CARE for South Asia

Climate Adaptation and Resilience for South Asia Project

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INTERVIEW: KAMAL KISHORE, NDMA, INDIA

Climate-smart Agriculture Practices in Bangladesh

Crop Modeling: How it Can Support Climate-smart Agriculture Policies in Pakistan

Enhancing Participation: Women and Resilience in the Face of Climate Change

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,

Climate change is an ever-hungry force that continues to ravage crops and livestock with harrowing rain, intense flooding, strong winds, and thirst-inducing droughts. Without the perseverance, relentlessness, and calculations made by farmers and policymakers to ensure food security, climate change will continue to threaten lives and livelihoods if we don't take urgent action towards sustainable agricultural practices.

In the 3rd issue of the CARE for South Asia newsletter, discover the major hazards threatening farming livelihoods in Bangladesh and what initiatives should be cultivated to promote Climate-smart Agriculture (CSA). Next, explore the role that crop modeling plays in devising new and improved agricultural policies in Pakistan.

Learn about CSA as a whole in the South Asian region through expert opinions the world over, analyze India's efforts to protect livelihoods amidst rising climate uncertainties, and gather extra information on the efforts of India's National Disaster Management Authority (NDMA) in an exclusive interview. Also, don't forget to dive into Pakistan's ambitions to mainstream water availability and increase women's participation in climate action.

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

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

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In This Issue

Cover photo by Jonas Bendiksen

Lead Story

Adapting to Risk: *Climate-smart Agriculture Practices in Bangladesh*

By Dr. Pashupati Chaudhary, Asadul Hoque, and Lalit Dashora

Bangladesh is a country that is highly vulnerable to the impacts of climate change. In fact, the latest Germanwatch report ranks this country seventh globally in the Climate Risk Index for 2000-2019. Each year, its over 164 million people experience frequent and extreme climatic events like river and flash floods, droughts, heatwaves, cold waves, saltwater intrusions, cyclones, and tornados. Such events are life-threatening and damage the country's development aspirations, but the people of Bangladesh are largely considered to be global pioneers in adaptation and resilience initiatives.

The agriculture sector is a national driver of the country's economy, contributing to 41 percent of employment and 14.8 percent of its Gross Domestic Product (GDP). However, climate-related hazards incur significant losses to arable land, livestock safety and wellbeing, and revenue due to their impacts on the availability of crops that reach markets and people's plates. Without urgent attention to climate-resilient agricultural practices, climate change will have a huge impact on poverty and food insecurity in the country both now and in the future.

A small change in temperature or precipitation alone can severely impact staple crop yields. In 2011, the World Bank projected an 8 percent and 32 percent decrease in rice and wheat production, respectively, by 2050. Rising temperatures also cause rising sea levels, thereby drowning arable lands in saltwater and reducing their ability to produce crops. The Ministry of Environment, Forest and Climate Change (MoEF) estimates that about one-third of Bangladesh (or 49,000 square kilometers) is affected by tides in the Bay of Bengal. Warmer temperatures and more changes in rainfall patterns also negatively impact

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soil organic matter, feed and fodder production, and animal health, thus increasing the loss of nutrients needed to grow bountiful crops and healthy grazing. Additionally, more salinity has a profound impact on the terminative energy and plant germination, while droughts, heatwaves, cold waves, and heatwaves create harsh growing conditions for different crops.

In the longer run, Bangladesh's efforts towards implementing Climate-smart Agriculture (CSA) have been gaining popularity as an effective strategy to address the risks and impacts of climate change, but its adoption remains slow despite the various concerted efforts of governmental and non-governmental organizations (GOs and NGOs).

The CARE for South Asia project has identified major climatic hazards and CSA practices to promote agriculture in the country, aiming to support policy reform, capacity-building, the piloting of promising CSA projects, and knowledge sharing. This article groups various such practices in the country with regards to the three fundamental pillars of CSA: food security, adaptation or resilience, and mitigation.

Water conservation and efficiency: too much or too little water as a result of climate change has major consequences to the viability of the agriculture sector, which means that its conservation and efficient use is essential. Current technologies being promoted in the country to protect this critical resource include rainwater harvesting and storage structures, drip irrigation, sprinkler irrigation, Alternate Wet and Dry (AWD) methods, buried pipe and solar-powered irrigation, Alternative Furrow Irrigation (AFI) for row crops, and waste/grey water harvesting.

Soil conservation and fertility management: the nutrients, level of moisture, and composition of soil play an important role in whether crops can grow well or even grow at all. The fertility of the soil is consistently being threatened by the impacts of temperature and precipitation changes, flooding, drought, and saline intrusion. In Bangladesh, CSA practices like vermicompost and tricho-compost, improved farmyard manure and compost manure, and efficient use of fertilizer (through such initiatives as micro-dosing) are having a positive impact on the country's climate resilience. Furthermore, conservation-oriented practices like cover cropping, mulching, crop rotation, and intercropping are all promoted by GOs and NGOs to improve soil fertility and retain moisture. Vegetable cultivation in sac and bench terracing in hilly areas is practiced in some areas to address drought and landslides, while different salinity management practices are adopted to mitigate and adapt to saltwater intrusion.

Crop management: apart from recognizing changes to climate and weather conditions that influence agricultural yield, smart crop management itself can also help farmers cope with climate change and improve their output. Such initiatives already practiced in Bangladesh include integrated farming, double transplanting, crop and crop variety management (such as improving sees or planting high-yield, fast-maturing varieties that are tolerant to droughts, floods, and salinity). It also includes integrated pest and disease management and traditional, yet innovative, floating garden practices for seedling production, vegetable production, and timely/early/late planting.

Agroforestry: the intentional integration of trees and shrubs into crop and animal farming systems is an effective way to reduce Greenhouse Gas (GHG) emissions, which agriculture is a major producer of despite its nature-based industry, and also improves adaptation, fodder, and crop productivity. Trees in croplands, rotational woodlots, improved fallow lands, fodder banks, and tree planting/afforestation are some of the key CSA practices that have been adopted in Bangladesh.

Livestock management: while climate change impacts livestock physiology, feed and fodder management, and the health and sanitation of livestock, the impacts of their grazing, water use and contamination, and other waste production can also have a negative climate change impact if left unchecked. The promotion of local livestock breeds can reduce methane emissions and enhance adaptation and yield, while appropriate fodder and feed selection can help reduce GHG emissions on one hand and increase their feed-use efficiency on the other. Common feed and fodder management strategies being practiced in the country include multi-species fodder banks, hydroponic fodder, promoting saline and water-tolerant fodder species, straw-based diets (urea-treated or urea molasses), straw preservation through the covering with plastic paper/bags, and silage preparation. Bangladesh is also implementing hay preparation and Total Mixed Ration (TMR) systems. To ensure clean and healthy livestock, the country requires health cards for scheduled vaccinations, deworming, and husbandry management to assist in the early detection of health risks and epidemics that pose a serious risk to livestock, and as a result, the supply and cleanliness of meat production.

Other CSAs: to effectively and efficiently scale up the above-mentioned CSAs, it is critical to establish different support systems. Climate Information Services such as climate diary, the establishment of weather stations, a weather forecast for climate-informed decisions, and the establishment of a decision support system such as an early warning system, are all also promoted as CSA technologies. Farmers Field School, the one-stop service and community-based cluster approach, and exposure visits are other CSAs for training and capacity building. Furthermore, weather-based insurance through a safety net, weather index-based agriculture insurance, and livestock insurance are CSAs promoted to compensate for climate-induced losses. Community/Group Approaches such as a cooperative society and rural level information dissemination platform are also required to enhance community resilience in a sustained manner.

Key Issues and Call for Action

Climate extremes and hazards vary across the region in Bangladesh due to geographical, ecological, and climatic variations. In this context, addressing their impact requires customized technologies and

practices, preferably marrying modern technologies with local and indigenous practices, to tailor mitigation to local problems and needs. To scale up CSAs, we need enabling policies, knowledge, capacities, and financing mechanisms. This requires a multi-pronged approach, favorable pathways, and active engagement of public and private institutions, including financial institutions. The integration and mainstreaming of CSAs into national and sub-national plans and allocation of a budget with appropriate resource-leveraging are key to the scaling-up of CSAs and their sustainability in the long run. A high-level, multi-sectoral and multistakeholder coordination mechanism would also help improve coherence and coordination among policies and institutions to scale up CSAs.

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Climate-smart Agriculture: a growing movement for the growing sector

Discover and compare the multiple risks and impacts of climate change on the agricultural sectors of Bangladesh, Nepal and Pakistan, and learn how the CARE for South Asia project supports climate resilience priorities in each country. Learn more here.


Photo by Ahmad Anas / Shutterstock.com

Crop Modeling: *How It Can Support Climate-smart Agriculture Policies in Pakistan*

By Dr. Ishfaq Ahmad

Climate change is impacting agricultural production in Pakistan, threatening the country's development given its high economic dependence on this sector. Specifically, changes in rainfall and temperatures combined with rising instances of flooding are reducing crop yields and reducing the number of goods going to market. Traditional farmers are particularly vulnerable to the impacts of climate change due to growing uncertainties on the best times for planting and harvesting, suitable methods of irrigation and fertilization, and the long-term impacts of using agrochemicals. In this context, the development and widespread adoption of climate-smart interventions can assist in counteracting the numerous risks involved and help promote food security.

Punjab province, Pakistan's major crop-producing area, has a large network of canals that distribute water to much of its 12.6 million acres of cultivated lands. Wheat, rice, maize, cotton, and sugarcane yields contribute to 21.7 percent of Pakistan's total income, and the province has seen an exponential rise in the cultivation of such crops since the 1960s. However, these crops are dwindling at a time when population and agricultural demand are on a steady increase, threatening both the food and economic security of the province and Pakistan as a whole.

There is an urgent need to evaluate climate change impacts and develop effective smart interventions for small-holder farms in Punjab. One such intervention is crop modeling, which is becoming a useful tool for understanding the projected impacts of climate change on the agriculture sector. These modeling studies can also assist policymakers with their decision-making process.

The link between rising temperatures and rainfall and reduced agricultural output

Punjab is getting warmer, and warmer climates restrict the type of crops that an area can produce. The annual temperature will likely increase by about 3.3°C by the 2050s, while climate models predict that southern and central Punjab (3.6°C) is getting hotter than northern Punjab (2.8°C).

Using a Decision Support System for Agro-technology Transfer (DSSAT) and Agricultural Production Systems sIMulator (APSIM), it is estimated that southern Punjab will lose up to 47 percent of its

cotton yields due to temperature and precipitation changes. This translates into a monumental loss for cotton farmers and will push up the number of farmers living in poverty in the area (i.e., on or under US$1.25 per day) from 1.2 percent to 17 percent by the 2050s. Furthermore, any increase over 40°C will decimate cotton crops as it will cause shedding of bolls and damage the quality of fibers.

In central Punjab, rising temperatures will reduce the maize yield by 29 percent by the 2050s as optimal growing seasons are shortened and grain development is restricted. Rice yields in northern Punjab will decrease by 17 percent as high temperatures reduce grain sizes and weight, ultimately leading to significant crop losses for an estimated 83 percent of small-holders and an increase in the poverty rate from 5 to 6 percent in this area.

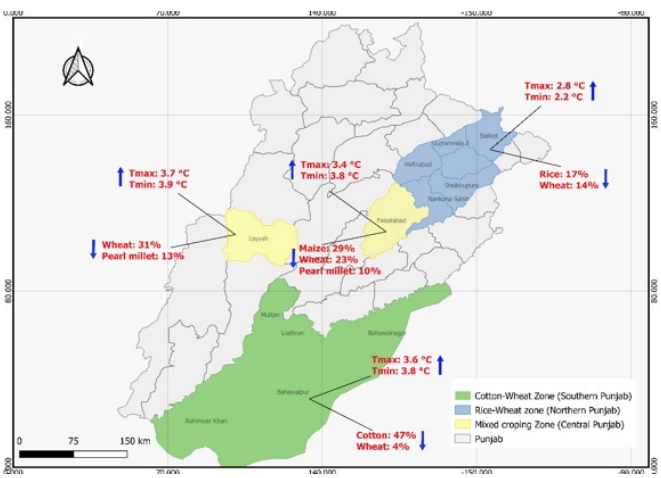

Figure 1: Climate change projections and impacts of climate change on agriculture productivity in Punjab, Pakistan as per mid-century (2040-2069) scenarios

Apart from local warming, an increase in rainfall variability, shifts in the seasonal distribution of rainfall, and a growing frequency of extreme events can drown or dry-out crops. Projected changes in rainfall for the mid-century are uncertain, with some models indicating wetter or stable conditions, while others indicate possible decreases of up to 52 percent in rainfall during the cotton-growing season and up to 42 percent during the wheat-growing season in southern Punjab. In central Punjab, annual precipitation could decrease by 73 millimeters by the mid-century, and the rainfall projections in northern Punjab showed an increase (about 25 percent) in summer rainfall and a decrease (12 percent) in winter rainfall by the mid-century.

Indeed, warm days and warm spells have become more frequent, maximum and minimum temperatures have increased, and rainfall patterns are becoming ever more uncertain. These climate change impacts will continue to impact agricultural productivity without sufficient use and adoption of climate-smart interventions like crop models.

Development of climate-smart interventions

Smart management practices for today's farms should be able to reduce the negative impacts of climate change, improve yields in current conditions, and reduce future vulnerabilities. In southern Punjab, better methods of fertilizer application, increases in sowing density and early sowing dates, as well as the cultivation of heat and drought-tolerant plant varieties will support climate-resilient wheat production. For cotton, the balanced application of fertilizers (nitrogen, phosphorus and potassium), widening row spacing to 15 percent more than is recommended, cultivating resilient varieties, and providing cash subsidies to small-holder farmers during cultivation periods would have positive impacts on farm returns and per capita income. If applied correctly, such interventions could increase wheat production by 21 percent and cotton yield by 33 percent.

In central Punjab, the application of nitrogenous fertilizer with irrigation water (known as fertigation), sowing 15 days early, increasing nitrogen fertilizer and plant populations by 10 percent each, and developing heat-tolerant cultivars are all supporting maize and pearl millet (Ahmad et al, 2019, 2020). The practicality of these interventions in the field in central Punjab was assured with the help of farmers and field researchers, resulting in an increase in maize yield by 21 percent and pearl millet yield by 15 percent.

For northern Punjab, sowing of high yielding varieties, increased plant populations by up to 30 percent for wheat and up to 15 percent for rice, shifting sowing dates earlier by about 15 days for wheat and 5 days for rice, increasing fertilizer up to 25 percent for wheat and 15 percent for rice are also practical responses to climate change. It is anticipated that farmers adopting these interventions would be able to reduce poverty in the area by about 13 percent by the 2050s. Therefore, it is suggested that the extension agent in Punjab should communicate/demonstrate these adaptation strategies to farmers.

It is concluded that the average annual temperature in Punjab is expected to rise by 2-3°C, which would reduce the crops yield by 13 to 50 percent in 2050s.

Climate-smart interventions such as the development of heat/drought-resistant cultivars, an adjustment in row spacing, alternate natural fertilizers, earlier planting dates, and increased plant populations, would increase the yield of crops from 15-21 percent in various crops.

To implement climate-smart interventions correctly, coordination and cooperation is required between local farmers and local decision-makers. On the policy aspect, soil and water conservation practices, construction of water storage, and efficient irrigation systems should be ensured, while institutional measures that anticipate changing climate conditions like agricultural insurance and farm mechanization (mechanical harvester/picker for cotton) should be provided to the farmers. This would have a positive impact on agricultural production and ensure food security despite the changing climate.

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Perspective

Till the Very Last Drop: *Reforming Water Policy Alignment in Pakistan*

By Zamir A. Soomro and Zeeshan M. Mann

Integrated Water Resource Management (IWRM) approaches enable action by taking into consideration multiple options for enhancing water use efficiency, equal distribution among users, and environmental sustainability. Water resources management requires a more integrated approach, rather than a sectoral one.

IWRM aims to: protect the interests of all upstream and downstream stakeholders; protect watershed and catchment areas; and prolong the life of water storage facilities. However, the concept of IWRM requires institutional strengthening and capacity at professional/managerial levels. This article seeks to discuss the alignment of major National Water Policy (NWP) themes with IWRM narratives.

According to Pakistan's Vision 2025, the freshwater resources availability of Pakistan has remained at almost the same level, for the most part, over the years.

Water demand is accelerating due to a rapid increase in population, the trend of industrialization, and emerging issues related to climate change.

Consequently, the gap between demand and supply is increasing continuously.

The non-recognition of the economic value of water is another factor that encourages the unregulated use of precious freshwater resources. Pakistan is among a group of countries that is moving from a water-stressed to a water-scarce scenario. Besides population growth, the sedimentation of the major water reservoirs, obsolescence of the hydraulic infrastructures, conventional cropping patterns, and lack of the relevant regulatory frameworks are all mainly responsible for water scarcity.

Additionally, the recurrent contamination of the water by means of the disposal of municipal and industrial effluents into freshwater resources, i.e., rivers, lakes, canals, and groundwater, limits the availability of freshwater.

Pakistan's Vision 2025 aims to ensure the availability of a satisfactory water supply for agriculture, industry, and domestic users. However, these policies are required to realize the balance between demand and supply in an IWRM context. The Vision envisages enhancing water storage capacity for up to 90 days, improving water use efficiency of the crops by 20 percent, and ensuring access to clean drinking water for all citizens of the country.

The National Water Policy (NWP) 2018 provides the principal guidelines for planners and developers regarding the water scarcity concerns of the country. The policy document highlights the overall scenario regarding the limitations of freshwater availability and provides a comprehensive framework and guiding principles for action plans. Keeping in consideration the current constitutional mechanism, the policy provides a roadmap of action plans at the national level, whereas it has been suggested that the provinces develop their own sustainable water management plans. Water resources development is within the jurisdiction of the federal government; however, irrigated agriculture, domestic water supplies for the rural and urban population, and environmental and other water sector-related demands all lie within the domain of provincial governments. Overall, the NWP describes policy narratives through 29 sections, covering the entire domain of the water resources sector.

As part of IWRM approaches, the NWP established guiding principles for the provinces to develop their projects and action plans towards efficient water management, focusing on water scheduling, reuse/recycling, ensuring food security, managing floods and drought, and coordinating regulation of groundwater use and institutional capacity-building to implement the existing legal instruments for the water sector appropriately.

IWRM approaches require multi-disciplinary knowledge and the vision of the stakeholders to develop the plan towards efficient, equitable, and sustainable solutions, to balance social and economic

Photo by Shahbaz Hussain from Pexels

needs including the protection of ecosystems for future generations.

To achieve the targets of Sustainable Development Goals (SDGs), IWRM is being modified into a cross-sectoral water resource management nexus approach based on the principle that "water, energy and food are closely linked through global and local water, carbon and energy cycles or chains."

The Government of Pakistan envisages the NWP 2018 as a comprehensive document, reflecting a transparent and coherent institutional framework. However, the narratives of NWP are mostly structural rather than management-oriented. Indeed, the scenarios identified in the water policy debate are inclined towards the engineering and environmental narratives.

The NWP sets its strategic priorities on water conservation at each water consumer end, focusing on enhancement of water use efficiency, adaptation of resource conservation technologies, increase in the existing water storage capacity, and implementation of an effective regulatory framework. The planning principles articulate: equity and participatory decision-making in water sector projects; provision of safe drinking water for all; and the ensuring of environmental sustainability. IWRM approaches endorse the wisdom of NWP as social equity, economic efficiency, and ecological sustainability, which are the basic principles of the IWRM approaches. The NWP defined the basin-level planning for the development of water resources by ensuring the sustainable environmental integrity of the basin through re-afforestation and soil conservation in the watersheds in line with the environmental protection measures proposed by IWRM.

On flooding control and infrastructure, the NWP proposes a mix of structural and non-structural measures for flood management. Similarly, it has been proposed that 10 percent of the federal public sector programme budget be allocated for irrigation management, a combination of hard and soft infrastructure. A major portion of the investment is dedicated to hard infrastructure, whereas IWRM shifts the focus from flood control to flood management

through non-structural measures. The IWRM defined the soft infrastructure, including measures such as improving the allocation mechanism and water equity for efficient water management. The NWP prioritized the capacity-building of federal and provincial water institutions in line with the IWRM principles for efficient management of the water infrastructure and provision of services. NWP also recognized the effective institutional support with legal cover for the implementation of the policy. As such, the National Water Council and Provincial Water Authorities were proposed at the federal and provincial levels respectively to update and implement the policies and regulatory frameworks.

NWP prioritized investments for the augmentation of surface storage and replacement of old infrastructures, whereas IWRM proposes investments for the modernization of infrastructure to improve service delivery and water use efficiency. Moreover, the IWRM approaches propose volumetric water pricing for bulk users, partial relief for retail consumers, and substantial subsidies for the poor. However, the NWP has framed the low water charges in the agriculture sector despite the fact that the economic value of water is of supreme concern in Pakistan.

The overall analysis of the NWP narratives is in close alignment with the IWRM narratives. However, in the current scenario, the priority of the actions/projects of the Water Sector in Pakistan typically reflects hard components/engineering solutions. Soft components like capacity-building, institutional reforms, the updating of policy, preparation of laws and their implementation, mass awareness, and irrigation scheduling on the basis of actual crop water requirements, are all limited in terms of project priorities.

On the recommendation of the NWP 2018, the National Water Council (NWC) was established for planning, regulation, development, coordination and management, under the Chairmanship of the Prime Minister of Pakistan. The Council reviews the Policy to identify gaps and document needs, which are expected to be updated in an appropriate forum over time.

Its initial meeting, held on 25th October 2018, placed an emphasis on adopting an integrated approach for conservation, storage, management and efficient utilization of available water resources. The meeting was concluded with the recommendation that it was necessary to develop a comprehensive roadmap for the implementation of the NWP in consultation with provinces and other stakeholders. Accordingly, the proposals were likely to be submitted for analysis to the Steering Committee on Water, headed by the Federal Minister for Water Resources and including representation from the provinces.

The Policy is the basic parameter document on water resources management in Pakistan, guided by the NWC and the Steering Committee for planning, regulations, development, coordination, and management in the water sector. The need of the hour is a more proactive role by institutions engaging water professionals, to implement the recommendations of the water policy in line with the narratives of IWRM.

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Protecting Livelihoods is the Next Frontier for India in the Fight Against Climate Change

By Prof. Ila Patnaik and Kamal Kishore

For a developing nation, putting some sectors on a path of lower carbon emissions without compromise on growth and development, is a challenge.

India committed to net-zero carbon emissions by 2070 at the COP26 in Glasgow. This announcement helped keep the global goal of net-zero emissions alive.

At Glasgow, India also asked developed countries to put a trillion US dollars a year into the climate fund. Whenever the funding comes, the challenge for India will be to use it well. In the meantime, there is a need to work on developing systems and norms that help us do so.

For a developing country like India, climate change is a big challenge. On the one hand, it would mean putting sectors like energy, transport, infrastructure and manufacturing on a path of lower carbon emissions. On the other hand, it would require building resilience to disasters without compromising on meeting goals of growth, development and poverty reduction. These two considerations have underpinned the policy discourse in the country.

India is exposed to a whole range of climate- and weather-related hazards — floods, droughts, cyclones, heat waves, lightning, glacial lake outburst floods and so on. There is mounting evidence that due to climate change some of these hazards are becoming more frequent and severe.

More than 57 per cent of India's farmland face the onslaught of extreme weather on a regular basis. Not only have severe cyclonic storms increased over the northern Indian ocean, there is a rise in cyclonic storms in the Arabian Sea. These are projected to rise.

So while India prepares to set out on the path to lower emissions, at the same time, it has to protect its people and their livelihoods from the ravages of more intense, frequent and unpredictable disasters.

This is a huge challenge, but there have been some important successes in the recent past. For example, India has seen 95-98 per cent reduction in mortality from cyclones in the last 15-20 years, a remarkable progress. Similarly, there has been a consistent and steep decline in heat wave-related mortality since 2015.

Local factors

Participation and governance at the local level is the key to building resilience. We need to understand how the signals that the climate system is delivering are affecting the biophysical systems and how they respond to those signals.

Similarly, we need to understand the inherent social, economic and cultural vulnerabilities of people, and how these come together to produce risk at the local level.

For example, there are differences in how a heat wave is experienced in Odisha and Rajasthan. Even within Odisha, the same level of temperature experienced in one district is different from how it is experienced in others. The key lies in localising the notion of risk and taking into account a range of local factors.

Finance

Efforts to adapt to climate change are costly. Building disaster-resilient cities, coastal towns and other infrastructure is one element of it. An equally large element is moving away from the dependence on the crops and livestock that people have traditionally cultivated and reared.

Money for resilience can be used in different ways, and must be done imaginatively. The Finance Commission has given states resources to address the whole spectrum of disaster risk management needs, not just response, and this has to be used creatively.

People-friendly scientific communication

In cyclone- and heat wave-related work there has been an effort to connect science to society. For adoption of new practices science has to be presented in an understandable, actionable, usable fashion.

In contrast to what was done 20 years ago, cyclone landfall forecasts by the India Meteorological Department (IMD) now tell you not just location and speed but also what wind speed would be and what the impact would be.

Saying wind speed of 150 km/hour is somewhat abstract, but when you say that all the coconut palms are going to get uprooted, then it becomes very real. In other words, scientific communication has to be transformed into something that is people-friendly.

Measurable targets for adaptation outcomes

While there is discussion in the media on resilience and on raising climate-related commitment, particularly reduction of emissions, there is a need to have the same level of ambition for adaptation, not just in terms of how much money we are going to put into adaptation, but the concrete results we will achieve on the ground.

For example, the coastal areas of India need to commit that they will have a certain level of resilience of power infrastructure so that for the most extreme cyclone events, their power system will be restored within three days. This is a measurable target. They can measure themselves against this target 10 years from now.

Local data

Currently we have a lot of data in different places and different formats. The tedious work of digitising the climate data of the past 150 years, and systematising data on our assets and their vulnerabilities is an essential building block of understanding risk.

India has had remarkable success in saving lives from climate- and weather-related disasters. Protecting livelihoods is the next frontier. We need to learn lessons from the past, anticipate the future, and create more resilient systems, society and economy.

Ila Patnaik is an economist and a professor at National Institute of Public Finance and Policy (NIPFP).

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https://theprint.in/ilanomics/protecting-livelihoods-is-the-next-frontier-for-india-in-the-fight-against-climate-change/768323/

Climate Talks

'Climate Talks' is a panel discussion series launched to share information on the impacts of climate change across different sectors and the urgency of adaptation at the policy and public levels. The full episodes are available on YouTube here.

Context

A quick glance at the vast open spaces that bear bountiful crops and grazing animals is enough to conceal a discerning fact—agriculture is harming the environment. Deforestation, the use of chemicals, and methane production from livestock are significant sources of pollution, contributing to an estimated 17.6% of global greenhouse gas (GHG) emissions.

Panelists

- Professor Vellingiri Geethalakshmi, Director of Crop Management, Tamil Nadu Agricultural University, India
- Dr. Arun Khatri-Chhetri, Agricultural Economist on Low Emissions Agriculture with the International Center for Tropical Research (CIAT), University of Vermont, USA
- Mr. James Giles, Climate Strategy Specialist with the Alliance of Bioversity International and CIAT in Viet Nam
- Dr. Pashupati Chaudhary, Senior Resilient Agriculture Specialist, ADPC

Moderator

- Ms. Vidya Rana, Senior Communications Manager, ADPC

Agriculture is a sector that ultimately reaps what it sows; being both a source and victim of climate change impacts.

A word from the expert

Professor Geethalakshmi explains that in South Asia, farming is both a source of life and livelihood. It is estimated that half of the region's people depend on agriculture to make ends meet, of which more than 80% consist of small and marginal farms.

Climate is a key driver of food security, while agriculture promotes economic independence for small communities in a rapidly-developing region that will grow hungrier and more vulnerable without sustainable interventions to promote climate resilience.

Professor Geethalakshmi also identifies the fundamental pillars of climate-smart agriculture, as per the United Nations Food and Agriculture Organization (FAO), which are: sustainably increase agricultural productivity and incomes, adapt and build resilience to climate change, and reduce and/or remove greenhouse gas (GHG) emissions.

How can the government patch the climate change hole in farmers' pockets?

The incomes of farmers are influenced by weather conditions. Dr. Arun Khatri-Chhetri highlights that agricultural output is maximized in favorable seasons, and practices are adapted in unfavorable seasons to put food on the table and send produce to the markets.

Climate change initially creates an uncertain return on investment for small farmers as lower agriculture production drives up market costs alongside growing economic demand.

Developing insurance and subsidy programs are sufficient first steps toward encouraging climate-smart agriculture, according to Dr. Khatri-Chhetri, but it is also a short-term solution that should encourage farmers to implement their own sustainable practices in the long term.

In this context, while new subsidy programs are developing in the region, public-private partnerships may be the next opportunity. However, without proper administrative planning and guidance, the impacts of climate change on farmers' incomes will continue to rise and place greater pressure on both public and private resources, thereby reducing the effectiveness of such schemes.

Is climate-smart agriculture an end solution?

No. Mr. James Giles points out that climate-smart agriculture is rather an effective tool that will contribute to protecting lives and livelihoods from climate change.

A community's access to knowledge, the capacity to adopt new technologies, market access due to remoteness and quality of roads, and damage to soil health degradation due to cropping intensity, erosion, and the use of fertilizers/pesticides will have a significant impact on determining the viability of such agricultural practices.

Furthermore, Dr. Khatri-Chhetri highlights that an individual farmer may not be able to reap all the benefits of climate-smart agriculture, or implementing such practices may not support their abilities to compete with others in demanding agricultural markets.

It requires clear implementation plans by decision-makers that can easily be quantified and compared to determine how effective policy interventions are to current and emerging climate risks.

Mr. Giles highlights that Nepal's Agriculture Development Policy 2015-2035 explicitly mentions climate-smart agriculture, whereas Pakistan and Bangladesh's frameworks refer to its key components. Climate-smart agriculture also features extensively in Nationally Determined Contributions (NDCs) and development plans in the region.

A key entry point is quantifying how the interventions can support the attainment of key policy objectives, and these recommendations need to be targeted towards concerned Government Ministries.

How is the CARE for South Asia project helping?

For agriculture to be both competitive and climate-smart, farmers and policymakers need to be able to together design an inclusive system that is well-aligned with environmental and economic priorities, encourage continuous learning and training to ensure that the best possible technology and skills are in use, and continuously promote favorable investment conditions and fiscal schemes.

Dr. Pashupati Chaudhary explains that the project seeks to create an enabling environment to improve agriculture resilience and national policy frameworks. A series of advisory services and capacity-building initiatives will have a long-lasting impact on systemic planning and development in this sector.

Specifically, the project will produce guidelines and documents and develop monthly frameworks to inform and support all relevant stakeholders in the appropriate implementation of climate-smart agricultural practices across the region.

This article is compiled by Zandre Van Straten, Knowledge Management Officer, Risk Governance department, ADPC.

Interview with *Kamal Kishore*

Kamal Kishore, Member, National Disaster Management Authority (NDMA), India, is also serving as the Indian Co-Chair of the Coalition for Disaster Resilient Infrastructure (CDRI).

ADPC recently held an exclusive 'Climate Talks' discussion with this esteemed disaster risk and resilience expert on India's efforts towards strengthening disaster and climate resilience. Watch the full interview here.

Which natural hazards or climate-induced threats have the highest impacts in India?

Let me start with cyclones. We traditionally invest more in cyclone resilience for the eastern coast of India, but we've noticed increased cyclone activity on the western coast as well in the last 6 to 7 years. While we're not yet sure that this is a long-lasting trend, it has an impact on our resources as we need to expand the same success against cyclones to both coastlines.

The same is the issue with flooding. There have been years when the overall monsoons performance in terms of All India Rainfall Index have been lower then normal, yet some parts of the country experienced extreme floods. We really have to focus on improving our flood risk management practices, early warning systems, flood control measures, and better land-use planning.

We also have "inter-connected mountain hazards" like glacial lake outbursts which lead to floods, landslides, avalanches, formation of lakes, and flash flooding downstream. We're working towards coming up with an integrated approach for monitoring these hazards and taking steps to provide as best an early warning as we can and overall, strengthen systems at the community-level to respond to these warnings and take necessary action.

We are going to see increased frequency and intensity of hydrometeorological events, some of which will be unprecedented when different hazards connect, which will produce outcomes and impacts that are more difficult to predict. Encouraging community-level action is going to be paramount.

A lot of these hazards will impact our infrastructure, and India is a country which still has a large infrastructure deficit. This is why big investments are going into building the resilience of such projects for generations to come, and it is in this context that India has been working with 26 other countries and international organizations to create the Coalition for Disaster Resilient Infrastructure to advance resilient power systems, water systems, telecommunications, railways, and freight corridors to withstand future climates.

How effective is India in promoting disaster risk reduction?

We've had good success in saving more lives by connecting science to society and taking a multi-sectoral approach. For example, we've been able to reduce mortalities from heatwaves by 90 percent, but we need to go beyond and reduce other kinds of losses as well.

We have to save lives, but also livelihoods. That requires making our infrastructure services resilient to shocks from natural hazards. We are making sure that power systems don't go down when cyclones hit or come back on quickly. There were times when power outages in cyclone-affected areas went on for months, but now some cities having underground cabling and better management systems, that recovery time has reduced to just a few days.

Can you share some experiences in managing disasters and climate change during COVID-19?

It's been a challenging time! We've had five cyclones during the pandemic on the eastern and western coasts. The National Disaster Risk Force (NDRF) had to not only protect people affected by cyclones, but also themselves from health risks. Around 100 NDRF members tested positive, but luckily, they all recovered in good time.

Standard Operating Procedures (SOPs) were redrafted, protective gear was distributed and evacuation procedures were revised to minimize the risk of transmission. Once vaccines were distributed, NDRF members were prioritized. One key lesson is that SOPs cannot be frozen in time, they need to continually evolve to respond to new risks that become known, otherwise they will become outdated and ineffective.

Given India's high population, what are the roles of local governments and communities?

They shouldn't only participate; they have to lead. Communities know how to respond to an early warning in an organized fashion.

When it comes to cyclone shelters, the story to be told is that these shelters are multi-purpose and they're managed by communities themselves.

If the Government is the only one managing it, then it is very possible that the cyclone shelter is either not available or not in a good condition. If it is managed in the community as part of their daily lives, they will have their own organization around it to ensure that the needs of women, children, old people, etc., are properly met during evacuation.

How is the Government ensuring access to disaster risk financing?

The Finance Commission, constituted every five years, looks at how central revenues are distributed and one of its thematic areas is disaster risk management. From this Commission onwards, India has predictable finance that covers the entire spectrum of disaster risk management activities—there are resources allocated to response, recovery and preparedness and capacity building on the one hand, and mitigation on the other.

The resources we have from these dedicated windows will be able to catalyze additional financing within the development sectors themselves. Turning policies into action is very challenging, however, so I hope that in a few years we can measure our success not by the amount of money we spent, but rather the outcomes we have achieved in risk reduction.

Enhancing Participation: *Women and Resilience in the Face of Climate Change*

Syeda Hadika Jamshaid, Climate Change Specialist at the Ministry of Climate Change (MoCC), Pakistan, is also currently serving as the UNFCCC Gender Focal Person for Pakistan.

She supports the MoCC in building climate resilient infrastructure, towards achieving Nationally Determined Contributions (NDC), localizing carbon market tools for sustainable development, and mainstreaming gender into policies and programs.

For this edition of our newsletter, Jamshaid spoke to Bhawana Upadhay, Senior Specialist, Gender and Inclusion, ADPC.

Photo courtesy Syeda Hadika Jamshaid

What initiatives are Pakistan taking to make women and marginalized groups more resilient to climate change, which has been compounded by the COVID-19 pandemic?

Pakistan is implementing various initiatives that have tried to address gender-related issues, apart from mitigating climate change impacts. Examples include the following projects:

We have started the Ten Billion Tree Tsunami Programme (TBTPP). This programme provides livelihood opportunities for women in forestry. It also assists women with raising plant nurseries in rural areas. Importantly, it employs female community mobilization teams of the Forest Department; which would approach those women who are impoverished and destitute, and then educate and train them.

Another initiative is the Prime Minister's Green Stimulus package which is targeted at COVID-idled daily wagers, including women, and largely focuses on diverting and re-configuring components of TBTTP to plant trees, raise saplings, and protect the plantations from intruders.

Clean Green Pakistan Movement (CGPM) was re-designed post-COVID to assist with the objectives of job creation, by contributing to total sanitation, solid waste management, and hygiene within identified districts of two provinces (Punjab and Khyber Pakhtunkhwa). This movement was redesigned to target a total of 53,250 livelihood opportunities over the span of three months. This would include community and, social mobilizers raising awareness around sanitation and drain cleaning, garbage collectors/scavengers, as well as certified Clean Green Champions. After the success of the pilot phase, the movement has been scaled up to include Azad Jammu Kashmir and Gilgit Baltistan.

I would also like to mention Glacial Lake Outburst Flood (GLOF) risk reduction in Northern Pakistan which aims at building resilience through Early Warning Systems (EWS), infrastructure, and disaster management policies. Project planning involved gender assessment: it aims to ensure enhanced participation of women.

All the above-mentioned adaptation measures are created with the intention of building community resilience by means of enhancing the participation of women. Besides, with a view to narrowing gender gaps and integrating gender perspectives in all sectoral policies, plans and strategies, the National

Climate Change Gender Action Plan (ccGAP) is currently being drafted by the International Union for Conservation of Nature (IUCN) and Pakistan in coordination with the Ministry of Climate Change (MoCC) and other relevant stakeholders.

You have been involved in the Intended Nationally Determined Contributions (INDC) process, which Pakistan has recently completed. Would you like to share how gender issues factor into the current INDC process?

As already highlighted, to make the updated NDC gender-sensitive, a Gender working group was formulated, which was led by a woman. This Group would identify the gender gaps in NDC sectors and develop recommendations to close these gaps. The working group participated in various meetings and developed a working paper to inform the NDC about emerging priorities and challenges.

However, women's participation in the rest of the working groups was low, and in some cases even nil. I also noted that the gender representatives from provincial departments should have further been allowed to improve the recommendations but given the time constraints, the best possible outcome was delivered within the given time frame. We are hoping to fill this gap through the on-going ccGAP consultations.

The working groups organized a series of meetings to identify and consolidate Pakistan's efforts over the last five years and to design recommendations for the next five years. The groups also identified the capacity, technology, and financial needs for NDC implementation.

In addition to these, a few new areas were highlighted which were never a part of Pakistan's NDC. These are youth, air pollution, health, WASH (Water, Sanitation and Hygiene), Blue Carbon, Carbon Markets, etc. Different sector partners helped the MoCC to develop evidence-based recommendations to enhance the NDC commitments. All these activities have been concluded, and NDC is now in the final stages of completion.

The Ministry of Climate Change has prepared a roadmap for the 26th iteration of the Conference of the Parties to the UN Framework Convention on Climate Change 2021 (COP26); to systematically engage government agencies and other partners in the process. As a part of the roadmap, thematic committees have also been constituted. Could you please tell us how gender has been mainstreamed into these committees? What are the achievements of the working group on gender and women's issues?

Two technical working groups were created, namely, adaptation and mitigation. Both groups had sub-groups based on NDC sectors like waste, land use change, agriculture, industry, energy, etc. It was ensured that provincial focal points are also a part of the groups in addition to participation from government sector, private sector, development sector partners, academia, private think tanks and community-based organizations. Gender, as the cross-cutting issue, had its own working group to ensure the recommendations are gender sensitive.

Pakistan will have its own pavilion at COP26, with side events, for which necessary arrangements have been made.

Could you identify gaps and challenges, with reference to gender considerations in climate resilience in Pakistan?

First and foremost is the inconsistency in the efforts that have been made so far. To sustain inclusive climate-resilient programming and operations,

We need policies which necessitate all programs to be gender-sensitive.

We have seen such approaches adopted at different levels in certain NGOs and in the commercial sector. The development of gender indicators and markers will ensure gender-sensitive public programming.

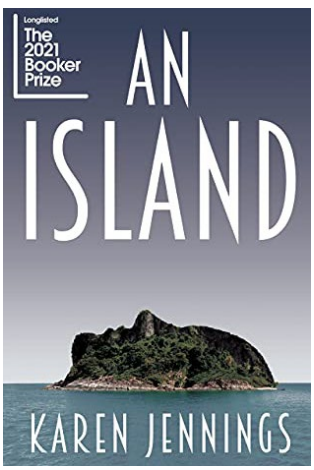
Secondly, I would like to highlight that the biggest challenge in South Asian countries is the unavailability of sex-disaggregated data. Countries need to build capacities and human resources at the local level to collect and maintain this data on a regular basis, so as to understand and build evidence on the gendered impacts of climate change and to design climate informed-programs.

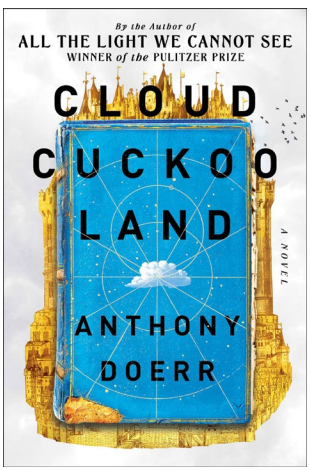
Cli-Fi

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:





An Island
by Karen Jennings (2021)

Shortlisted for the Booker Prize 2021

This book offers a personal perspective on climate change in the context of displacement through this classic, interior tale. A young refugee washes up, unconscious, on a small island; inhabited only by Samuel, an old lighthouse keeper. For Samuel, the newcomer is a reminder of the life he left behind, on the mainland: one that suffered the ravages of colonizers, a fight for independence, and the subsequent rule of a cruel dictator. Anonymous as he is now, he too played a part—and now, he begins to reflect again on what land and ownership mean, today.

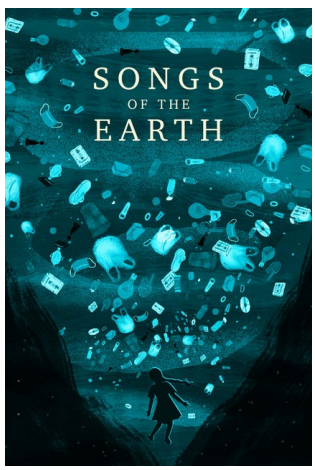
Can humanity learn from its mistakes when provided with a new chance?

Cloud Cuckoo Land
by Anthony Doerr (2021)

This Pulitzer Prize-winning writer has usually written about older times (*All the Light We Cannot See*) or lesser-known places (*The Shell Collector*). In this ambitious new work, he moves from the past, to 2020, to the future. 'Climate change, ecoterrorism, ancient Greek, the Renaissance, the Ottoman Empire, metallurgy and the economic hardship of being a single mother in 21st-century Idaho are all dealt with in crisp, swiftly moving sentences', said *The New York Times.*

What can we learn from the past and the potential future to inform our present?

Movies:



Bring Your Own Brigade
(2021)

Wildfires are among the most catastrophic current disasters which are caused partly by climate change. This 2021 American documentary film covers the aftermath of California's destructive Camp Fire in 2018. As it shows us, rising temperatures make firefighting more difficult; yet another reason to prioritize addressing the ongoing crisis.

How do we learn from previous disasters to prevent the worst impacts of climate change?

Songs of the Earth
by Somak Datta (2021)

An animation film accompanied by an eight-track album responding to climate change, this unusual film addresses pressing issues ranging from climate migration and ocean pollution to sustainable fashion. With a preview on 10 Downing Street and a debut at COP26, this small film is making a big impact.

'At the heart of the film and the album is a question – is our behaviour as a people sustainable?' – Somak Datta

Breaking the Jargon

By Dr. Niladri Gupta

Water Cycle
The process through which water evaporates from the surface of the Earth rises into the atmosphere, cools and condenses into clouds, and falls again to the surface as precipitation. The water accumulated in rivers and lakes, soil, and porous layers of rock, and much of it flows back into the oceans, where it evaporates again. This cycling of water to and from the atmosphere determines the Earth's weather pattern. (Source: NASA GPM)

Integrated Water Resources Management
The process which promotes coordinated development and management of water, land and related resources, so that the resultant economic and social welfare is maximized in an equitable manner without compromising the sustainability of vital ecosystems. (Source: UN Water)

Water–Energy–Food Nexus
Food, water and energy systems are intimately connected with each other and water is a crucial component to make food and energy systems work. This approach considers the different dimensions of water, energy and food equally and recognizes the interdependencies of different resource uses to develop sustainably. (FAO, 2014)

Types of Water	Water Footprint An assessment of the patterns of use of direct and virtual water in volume unit at different levels (individual to local to national to regional to global).
Blue Water The water available from surface (rivers, lakes and streams) and groundwater resources.	**Blue Water Footprint** The amount of surface water and groundwater required (evaporated or used directly) to produce an item or a service.
Green Water The water available in plants and in soil for plant uptake.	**Green Water Footprint** The amount of rainwater required (evaporated or used directly) to make an item.
Grey Water The waste water generated from household and commercial areas. (If it contains higher levels of pollutants and fecal matter, it becomes black water.)	**Grey Water Footprint** The amount of freshwater required to dilute the wastewater generated in manufacturing, in order to maintain water quality, as determined by state and local standards.
Recycled water Treated wastewater, from which solids and other impurities have been removed; further disinfected to make it safe for consumption.	**Brackish Water** Water occurring in a natural environment, possessing more salinity than freshwater.
Virtual Water The water that is consumed throughout the value chain to make a product or a service, unseen by the end user.	**Fossil Water** Ancient or paleowater found in deep aquifers or isolated places.

CARE for South Asia Project Updates

ADPC officially launched the Climate Innovation Challenge (CIC) website that accepted proposals on innovations across the South Asia region on multiple climate sectors.

Each winning innovator would have access to a maximum of US$150,000 to pilot their innovations at the regional or national level over a period of 12 months in areas like climate information and analytics, community-level early warning systems, climate-smart agriculture, integrated water resources management, resilient infrastructure, nature-based solutions, and risk-financing solutions.

The CIC is a pool of US$3.5 million administered by the World Bank, funded by the United Kingdom's Foreign, Commonwealth & Development Office (FCDO), and implemented by ADPC. It aims to crowdsource innovative and disruptive technology solutions from around the world for resilience in South Asia.

A Memorandum of Understanding (MoU) between ADPC and the Climate Resilient Local Infrastructure Centre (CReLIC) which is part of Bangladesh's Local Government Engineering Department (LGED).

The agreement aims to facilitate knowledge exchange, promote joint study projects and capacity building initiatives, and encourage technical support. The collaborative partnership will assist in exploring collaborative designs, share and gain knowledge, experiences, and best practices on resilient climate elements in the country.

Furthermore, a consultative workshop with the Design Unit of LGED was organized to integrate climate resiliency for roads and road infrastructure. Discussions focused on proposed framework and recommendation for innovative, sustainable materials for transport.

A webinar focusing on water resources management, the third of the webinar series on Decision Support Systems (DSSs) for Understanding and Reducing Climate Risks was organized by RIMES in November to provide an overview vis-a-vis water-related hazards and their impacts in South Asia, and the potential for a customized DSS to improve both water resources and risks management.

The webinar engaged planners, decision-makers and development practitioners in the water resources management sector, as well as researchers, developers and implementers of decision support tools and other technological information platforms, to enhance awareness, as well as to obtain feedback and inputs that could be beneficial for onward development/ customization of DSS for the water sector.

A consultation meeting was held with the Nepal Department of Roads (DoR) to discuss risk assessment methods and selection criteria for pilot districts to develop climate change scenarios. Province No. 2 and Bagmati Province were selected and endorsed for the demonstration study.

A meeting was held with the Nepal Agricultural Research Council (NARC) to discuss strategies to conduct Agro-ecological Zoning (AEZ) and Agriculture Sector Risk Assessment (ASRA). Discussions focused on improving data sharing and joint research and publication. A webinar was subsequently organized on Agro-ecological mapping to share experiences from Nepal and Pakistan.

Provincial level stakeholder meetings and field visits were also undertaken in Nepal's Province No. 2 to orient stakeholders on the project and discuss possible collaboration and coordination mechanisms.

A Consultative Focus Group Discussion (FGD) workshop was also organized on gender in climate-smart agriculture in Pakistan.

An inception workshop was organized in Karachi to discuss the possibility of establishing any type of pearl farming operation in Pakistani waters. The workshop also explored the possibility of information and data availability. The workshop was successful in bringing stakeholders together, initiating dialogue, answering questions on the subject of culturing pearls and sharing ideas on how to best tackle the difficulties and opportunities that this Blue Industry could bring to Pakistan.

A workshop on focusing on setting up dialogue to enhance water sector policies, standards and capacities was held in Bangladesh to provide an update to the leadership of the Ministry of Water Resources (MoWR) and relevant departments about the progress of CARE for South Asia project work in water sector and to seek their advice and inputs for the key actions in 2022.
Similarly, a national workshop was held in Nepal to provide an update to the Ministry of Energy, Water Resources and Irrigation (MoEWRI) and relevant departments about the progress of CARE for South Asia project work in the water sector and to seek their advice and inputs for the key actions in 2022. The workshop strengthened on-going collaborations and highlighted Government priorities.

Bangladesh's Climate Public Finance Tracking Methodology 2018 has been reviewed and the draft of the updated Bangladesh Climate Change Strategy and Action Plan will be finalized this year.

Similarly, a national sharing workshop was held on Nepal's Status Paper for the 26th Conference of the Parties (COP26) under the National Policy Dialogue on Climate Resilience with the Ministry of Forests and Environment (MoFE). The workshop brought together 4 Secretaries from the Office of the Prime Minister and Council of the Ministries, National Planning Commission, Ministry of Agriculture and Livestock Development and line ministries, departments, INGOs, NGOs, private sector, federations, academia, and media.

A Policy Brief was published that explores a variety of options for mainstreaming climate finance into the planning and budgeting process of Nepal. The publication identifies climate policy provisions, planning and budgeting, needs estimations, expenditure tracking as well as gender and poverty in a climate context.

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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