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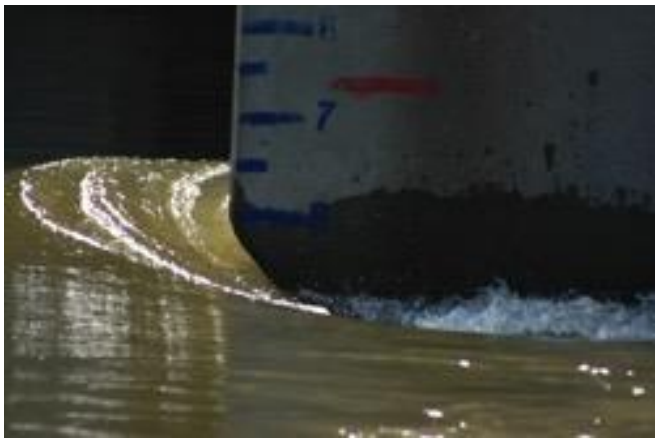
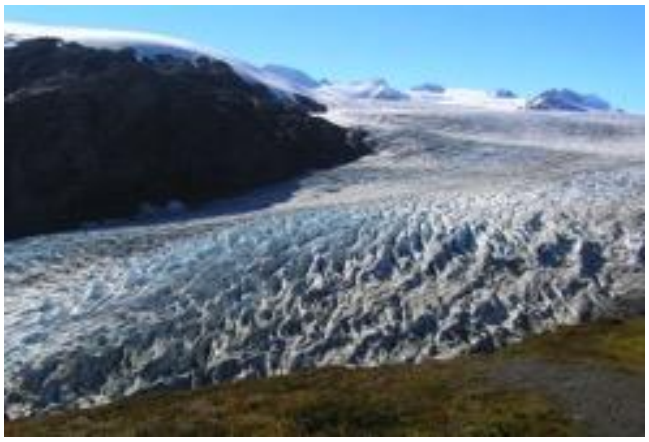
South Asia Water Initiative

Final Report for Regional Conference on Risks and Solutions: Adaptation Frameworks for Water Resources Planning, Development and Management in South Asia

Hilton, Colombo, Sri Lanka 12th-13th July 2016





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Background

Over 65 water resource and climate change experts, scientists and policy makers from Afghanistan, Bangladesh, Bhutan, China, India, Nepal, Pakistan and Sri Lanka convened at the Hilton, Colombo, on July 12 - 13, 2016, to discuss adaptation frameworks and strategies necessary to respond to the water resources related risks of climate change South Asia[1].

Jointly organized by Dr. Alan Nicol of IWMI and Dr. Rafik Hirji of the World Bank, this South Asia Water Initiative funded meeting was inaugurated by H.E. Dr. Sarath Amunugama (Minister of Special Assignments, Sri Lanka). Also in attendance at the opening were Dr. Jeremy Bird (Director General of IWMI), Ms. Rolande Pryce of the World Bank, and Professor Mohan Munasinghe (Chairman and Founder of MIND), who gave the opening address.

To support core ideas, inform discussions and achieve feedback from participants, three diagnostic papers were presented by Dr. Guillaume Lacombe of IWMI (Paper 1), Dr. Richard Davis of the World Bank (Paper 2), and Mr. Sanjiv de Silva of IWMI (Paper 3), respectively, the knowledge landscape, policy landscape and institutional and economic landscape relevant to climate adaptation and water resources management and planning in South Asia. Dr. Casey Brown (University of Massachusetts Amherst) and Dr. Aris Georgakakos (Georgia Water Resources Institute) presented on the decision tree framework and the Rufiji Basin case study, respectively, provided important comparative perspectives.

Following the meeting, a field trip took place to the Kelani River near Colombo, providing delegates the opportunity to understand more about current water management practices and the impacts of recent flooding.

During the two-day meeting, discussions were supported by comprehensive communication and outreach activities, including video interviews and live tweeting. This resulted in over 38,000 impressions on Twitter and over 234,000 people reached.

A copy of the concept note, agenda and full list of participants can be found in the Appendices. For full information on the conference, including social media and access to presentations given, please visit the conference link – http://goo.gl/YuJuYO.

[1] This report was authored by Alan Nicol (IWMI), Christopher Patacsil (IWMI), Rafik Hirji (World Bank), Indika Arulingam (IWMI), and Nitasha Nair (IWMI).

1 Day 1, Opening Session: Introductions

Fig.1. Opening Session: (L to R) - Ms. Rolande Pryce, Mr. Jeremy Bird, HE Dr. Sarath Amunugama, Prof Mohan Munasinghe, Dr. Rafik Hirji, Dr. Alan Nicol (Photo: IWMI).

1.1 *INTRODUCTION* CHAIR MR. JEREMY BIRD, DIRECTOR GENERAL, IWMI

Director General Bird welcomed guests to the conference, describing it as a timely meeting and one that was important for setting priorities for implementation at a time when the reminders of climate change, such as flooding and landslides, are ever-present. He echoed wider sentiment in the room that participants were eager to examine and learn from shared experiences under the World Bank and SAWI initiatives. He urged attendees to look at the variable impacts at an individual level and make sure that they responded to the needs of people in affected and potentially-affected communities.

1.2 *WELCOME REMARKS BY THE WORLD BANK* MS. ROLANDE PRYCE, OPERATIONS ADVISOR-SRI LANKA, WORLD BANK

Ms. Pryce spoke about the historical importance of water to Sri Lanka and highlighted the fact that the island nation could both offer and learn lessons in relation to the South Asia experience. She highlighted that the World Bank was pleased to partner with IWMI to help find ways to safeguard the poor who are disproportionately affected by water insecurity. The Climate Change Action Plan agreed upon earlier this year commits potentially $29 billion per year for climate projects by 2020, involving urban resilience, early warning systems, and climate-smart agricultural investment plans.

1.3 *REGIONAL CONTEXT AND CONFERENCE OBJECTIVES* DR. RAFIK HIRJI, TEAM LEADER, WORLD BANK/ DR. ALAN NICOL, THEME LEADER, IWMI

The two organizers of the conference presented the regional context of the conference including the primary and secondary effects of climate change on South Asia's water resources and the conference objectives and the proposed adaptation framework for addressing climate risks for water resources in South Asia and spoke about the need for dialogue and clear policy

frameworks, which was the core objective of the meeting. They emphasized how many countries in the region had adopted (and adapted) IWRM principles, but that implementation was far from adequate, and that water management was often about addressing variability and uncertainties in the context of constant (and growing) need (and demand). The agenda followed a review of current knowledge, working groups and in-depth analyses of the major issues.

1.4 IS SOUTH ASIA'S WATER SECTOR RESILIENT ENOUGH TO ADAPT TO CLIMATE CHANGE AND ACHIEVE THE SDGS? (PROFESSOR MOHAN MUNASINGHE, FOUNDER CHAIRMAN OF MIND)

Professor Munasinghe, formerly a Vice Chair of the UN Intergovernmental Panel on Climate Change (IPCC-AR4) and co-recipient of the 2007 Nobel Prize for Peace, described climate change as the ultimate threat multiplier that would only exacerbate water vulnerability, particularly given our current over-use of resources. Professor Munasinghe highlighted the fact that 6-8 million people die from water related diseases per year, and that Asia and Africa were by far worse off in terms of water scarcity due to high variability. Agriculture, he said, consumes more and more water year after year, and yet some regions still suffered food scarcity. Governance was an issue, and he expressed disappointment at disorganized local-level interventions—a lot of money was being invested in the sustainable development goals, he said, but water cost recovery was low, as was needed investment.

Wealthy people earned more than 85% of the world's income, and wealthy nations disproportionately contributed to climate change as income is directly correlated with carbon emissions, he explained. He urged the empowerment of the public and more engagement with the private sector to bring them in to water management. He called this "sustainanomics" to emphasize how sustainability depends on the economic, ecological, and the social dimensions equally, positing a concept of sustainable water resources management as a key concept for the future.

1.5 *KEYNOTE 1: GUEST OF HONOR* H.E. DR. SARATH AMUNUGAMA, MINISTER FOR SPECIAL ASSIGNMENTS, GOVERNMENT OF SRI LANKA

Minister Amunugama remarked how well-timed this conference was, as the dangers of a changing environment were more apparent than ever. In the past, South Asia was not vulnerable to climate, but times had changed. If leaders had known about the toll and the damage of a disaster like the 2004 tsunami, they would have been more prepared, he said. Water remained a vital resource, central to South Asian economies. Countries had become more energy dependent, heightening dependence on water; for example, Sri Lanka generates 30-35% of its power from hydroelectricity.

Urbanization drew large movements of people toward big cities, he stated, which meant better information systems and infrastructure were needed, adding that there had been a history of countries unwilling to share information, and striking out on their own to reinvent the wheel when it came to water management. There have been huge improvements in the economies of China, India, Sri Lanka, and Bangladesh. Today Asia is the driver of growth, but it is screeching

to a halt and countries need to rethink their strategies together, and not take the path of the UK and Brexit. He encouraged scientists and leaders from all of the countries within South Asia to work together and find solutions for large groups of people.

1.6 COUNTRY PERSPECTIVES

Selected country participants were invited to provide very short initial opening remarks from their respective national perspectives.

Afghanistan (Mr. Said Shakib Atef, Ministry of Energy and Water): A country ravaged by both floods and droughts, Afghanistan lacks infrastructure in key areas to enable adaptation to these extremes, he said. He then described how the government was finalizing a national adaptation plan to mitigate the effects of climate change, having already put into place more than 20 policies. These covered areas including poverty reduction, protection of wetlands, disaster reduction, protection of biodiversity, as well as legal frameworks.

Bangladesh (Dr. Ahsan Uddin Ahmed, Executive Director, Centre for Global Change (CGC)): Citing a study by National Geographic, Dr. Muhammad described how Bangladesh was one of the most vulnerable countries to extreme events—over 50% of the country was within 10m of mean sea level. Combined factors including oceanic temperature increase of 0.55 degrees Celsius, sedimentation, low flows and salinity increases had all affected livelihoods in the country. Women, in particular, he said, bore the brunt of climate change due to processes including the gradual feminization of agriculture. The economy was growing, he said, and the government had framed plans and invested considerable financial resources in mitigating the impacts of climate change.

Bhutan (Mr. Karma Dupchu, Department of Energy, Ministry of Economic Affairs): Although endowed with considerable water per capita, Bhutan faces increasing water demand from agriculture and hydropower, which represents over 40% of GDP. Seasonal water shortages and increased sedimentation posed a constant threat to Bhutan, he stated. Some 70% of the country's settlements are along watercourses and so were vulnerable to GLOF, or Glacial Lakes Outburst Flooding. IWRM is promoted by many, but success in implementation had been limited to date, which is why good governance was needed, he said.

China (Prof. Zhao Chengyi, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences (CAS)): China will be one of the countries most affected by climate change, due to its size and diverse environmental conditions, particularly in the South and East, he stated. There were several ways in which the country's GDP was affected, including the impact of floods, droughts, and tropical cyclones. The government was undertaking different approaches to adaptation, Prof. Zhao Chengyi stated, including surface and underground engineering projects, and improvements to flow storage.

India (Dr. Amita Prasad, Ministry of Environments, Forests and Climate Change): Groundwater accounts for over 50% of agricultural water use in India. Dr. Amita Prasad described how 67%

of India's geographical area had a history of droughts and that integrated river basin planning was key to the protection of irrigation, surface water, and groundwater management. The government spent 30% of its money on the restoration of water resources, to help store water from the 60 wet days per year that India experienced, she said. National resilience and drought mitigation programs were in place, led by the Ministry of Water Resources, River Development, and Ganga Rejuvenation. However, it was important to not become focused exclusively on figures and data—community involvement was also key to effective water management, she said.

Nepal (Mr. Madhav Belbase, Ministry of Irrigation): Large seasonal variation of flows meant that water supplies were not reliable and people often migrated because springs dried up, Mr. Madhav Belbase stated. Landslides, droughts and floods resulted in sediment deposition that had caused loss of livelihoods and large displacements of people. Food security had been greatly threatened. The Nepalese government was enacting new laws to mitigate disaster, he stated. He stress that sharing information across the region would be vital in filling knowledge gaps.

Pakistan (Dr. Muhammad Nadeem Javaid, Ministry of Planning and Dev Reform): Dr. Muhammad Nadeem Javaid described how per capita water availability was just 1,100m3 today; by 2020, that number could be as low as 850m3. Since the 1980s, the very water-intensive sugar industry had been an important factor undermining water security. Government subsidies encouraged the export of sugar, which consumes large amounts of water. On the plus side, Pakistan was one of the first countries to integrate SDGs into its national policy framework and most provinces had been encouraged to adopt this framework, he said. The government hoped that water pricing and other economic initiatives would help deal with future water scarcity challenges, he said.

Sri Lanka (Dr. S Pathmarajah, University of Peradeniya): Dr. S. Pathmarajah warned of the limits to existing adaptation mechanisms. Climate change had rendered traditional strategies obsolete, and farmers were losing a lot of productive water as a result, he said. There was no well-known basket of adaptation mechanisms; governments might have adaptation options, but in the field, farmers did not have many of the required tools. Information transfer was therefore not perfect. People needed proper response mechanisms for the short term, in addition to longer-term solutions, he stated.

2 Day 1, Session 1: Knowledge and Decision-making Landscapes

2.1 KEYNOTE 2: THE DECISION TREE FRAMEWORK: BEYOND DOWNSCALING TO CLIMATE-INFORMED DECISIONS PROFESSOR CASEY BROWN, UNIVERSITY OF MASSACHUSETTS AMHERST

Professor Brown presented the decision tree framework—a tool for helping decision-makers to use often complicated and conflicting climate information to make investment choices. The framework is designed to clearly evaluate the risks projects face from climate change as well as other potentially significant factors. The stepwise process involves a systematic sensitivity analysis, a climate stress test, and an assessment of the level of risk based on the best climate science. Examples of the framework's use in Kenya and Nepal were also presented.

Fig. 2 Prof. Casey Brown (left) and Dr. Guillaume Lacombe (right) presenting (Photos: IWMI).

Thoughts forwarded during the questions included whether this approach for individual projects could be combined with a more adaptable and system-based approach, how the decision tree could be integrated into policy, and how to define what success/failure of a project actually entailed

A member of the Bangladeshi delegation noted that Dr. Brown's model used a small basin, but wondered how it would handle a large basin with much greater variability. Dr. Brown replied that it was true that you could have different climate change patterns in different parts of a basin. For example, in Sierra Nevada, the mountains were actually warming more quickly than the lower areas, so they needed to take that into account. He recommended first assessing whether the region could be modeled uniformly or if it needed to be further disaggregated.

When asked about how to keep the temperature from increasing from 1.5 degrees Celsius to 2 degrees Celsius, Dr. Brown replied that while the rise in temperature was a pressing issue, water management should be the center point of discussion because he was confident that with good water management systems, the world would be able to handle even a 2 degree Celsius increase. The discussion then turned to flexibility and how well the decision tree framework would be able

to cope with stresses. Dr. Brown described climate risk-informed decision analysis (CRIDA) and adaptation pathways that allowed for changing one's course as a policy maker, incrementally.

In the following section authors of three diagnostic papers presented to participants.

2.2 PAPER 1: CLIMATE CHANGE SCIENCE, KNOWLEDGE AND IMPACTS ON WATER RESOURCES IN SOUTH ASIA DR. GUILLAUME LACOMBE, IWMI

The presentation reviewed climate change by examining the variability, trends, and drivers of water resources, its associated risks, the certainties and uncertainties of climate change and water resources, and, finally, knowledge gaps and recommendations. The presentation echoed Dr. Brown's presentation in that although there are a lot of models, trend analyses can be filled with inconsistencies due to the variety of tests, statistical levels, and time periods analyzed. Predictions depend on models and scenarios, but one needed to refer to the most updated model such as the Couple Model Intercomparison Project (CMIP5), otherwise there was a lot of uncertainty about the kind and extent of climate change to affect the South Asia region, Dr. Lacombe stated.

It was certain, however, that water resources that are vital to the public and the economy are endangered all across South Asia: 25% of the world's population live there, but they only had access to 5% of global water resources, he stated. Growing agricultural, domestic and industrial demands were soaking up water, and this dependence was threatened by climate change. More than half of South Asia was drained by two major river basins with very different hydrologies—the Indus and the Ganges-Brahmaputra-Meghna Basins. Key challenges in these basins included arsenic and fluoride contamination, as well sediment deposition, etc.

The paper recommended more hydro-meteorological data from ground measurements to understand surface-groundwater interactions, improved techniques for crop water use efficiency/productivity, as well as capacity building, communicating, and coordinating actions with local communities.

Questions raised included whether climate models could relate to various microclimates from mountainous Nepal to landlocked Afghanistan and if climate trends were standardized, would it be possible to talk about the attribution of them to both anthropogenic and natural causes. The question of wow well reservoirs protected countries and communities from climate change was also posed.

Comments included the need to further verify data presented on safe drinking water access, e.g. in relation to Pakistan and that groundwater assessment and monitoring should be given priority. Similar to flood early warning, drought early warning should also be included in the paper. Other comments suggested that country-level reports could be studied and standard protocols for

assessment provided. Finally, information on the scale of data metrics concerning recharge rates of the basins, elevation gradients, and mass to ice balance changes should be mentioned.

2.3 *PAPER 2: WATER AND CLIMATE POLICY AND PLANNING* DR RICHARD DAVIS, CONSULTANT, WOLRD BANK

This paper assessed the shape of national water management policies in South Asia in the face of climate change through an evaluation of existing policy documents. This desk study distinguished between water-specific and climate change-specific governmental outputs and determined the extent to which the two themes had been integrated.

Fig.3 Dr. Richard Davis (Consultant) presenting Diagnostic Paper Two. (Photo: IWMI)

Follow-up comments explored whether further analysis might include the actual implementation of these policies and activities on the ground and how other policies had an impact on, but were not directly related to, water resource use, as well as the disconnect between different sectors dealing with water.

Feedback on the presentation highlighted that the use-value of the report was compromised by lack of analysis on the implementation side. The status of implementation was very important to understand where countries are and where they would like to be – analysing policies just by reading them was different to understanding them in practice.

Another aspect highlighted was the requirement for analysis of the institutional setup. The delegate gave the example of Nepal, where different organisations were dealing with the subject of water. He pointed out that there was a lack of a coordinated approach in forming policies

around water and that the authors should look into this. A Pakistani delegate pointed out that the report should also include two relevant legislations passed in the country – The Pakistan Environmental Protection Act 1997, and the Pakistan Water and Power Development Authority Act of 1958 for water resources management.

Other suggestions for the second phase which were raised included transferring of knowledge down to the community level, having a data repository for each country, looking at policies which outwardly did not talk about water but were in some ways interlinked. It was also suggested that inter-ministerial meetings should be held to promote regional cooperation on water issues, and even that suggestions presented in the paper can be turned into regional policy.

3 Day 1, Session 2: Economic and Institutional Landscapes

3.1 *PAPER 3: ECONOMIC AND INSTITUTIONAL LANDSCAPES* MR. SANJIV DE SILVA, IWMI

The presentation by Mr. De Silva highlighted the adaptation gap, i.e. the difference between adaptation costs and adaptation finances that existed within water-stressed countries. It sought to answer how well the costs of climate change and adaptation were understood, as well as determine which institutional arrangements existed for decision making with respect to adaptation responses.

South Asia consists of some of the fastest growing economies where agriculture accounts for at least 50% of employment. This growth, however, masked high vulnerability, and defining the situation in terms of GDP simplified what countries had at stake. Except for Bangladesh and India, all other countries in South Asia relied heavily on external finance, he stated.

There were issues with mainstreaming and tracking adaptation finance, and although there may be coordination structures for integrated water resource management, there was very little in practice. Technological and financial planning remained centralized in all countries, which undermined local and specific stakeholder voices, de Silva argued. Moreover, water management continued to be driven by traditional sector needs (i.e. water for hydropower), and in order to achieve sustainability, cross-sectoral integration, capacity building, and collaboration in planning was necessary.

Fig.4 Mr. Sanjiv de Silva (IWMI) Presenting Paper 3 (Photo: IWMI).

In order to improve adaptation, more nuanced information about local risk, allocation, and accountability, as well as international cooperation, were necessary to protect the public, and particularly the poorer populations that are disproportionately affected, he stated. Similarly, there needed to be a government commitment that viewed adaptation as mission-critical to overall development.

Some of the questions raised included how to operationalize regional cooperation potential involving national and regional institutions and how countries should approach the issue of gender-based adaptation since women faced different types of challenges to men in some contexts. Mr. de Silva agreed that more needed to be done to better understand the implications for women, as IWMI had undertaken only a few studies in Bangladesh. If and when the project moved on to Phase 2, then it would be more properly considered, he suggested. A Nepal delegate stressed that more infrastructure was needed at the local level, since the impact was inherently local, while taking budget constraints into consideration.

It was recommended that the costs of non-adaptation should be included in order to make the decision even simpler for politicians when deciding on whether to follow through on adaptation frameworks. In addition, it was suggested that the issue of water rights should be included in the paper, as well as the role of NGOs, INGOs, and PPPs.

3.2 DAY 1, SUMMARY: DR. RAFIK HIRJI, WORLD BANK

Dr. Casey Brown's presentation proved that we must talk more about management, not just about risks of climate change, Dr. Rafik Hirji stated in his summary of Day 1. South Asia's climate impacts are diverse geographically, they extend from HKH glaciers to coastal areas and from major cities to rural areas. Climate change will accentuate existing water management issues - deficits in sanitation and water supply coverage, and irrigation, hydropower and flood and

drought management needs, and water resource development and management in general, including water allocation, resource protection and resource planning.

Climate change adaptation does not call for a new way or management – just better management, in large part because it entails a wide range of options related to good water resources management. Climate change adaptation underscores will also need to focus attention on groundwater, which has been relatively neglected in policy and planning and remains poorly managed. Groundwater management will be increasingly important with climate change. It will also require addressing two new issues – addressing coastal water contamination resulting from sea level rise and the need to incorporate non stationarity into modelling and management, including design standards. Some climate risks such as flooding, droughts and sea level rise may be regional at their core, and will require increased regional cooperation amongst nations sharing common water resources.

Day 2 would be about discussing what is actionable, including a good practice example of how climate change considerations are integrated in the preparation of a river basin plan. Participants would also work on climate risk analysis and national adaptation frameworks in groups.

Fig.5 Group Photo Day 1 (top); Dr. Ajaya Dixit greeting H.E. Minister Dr. Sarath Amunugama (bottom left); Dr Alan Nicol (IWMI) (right centre); Dr Rafik Hirji (World Bank) (bottom right) (All photos: IWMI)

4 Day 2, Session 3: From Theory to Practice

Recap of Day 1 and Introduction to Day 2 Dr. Alan Nicol, IWMI

During Day 1, the conference discussed a range of different ways of conceptualizing the challenge of water management in South Asia in relation to climate change adaptation. South Asia needed both adaptation and transformation, and not just at the national level, but also at a transboundary level. Governments should not be too technocratic because they needed to reach out to people as well. A landscape mapping of knowledge, policy, institutions and economic/financing issues could assist in understanding potential options and future direction, Dr. Nicol stated.

4.1 KEYNOTE 3: INTEGRATING CLIMATE ADAPTATION AT BASIN SCALE, THE RUFIJI BASIN EXAMPLE, TANZANIA; WATER RESOURCES MANAGEMENT AND CLIMATE CHANGE: A CHALLENGE WITH A SILVER LINING (DR. ARIS GEORGAKAKOS, GEORGIA WATER RESOURCES INSTITUTE)

Dr. Aris Georgakakos described the water management challenges and solutions in the Rufiji Basin of Tanzania, which covers 20% of Tanzania. The basin was very important in both economic and social spheres, he stated, due to its support of rice, maize, and power generation. In common with many places in South Asia, there were multiple water security issues in combination with poor management and monitoring networks, and insufficient technical capacity for IWRM. Every project, he suggested, needed to answer the questions: can the available water resources support the water use targets and is the infrastructure good enough to support these developments?

The presentation highlighted the need to understand sectorial and regional stresses and conflicts; for example, there was a huge gap between demand and supply of water, such that by 2035, the government will have permitted 82% of flow to be used for development, which was dangerously high and unsustainable. He noted a huge disconnect between national plans and local water supplies, and the necessity of stakeholder participation. For example, Ruaha National Park has a flow below the natural minimum 45% of the time and flow stoppage 20% of the time due to wetland disruption and irrigation.

Dr. Georgakakos noted that although there may be uncertainties in models, scientists and policy makers should not stall in taking action; and rather than taking averages of the predictions, they should instead paint scenarios. He stressed the need to take a bottom-up approach to IWRM, where one starts with basin-level assessments to understand the local context, and then sectorial and local plans carried out by local governmental authorities to follow up on implementation strategies to which they are made accountable. In order to cement IWRM into law, comprehensive policy and legal frameworks are necessary.

Questions asked included how to account for biomass change and evapotranspiration as bio-stressors/indicators. There was a brief discussion about hydrological conditions following a

question by the Bangladeshi delegation about comparing future flows to baseline numbers in order to see an effect. A good point was raised about how migration from rural to urban environments could be related to stresses on the basin. Dr. Georgakakos urged the need to manage both above- and below-ground water levels to meet environmental flows; there was no need to modify plans and risk taking too much of the mean flow. Protective laws needed to be applied now to protect stakeholders and the environment alike.

4.2 GROUP DISCUSSION—CLIMATE RISK ANALYSIS

The participants then undertook thematic group discussions on climate risk analysis in order to assess and unpack the elements of risk, outline a framework for a range of potential responses, and work towards a set of best practice guidelines.

Fig. 6 Group work, Day 2 (Photo: IWMI).

Group 1 Output: Inland Flooding (Urban Flood, Monsoon River Floods, Flash Flood & Landslides, Cloud Outburst Floods, and Reservoir-Induced Floods)

The elements of risk included both climactic (e.g. heavy rainfall, high temperature and glacial melting, cloud-burst) and non-climactic drivers (e.g. deforestation, land-use change, anthropogenic factors). The framework for potential responses included the collection of observations (both spatial and temporal data), early warning systems for communities, as well as flood plain zoning, flood insurance and evacuation plans. Engaging with the disaster management committees at every level (national, regional, local), in addition to establishing a flood forecasting/warning dissemination center could be vital for countries.

In the long term, wetland restoration, effective legislation, community risk assessments, and observations were all important for inland flooding. In the short term, flood forecasting, early

warning systems, crop insurance/compensation, and drainage improvements for vehicles were also important.

Group 2 Output: GLOF—Glacial lakes outburst flooding

These are floods related to the bursting of lakes formed either by advancing glaciers and/or the blocking of side streams. The climate drivers include warming, heat-waves, and heavy precipitation. The non-climatic drivers include tremors, thin debris (< 5cm), carbon soot, Himalayan geology, surface slope (if < 2 degrees), as it helps in accumulation of supra-glacial lakes, and aspect (southern facing glaciers receive more solar radiation).

Key responses include creating a database for observations and transboundary information, hazard mapping of potentially dangerous lakes, and an automatic early warning system. Community awareness programs that incorporate indigenous knowledge and sharing information from advanced to less developed countries is important for the safety of regions.

Group 3 Output: Droughts

Droughts are a complex but slow-onset hazard that allows time for mitigation and preparedness. Precipitation and temperature are the main climatic drivers, whereas land use, management practices, industrial effluents, and irrigation are the main non-climatic drivers. Existing response networks include SASCOF (South Asian Climate Outlook Forum), as well as national, state, district and community-level practices. In order to improve responsiveness, there should be forecasting, advisory, and monitoring systems. There should also be ICT based basin-level authority for planning and management, and finally capacity building for all stakeholders.

Best practices, in addition to the improvements above, would include drought vulnerability mapping under climate change scenarios at suitable authority level, drought monitoring at regional level, and response planning/management. The integration of technological, management and institutional interventions could be beneficial, in addition to the formation of regional-level groups to assist in drought monitoring.

Group 4: Sea-level rise/Coastal Flooding

Major water sources could be affected by sea-level rise/coastal flooding: freshwater, including groundwater, could be affected by saltwater intrusion, damaging supplies for drinking water, agriculture, and aquaculture.

The main drivers are climate-related, including wind speeds, storm surge, and sea-level rises. At risk are coastal infrastructures and industries, ports, agriculture, and aquaculture.

The framework of responses includes the relocation of industries, increasing freshwater flow, zoning, and forestry, which are national interventions that are more long-term. Selecting suitable species, alternating crop varieties, bed management and drip irrigation are interventions that can be undertaken at the local-level immediately.

Responses need to take a top-down approach that is data-driven. Therefore observations and data sharing among countries is necessary, especially since each country has shared climate zones in addition to its own distinct characteristics. Developing risk maps of the region to determine sensitivity will aid disaster management. By planning potential costs, countries could prioritize the order of response by money and effectiveness, and a regional trust fund could provide the necessary resources. Moreover, at the community level, groups should assess social effects of disaster that range from violence to theft, in order to best protect against them. Finally sharing best practices that incorporate indigenous knowledge and creating a community ladder for early warning systems can engage and empower citizens.

5 Day 2, Session 4: Towards National WRM and Climate Adaptation Frameworks

Key points arising from Country Adaptation Framework Groups[2]

The delegates split into country-specific groups to discuss risks, barriers and solutions. There were many commonalities in the identified risks (flooding, drought, river degradation, landslides, sedimentation, and extreme events) and also some more country-specific risks such as salinity intrusion (Bangladesh), GLOF (Bhutan, India, and Nepal), uncertainty about climate change at high altitudes (Pakistan), and sea-level rise (India, Bangladesh).

Barriers mentioned included financial and technological constraints, lack of political commitment and transboundary coordination, as well as limited public awareness. In addition to that, harsh terrain, weak forecasting, and land acquisitions also served as barriers. Together, these resulted in poor coordination between agencies and limited data collection and sharing.

The required institutional, technical, and infrastructural changes to overcome these barriers varied from country to country. However, the solutions offered commonly involved increased cooperation, capacity building, data collection and sharing, innovation, knowledge dissemination and policy evaluation.

The specific country adaptation frameworks presented included the following:

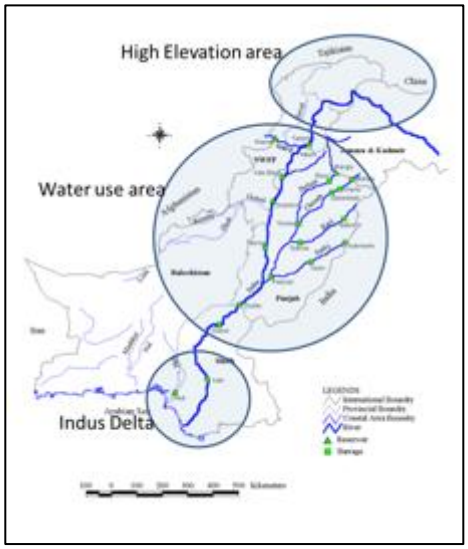
[2] Note, China did not form a group for the purposes of this exercise.

Afghanistan: In order to overcome the financial, environmental, and social obstacles that Afghanistan faces, their delegation first proposed vulnerability assessments to flood and drought. With proper data, mapping, and modeling, policy makers will be better equipped to monitor and manage the country's water and land use. Now, there are issues due to technological constraints and land acquisition, but the coordination between key agencies can provide the solution. The Afghani delegation recommended the establishment of a hydro-meteorological station to collect data to help assess glaciers and climate change impacts on ground water. Early warning systems would go a long way to assist the public, as well as proper communication of policies so that local people are aware of the tools available to help ensure their food security is drought-proofed. They also recommended training programs, proper infrastructure, the construction of reservoirs and water harvesting structures as well as crop diversification and drought resilient cropping. In addition to engaging the regional communities, the Afghani delegation reiterated the common need to talk about transboundary river basin management across nations to support the cause of South Asian water security.

Bangladesh: The five priority risks identified for Bangladesh include sea-level rise, cyclone and storm surge, tidal and monsoon flooding, salinity intrusion and urban flooding, water logging and river bank intrusion. Adaptive responses to each were presented, followed by barriers and constraints that have to be overcome. Ways of overcoming these included, among others, strengthening institutional capacity and coordination, improving regional cooperation in tacking these issues, suitable technology use and transfer (including of ICT), and obtaining the necessary financing.

Bhutan: In order to better implement IWRM to increase resilience to the impacts of climate change on water security, Bhutan aims to increase water resources monitoring, assessment and mapping for the sake of early warning systems and protection against GLOFs, adopt and diffuse appropriate technologies for water harvesting and efficiency to reduce dependence on hydroelectric power, and to promote climate resilient household water supply and sanitation. With respect to agriculture, Bhutan plans on making agriculture climate resilient by developing and introducing diverse crops varieties and pest controls, initiating crop insurance programs against climate-induced extremes, and establishing cold storage facilities at sub-national regions. With more data and information readily available, policy makers will be able to develop climate change scenarios and proper solutions to be communicated country-wide. Bhutan looks forward to making use of ICT-based technologies to share information, to improve HRD capacity in IWRM, and to educate politicians, local governments and communities on climate change, climate impacts, and how water resource management can help.

India: The top priority identified by the Indian team was vulnerability and risk mapping under climate change scenarios at appropriate scales for floods, GLOF, droughts, sea level rise and cyclones. Other priority areas highlighted included real-time monitoring of droughts and flood areas, evaluation of present design practice of water infrastructure for their adaptation potential, evaluation of present legislation and policies, credible assessment of water supply (both surface water and ground water) and demand management, and decision support tools for participatory integrated water management considering (geo)hydrology, agronomy, and socio-economic factors, at micro and macro scales.



Some steps were identified for overcoming barriers to climate change adaptation, which included, strengthening data observation systems, inter-agency and inter-institutional coordination, partnership at different levels of government, identifying environmental, technological and financial constraints and building capacity across different stake-holders.

Nepal: The different types of risks facing Nepal include flooding/inundation, landslides, GLOF, sedimentation, and droughts (agricultural and hydrological). Of the different priority actions identified, institutional aspects covering policies, laws and legislation, organizational structure and capacity building (especially financial resource management) were discussed as being one of the most important. The barriers to overcome were discussed bearing in mind that Nepal is at present trying to finalize water resources policies based on the principles of IWRM, and that the management of water resources will be in the context of the new constitution that calls for a federal state system.

Pakistan: The country can be divided into three zones characterized by their own climate change challenges (see adjoining figure) – namely, a high-elevation area which is the source of most of the water in Pakistan, the central part which contains large irrigation networks and accounts for most of the water use and lastly the delta area. Priority actions which were identified included enhancement of monitoring system for high elevation climate change assessment, developing water storage and infrastructure, hazard assessment and mapping, rainwater harvesting, Indus deltaic ecosystem management, enhancing capacity and improving the legislative framework among others. Some of the barriers to dealing with climate risk included the transboundary nature of basins, weak monitoring systems, data scarcity, weak or poor infrastructure in handling extreme events and weak coordination among stakeholders. In conclusion, the group highlighted that to overcome all types of barriers and obstacles, implementation of water and climate change policies would be essential.

Sri Lanka: The Sri Lankan delegation prioritized vulnerability and risk mapping, a data sharing mechanism among government institutions, and an efficient climate information and communication system. From good data, policy makers should be able to then formulate appropriate surface and groundwater policies, develop watershed- and basin-level investment and management plans, and assess the socioeconomic impacts of these plans. Rather than focusing on disaster response, the delegation urged a focus on disaster reduction and prevention in the first place. Updating protocols at basin and underground reservoir levels would be the first step in collecting better data for flood/drought mapping and zoning. This would result in better models and more effective early warning systems that then need to be better communicated to the public through capacity building. By promoting climate-smart agriculture, information sharing across different sectors, and implementing the Soil Conservation Act, Sri Lanka will be able to adapt to climate change and better promote water security for generations to come.

5.1 CLOSING REMARKS AND NEXT STEPS

Dr. Rafik Hirji, World Bank & Dr. Alan Nicol, IWMI

Recommendations that emerged from the studies were presented for feedback and votes were taken to help prioritize actions for a second phase (from the assembled participants in the room at the end of the last session). The recommendations are listed below.

Of these, establishing a regional education initiative on climate change adaptation and water management received the highest score, closely followed by a data-sharing initiative. The group suggested including droughts as well to the recommendation of a jointly-developed flood early warning system initiative.

It was agreed that a community of practice would be set up to help guide the process further, including the establishment of a Phase 2 activity leading to specific country support to WRM and climate change adaptation frameworks.

Following a period of revision, the three papers would be made available by the end of the year.

Recommendations List	Votes
A Jointly-Developed Flood and Drought Early Warning System Initiative: A pilot study of a flood early-warning system could be undertaken to examine both the technology required and the means of disseminating possible flood conditions to potentially-affected communities. This would integrate existing national systems and support a region-wide network.	**26**

A Data Sharing Initiative: A number of countries have proposed sharing water data across transboundary river basins and aquifers. Can opportunities for developing shared early warning systems for flood forecasting be taken up through design of an online method for collating and reconciling data collected through different protocols across countries? Are there administrative issues that require further study for both surface and groundwater? How would this be integrated with SAARC initiatives?	**29**
Regional Knowledge-Into-Use Initiative: To what extent is the growing understanding of scientific climate change impacts in the water sector being passed to, and understood by, decision makers? Is scientific information actually influencing the different adaptation responses needed in different South Asian countries? An analysis of potential bottlenecks in the uptake of scientific information and actions to reduce any bottlenecks would be timely. Training in the use of techniques such as Decision Tree analysis and integrated river basin planning would help decision makers appreciate the sensitivity of proposed projects to climate impacts and the role of river basin plans to inform future development, operational and management decisions, respectively.	**17**
A Non-Water Governance Initiative: What is required to effectively mainstream climate change adaptation across water-dependent sectors? Education of officials in water related Ministries? Coordination with agencies responsible for climate change? How can adaptation activities be properly defined and tagged within Ministry budgets without incurring excessive overheads?	**15**
A Climate Adaptation and Groundwater Initiative: The impacts of climate change on groundwater needs greater attention in both policy and practice, and in financing. The best way to control groundwater use in different hydro-geological and socioeconomic settings needs to be better understood.	**28**
A Climate Adaptation/Infrastructure Management and Development Initiative: Major infrastructure will only provide adaptation to climate change if it is designed and operated taking account of climate change. How can design standards and operating rules be developed that take account of climate change. Bangladesh, in their 2nd Communication to UNFCCC, state that they will establish design standards for flood embankments that take account of climate change. Is this a useful case study and example?	**24**
A Regional Basin Planning for Climate Change Initiative: Introducing basin-level planning and management is a major challenge. Are there lessons to be learnt from pilot studies in Nepal, Pakistan and elsewhere about how to do this?	**18**
A Regional Educational Initiative on Climate Adaptation and Water Management: What is the best way to raise general understanding of climate change impacts? Sri Lanka says that generic media campaigns are not effective and that targeted approaches through selected on-ground implementation agencies and small groups are more effective. Is this true more widely across South Asia? How should the targeting be done in different countries?	**30**

The extended list of recommendations were as follows –

Water Resources Knowledge:

1. Droughts and floods can be monitored in near real-time using remotely-sensed water-related indices. Can the capacity of South Asian countries be improved such that these technologies can be applied more widely?
2. A Jointly-Developed Flood Early Warning System Initiative: A pilot study of a flood early-warning system could be undertaken to examine both the technology required and the means of disseminating possible flood conditions to potentially-affected communities. This would integrate existing national systems and support a region-wide network.
3. Achieving improved water-use efficiencies will require better dissemination of knowledge from research institutions and agricultural extension services to farmers, and the development of capacities to implement these efficiency measures. Can good practice examples be identified and used as models for disseminating scientific understanding to irrigators more widely?
4. A Data Sharing Initiative: A number of countries have proposed sharing water data across transboundary river basins and aquifers. Can opportunities for developing shared early warning systems for flood forecasting be taken up through design of an online method for collating and reconciling data collected through different protocols across countries? Are there administrative issues that require further study for both surface and groundwater? How would this be integrated with SAARC initiatives?
5. If community-level adaptation is to become a successful part of the response to climate change, how can community-level monitoring and data sharing be organized and funded so that it can also contribute to higher levels of management? Protocols for data collection, training and capacity development, etc. will be needed. Nepal may provide a useful case study.
6. Regional Knowledge-Into-Use Initiative: To what extent is the growing understanding of scientific climate change impacts in the water sector being passed to, and understood by, decision makers? Is scientific information actually influencing the different adaptation responses needed in different South Asian countries? An analysis of potential bottlenecks in the uptake of scientific information and actions to reduce any bottlenecks would be timely. Training in the use of techniques such as Decision Tree analysis and integrated river basin planning would help decision makers appreciate the sensitivity of proposed projects to climate impacts and the role of river basin plans to inform future development, operational and management decisions, respectively.

Water Resources Governance:

1. What are successful models for effective coordination between highly water-dependent sectors and also between water agencies and institutions responsible for climate change in each country? Are water agencies, environmental agencies, or independent coordinating committees, more successful?
2. How well do water managers understand the impacts of climate change and how well do they understand that the IWRM model (even if difficult to implement) provides an adaptation response to climate change?

3. A Non-Water Governance Initiative: What is required to effectively mainstream climate change adaptation across water-dependent sectors? Education of officials in water related Ministries? Coordination with agencies responsible for climate change? How can adaptation activities be properly defined and tagged within Ministry budgets without incurring excessive overheads?
4. In federal systems (India and Pakistan) a significant proportion of the adaptation budget is directed through State/Provincial agencies. How well is this coordinated with the national effort and, also, with local adaptation activities? What can be done to improve this coordination?
5. A Climate Adaptation and Groundwater Initiative: The impacts of climate change on groundwater needs greater attention in both policy and practice and in financing. The best way to control groundwater use in different hydro-geological and socioeconomic settings needs to be better understood.
6. The inability of the current institutional and financial set up to address climate change challenges through an integrative cross-sectoral approach suggests that the development of water-sector specific adaptation measures may be more successful. Institutionally, such measures could be developed involving not only relevant ministries working in water issues, but also those responsible for land management and energy planning.
7. While ministries in charge of local government are included in central decision making bodies, what is lacking is an explicit mechanism to reflect adaptation needs from the ground upwards. This would enable planning, allocation and tracking of climate funding to support priority needs more effectively and efficiently, and to ensure accountability in the conversion of funds into results. These center-local linkages are key not only for identifying context-specific adaptation strategies, but also for highlighting the centrality of water resources management in climate adaptation.

Water Resources Infrastructure:
1. Most infrastructure plans focus on major structures for storage. But is it more effective to revive small, local structures, including traditional storage mechanisms or make more use of local groundwater storage (including Managed Aquifer Recharge and sand dams)?
2. A Climate Adaptation/Infrastructure Management and Development Initiative: Major infrastructure will only provide adaptation to climate change if it is designed and operated taking account of climate change. How can design standards and operating rules be developed that take account of climate change. Bangladesh, in their 2nd Communication to UNFCCC, state that they will establish design standards for flood embankments that take account of climate change. Is this a useful case study and example?
3. The design of new storage infrastructure will require greater attention to issues of erosion and siltation because of the frequency and intensity of major storms anticipated under climate change. Do design standards take account of these potential impacts? Are there adequate monitoring and reporting arrangements for tracking erosion and siltation?

Water Resources Planning and Management:

1. Coordinating across national boundaries to develop water-sharing plans under the influence of climate change is a major requirement. Are there preliminary studies that would build confidence and tackle some technical issues to help pave the way for transboundary water planning?
2. A Regional Basin Planning for Climate Change Initiative: Introducing basin-level planning and management is a major challenge. Are there lessons to be learnt from pilot studies in Nepal, Pakistan and elsewhere about how to do this?
3. How can water-related adaptation measures be designed to benefit the poor and disadvantaged? How can more gender-responsive approaches be designed into current and future adaptation approaches?
4. Saltwater contamination of coastal aquifers will affect Bangladesh, India, Pakistan and Sri Lanka. However, it receives relatively little attention in climate changes strategies. Is it inevitable? Are there protective mechanisms that are cost effective? Would a pilot study help define the steps to be taken to deal with saltwater intrusion into urban and rural water supplies?
5. An integrated pilot study of drought resilience could be undertaken using a combination of actions – demand management, regulation, water efficiency improvement, MAR, and monitoring.

Communication, Education and Participation:

1. What are the identifiers of successful community engagement in adaptation actions? Case studies in Bangladesh or Nepal would be timely. Nepal now has 200 NAPAs in progress – how well do they work? What are the lessons? How should they be organized to provide nationally-coherent responses while still retaining local control? How should they be financed and provided with skills that may not be available locally? How can their lessons be disseminated?
2. A Regional Educational Initiative on Climate Adaptation and Water Management: What is the best way to raise general understanding of climate change impacts? Sri Lanka says that generic media campaigns are not effective and that targeted approaches through selected on-ground implementation agencies and small groups are more effective. Is this true more widely across South Asia? How should the targeting be done in different countries?
3. Groundwater is likely to play an increasingly important role in climate change adaptation. How well do groundwater users understand the nature of the communal resource? Can the tragedy of the commons be avoided through education and technical knowledge about shared water resources? Is there need to build this understanding in groundwater-dependent communities?
4. If community-level adaptation is to be a major component of adaptation activities, how can existing community and local institutions, including local government, be utilized? What guidelines, regulations, education and technical support are needed to help them become involved? How can the strategies of government agencies in climate adaptation be better linked with local community strategies to cope with climate change. Climate-smart villages, in which researchers document local villagers' adaptation strategies in agricultural development and water use, can be considered a starting point from which to build up this linkage. How can ideas of

‘water-smart agriculture’ be developed and shared across the region – combining efficiency, effectiveness and productivity in use of scarce water resources.

6 Appendices

6.1 APPENDIX A: CONCEPT NOTE

The two-phased South Asia Water Initiative aims to build knowledge, tools and capacity across South Asia to assist governments in adapting to emerging climate change challenges in the water sector. Envisaged support includes development of effective policy frameworks as well as practical planning, development and management actions that highlight and address the need for adaptation.

Phase 1 of this work on water resources management and climate adaptation is being implemented by IWMI with support from the World Bank and includes a review of the current knowledge, policy and institutional/financing environment on climate change adaptation and water resources management in the South Asia region.

The objective of this two-day regional conference is to bring together key decision makers from seven South Asian countries to review the three diagnostic papers prepared under Phase 1, and to seek guidance and support for the establishment of a second phase, focused on the development of adaptation frameworks in respective countries.

Day 1—Understanding the landscape of knowledge, policy, institutions and financing

The opening session will start with an address by the Guest of Honour from the Sri Lankan Government. A presentation by the World Bank and IWMI will then set the scene for the day, the focus of which will be on the complex landscape of existing scientific knowledge – including key gaps and challenges in downscaling climate models – and on the mosaic of policy and institutions tasked with addressing climate change and preparing countries and peoples in the region for greater climate resilience and adaptation capacity. This will be followed by a keynote address from Professor Mohan Munasinghe. The day will include further expert input on ways of systematizing responses to climate uncertainty in water resources planning and project design.

Day 2—Towards water resource management for adaptation and resilience

The second day builds on the knowledge, policy and institutional landscapes presented on day one. Participants will work more closely in groups to establish key steps towards developing national-level adaptation frameworks. Additional support will be provided through a keynote presentation providing an example from Africa in which climate change adaption has been integrated into basin-level planning in Tanzania. Group work will both be centered on addressing specific risks and on establishing country level approaches to the development of WRM adaptation frameworks.

6.2 APPENDIX B: AGENDA

DRAFT PROGRAM

Regional Conference on Risks and Solutions: Adaptation Frameworks for Water Resources Planning, Development and Management in South Asia

Hilton Colombo, Sri Lanka, 12-13th July 2016

Conference goal

The two-phased South Asia Water Initiative aims to build knowledge, tools and capacity across South Asia to assist governments in adapting to emerging climate change challenges in the water sector. Envisaged support includes development of effective policy frameworks as well as practical planning, development and management actions that highlight and address the need for adaptation.

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12th July	**Activity**
08.00-09.00	Registration and coffee
Opening session: Scene setting	
Chair	*Mr. Jeremy Bird, Director General, IWMI*
09.00-10.00	***Address by the Guest of Honour***: H.E. Dr. Sarath Amunugama, Minister for Special Assignments, Government of Sri Lanka ***Welcome remarks from the World Bank***: Ms. Rolande Pryce, World Bank Country Office, Sri Lanka ***Regional context and conference objectives***: Dr. Rafik Hirji, Team Leader, World Bank / Dr. Alan Nicol, Theme Leader, IWMI

	Inaugural address: Professor Mohan Munasinghe, Founder Chairman of MIND: *'Is South Asia's water sector resilient enough to adapt to climate change and achieve the SDGs?'*
10.00-11.00	***Country perspectives*****:** brief interventions from country participants and feedback
11.00-11.30	Tea/coffee break
12.00-12.30	***Facilitated plenary discussion***: Navigating the complex mosaic of landscapes and change in South Asia / Facilitator: Dr. Ajaya Dixit, ISET-Nepal
12.30-13.30	Lunch
Session 1: Knowledge and decision-making landscapes	
Chair	*Dr. Vidhisha Samarasekara, ADB*
13.30-14.30	**Keynote 2**: *An Operational Perspective: The Decision Tree Framework* Dr. Casey Brown, World Bank (including 30 mins discussion and feedback)
14.30-15.00	***Diagnostic Paper 1: Climate change science, knowledge and impacts on water resources in South Asia:*** Dr. Guillaume Lacombe (IWMI)
15.00-15.30	***Facilitated plenary discussion***: Comments and feedback on the paper Facilitator Mr. Madhav Belbase, Nepal
15.30.16.00	***Diagnostic Paper 2: Policy and Planning*** Dr. Richard Davis (Consultant)
16.00.16.30	***Facilitated plenary discussion***: Comments and feedback on the paper Facilitator Mr. U. P. Singh, India
16.30-17.00	Tea/coffee break
Session 2: Economic and institutional landscapes	
Chair	*Dr. Muhammad Nadeem Javaid, Pakistan*
17.00-17.30	***Diagnostic Paper 3: Economic and Institutional Landscape*** Mr. Sanjiv de Silva (IWMI)
17.30-18.00	***Facilitated plenary discussion***: Comments and feedback on the paper Facilitator Dr. Ahsan Uddin Ahmed, Bangladesh
18.00-18.30	***Closing summary and wrap up***
18.30-20.00	Evening cocktail reception, Hilton Colombo

Day 2—Towards water resource management for adaptation and resilience

The second day builds on the knowledge, policy and institutional landscapes presented on day one. Participants will work more closely in groups to establish key steps towards developing national-level adaptation frameworks. Additional support will be provided through a keynote presentation providing an example from Africa in which climate change adaption has been integrated into basin-level planning in Tanzania. Group work will both be centered on addressing specific risks and on establishing country-level approaches to the development of WRM adaptation frameworks.

13th July	**Activity**
Session 3: From theory to practice	
Chair	*Dr. Said Shakib Atef, Afghanistan*
09.00-09.15	***Recap and introduction to second day*** Dr. Alan Nicol (IWMI) / Dr. Rafik Hirji (World Bank)

09.15-09.45	**Keynote**: Integrating climate adaptation at basin scale – the Rufiji Basin example, Tanzania, Prof Aris Georgakakos, Georgia Water Resources Institute
09.45-10.15	***Facilitated plenary discussion***: Comments and feedback on the presentation Facilitator Mr. Karma Dupchu, Bhutan / Dr. Alan Nicol (IWMI) / description of Group Work
10.15-10.45	*Break*
10.45-12.30	***Group Work: Climate Risk Analysis****: (Provisionally four groups split across countries and non-country participants: inland/coastal flooding; drought; sea-level rise; infrastructure design and operation)*
12.30-13.30	Lunch
Session 4: Towards national WRM and Climate Adaptation Frameworks	
Chair	*Dr. Kusum Athukorala, Sri Lanka*
13.30-14.00	***Group presentations and feedback*** Facilitator Dr. Alan Nicol (IWMI)
14.00-16.00	***Country Adaptation Framework Groups***: *(Provisionally seven groups arranged by country with non-country participants distributed equally across groups to support deliberations); each addressing the following:* • Defining priority actions to take forward WRM-related climate change adaptation • Ways of overcoming barriers and obstacles to managing water-related climate risks Feedback and presentations by country
16.00-16.30	Tea/coffee break
16.30-17.00	***Facilitated discussion on key points arising and next steps to adaptation frameworks*** Facilitators: Dr. Rafik Hirji / Dr. Alan Nicol
17.00-17.30	**Closing remarks from organizers and participants**
14th July	***Half-day field visit to irrigation and flood control areas near Colombo (08.00-12.00)***

6.3 APPENDIX C: LIST OF PARTICIPANTS

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