be considered while combating climate change. What are the main points that you would like to underline, which require action?

Energy must be transformed from its current carbon-intensive structure to low carbon-footprint structures, which means that, by 2050, we must be able to achieve net zero emissions globally. That implies that a very fast reduction of annual emissions, by close to 7 percent per year, is needed. This is a necessary pathway that we must embrace to achieve climate stabilization.

You have been the Chair of IPCC for the past 7 years; would it be true to say that collaboration between the authors and contributors is now at its optimum and the message has never been stronger?

Optimum is maybe difficult to define, especially when it deals with the collaboration between the different scientific disciplines, but I want to say this: Though it is always a challenge to sustain an effective interdisciplinary approach, I found that authors working on the IPCC assessments found a great deal of enthusiasm for the intellectual synergies in this atmosphere and framework of assessing vast literatures.

They indicated a strong desire to understand the horizon as well as the big picture, and we do have a variety of successful examples of such inter-disciplinary approaches. Our assessment reports contain examples of cross-chapter boxes or cross-working group boxes; examples include biodiversity over matters related to economics.

I found that collaboration was coming from among the authors, to improve the integrated natures of these climate change problems and solutions.

If we look back at the 26th Conference of the Parties (COP26) in Glasgow, it was dubbed the 'Conference of Adaptation' and you have been a great advocate of creating coherence between mitigation and adaptation. How is IPCC trying to enhance the understanding of their costs and benefits, especially in the context of development?

Adaptation, mitigation, and development are very closely interrelated. Development provides the capacity for adaptation and mitigation, and in turn, adaptation contributes to development, which further provides the capacity for mitigation.

Adaptation costs will be higher when global warming is higher. The best enabler of adaptation is mitigation. Many ecosystem-friendly adaptation measures will be possible only when global warming stays below a certain level. There is a slight difference between adaptation and mitigation benefits – adaptation benefits can mostly be captured locally, whereas mitigation benefits are globally shared with only some local benefits.

Therefore, action means how one can make infrastructure decisions and investments to increase resilience against climate extremes and rising global temperatures, increasing the speed of transformation towards net zero. This requires long-term planning and finance roadmaps, and this will only be possible with very strong public and private sector partnerships.

For lower-income countries, would you agree that interactions between nature, climate, and humans also require interactions between mitigation and adaptation?

They apply regardless of income classes. Therefore, the question to lower-income countries would be: 'how much adaptation is possible?' given the requirements for countries to accomplish so many other things.

Here I want to emphasize that adaptation is a part of, and a very important element of, a development portfolio. Constraints for adaptation are really the availability of finance.

If we have a development strategy on the basis of 'business as usual' climate, then that development will never deliver the desired development goal. Adaptation, especially in lower-income countries, requires financial assistance from various sources as a way of not only having effective adaptation, but also of achieving development goals.

A number of countries have made pledges to reach net zero and lower emissions, especially through their energy sectors. The world is trying to recover from a pandemic at the same time and there is an energy crisis in Europe. What does that mean for the commitments of those countries?

Well, that's a very important question. We need to differentiate between the systemic and transient changes. We have observed rising and fluctuating oil and gas prices for the last two decades and CO2 intensity and content has decreased globally. For the last 10 years, it has decreased 0.3 percent annually and the energy intensity per unit of GDP produced has also declined.

These two important elements – carbon intensity and energy intensity – declined regardless of fluctuating oil and gas prices. Two years ago, oil prices dropped to about US $40 per barrel and people talked about the demand peaking.

I think the recent incident revealed the vulnerability ingrained in current energy systems, in terms of energy security and global supply chains surrounding the energy supply structure. Current incidents will obviously cause, in my understanding, a systemic change toward a reduced supply chain and more localized production. Now these changes will be in line with net zero transformation pathways, which means more renewable energy use and more technologies to reduce carbon footprints.

The impact of current incidents on systems and behavioral changes will turn out to be a blip in the journey towards net zero, and recent changes will only reinforce the reason for achieving net zero as soon as possible.

Moving forward, how do you see the role of bioenergy in the context of meeting our climate goals? And, what are some of the challenges in terms of land use and food security, as well as any other challenges or considerations we should be thinking of?

The biggest challenge for bioenergy is sustainability. When scaled up, there is great concern about how such a strategy will collide with the scarcity of land and water. It will also collide with the desire to preserve biodiversity. Biotechnology itself has an

ingrained risk, and sustainability issues arise from its scaling and cost. When we look at bioenergy, we need to look at the specific choice from the nexus of energy, water, and land.

Considering the economics of climate change and given the vast population of Asia, is the single biggest hurdle in establishing effective sustainable adaptation measures the funding of these measures?

Funding is the critical element of every activity, regardless of adaptation or mitigation, especially for countries in Asia. A great deal of climate impacts will be expected to appear in this region in a number of sectoral analyses. Therefore, it is very important that the public and private sources of capital are mobilized for this region, and I believe that multilateral development banks will have a greater role to play to help with its adaptation funding.

If we are looking for signs of progress in dealing with climate issues, would you say that the advances in technology are offering positive opportunities across sectoral mitigation development?

Definitely, yes. There are generally two types of energy policies – the first one would be so-called 'technology push' policies such as R&D support and support for training and development, and there are also 'demand pull' policies such as technical standards and taxes. The purpose of those 'demand pull' policies are to create incentives and market opportunities.

Also, an important element is the transfer of such technologies to the lower-income countries so that those countries will be able to apply them for better adaptation and mitigation activities. Technology development has a positive spillover both for domestic and international economies, so it's a good strategy for the development program as well.

Specifically, this Working Group III Report highlights the importance of digital technologies in contributing to the mitigation of climate change; especially when accompanied by dematerialization and smart supply chain management, we should expect a very large dividend of reduced carbon footprints.

Do low-income Asian countries have the economic and technological capacity to fulfill the requirements of the IPCC?

IPCC only provides the available options and actions that countries should consider when they develop climate-related policies. I'm sure our report will be beneficial to our member Governments' decision-making towards a better climate domestically as well as globally. Adaptation, as I said before, is a very important element for domestic development strategies.

Our Report contains a great deal of technical, economic, and environmental elements which can facilitate very appropriate decision-making processes for our member Governments. I hope our report will be beneficial and useful to decision-makers around the world.

Your next report will be a synthesis of this recent cycle of reports, but presumably you're already planning the next cycle. What can we expect to be your areas of focus?

First, the 6th Assessment Cycle clearly indicates that this increasing trend of urbanization generates both a challenge in terms of mitigating climate change as well as adaptation, but also opportunities. A lot more scientific assessments need to be undertaken about this increasing trend of urbanization in terms of climate change actions and developing strategies.

Second will be a better understanding of the regional information and the decisions being made by local and sub-national governments, which all require very detailed information about climate extremes and other matters related to climate changes and their abilities. Therefore, the general direction will require a further understanding of climate issues.

During the flooding season, boats become the only means of transport in the Kosi River Basin in places within the embankments (Photo: Manoj Kumar Singh / Gorakhpur News Line)

Perspective

Living with the River: *Going with the Flow of the Kosi*

By Malavika Thirukode and Manvi Tripathi

The Kosi is a transboundary river that springs from the Himalayan slopes of Tibet and flows through the Northern Himalayan region. The Kosi River Basin covers 74,500km^2 and drains into the river Ganga through numerous channels, eventually passing through Bangladesh to the sea in the Bay of Bengal.

The basin supports the lives and livelihoods of 40 million people, more than 80 percent of whom depend on agriculture for food and employment. Now, concern is growing that climate change is disrupting the basin's ecology and will seriously damage millions of lives.

The basin has already faced repeated disasters including landslides, floods, and glacial lake outbursts that have devastated downstream communities. In 2020, some 9.6 million people in the Kosi River Basin, reeling from the Covid-19 pandemic, were inundated by monsoon flooding in Nepal, India, and Bangladesh.

There is a growing need for citizen-centered approaches to water governance and transboundary cooperation. In this article, we call for a more inclusive paradigm of water governance, guided by the needs of riparian communities and an ethos of cooperation and conservation, rather than transboundary water politics and ecologically ineffective infrastructure development.

The ecology and climate of the Kosi River Basin

The Kosi Basin illustrates the interconnected effects of climate change and man-made interventions on lives and ecosystems in a transboundary basin. Floods impact agricultural production as fields remain submerged for months.

Growing population density, urbanization, and encroachment on watersheds put additional pressure on the basin's freshwater ecosystems. Water disasters in the basin, triggered or amplified by poorly planned infrastructure, strike communities without regard to international borders.

In 2008, the Kosi breached the man-made embankments that had been built to control and contain it, with grave consequences for 2.64 million people in India and Nepal, taking lives and destroying livelihoods on both sides of the border.

The floods deposited sand and silt on arable lands that left them unfit for cultivation for years. In Nepal, 4,648 hectares of agricultural land were ruined. In Bihar, India's most flood-prone state, the 2008 floods damaged 100,000 hectares of wheat and rice farmland and the livelihoods of around 500,000 farmers.

Communities living along the basin are among the most economically disadvantaged, the most vulnerable to natural disasters, and the least able to adapt and respond to rapid ecosystem degradation.

In India, the Kosi flows through one of the poorest states, Bihar, where a majority of the rural population is dependent on agriculture. In Nepal, 40 percent of the population in the basin lives below the poverty line. While high-profile hydropower projects in the basin have been a development priority, they are yet to improve livelihoods or other socio-economic benefits in the basin, including electricity access.

These socio-economic inequities were echoed in a series of multi-stakeholder dialogues in the basin, organized by community-based NGOs and organizations supported by The Asia Foundation, in which the communities described the challenges they face in the Kosi River Basin.

Development issues persist across the board, from lack of a minimum wage or access to land to inadequate healthcare, sanitation, and education. Male migration from the region has increased in the last decade. Women are particularly affected by the lack of sanitation and freshwater for domestic care work.

Riverine communities are adapting to climate change

In the 1950s, thick embankments were constructed along 150km of the Kosi River to defend against flooding. While farmers had traditionally constructed bandhs—low structures of mud and stones to control flooding and support irrigation—these were intentionally temporary, and although flooding still occurred in rural villages, the large expanses of floodplain slowed the flow of floodwaters and reduced damage to property and livelihoods. The floods nourished agricultural lands in the region.

But beginning as early as colonial times, successive governments built permanent embankments that altered the natural drainage of the basin and cut off the river from its surrounding floodplains. Unlike the traditional bandhs, these embankments often stand some distance from the river, sometimes closer to villages, and completely block the natural drainage of water in the floodplain.

The rationale was to protect farms, livelihoods, and development infrastructure from flood damage, but the effect was often just the opposite. As the Kosi River flows through the Himalayan mountainous regions, it carries with it large amounts of silt that it deposits onto the plains of Nepal and northern India. When traditional irrigation channels that conducted water and silt through the floodplains were subsumed by large embankment projects, it altered this flow, causing unchecked accumulation of sand and silt.

Silt deposition near an embankment at Navbhata, Saharasa, Bihar, India, in the Kosi River Basin (Photo: CC BY 3.0 via Wikipedia)

The embankments were equipped with sluice gates that could be opened or closed to control the flow of water in the main river channel, but disrepair and poor management of the gates have allowed silt to accumulate within the embankments, raising the riverbed and causing water to flow into the villages.

There the floodwaters stagnate, depositing silt and sand that make the land inarable. Families in villages between successive embankments must evacuate to higher ground when waters rise. Often, they are unable to move due to socio-economic reasons and remain excluded from basic government disaster relief.

Multi-stakeholder dialogue on the experience of inundation and flooding in the Kosi River Basin conducted by Gorakhpur Environmental Action Group (Photo: Malavika Thirukode / The Asia Foundation)

Moving from water management to inclusive water governance

Water—its scarcity or abundance—shapes ecosystems and communities. Governments in the Kosi River Basin have pursued a centralized, institutional approach to water governance that has focused on irrigation, flood control embankments, and hydroelectric development.

Experts have observed that inhabitants of the disaster-prone basin live with piecemeal information on environmental risks. Adapting to new extreme-weather scenarios requires regional and subregional support systems, projects, and laws.

What is needed is a citizen-centered approach that involves local communities in managing water resources. When community stakeholders in the basin are involved in resource management, their knowledge of local conditions and familiarity with their own needs create opportunities for more informed, inclusive, and integrated solutions.

The Asia Foundation has partnered with the Gorakhpur Environmental Action Group (GEAG) and the Centre for Policy Research in India, and with ISET–Nepal and Policy Entrepreneurs Inc. in Nepal, to better understand the lives of communities in the basin and their water governance needs. The project has launched multi-stakeholder dialogues and knowledge-sharing initiatives to develop evidence-based water governance mechanisms and transboundary collaborations in the basin. A Transboundary Citizen's Forum has built the capacity of partner organizations to promote community understanding, trust, and collaboration.

Towards transboundary water cooperation

Several mechanisms for cooperation on ecological conservation and resilience already exist. The Sendai Framework for Disaster Risk Reduction 2015–2030 highlights the need for collaborative, regional response mechanisms and revised institutional mandates. The Thimphu Statement on climate change emphasizes regional cooperation, the sharing of best practices, and an integrated approach to climate change in South Asia. Other initiatives include intergovernmental platforms for disaster preparedness and information-sharing support for communities to better anticipate and plan for disasters. Pilot projects are needed to develop local strategies. The time has come to "coexist with the river" rather than opposing its flow.

Malavika Thirukode is a Program Officer and Manvi Tripathi is a former Intern with the Asia Foundation's India-U.S. Triangular Development Partnership (TriDeP). Malavika can be reached at malavika.thirukode@asiafoundation.org. *The views and opinions expressed here are those of the authors, not those of The Asia Foundation.*

This piece was previously published on The Asia Foundation's InAsia blog on March 16, 2022: https://asiafoundation.org/2022/03/16/living-with-the-river-going-with-the-flow-of-the-kosi/

Exploring the Impacts of Climate Change on Groundwater Resources

By Dr. Laxman Sharma

Climate change has brought about increased temperature and shifts in precipitation patterns around the world, impacting the water resources sector. The IPCC's sixth assessment report (AR6) highlights that changes in extremes have been observed, causing extreme weather events such as heatwaves, heavy precipitation, droughts, and tropical cyclones due to global warming.

Continued global warming is projected to further intensify the global water cycle, spreading its variability, global monsoon precipitation pattern, and the severity of wet and dry events, impacting availability of water resources and their management throughout the world. Groundwater is an important component of the freshwater regime for agriculture, drinking water supplies, and sustaining ecosystems. It modulates the temperature and baseflow of rivers, lakes and wetlands; regulates exchanges of nutrients and minerals; and prevents land subsidence and seawater intrusion. Groundwater, often unseen and neglected, holds immense promise in our adaptation to climate change and needs to be judiciously managed.

According to the United Nations World Water Development Report 2022 (UNWWDR 2022), which uses 2017 data, the global rates for withdrawal of freshwater exceeds 3,881 km^3 per year, with groundwater contributing about a quarter of the total withdrawal. Estimates show that about 959 km^3 (959 trillion liters) of groundwater were withdrawn in 2017, out of which 69 percent was for agriculture, 22 percent for domestic and 9 percent for industrial use.

Groundwater is important, for agriculture – food production and security, while domestic use, though smaller in volume, is critical for survival. Almost 50 percent of the global urban population depends on groundwater as the primary source for drinking water and its societal importance far outweighs the volume of extraction.

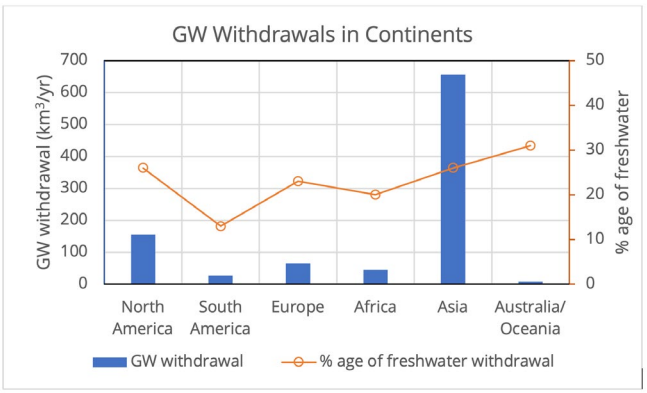


Figure 1: Groundwater Withdrawal Volumes and Its Share in Freshwater Withdrawal in the Continents (Data from UNWWDR, 2022)

Asia withdraws the highest volume of freshwater: 2,505 km^3 every year, of which 657 km^3 is groundwater. This represents about 69 percent of the total world groundwater extraction. These figures are large for Asia, due to its large population and water-intensive agricultural practices in the region. Groundwater withdrawal in South Asia alone is about 401 km^3 per year. Groundwater is a spread resource, available where there is an aquifer and providing direct access to consumers. It is generally of a high quality, and is not directly impacted by rainfall variability. It is also less polluted than surface water. This poses opportunities for exploitation as well as constraints in the management of this valuable resource.

Figure 2: Diesel Pumping Set Extracting Water from a Shallow Tube Well for the Paddy Crop on the Outskirts of Dhaka, Bangladesh (Photo: Dr. Niladri Gupta, 2022)

Water resources management, on a broad scale, requires information on future water availability and requirements of a finer temporal and spatial

resolution, to decide on new projects as well as on the operation and maintenance of existing systems. The existing and future needs and demands are both affected by climate change at the river-basin and local scales. It is certain that the future demands on groundwater and reliance on this resource will increase due to the increasing uncertainty of surface water. Surface water is directly impacted by climate change and its ushering in of extreme events, more intense rainfall and floods, along with extended periods of drought which create water stresses. This will potentially increase the rates of groundwater extraction, lowering water tables of already-stressed aquifers.

The direct impacts of climate change on groundwater is still the subject of research. The recharge of aquifers takes place via widespread "evaporation-surplus" rain as well as express recharge pathways such as leakage from rivers, ephemeral streams, wetlands, or lakes. Groundwater systems respond at a slower pace to climate change than surface-water systems. Rising temperature reduces water available for infiltration by evaporating more water from the surface, soil profile, and even, shallow aquifers, enhancing soil salinity and raising the temperature of shallow groundwater, with possible repercussions on the physio-chemical properties of water.

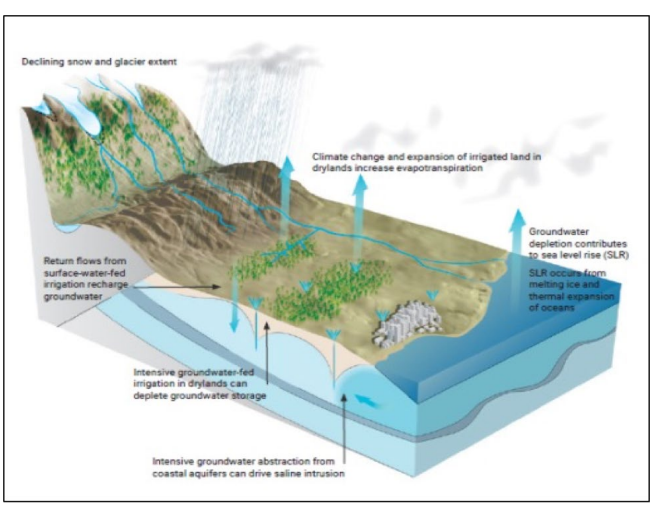


Figure 3: Conceptual Representation of Key Interactions between Groundwater and Climate (Taylor et al., 2013)

Variabilities in rainfall affect groundwater differently. It is commonly believed that in humid areas, intense rainfall of a shorter duration limits the time available for infiltration; top soil remains saturated during precipitation and a higher portion of rainfall is partitioned into runoff, thus reducing groundwater recharge.

Variations in aquifer recharge not only change the aquifer yield or discharge, they can also modify the groundwater flow network; e.g. gaining streams may suddenly become losing streams, groundwater divides may change position. It should be noted that the effect of climate change on groundwater is often impacted by indirect effects, introduced by anthropogenic choices in response to adapting to climate change.

In mountainous areas, snow and glacier melt generally dominate mountain hydrology. Groundwater contribution to runoff can be significant during the spring and the dry season, providing a perennial or seasonal groundwater supply to mountainous springs and ecosystems. Melting snow, permafrost and glaciers provide a steady water supply for infiltration in the near future, while the distant future could face water scarcity due to the absence of these storages of water. Climate change impacts are often blamed for a reduction in the flow - or even the drying-up - of springs in Nepal, as well as in Sikkim, in the Eastern Himalayas; but these could be complicated by anthropogenic reasons including land use changes.

The alteration of groundwater quality due to over-extraction or polluted runoff including contaminants from fertilizers, pesticides, herbicides or municipal wastes such as pharmaceuticals and personal care products (PPCPs), perfluoroalkyl and polyfluoroalkyl substances (PFAs) and even sewage leakages, are all issues that need to be strictly controlled and managed to assure the sustainability of this vital resource. It should be understood that climate change's effects on groundwater are amplified by our actions. The net effect of climate change on groundwater depends not only on changing climatic conditions but also on the physical characteristics of a region, human actions and management decisions.

Sound groundwater management actions need to be implemented to better safeguard this vital resource and enhance our adaptive capabilities, with a better understanding of the impacts of climate change and human interventions on groundwater. The CARE for South Asia project is carrying out the scoping study on impact of climate change on groundwater resource in Nepal in to better understand the ground realities and the necessity for planning ahead.

The writer is Water Resources Management Specialist in Nepal at ADPC, and can be reached at:
✉ laxman.sharma@adpc.net

Tracking Delta Investment in Bangladesh: *The First Step Through the Eighth Five Year Plan*

by Adil Hassan

The Government of Bangladesh published the Eighth Five Year Plan (8FYP) in December 2020 and formulated strategic directions for the period running from 2021-2025. The 8FYP provides essential guidance on initiating the implementation of the Bangladesh Delta Plan 2100 (BDP 2100), from 2021 onwards. The vision of the government, towards building a climate-resilient delta, is well-reflected in this 8FYP. The present article reflects how the 8FYP addresses investment in the Integrated Water Resources Management (IWRM) sector, and makes an attempt to track delta development progress.

Delta management in Bangladesh is water-centric; this is why almost all sectors in the country are somehow linked with the water sector in the context of IWRM. The 8FYP allocates an investment of US$ 21.7 billion in 2021 for 47 new projects. The line ministries or sectors assigned for implementation of these projects are: the Ministry of Water Resources (MoWR), Local Government Division (LGD), Ministry of Agriculture (MoA), Bangladesh Inland Water Transport Authority, Ministry of Fisheries and Livestock, Ministry of Disaster Management and Relief, and Ministry of Environment, Forest and Climate Change (MoEFCC). More than 50 percent of the total investment plan of the 8FYP is allocated to MoWR, as it is the lead ministry to deal with water resources.

Agriculture, which includes subsectors of fisheries and livestock, is the governing sector in IWRM in Bangladesh. This sector accounts for more than 87 percent of total freshwater withdrawal in the country according to the World Bank. MoWR provides essential implementation support to this sector. In the 8FYP, the Annual Development Plan (ADP) allocation for MoWR varies within a range of 65-79 percent of total investment in each fiscal year. Thus, the role and responsibilities of MoWR in resource development for the agriculture sector as well as in delta development is substantially significant.

Climate change, on the other hand, is a serious threat to the investment plan and sustainability of the delta here. According to Germanwatch, Bangladesh ranks 13th and 7th in the Climate Risk Index (CRI) in 2000 and 2019 respectively. It is evident from the CRIs that Bangladesh has been one of the most climate vulnerable countries in the last two decades, and will remain so in future. As is the case in other national plans, the investments planned and made in the 8FYP will take a considerable toll on climate change.

Considering the investment plans outlined in the 8FYP, inputs to the agriculture sector, and the adverse impact of climate change, there is likely to be a substantial challenge to keep the current rate of development growth and meet the goals of the BDP 2100. To equip the government with adequate capacities for investment tracking and performance evaluation, the 6FYP first introduced the concept of Results-Based Monitoring and Evaluation (RBM&E) and suggested its implementation across the ministries and different sectors.

The traditional system of monitoring physical and financial progresses of projects will no longer support the government to measure the effectiveness of any plan or implementation effort. The 8FYP provides a strong commitment to introducing and implementing the RBM&E system across different sectors, and for all programs and sub-programs which will be implemented under the BDP 2100. The 8FYP proposes a list of 104 indicators which are distributed among

15 top-priority areas at national and sectoral levels. Development goals of these indicators are aligned with the SDGs and the national Perspective Plan 2021-2041 (PP 2041) in addition to the BDP 2100.

The suggested institutional setup of the BDP 2100 is also addressed in the 8FYP with essential requirements for capacity-building. As the General Economic Division (GED) under the Bangladesh Planning Commission (BPC) is the responsible agency for the M&E of mid- and long-term plans like the BDP 2100, the institutional setup Delta Wing has been placed at GED, and includes other appropriate stakeholders. According to the 8FYP, the capacity-building actions for Delta Wing include, but are not limited to the following.

- Establish a Delta Fund at GED to support financing for the delta programs
- Improve current O&M practices for the ministries involved in implementation of the delta plan programs
- Strengthen implementation capacities of the line agencies such as BWDB, WARPO and MoWR
- Establish a decentralized water management system by connecting and integrating local water management bodies
- Establish a solid foundation for the delta knowledge bank
- Develop an RBM&E system for monitoring and performance evaluation

The Delta Knowledge Bank and the M&E system are integral to the accomplishment of the specific goals of BDP 2100. The 8FYP recommends a multi-stakeholder consultative approach for the design of a delta plan level M&E system, with technical inputs from different knowledge partners in the country in the area of IWRM. Additionally, the plan sets a target for preparing a draft M&E proposal by the end of the first 18 months of the 8FYP, implementing the M&E system within the next 30 months, and preparing the first M&E report for approval by the government by the beginning of the 5th year of the plan.

The Climate Adaptation and Resilience for South Asia (CARE for South Asia) project plans to contribute to the development of the intended M&E system for the BDP 2100 by providing essential technical assistance to the GED and other nominated stakeholders, and by following the targets set forth in the 8FYP. It is expected that with the delta level M&E in place, the 8FYP will have a solid foundation for performance monitoring and evaluation to support maximum utilization of the investments made, and be able to bring about a transformational change in the delta management capacity of the government.

NB: All figures mentioned in this article, except otherwise explicitly referenced, are taken from the 8FYP document.

The writer is Water Resources Management Specialist in Bangladesh at ADPC and can be reached at:
✉ adil.foisal@adpc.net

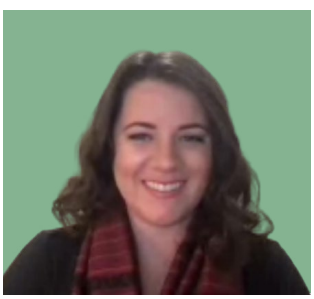

Guava farmers trading at a floating guava market in Bhimruli, Jhalokathi, Bangladesh
(Photo by Insight-Photography/Shutterstock.com)

Equal Space: *Addressing Gender Gaps with Geospatial Information Systems (GIS)*

It's worth repeating over and over again that women are affected by disasters disproportionately. Quantifying and visualizing gender inequality is still difficult due to various reasons.

ADPC held a 'Climate Talks' panel discussion on International Women's Day to discuss the role of geospatial technologies such as the Gender Equality Monitoring (GEM) Tool in tracking the progress of gender equality and attempt to identify some of the gaps that exist in making this progress in the Lower Mekong region and determine best practices in South Asia.

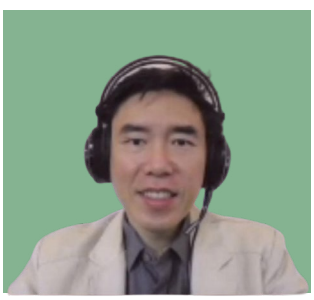
Read below some of the key quotes from the panel discussion and watch the full episode here.



Amanda Markert
Regional Science Coordination Lead for SERVIR-Mekong, NASA

With geospatial technologies and using NASA Earth observation data, we can help identify areas that people at-risk of climate-related threats and environmental injustices are located.

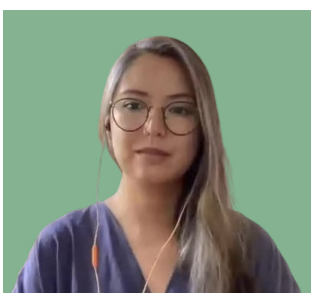
Identifying these risks is very helpful to ensure that everyone is able to mitigate these impacts and adapt to this changing world.



Dr. Peeranan Towashiraporn
Director, Geospatial Information, ADPC and Chief-of-Party, SERVIR-Mekong

We know that gender and social inclusion gaps exist, and we know we want to help reduce these gaps.

That is actually the main purpose of the GEM Tool – it brings together gender data and visualization techniques through interactive maps in a web-based format that is easy to access by users.



Elizabeth Thipphawong
Civil Society Specialist of USAID Mekong for the Future project, WWF Greater Mekong

Being able to access open data would allow civil society organizations to eliminate redundancies in baseline surveys.

This means that we can also, rather duplicating services and information and data collection, we can be building upon other people's work and building diverse datasets.

Bhawana Upadhyay
Senior Specialist, Gender and Inclusion, ADPC

Information on gender statistics should be made available to policymakers to make gender-informed decisions.

If we don't invest in generating such gender analytics and data, then this information would be based off, kind of, thin air!

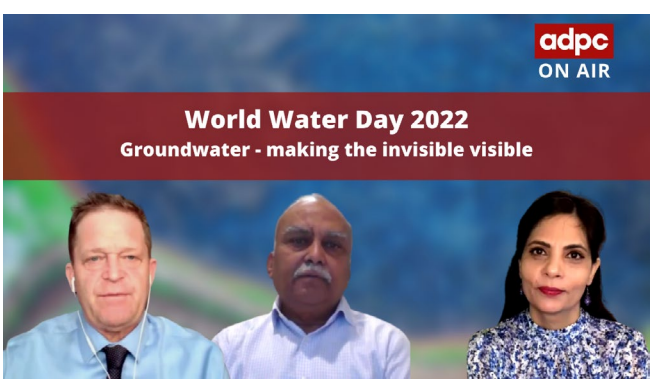
Groundwater – Making the Invisible Visible

ADPC marked World Water Day on 22 March 2022 with a panel discussion on the significance of groundwater and its link to various disaster and climate risks. Watch the full discussion here.

Context

About 70% of groundwater withdrawn is used for agriculture, so now with more than 7.5 billion people on the planet, there is an ever-increasing need for water in agricultural production, domestic use purposes, and industrial development.

To meet this need, groundwater is already being over extracted – leading to the lowering of water tables in some regions. The impacts of groundwater overexploitation are numerous and often irreversible. Ironically, as opposed to surface water such as rivers and streams, our lifeline (which is buried deep in the ground) gets less attention.

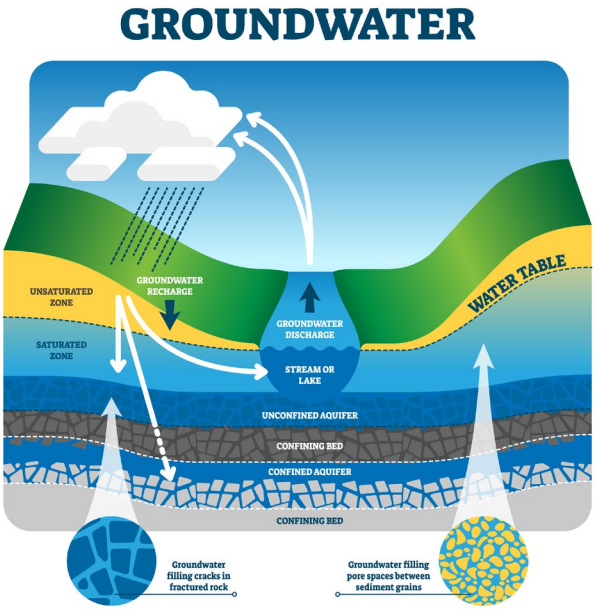


Panelists

- Mr. Hans Guttman, Executive Director, ADPC
- Dr. S.K. Subramanian, retired Group Director, Indian Space Research Organization (ISRO)

Moderator

- Ms. Vidya Rana, Senior Communications Manager, ADPC



Groundwater Illustration
(Photo by VectorMine/Shutterstock.com)

What are the origins of groundwater?

Dr. Subramanian explains that groundwater is distributed and stored in aquifer systems in the Earth (similarly as to how money is deposited into banks). It comes from rainwater, snow melt, surface waters, streams and leaks which flows in between the primary porosity (sedimentary rocks) and secondary porosity (cracks underground caused by volcanic activity).

Depending on factor such as geology and land-form characteristics, aquifers will have different levels of deposit and retention capacities.

Are current groundwater practices in Asia adequate to manage the available resources?

No. The current rate of groundwater extraction in the continent poses a serious long-term risk to food, water and energy security and livelihoods of people in South and Southeast Asian countries according to Dr. Subramaniam.

Excessive pumping and unregulated land-use is causing a decline in available groundwater resources – North India is witnessing an annual decline of 12.5 millimeters, Pakistan's upper Indus is seeing up to 13.5 millimeters, and Bangladesh averages 8-9 millimeters.

Furthermore, if surface water gets polluted then so too does groundwater and water treatment is an expensive and complex procedure. If seawater also intrudes into coastal and alluvial terrains where Asia's major cities are located, then residents will increase their use of rivers as freshwater sources.

How do depleted groundwater levels affect infrastructure and disaster risks?

Mr. Guttman explains that cities like Bangkok, Jakarta and Ho Chi Minh City, which have been subsiding by up to 10 centimeters per year, are more vulnerable to floods and storms. Building may shift, roads will crack and drainage patterns will be altered as the ground sinks – thus creating new and severe floods.

Furthermore, new waterborne diseases and outbreaks can emerge as water patterns shift due to subsidence. Drinking water supplies will also be affected and risk contamination.

Are groundwater-related issues being adequately highlighted in global discussions and international frameworks?

Yes and No. Mr. Guttman notes that it's a difficult issue to rally around and mostly takes centerstage in discussions when there are current problems of contamination or scarcity. The Integrated Drought Management Programme (IMDP) of World Meteorological Organization and Global Water Partnership is one international example and there are several national examples.

All these need to be put into local circumstance contexts. Groundwater management is complex but we cannot ignore it just because it is complex.

What national initiatives can we learn from?

There should be distinct management styles for rural and urban areas according to Dr. Subramanian. ISRO and India's Ministry of Water Resources, River Development and Ganga Rejuvenation prospected groundwater resources and aquifers across the country and developed a high-scale online map.

This map forms the basic input for people researching surface water managements, agriculture, pollution detection, water exploitation according to Dr. Subramanian. Having access to basic information like this is needed to make more sustainable decisions in South Asian countries in the context of climate resilience.

How is ADPC supporting Asia and the Pacific countries in addressing increased water scarcity and drought, and what role does groundwater play in this?

Mr. Guttman explains that ADPC works with different agencies to encourage sustainable groundwater uses in irrigation to build climate resilience. Groundwater is a significant source for crops, and in countries like Pakistan, cropping intensity has doubled over 50 years and wells have increased 10-fold over 30 years until 2000. The country is revisiting its strategies to make groundwater adaptable to local conditions and ADPC is supporting an IWRM approach that brings together relevant government agencies, political leadership and knowledge institutions and other stakeholders.

ADPC also supports the enhancement of decisions support systems available with irrigation departments (most working in Sindh province), is part of the intervention that is developed in a digital groundwater information system for the province, and also supporting the groundwater strategy for drought-affected districts of Sindh with a focus on water demand and supply.

Final thoughts from the panelists

Mr. Guttman recommends that effective enhanced groundwater and aquifer recharge systems need to be run in parallel with other modifications to different river basins and remain a key part in IWRM. The recent development in mapping of groundwater resources through remote sensing and being able to link up different systems and making this information available to many stakeholders is a key area for being able to build the basis for improved management.

Dr. Subramanian suggests that groundwater management solutions need support to upscale them and will be useful at the national level. For example, all of India's groundwater and surface water data is available on India Water Resources Information System (India-WRIS) and this data will form a base for policymakers and planners. An integrated water management approach is also more sustainable to control surface runoff, soil erosion and also flash flooding.

This article is compiled by Zandre Van Straten, Knowledge Management Officer, Risk Governance department, ADPC. He can be contacted at:
✉ Zandre.vanstraten@adpc.net

Cli-Fi

Climate Fiction and Climate Realities

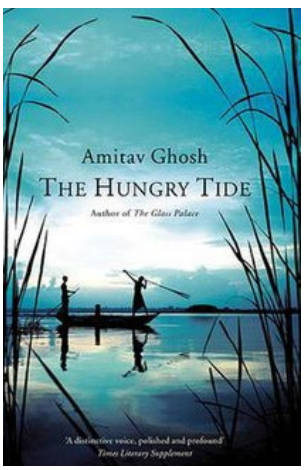
Climate Fiction, popularly abbreviated as 'cli-fi', is a great source of learning about climate change and its potential impacts on humanity

Books:

The Water Knife
by Paolo Bacigalupi (2015)

Blood spills quicker and thicker than water in this dystopic biopunk novel as communities fight and bribe their way to secure access to this precious resource. A dry and drought-stricken Colorado River, being a vital source of water supply in the American Southwest, sparks intense conflict between dependent states. The states then consult the services of 'water knife' mercenaries to cut off and sabotage each other's water supplies, thereby making luxurious private arcology settlements the only means for adaptation and survival.

What laws, policies and mechanisms can we rely on to promote integrated water resources management and transboundary cooperation?



The Hungry Tide
by Amitav Ghosh (2004)

A classic South Asian saga set in Calcutta and the Sundarbans, an archipelago of islands in the Bay of Bengal. This renowned stretch of mangrove forest is currently being shaped by the tides, which can reach more than 100 miles inland. And, by the wilds - from crocodiles to man-eating tigers, other animals rule the land. When a small ship arrives in 2001, to conduct an ecological survey, scientists examine the sociocultural fabric of a land constantly shaped by the 'hungry tide' of water.

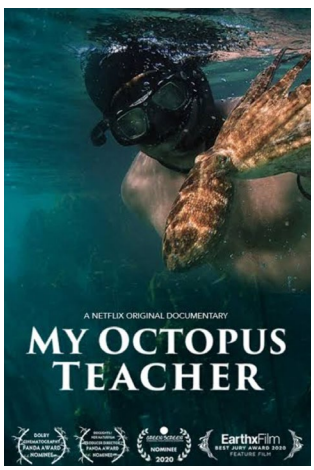
How can we learn from the role water plays in the form of the ocean, in terms of projected climate change?

Movies:

Rango
by Gore Verbinsk (2011)

'Control the water…and you control everything!' are the words that echo throughout this animated story about a dry desolate desert town known as 'Dirt'. Rango, a pet chameleon, becomes Sheriff of Dirt and learns that its residents have to queue up every Wednesday to get water from a single controlled source. But one day the tap runs dry and the town goes into panic; Sheriff Rango starts his investigation. This is a riveting tale about water management, all about saving townsfolk from thirst and thugs by delivering good, old-fashioned justice, Wild West style.

What opportunities and mechanisms exist in your community to promote water management, conservation, and climate resilience?



My Octopus Teacher
by Pippa Ehrlich and James Reed (2021)

A year spent by filmmaker Craig Foster in a South African kelp forest forges an unlikely bond with a wild octopus. The ocean is both wild, moving, and accessible in this narrative, lovingly documentary when he began diving in False Bay. Following various attacks, the octopus follows many stages in the life cycle: conveying the fragility of life, and the tremendous, temporary power of life in the face of inevitable ecological change. This hit 2020 Netflix documentary won best feature at the 93rd Academy Awards.

What lessons can we learn from the oceans to temper our understanding of the great resource and obstacle water can be, as the world changes?

Breaking the Jargon

By Dr. Niladri Gupta

Groundwater:

Groundwater is water that exists underground in saturated zones beneath the land surface. It fills the pores and fractures in underground materials such as sand, gravel, and other rock. A number of terminology associated with groundwater are detailed as below:

Aquifer: An aquifer is an underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials (gravel, sand, or silt). Groundwater is saturated in the aquifer.

Water table: The water table is the upper surface of the zone of saturation or the depth below which the groundwater is saturated.

Lineament: A lineament is a linear or curvilinear feature in a landscape which is an expression of an underlying geological structure such as a fault. Typically, a lineament will appear as a fault-aligned valley, a series of fault or fold-aligned hills, a straight coastline, a river having a linear alignment in a flat terrain. Most lineaments are identified through remote sensing, such as satellite imagery or topographic, gravimetric, and magnetic data. These features are mappable from local to continental scale, and can be utilized in mineral, oil and gas, and groundwater exploration studies.

Groundwater recharge: Groundwater recharge is part of the hydrological cycle though which water from the surface percolates to the sub surface to replenish the supplies. A considerable amount of recharge is done by precipitation and snowmelt and some through rivers, streams and lakes. Recharge can happen naturally as well as artificially.

River Channel Morphology:

River systems move from the source to the mouth of sea through various terrain and each terrain characteristic, water and sediment volume and the method of transportation of the water and sediment characterize the channel morphology in a river system. Based on the channel morphology rivers can be classified as:

Meandering river: These river systems are located on flat terrain that reduces the flow speed of water, allowing the river to curve or "meander". The bends in the river migrate back and forth within the river valley due to differentiation in flow speeds producing areas of erosion and deposition.

Braided river: These river systems consist of a network of river channels separated by temporary islands called braids. Braided morphology occurs in systems which carry high sediment load, having frequent variation of amount of water they carry, high stream gradient and banks which are erodible.

Anastomosing river: An anastomosing river is composed of two or more interconnected channels that enclose floodbasins, though individual channels within the river system can be straight, meandering or braided.

Anabranching river: An anabranching river is defined as a system of multiple channels characterized by vegetated or otherwise stable alluvial islands that divide flows at discharges up to bankfull. They occur generally in a flood-dominated flow regime and banks that are resistant to erosion, with some systems characterized by mechanisms to block or constrict channels, thereby triggering avulsion.

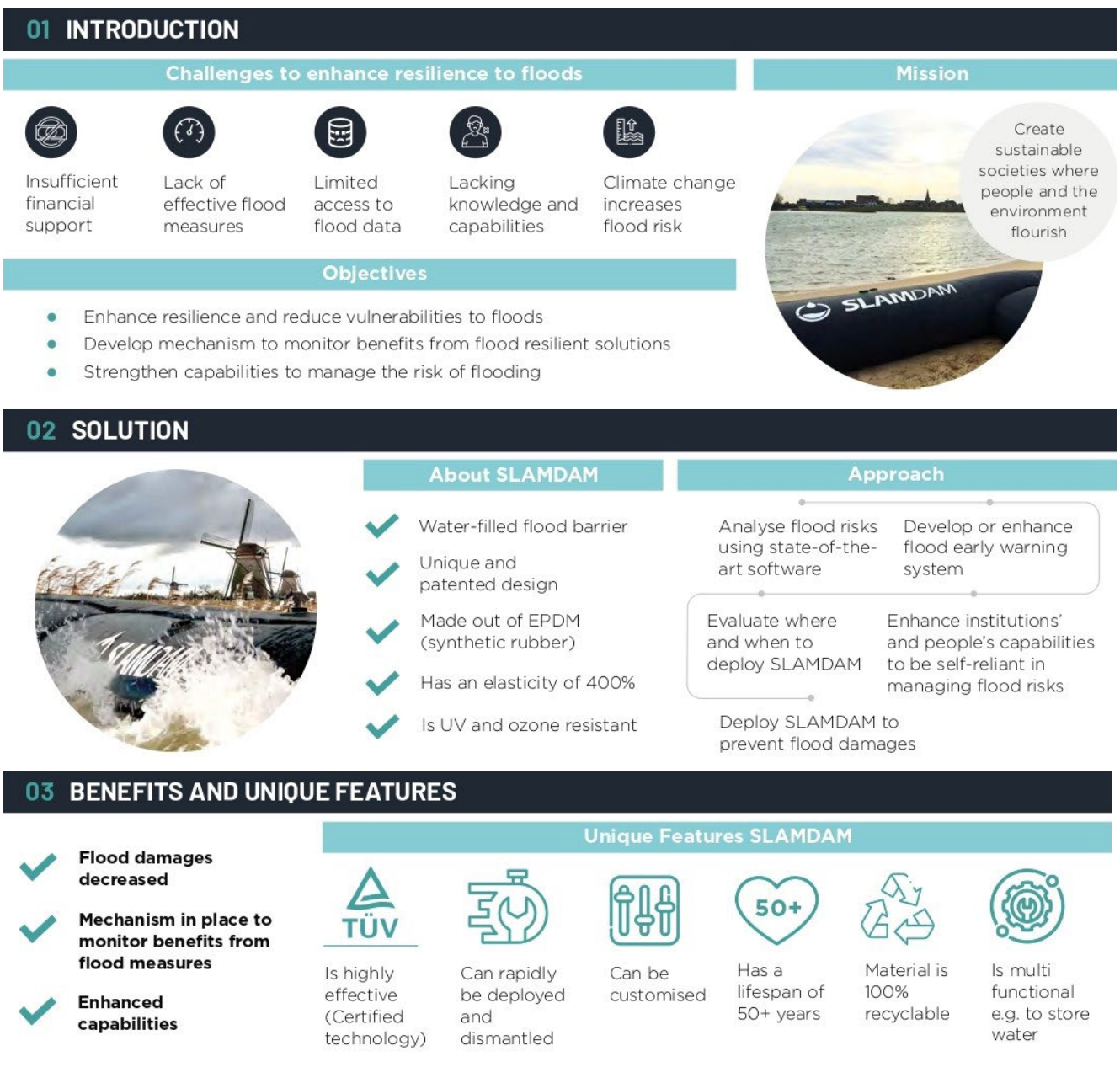
River Avulsion: It is a process by which flow of a river channel is diverted out of an established river channel into a new course on the adjacent floodplain. This process is a primary features of aggrading river floodplains and recurrence timeline can vary from as low as 28 years in River Kosi in India to up to 1400 years for the River Mississippi in United States of America.

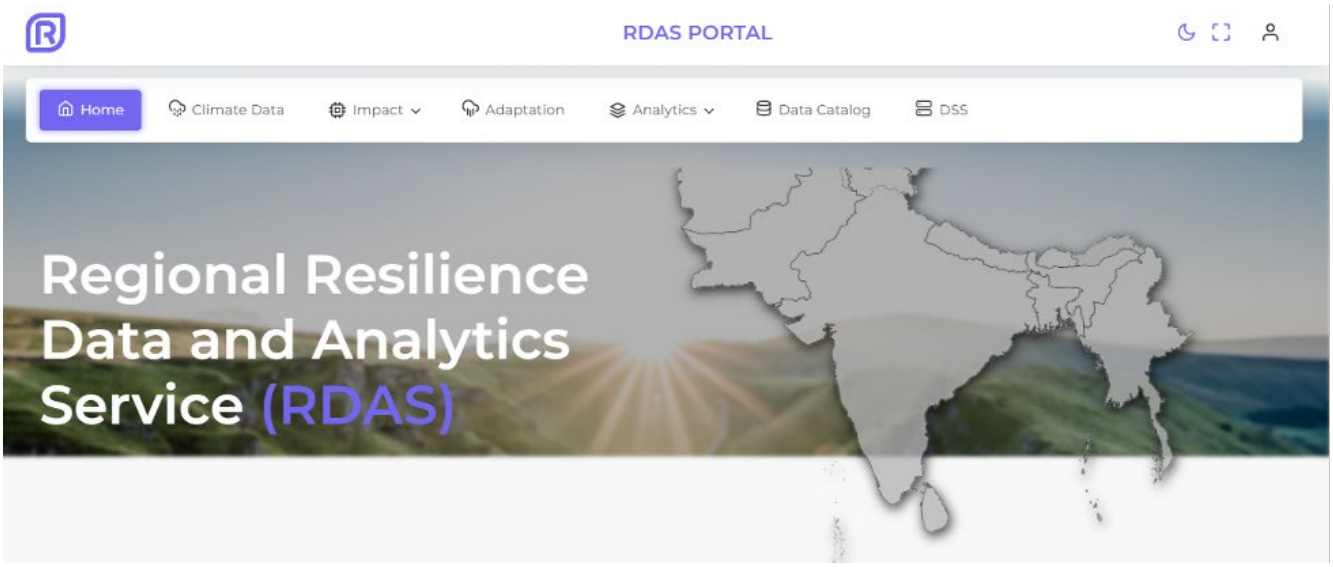
Featured Innovations

Zephyr Consulting Limited will pilot the SLAMDAM-technology, a low-cost hardware technological solution to enhance resilience against floods. The movable water-filled flood barrier, will be deployed in Pakistan where there are flooding risks and therefore improve resilience to flooding risks.

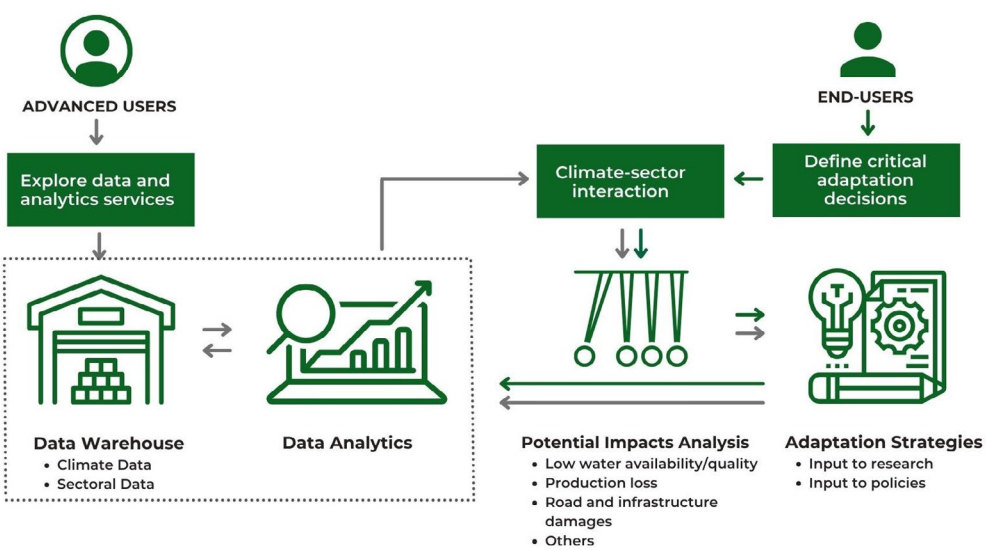
This unique technology is one of the 16 winners of the Climate Innovation Challenge (CIC), which aims to crowdsource innovative and disruptive technology solutions from around the world for resilience in South Asia.

The Program for Asia Resilience to Climate Change, a trust fund administered by the World Bank and funded by the United Kingdom's Foreign, Commonwealth & Development Office (FCDO), has made US$ 3.5 million available to ADPC through the TechEmerge Resilience India and CIC to identify and pilot innovations to reduce climate risk and build climate resilience of communities vulnerable to such risks and extremes. Learn more by clicking here.





The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) launched the prototype of its Regional Resilience Data and Analytics Services (RDAS) in March 2022 under the CARE for South Asia Project. The fully-developed RDAS provides open data and analytics for climate-informing key policies, decisions and investments in climate-sensitive sectors in Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.



Features:

Once completed, it will provide easy access to climate information of different timescales and sectoral data and allow users to select climate and sectoral data and apply different analytics for resilience-geared decisions, policies, and investments.

The RDAS will leverage existing data systems in South Asia, and in its inclusive countries and key sectors. It will also will deploy tools for analysis and interpretation of global and regional climate circulation models. and generate tailor-made and downscaled information for the countries in the region. The RDAS prototype can be accessed via https://rimes-rdas.web.app/

CARE for South Asia Project Updates

Sixteen innovators from around the world have won the Climate Innovation Challenge (CIC) for their disruptive and cutting-edge technologies to build communities' resilience against the threats of climate change in South Asia. The winning innovators will receive the CIC grant funding from a pool of US$2 million, to pilot their solutions in the seven countries of South Asia over a period of 8 months.

ADPC is also organizing a series of webinars on innovation in climate adaptation and resilience (iCARE) to discuss the applicability and sustainability of innovations for enhancing climate resilience in South Asian countries. Seven webinars will be organized on a host of topics throughout 2022. This series will bring together global experts and practitioners on climate adaptation and resilience to share their practical field experiences from other regions. Two webinars have been organized so far on 'Partnership in Innovations for Climate Adaptation and Resilience in South Asia' and 'Scaling Innovations in Climate-Smart Agriculture'.

The Program for Asia Resilience to Climate Change, a trust fund administered by the World Bank and funded by the United Kingdom's Foreign, Commonwealth & Development Office (FCDO), has made US$ 3.5 million available to ADPC to identify and pilot innovations to reduce climate risk and build climate resilience of communities vulnerable to such risks and extremes through the TechEmerge Resilience India Challenge and Climate Innovation Challenge (CIC).

Maps were developed and validated for non-cultivated lands in Punjab province, Pakistan, using satellite images to support their development into green lands. The maps identify water-logged, saline, and desert soils and will be used to support policy developments on food security in the province.

A stakeholder consultation workshop was organized by RIMES in Bangladesh to present the prototype of the decision support system (DSS) for climate-informed plans, decisions, and investments in the country's livestock sector with the Department of Livestock Services. Key DSS features include visualized Upazila-specific weather forecasts, extreme weather alerts, and livestock population statistics revealing hotspot zones for diseases. Feedback and recommendations included adding cyclone warnings for poultry farmers and mobile application development.

Two training events were held by ADPC in Islamabad and Karachi in Pakistan to acquaint over 50 Government officials, civil society organizations, and private sector participants on accessing opportunities through the Green Climate Fund (GCF). GCF is an international fund of the United Nations Framework Convention on Climate Change (UNFCCC) to assist developing countries in adaptation and mitigation practices to counter the effects of climate change.

A national sector focal point workshop was organized in Nepal to discuss progress updates, implementation strategies, and synergies across a variety of critical sectors such as agriculture, water, transport, and planning, policy and finance. The workshop was successful in disseminating the progress of activities and sectoral key priorities of the project for 2022-2025 and seeks to encourage climate-informed plans, decisions, and investments in Nepal.

ADPC organized a workshop on the Hazard, Vulnerability, Risk, and Criticality Assessment (HVRCA) Framework and Method for Roads in Bangladesh was presented to engineers from over 19 districts and Department of Local Infrastructure (DoLI) officials. Two technical reports were also developed on climate change-induced landslide hazard assessments in Rangamati district, Bangladesh, and Bagmati and Madhesh provinces, Nepal, to support road sector strategies.

A webinar was organized by ADPC on 'Climate-resilient Road Infrastructure: Getting the Strategies and Designs Right' to integrate climate change risks into road asset management. Over 50 participants tuned in from across the world to learn about the concept of resilience in the transport sector based on practical evidence, relevant literature, and international best practices.

ADPC organized national dialogues on the Water-Energy-Food (WEF) Nexus in Bangladesh and Nepal to formulate effective and climate-informed approaches. Government officials and international organizations and academic representatives discussed barriers, capacity needs, and climate change impacts on different stakeholders, and how to develop policy and act ambitions into practice in the countries.

A fieldwork survey was conducted on Charna Island (off the coast of Balochistan, Pakistan) to identify pearl oyster beds and the current condition of the marine environment. Survey findings were presented in a validation workshop in Karachi with federal and provincial government officials from Sindh and Balochistan provinces to discuss the potential of pearl farming as an alternative livelihood option for coastal regions.

ADPC signed a joint cooperation agreement with the Pakistan Council of Research in Water Resources (PCRWR) to carry out interventions in the water sector as part of the CARE for South Asia project at a World Water Day celebration organized by PCRWR.

The Climate Adaptation and Resilience (CARE) for South Asia project brings together data, tools, guidelines, and capacity to mainstream climate adaptive measures in the agriculture, water resources management, transport, and finance & planning sectors. It contributes to an enabling environment for climate resilience policies and investments in climate-sensitive sectors in South Asia, initially focusing on interventions in Bangladesh, Nepal and Pakistan.

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Asian Disaster Preparedness Center
SM Tower, 24th Floor 979/66-70 Pahonyothin Road
Phayathai, Bangkok 10400 Thailand
Tel: +66 2 298 0681-92
Fax: +66 2 298 0012
E-mail: adpc@adpc.net
www.adpc.net

Regional Intergrated Multi-Hazard Early Warning System (RIMES)
2nd Fl. Outreach Bldg., AIT Campus, P.O. Box 4
Klong Luang, Pathumthani 12120, Thailand
Tel: +662 516 5900 to 01
Fax: +662 516 5902
E-mail: rimes@rimes.int
www.rimes.int