APAN Technical Report FY 2013 Chapter By GWP South Asia

Emerging and Critical Issues in Climate Change Adaptation in Water in South Asia

1.1Background

South Asia is home to well over one fifth of the world's population, making it both the most populous and the most densely populated geographical region in the world. Almost one in five people in South Asia still lack improved water sources, despite significant progress made in recent years and the availability of many technically feasible and low-cost solutions. The Water Security Index for South Asia 1.6 (ADB's Asia Water Development Outlook 2013) confirms the region as a hotspot where populations and economies are being adversely impacted by poor water security. South Asia has the highest regional Global Hunger Index score indicating highest levels of hunger among populations. The region has the highest concentration of undernourished (299 million) and poor people with about 40 per cent of the world's hungry (Wordbank 2012). South Asia is among the areas expected to be hardest hit by climate change. It will likely to have profound effects on food and water security. Climate change is expected to adversely affect food production, especially in rain-fed areas which are also relatively more impoverished. South Asia will thus need to face the full implications of the increasingly strong interconnections between water insecurity, food insecurity, climate change and regional integration. Therefore, climate change adaptation in the water and agriculture sector and water related disaster coping with disaster preparedness through systematic planning and implementation is the most difficult challenge in the region. There is clear indication that in the emerging global and regional scenario, climate change adaptation and disaster coping is interwoven and crucial to the success of initiatives in the water sector, impacting on all countries in South Asia region.

The region's rainfall varies from year to year, causing droughts and floods that result in deaths along with social and economic shocks. South Asia also faces water-related environmental problems—shrinking glaciers, soil erosion, pollution, groundwater degradation—and trans-boundary issues that put pressure on the availability of water. South Asia's renewable freshwater resources are about 1,200 cubic meters per capita. Withdrawals of freshwater are high, and many aquifers are overexploited as subsidized electricity makes pumping of water cheap. Many of the rivers in the region are shared across borders. Bangladesh, Bhutan, India, Nepal and Pakistan, share 20 major rivers. Conflict between countries, states, or groups over

the access to water resources for drinking, fishing, agriculture, food production, industry , trade , energy, health andenvironment etc.Conflicting claims over shared water resources is a major security challenge in the region. This requires mediation and dispute resolution for water sharing between countries and communities. Though the increased scarcity of water has been a source of many tensions and conflicts in the region, there has also been recognition for the need for regional cooperation. The many treaties, protocols and conventions are proof for this. Groundwater is the primary source of water for drinking and irrigation in South Asia. Adequate management in terms of quantity and quality is critical to ensure access to safe drinking water. Access to drinking water is reduced either by a shortage in the quantity of water or by the deterioration of the water quality of aquifers. Groundwater quality issues are also widespread in the region. This is due to untreated wastewater in urban areas or to the seepage of irrigation water into the aquifers. In addition, natural contamination of groundwater with arsenic and other metals such as fluoride is common throughout Bangladesh, as well as in India, Nepal and Pakistan. In the last decade, Bangladesh has lost nearly a fifth of its safe drinking water sources due to natural arsenic contamination of groundwater. Arsenic impact on food security may eventually turn out to be a trickier problem for Bangladeshis (and other countries if the problem also exists there) to manage. Mountains are hotspot for climate change: vital resources and growing vulnerabilities.

1.2 Adaptation and Resilience to a changing Climate - a regional overview

Hydro-meteorologicaldisasters will have higher frequency, higher intensity with high uncertainties in the coming years and the likelihood of more trans-boundary disasters will increase. Disaster size will de-capacitate system and governance laid down for Disaster management at both national and regional level. Therefore, to cope and adapt with new scenario of extreme events may require regional and sub-regional support, programmes, systems, projects and laws etc.The role of regional Institutions, intergovernmental bodies, treaties, associations, UN bodies are required to redefine its mandate to address present scenario. Implementation of Thimphu statement on climate change (2010 SAARC) in the region is of paramount importance. The integration of Climate Change Adaptation, Disater Risk Reduction, Loss and damage and development will improve the climate resiliency significantly.

Adaptation to climate change involves an “adjustment in natural or human systems in response to actual or expected climatic stimuli and their effects which moderates harm or exploits beneficial opportunities” (IPCC, 2001).Knowledge aboutfuture climate impactsis important to developplanned adaptationstrategies. Climate science and the projections of its various impacts are at an early stage of development in the region. Yet South Asia is among the most data-rich regions of the developing world and is well endowed with considerable analytical capacity for

providing policy inputs – a capacity that has yet to be fully mobilized for effective policy and institutional responses(REF). Adaptation is a dynamic social process: the ability of societies to adapt is determined, in part, by the ability to act collectively.Community based adaptation approaches emerging and social capital and the ability to act collectively is high in the region.

1.2.1Hydrological DataSharing AmongRegional Countries

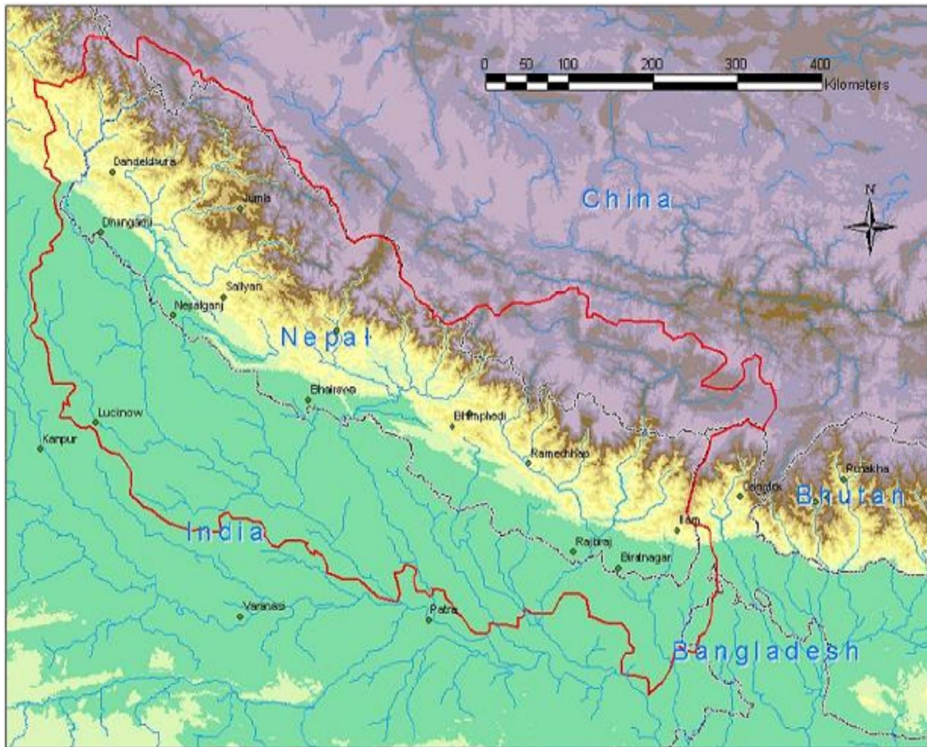
Hydrological and Meteorological Data Sharing among countries that shares trans-boundary rivers in South Asia has not been very successful and there is a considerable reluctance to share the hydrological data. For reducing uncertainties it is important to have flood, tsunami, cyclone forecasting,therefore, it is important to initiate data sharing for forecasting and early warning for floods etc. It is also important to identify which agencies are involved in sharing data, what type of data are shared and to have a protocol for data sharing. Translating data into meaningful early warning messages and communicating to the vulnerable populations also do not happen to a satisfactory level. Move ahead from national to sub regional and regional for meaningful cooperation is the key for successful data sharing.

<u>Regional Flood Information System in the Hindu Kush Himalayan Region</u>

HKH-HYCOS: Joint Project (Nepal. Pakistan, Bhutan, Bangladesh, (China and India as observer) coordinated by ICIMOD with support from Government of Finland technical advice from WMO.

Nepal India Joint Flood forecasting system

Nepal India Joint Flood forecasting system was initiated after a High-Level meeting inKathmandu in March 1988 and is one the successful forecasting systems that exist in the region. Identified stations and equipment required for the scheme. Start sending data beginning in June 1988



The major rivers and locations in the area under the Nepal India Joint Flood forecasting system

1.3 A step towards Water Security-progress and success stories

1.3.1Afghanistan

1.3.2Bhutan

Bhutan do not have long term monitoring data and the analytical skills are limited to assess the Climate Change impacts. There is a lack of studies on snow, glaciers and groundwater and technology and finance are constraints. Urbanization and development (specially hydropower) is also taking place in Bhutan therefore that will also affect the water security.

1.3.3Bangladesh

Efforts for water Security

- National Policy for Safe Water Supply and Sanitation, 1998: calls for nationwide access to safe drinking water & sanitation services at an affordable cost.
- National Water Policy, 1999: The policy goals - developing water from all forms of surface and ground water sources and managing the sources in an efficient and equitable manner and ensure water availability to all section of society.
- National Water Management Plan, 2001: emphasizes the equitable, safe and reliable access to clean water in sufficient and timely quantities for multipurpose use and objectives like production, health and hygiene & preservation of aquatic ecosystems.
- National Water Quality Monitoring: On regular basis, DoE carries out water quality measurement and monitoring (city rounding rivers & wetlands)
- Environmentally Critical Areas (ECAs) and Integrated Wetland Management: rivers surrounding Dhaka city declared as ECA to save them from further pollution
- Environmentally Responsibility Awareness Raising and Empowerment: DoE carries out awareness raising campaign through mass media, seminar & conf. Its monitoring and enforcement wing drives against pollution, makes the polluters treat the waste water (through monitoring ETP establishment & running in industries) and fine the polluters as to the pollution for which they are responsible .

The way forward

- In the future DWASA plans massive investment to replace dwindling groundwater resources with treated surface water from less polluted rivers (Shitalakhkhya and Meghna) located up to 160 km from the city. (Source: Taqsem Khan, 2011)
- DWASA plans to undertake water purifying (affordable for all) program on larger scale to ensure safe drinking water for all sections of people.
- The Government plans to boost bottled water service both by public and private initiatives so that people of all quarters particularly poor and under privileged ones can afford safe water for drinking and other productive and hygiene purposes.

1.3.4India

Policy Initiative taken by Govt of India for Water Supply

Rural Water Supply	Urban water Supply
National Rural Drinking Water Program (NRDWP) (2009)	Accelerated Urban Water Supply Program (1993-94)
To provide every rural person with safe water for drinking, cooking and other domestic basic needs on a sustainable basis.	Centrally sponsored scheme initiated with the objective of solving the drinking water problems in towns having population of less than 20,000 (as per 1991 census).
NRDWP encourage States to achieve drinking water security at the local level	Funds are allocated according to five years plans state wise.
Promotion of simple to use technologies such as terracotta based filtration systems, solar distillation and dilution through rainwater harvesting for tackling iron, salinity and suspended particulate matters.	

1.3.5Maldives

Maldives is one of the most water scarce countries and the annual average rainfall is more than 1900 mm (NAPA, 2006). Groundwater is a scarce resource because of hydrology and Surface freshwater is lacking expect few wetland and swampy areas. Traditionally people depended on shallow wells for potable and other purposes. Rainwater is widely used in the islands & accounts for more than 94 % use (MPND, 2006).In Male' & few islands desalinated water is supplied to households. Island Water Situations are Complex and Diverse and in the outer islands, households obtain water from a range of sources: local and imported bottled water, desalinated seawater using reverse osmosis plants and rainwater harvested from roofs and stored in household and community rainwater tanks, and groundwater. The choice depends on the season, the use, and household finances. The per capita household demand for potable water has generally been estimated at 10 liters per person per day (L/p/day). The total per capita demand for non-potable water (including bathing, washing clothes, and toilet flushing) is estimated at about 100 L/p/day to 120 L/p/day (Bangladesh Consultants, 2010a, b, c and d). A survey of 70 islands in 2010 reported that household groundwater is contaminated in most of the islands and not suitable for drinking (MEE, 2011). Piped water coverage in the outer islands

remains low, with no more than 23 percent of the population serviced via piped connections in any atoll outside of Greater Male'(MEE, 2011).

Maldivian Constitution (Article 23) recognizes the right to Safe water and Adequate Sanitation to every citizen and draft Water Act is in the process of enactment. Improved sewerage systems are in 30 islands,desalinated piped water is provided in5 islands (across the outer atolls), Emergency desalination plants (without piped network) in 25 islandsand Rainwater harvesting system 2500 L water tank (HDPE) in each household.

Currently 08 water and sewerage projects under implementation in different islands and 52 new water and sewerage projects are planned to be implemented this year. Public and multilateral investment into water and sewerage development planned for 2013 alone totals USD 64.2 million.

1.3.6Nepal

1.3.7Pakistan

1.3.8Sri Lanka

According to UN standards, per capita water availability in Sri Lanka is at an adequate level.However, Sri Lanka experiences water scarcity due to spatial and temporal variations in rainfall pattern. Such water scarcities are overcome to some extent by tran- basin diversions

Household Water Security Progress and Success Stories

- Government Policy Framework for 2010-2020, provides for pipe-borne water facilities are to be increased to 60% and safe water to 100%by 2020
- Sanitation is always linked to household water, increased level to sanitation with government grants/support for r building toilets to low income rural and urban families.
- Bringing behavioral changes and promoting better hygienic practices among user communities through effective awareness programs have decreased water related deceases.
- Private sector and NGOO are engaged in sanitation advocacy and promotion activities
- Government has adopted a Rainwater Harvesting Policy in 2005 ,reducing burden on pipe-borne water.

- Capacity building of CBOs to manage their own water resources - 2500 CBOs involved in construction, operation and maintenance community water supply schemes. 30% national coverage.

Economic Water Security Progress and Success Stories

- Trans-basin diversions are multipurpose carrying nearly2250 MCM to be increased to more than 2500 MCM in near future. Nearly 70% of crop water ET requirement of Anuradhapura and PolonnaruwaDistricts are provided through such diversions.
- A cascade system of storage d from historical times secures irrigation and livelihood, ground water recharge and environmental needs.
- Government has initiated14 water resources development projects to harness the optimum use of surface and ground water.
- Rehabilitation and modernization of irrigation infrastructure is undertaken to Increase water use efficiency.
- Bulk water is issued for industrial sector.
- Improved water management techniques and practices are adopted (real time monitoring-MASL) for sharing water with other sectors (drinking & industrial).
- Farmer capacity is increased for community participation in irrigation management .
- Introduction of crop varieties and technologies to Increased water productivity & minimize water usage for agriculture.
- 89% of the total population is provided with pipe-borne water to urban areas; 3% use deep wells and 8% use shallow wells.
- 32% of industrial waste water is treated and released to environment.
- At present pipe-borne sewerage covers 3%; it is expected to expand up to 7% by 2020 in urban areas.
- We do not have secure storage of rain water to supply urban water requirements; cultural barriers/ inhibitions are constraints to use of collected water for drinking.
- Government has plans to construct 14 major water supply projects to increase water supply in main townships by 2020.
- Challenge-Low waste water management practices. Cultural barriers to use of treated waste water.

Urban Water Security Progress and Success Stories

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Urban Water Security Progress and Success Stories

- Historical and traditional environmentally friendly cultural practices bound with minimum disturbance to the watershed.
- Illegal expansion /encroachment in agriculture in hilly areas have negatively impacted on main watersheds of the country.
- Effort to mitigate the negative effects to the watersheds through legal institutional and administrative means.
- Watershed Management Policy was accepted by government in 1994.
- In 1980, government passed the National Environment Act ,again revised in 2000 to strengthen the legal framework for sustainable environment management
- Environmental aspects when constructing irrigation facilities (fish ladders, maintaining minimum water flow , animal crossings etc)
- EIA and SIA process is followed to minimize adverse environmental effects.
- Tank and Anicut (wier) system built throughout the country support agriculture and environment; historically some of these tanks were built to conserve water only for ground water recharge and environmental purposes.

1.4How can Indigenous Knowledge and modern technology work towards resiliency in the water sector

Adaptation is multidimensional process and phenomenon and it could be focused / based on single or multiple issues. The adaptation-resilience strategies are multi-disciplinary,complex and changing.Adaptation options should address both the physical and social vulnerability in order to be sustainable. Adaptation capacity is made up of range of livelihood assets and strategies including the formal policies. Technology is a part of Capacity and knowledge and technology are in the same systemAdaptation Technologies could be hardware andsoftware tools, methodologies and approaches.Indigenous Knowledgeincludes local actors, needs, experiences, available opportunities, means, technology and collective actions in a given context and the knowledge and the technologies are in the same system.Community havealready been adaptingto climate change andclimate variability forcenturies. It is important to knowwhat those localexisting adaptationstrategies are and howrobust they are in thechanging context in order to use them.Climate predictions should not be the central tool to guide adaptation to climate change. There should be enough emphasis to focus on existing vulnerabilities and the real causes of vulnerability in a context of change where climate change is one driver among others. Therefore Community Based Adaptation(CBA) as a bottom-up and 'place-based' approach to adaptation should be given due consideration. CBA begins by identifying areas and communities that are most vulnerable to climate risk, and then uses the best available science on climate induced impacts to engage with vulnerable groups (Huq & Reid, 2007).Appropriate integration, mix, build-on of indigenous and modern knowledge and technologies are needed for sustainable climate resiliency. Weather and climatic systems, awareness development, early warning systems and real-time forecasting, monitoring for impacts and adaptation planning needs integration. Enhanced research, development and access to area specific adaptive technologies rooted on indigenous knowledge and capacity but with modern improvements is the way forward to climate resiliency.

Comparison of Indigenous Knowledge and Modern Technology

Indigenous technology	**Modern technology**
Low capital intensity,	High cost
Sustainable (environment and ecology-friendly)	Low labor
Location and site specific	Adaptable to wide areas
Low mobility	High mobility
Low productivity (limited to only few practices not whole system package)	Dramatic impact

Benefits from local knowledge can only be achieved with modern scientific and technical knowledge Science and technology validates and upgrades indigenous knowledge and drives modernization. Sustainable approach to modern technology innovation thus springs from a realization that sustainable adoption will be based from a mechanism where the 'professionals' first learn from the 'practitioners' before suggesting improvements. Research achieves greatest pay-offs when they are based on a strong base of indigenous technology

Dams, ponds, tanks, rain water harvesting, improved irrigation systems, water conveyance systems, energy sources development, inter-basin water transfers, desalination, drainage, levees, terraces and contour farming, shallow and deep tube wells, surface system linings, treadle pumps, bucket drip systems, ceramic pot technology, fog harvesting are Infrastructure, machinery and equipment that for climate change resiliency in agricultural water management

1.4.1Knowledge, skills and practices –

The following questions needs answers before the adaptation technologies are selected introduced. Adaptation for whom?for what? to what? What are the tradeoffs?

Helmalu (Cascade) system In Hilly Terrain in Sri Lanka Central Province

Two types of chang-ghar (house on stilts of the Mishing community): left, the original design of bamboo and wood; right, wealthier households invest in concrete to make higher stilts

1.4.2 Examples of Good Practices of Climate Resiliency (Adaptation Technologies and Adaptation Capacities)

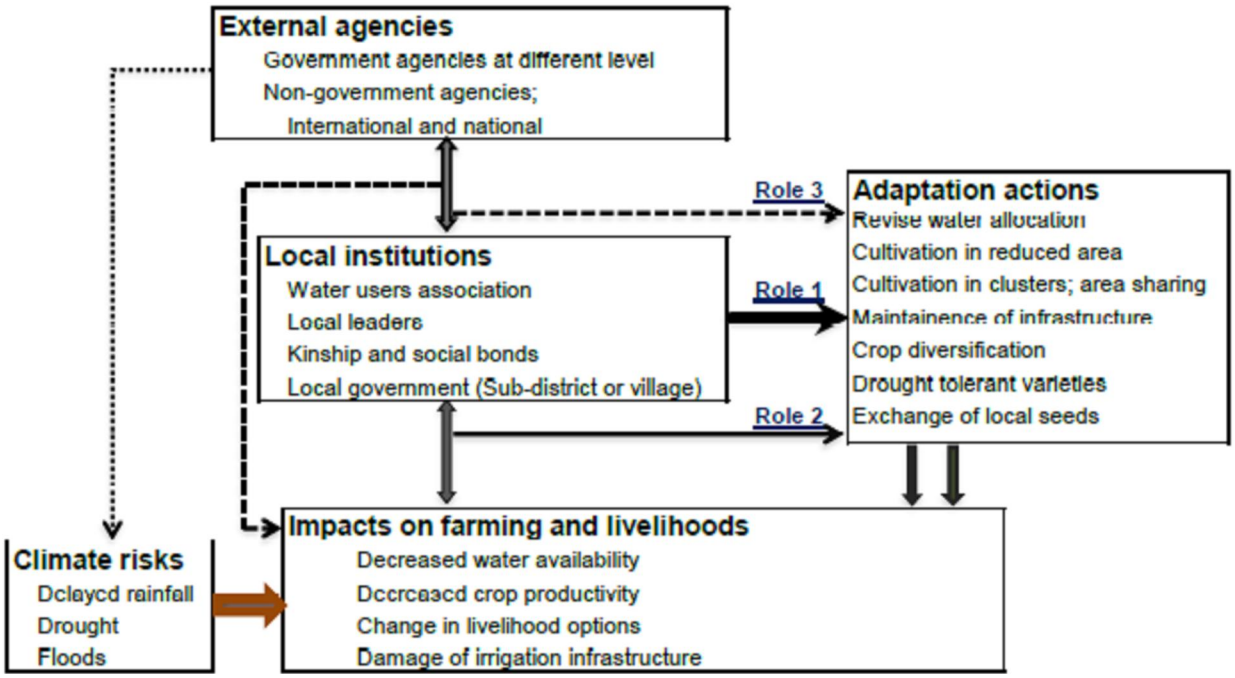
Social Capital

How the social capital built around irrigation system could help adapt to the climatic variability?

Institutional responses

Local institutions

Local institutions facilitate adaptation in different ways



Water Users' Association (WUA) responsible for management and deal with external disturbances

- WUAs (mainly in FMIS) can mobilize users for quick response, eg, repair flood-damaged infrastructure
- Local leaders facilitate water allocation in case of shortage (observed in Thailand)
- Local administration [eg TAO in Thailand] play crucial role in establishing link with external agencies

1.5Coherent Policies or Strategies and Institutional Framework

Local responses are influenced by wider trends, processes and pressures, in particular larger policy and market contexts. Therefore, it is important to understand the role of policies in influencing how people are supported (or not) in their efforts to deal with climate change.

The risk of floods and their impact on people's income and livelihood options have made public and private agencies cautious of bringing services. Vulnerability to climate change reduces access to systems, services and institutions that coulddecrease adaptive capacity, creating a potential downward spiral of increasing vulnerability.Remittances are known to be a relatively stable source of household incomeduring natural disasters, financial crises, and armed conflicts. In this way,labour migration and remittances 'moderate the harm' caused by water. Remittances from labour migration have a significant impact on the quality of life of recipient households and on their ability to respond.

Policy advocacy at the head of the state level is an important driver for any regional level adaptation initiatives. SAARC could be a lead in galvanizing sincerity of various stakeholders.System of taking stocks on the agreed actions is required for successful implementation.

1.6 Gaps and Challenges – Recommendations

National and local capacities on adaptation technologies needs improvement. Regional resources (funds, expertise, capacity) needs to be mobilized to build the national, sub national and community level expertise and capacityfor effective adaptation.

Dissemination of information on climate change impacts, knowledge, skills and practices to farmers and grass root level stakeholders needs improvement.

As climatic conditions change, people are testing new approaches, some contribute to increased adaptive capacity, which are not sufficiently captured to be communicated to other beneficiaries.

Cultural norms affect people's adaptive behaviour; despite being deeply rooted, they can shift over time in response to the needs.

1.7 Conclusions

Climate science and the projections of its various impacts are at an early stage of development in the region. Yet South Asia is among the most data-rich regions of the developing world and is well endowed with considerable analytical capacity for providing policy inputs – a capacity that has yet to be fully mobilized for effective policy and institutional responses.

References