

Upper Indus Basin-Network (UIB-N)
Workshop for

Enhancing Science-based Regional Cooperation



About ICIMOD

The International Centre for Integrated Mountain Development (ICIMOD) is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush Himalaya (HKH) – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – based in Kathmandu, Nepal. Globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream and downstream issues. ICIMOD supports regional transboundary programmes through partnerships with regional partner institutions, facilitates the exchange of experiences, and serves as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop economically and environmentally-sound mountain ecosystems to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now and in the future.



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Upper Indus Basin-Network (UIB-N)

Workshop for

Enhancing Science-based Regional Cooperation

24-25 April 2018, Kathmandu, Nepal

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Meeting Summary

The International Centre for Integrated Mountain Development (ICIMOD) conducted the UIB-Network Workshop: Enhancing Science-based Regional Cooperation on 24-25 April 2018 in Kathmandu. Fifty-seven scientists and decision makers from the UIB region and beyond unanimously agreed to extend the UIB-N beyond Pakistan to form a regional UIB-N. Following this, the group revised the UIB-N core principles to make them more responsive across the transboundary river basin and modified the guidelines for the Technical Working Group, as well as Network Objectives, Vision, Mission, and governance structure. An Ad Hoc Regional Strategic Committee was formed during the workshop and is mandated to propose the governance framework of the Network within the six-month interim period. The expansion of the UIB-N into all four basin countries is expected to be an immense opportunity to learn best practices across borders, with the four country chapters as building blocks.

The workshop at the ICIMOD headquarters in Kathmandu consolidated efforts to strengthen research and knowledge generation throughout the Upper Indus Basin Network (UIB-N) across four riparian countries sharing the Upper Indus Basin (UIB) waters. UIB-N is an informal knowledge and research network of national and international researchers, scientists, academicians, government officials, and relevant private sector organizations from Afghanistan, China, India, and Pakistan, as well as experts from ICIMOD working in the upper part of the Indus Basin. The six UIB-N Technical Working Groups and scientists working in the region discussed the knowledge generated and the gaps identified by research in the basin. Workshop participants emphasised the need for and importance of such a voluntary and neutral platform of scientists and researchers to share learning experiences related to the effects of climate change on the Indus Basin and on cryospheric changes in the region. Such a forum will provide them the opportunity to discuss possible solutions to deal with the effects of climate change and to provide advice based on scientific evidence to relevant decision makers in their respective countries and at international platforms.

The workshop revisited key aspects such as the number, role, and coverage areas of the Technical Working Groups (TWGs) four years into the implementation of the UIB-N. Knowledge, communication, and gender is a cross cutting theme across all TWGs, and the names of the initial six have been revised. The network's governance structure will be revised to expand it to other riparian countries, including Afghanistan, China, and India, by forming country chapters and revising the Strategic Committee to include representatives from the riparian countries. The table below presents the revisions to the UIB-N structure. UIB-N's mission is to promote coordination and collaboration among the organizations and individuals active in research in the UIB for improved understanding of present and future water availability, demand, and hazards. UIB-N also seeks to develop solutions for various stakeholders at the local, national, and international levels.

Ad Hoc Strategic Committee meeting decisions (25 April 2018)

1. Framework: 10-to-15-page framework by late May 2018 with vision, mission, country chapters, members, leads and co-leads of Technical Working Groups, at the regional aspects. Strategic committee will review and provide inputs. The resulting draft will be shared with the nominated Advisors – Mr Nisar A. Memon, Ms Nusrat Nasab, Dr Matthias Winiger, and Dr David Molden. The revised version to be circulated to all UIB-N members for input, with a 15 day deadline. Final version of document expected by the end of June 2018.
2. The Country Chapters: The Afghanistan Chapter to be formed and meetings to be scheduled in July-August 2018. The Pakistan Chapter to hold a meeting in June or July 2018. The Ad Hoc Strategic Committee will propose strategy for India and China Chapters.
3. To document the experience and lessons learnt of UIB Pakistan 2014-15 by end of May 2018, led by Dr Matthias Winiger.
4. The **next** UIB-N regional meeting is planned for September-October 2018. The tenure of the newly formed Ad Hoc Strategic Committee will run until this meeting.

Previous UIB-N Structure	Revised Regional UIB-N Structure
<i>Group 1:</i> Data collection, quality, and sharing	<i>Group 1:</i> Framework of data collection, quality, and standardization
<i>Group 2:</i> Climate and air pollution variability and trends	<i>Group 2:</i> Climate change, variability, air pollution, and black carbon
<i>Group 3:</i> Cryosphere and black carbon monitoring and modelling	<i>Group 3:</i> Cryosphere monitoring and modelling
<i>Group 4:</i> Hydrology, water availability, and demand basin scale	<i>Group 4:</i> Surface and groundwater hydrology, water availability, and demand
<i>Group 5:</i> Hazards and Risks	<i>Group 5:</i> Understanding and managing hazards and risks
<i>Group 6:</i> Managing socioeconomic impacts through adaptation measures	<i>Group 6:</i> Managing gendered socioeconomic impacts through adaptation measures
Strategic Committee <i>Chair:</i> Khalid Mohtadullah Arun Shrestha, ICIMOD Babar Khan, WWF Daniyal Hashmey, WAPDA Ghulam Rasul, PMD Advisors Asif Khan Nusrat Nasab Matthias Winiger	Ad Hoc Strategic Committee <i>Chair:</i> Khalid Mohtadullah Afghanistan: Muhammad Hassan Faizee China: Liu Shiyin India: Dr F. A. Shaheen Pakistan: Ammara Farooq Malik ICIMOD: Arun B. Shrestha Advisors Nisar A. Memon Nusrat Nasab Matthias Winiger David Molden

The UIB-N meeting was organized by the Indus Basin Initiative (IBI) supported by the Australian Government's Sustainable Development Investment Portfolio (SDIP) of the Department of Foreign Affairs and Trade (DFAT), and the initiative on Strengthening Water Resources Management in Afghanistan (SWaRMA) supported by the Government of Australia, both under ICIMOD's Regional Programme on River Basins and Cryosphere. The two-day event was preceded by UIB side meetings for Afghanistan organised jointly with Strengthening Water Resources Management in Afghanistan Initiative (SWaRMA) and Pakistan by Indus Basin Initiative.

ICIMOD continues to support partnerships for strengthened research and knowledge generation and sharing in the Upper Indus Basin, a journey that began with the establishment of the Upper Indus Basin Network (UIB-N) in Pakistan in 2014. Partners have now progressed to deliver research outputs and expand networks. This milestone is expected to further precipitate science-based dialogue between government officials and private sector organizations from all four countries, as well as international scientists, researchers, and ICIMOD. The expansion into all four basin countries is an immense opportunity to learn best practices across borders.



Introduction

The Upper Indus Basin

The transboundary Indus River basin in Afghanistan, China, India, and Pakistan is among the world's most significant in terms of human dependency on water resources and agricultural livelihoods. The upper basin consists of mountainous terrain of the Hindu Kush, Karakorum, and Himalayan ranges. The IBI is one of six in ICIMOD's River Basins and Cryosphere Programme, and is supported by the Australian Government's Sustainable Development Investment Portfolio (SDIP) of the Department of Foreign Affairs and Trade (DFAT).

Home to nearly 268 million people, the Upper Indus Basin has six main rivers originating from glaciers in the Western Himalaya, the Karakoram, and the Hindu Kush, which are sources of irrigation for over 16 million hectares of agricultural land. The basin mainly receives precipitation in the form of solid precipitation due to the Indian winter monsoon. The basin is water-scarce overall, yet the demand for water due to rapidly changing demographics and climatic conditions continues to grow rapidly, putting further stress on the rapidly depleting resources in the Upper Indus Basin. ICIMOD considers the UIB-N an opportunity to develop economically and environmentally-sound mountain ecosystems to improve and exchange views on the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now and in the future. This initiative will provide an important platform for interactions and the formulation of policy mechanisms.

The Upper Indus Basin Network

UIB-N is a voluntary and informal knowledge and research network of national and international researchers working in the upper part of the Indus Basin. It is a voluntary and neutral forum of researchers/scientists and development organizations interested in the UIB to share their understanding and experiences with each other. Its mission is to promote coordination and collaboration among organizations and individuals active in research in the UIB for improved understanding of present and future water availability, demand, and hazards. UIB-N also seeks to develop solutions for various stakeholders at the local, national, and international levels. The network comprises national and international researchers, scientists, academicians, government officials, and relevant private sector organizations from Afghanistan, China, India, and Pakistan, as well as members of ICIMOD and other international organizations and universities working in the UIB.

The UIB-N functions as a vital common resource providing a neutral platform of scientists and researchers to share learnings and experiences related to the effects of climate change on the Indus Basin and *Cryospheric* resources in the region. The platform fosters deliberations around potential gender-sensitive solutions to the impacts of climate change. It will also provide scientific, evidence-based advice to national, regional, and global decision makers. These efforts are expected to contribute to regional development overall.

The Workshop

ICIMOD conducted the Enhancing Science-Based Regional Cooperation UIB-Network Workshop on 24-25 April 2018 in Kathmandu. Fifty-seven scientists and decision makers from the UIB region and beyond unanimously agreed to extend the UIB-N beyond Pakistan to form a regional UIB-N. Following this, the group revised UIB-N core principles to make them more responsive across the trans-boundary landscape, modified guidelines for the Technical Working Group, as well as for Network objectives, vision, mission, and governance structure. The current UIB-N Regional Strategic Committee is to be revised to include representatives from Afghanistan, China, India, and Pakistan. An Ad Hoc Regional Strategic Committee was formed during the workshop and is mandated to propose the governance framework of the Network within the six-month interim period.

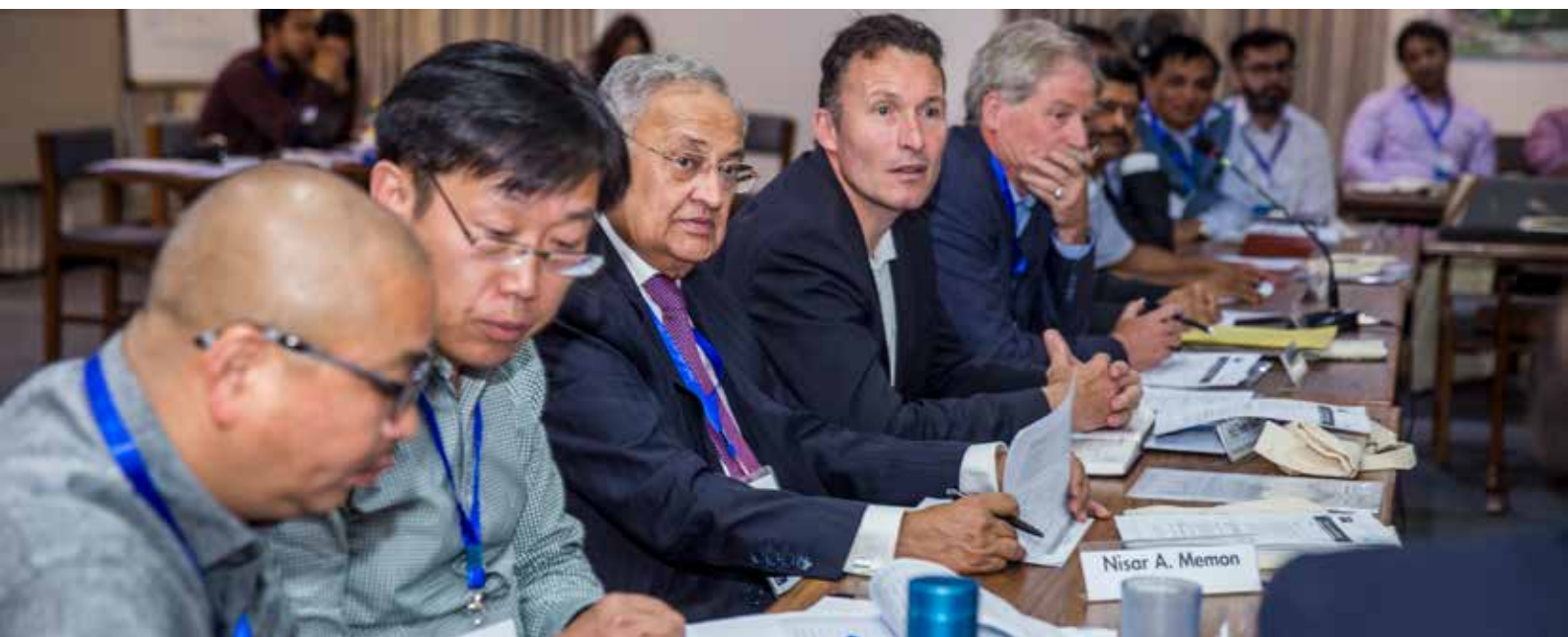
Day 1 of the workshop served to update network members and workshop participants on the progress of the six current Technical Working Groups and five key areas of research. On Day 2, participants assessed the existing Network modality and structure against the current scenario four years into formation of the Network, and also with a view to creating a framework conducive to regional collaboration efforts. Day 2 began with revisiting and revising the Network governance framework and operational modalities, leading to a revision of the governance structures and the formation of an interim Regional Ad Hoc Strategic Committee.

The two-day event was preceded by UIB side meetings for Afghanistan organised jointly with Strengthening Water Resources Management in Afghanistan Initiative (SWaRMA) and Pakistan by the Indus Basin Initiative. The pre-event set of meetings concluded that each of the four basin countries would form Country Chapters from which to conduct their respective work, and a Regional Strategic Committee would be formed with representation from each of the country chapters. Some of the TWGs may be least relevant to some of the member countries, so the country chapters may decide to form the most relevant TWGs to work on, depending upon the relevance and priority.

Objectives

Workshop objectives were to strengthen research and knowledge generation across four riparian countries (sharing UIB waters in Afghanistan, China, India, and Pakistan) in a coordinated manner, and:

- Share knowledge generated and gaps identified by UIB-N TWGs and scientists working in the UIB.
- Revisit the UIB-N objectives, vision, mission, and governance structure.



DAY 1

Opening Session Welcome Remarks

David Molden, Director General, ICIMOD, highlighted the importance of the Upper Indus Basin region as the source of ten major rivers, which sustain millions downstream, and the significance of this first gathering of representatives from all four Indus Basin-sharing countries as part of the UIB-N. He expressed high optimism about possibilities that might emerge from expanding the Upper Indus Basin network beyond Pakistan into Afghanistan, China, and India. He emphasised that through collaboration between the four countries, the extended UIB-N could generate scientific and fundamental knowledge about what is happening in the mountains. Molden highlighted the success of the UIB-N in Pakistan in developing synergies between multisectoral experts from different organizations working in the basin, and encouraged China, Afghanistan, and India to develop and learn from the Network, with this workshop as the first step in a long journey together.

Khalid Mohtadullah, Chair, UIB-N, highlighted that the Network was set up in Pakistan to integrate organizations that were already working in UIB area but had little coordination between them. The network serves as a platform for scientists and other stakeholders to discuss issues and ways forward in terms of methodologies and standards to build on each other's work and develop synergies. In doing so, the Network's greatest contribution has been to give a voice to communities in the UIB.

Water-related issues are the same across the riparian countries in the region. However, Indus Basin-sharing countries still hesitate to share knowledge and experiences. The extended UIB-N is intended to produce good science for common, shared resources; scientific research at the country level; enhanced scientific analysis at the regional level; better understanding and enhanced benefit sharing; and in the process, safeguard future investments in the Basin countries. He emphasized that the time is now to start applying research findings. He also cautioned participants about the danger that Basin-sharing countries may lose billions of dollars' worth of water-related investments if understanding around this common resource is not improved.

Afghanistan – Muhammad Hassan Faizee from the Ministry of Foreign Affairs, Afghanistan said that in Afghanistan, the impacts of climate change and associated vulnerabilities are significant along the Kabul River Basin, a sub-basin of the Indus Basin and the most populous in the country. He emphasized the urgency of enhancing Afghanistan's knowledge about changing patterns and adaptation for resilience. As part of a larger basin, the impacts of climate change were said to be similar in all four countries. Managing these impacts and water resources for building resilience can be shared across the countries based on experiences. He outlined the need to develop an integrated strategy for this through the UIB-N and said he hoped to contribute to currently ongoing discussions.





China – Prof. Liu Shiyin expressed happiness to be part of UIB-N and looked forward to contributing to the dialogue for the wider benefit of all. He explained that the Chinese Government has been funding the China Pakistan Economic Corridor (Belt and Road Initiative) in China and in the Upper Indus Basin in Pakistan, and has concerns about its environmental threats. He said that he looked forward to generating and applying learnings in this area and in other places in the basin.

India – Dr George Pottakkav Jose from National Institute of Hydrology (NIH) said that UIB-N is very new to India and they hope to learn from it. NIH has been working on the glaciers of the Chenab River Basin and Ganga. The NIH focuses on the Indus River Basin, which is important as a common resource that needs to be understood holistically. The best way to take care of this very precious source would be to share good science through regional collaboration among Indus-Basin sharing countries.

Pakistan – Mr Nisar A. Memon of Water Environment Forum emphasised that the Indus, Kabul, and Chitral Rivers are the lifelines of the communities in this region, which depend on the rivers for their survival, livelihood, and economic growth. He brought attention to the interlinked destinies in the region and the need for common parameters; the need to make the water, energy, and food nexus more people-centric from the mountains to downstream; and the importance of developing a directory of institutions working in the mountains for cooperation and sharing of knowledge and experiences. He highlighted that bringing people together for this purpose had been a challenge which is being addressed by ICIMOD with support from the Australian Government. He ended by saying that a failure to capitalize on this opportunity to benefit the countries dependent on water economy through science-based cooperation would mean that we had failed to do justice to the coming generations.

His Excellency Peter Budd, Ambassador of Australia to Nepal, said that Australia is working to build mechanisms and platforms such as the UIB-N to generate information and enable greater cooperation across all riparian countries. Ambassador Budd highlighted the need for coordination and cooperation in scientific programming and knowledge generation to support sustainable basin management while keeping current competing demands, as well as climate and disaster risk management, in mind.

The importance of UIB in terms of communities, environment, and livelihood is recognized by the Australian Government, which appreciates the scientific cooperation on current and future vulnerabilities related to disasters and hazards. Under DFAT's SDIP, the focus is on integrated food, energy, and water security in South Asia. He expressed hope that this workshop would open new avenues for scientific cooperation and knowledge sharing.

Introduction and status update of UIB-N, Arun Shrestha, Regional Programme Manager of the River Basins Programme at ICIMOD, said that the Indus is a very large basin spanning 114,000 km² shared by Pakistan (47%), India (39%), China (8%), and Afghanistan (6%). It is the most glaciated basin (35%) of the ten basins in the HKH. It supports the largest contiguous irrigation system in the world. The population and water demand are increasing,

but the water availability varies spatially and temporally. It is therefore very important to study the dynamics of the upstream cryosphere and climate, and how they interact with the human environment. Various organizations and individuals are working in UIB, but coordination among those was lacking and there is also no common platform where these organizations can discuss the common issues. With coordination, duplications were occurring, but there were critical knowledge gaps.

An expert field visit was organized to the Upper Indus Basin in Pakistan in 2014 to solicit ideas about the climate, socioeconomics, water, and cryosphere. The UIB-N was established with the overall goal to promote coordination and cooperation among organizations active in the Upper Indus Basin. This is expected to lead to improved understanding of present and future water availability, demand, and hazards, and to develop solutions for local to national stakeholders through identified thematic areas. This informal Network supports programmes for science-based cooperation and knowledge sharing. The consultative mode is very important. So far, the Network has been Pakistan-focused, but science is not bound to boundaries, which is why it is very important to extend it across the entire Upper Indus Basin.

Current Drivers for Research

1. What were the climatic trends and variability in the Basin in the past, and what will they be in the future?
2. What is the state of the various cryospheric components (glacier, snow, permafrost), how are they changing with climate change, and how will they change in the future?
3. How can the present observation system be strengthened to support previous questions?
4. How to enhance the effectiveness of data collection, quality control, and dissemination at national and regional levels?
5. How will climate change and cryosphere dynamics impact the water availability in the future?
6. What will the water demand scenario of the future be?
7. How can the supply-demand gaps be addressed?
8. What are the most suitable and sustainable development options for the upstream part of the Basin?
9. What are the natural hazard hotspots and how is the vulnerability changing?
10. What could be the impact of cryosphere change on ecosystems?
11. What is the impact of upper riparian controls on lower riparian regions?



Current Technical Working Groups

The major emphasis is on the Technical Working Groups, as it is a science-based network.

- Group 1. Data collection, quality, and sharing lead by Daniyal Hashmy and Matthias Winiger
- Group 2. Climate variability and trends lead by Ghulam Rasul and Elisa Vuillermoz
- Group 3. Cryosphere, black carbon monitoring and modeling lead by Adnan Shafique Rana and Anna Sinisalo
- Group 4. Hydrology, water availability, and demand-basin scale lead by Yinsheng Zhang and Arun Shrestha
- Group 5. Hazards and risks lead by Philippus Wester and Muhammad Asif Khan
- Group 6. Managing socioeconomic impacts through adaptation measures lead by Luca Listo and Muhammad Zafar Khan

This meeting would be an opportunity to revisit the groups and adjust leads as needed. The Strategic Committee and Technical Working Group meetings are held twice a year. The previous Strategic Committee meeting was held in Islamabad in February 2018, and the previous Technical Working Group meeting was organized in 2017 in Kathmandu. UIB-N has also been collaborating with the Indus Forum to jointly organize Indus Basin Knowledge Forum workshops. The last two meetings were held in Kathmandu in 2016 and Colombo in 2017. In the Colombo Indus Basin Knowledge Forum, ten action points were agreed upon:

1. Establish an Indus Basin research “center of excellence”
2. Continue to build and develop the Indus Basin Forum and online knowledge platform
3. Connect science with policy and practice
4. Come together to confront floods and other water-related disasters
5. Support dialogue on Kabul River Integrated Water Resources Management
6. Strengthen capacity with a policy focus, involving youth in particular
7. Foster data sharing, with an emphasis on hydrometeorology data, through portals and knowledge networks
8. Embark on joint research programs and engage with external support agencies
9. Intensify analysis of scenarios, trends, and futures, with a systems perspective
10. Promote interaction with the regional research networks Central Asian Water (CAWa), the South Asian Water Initiative (SAWI) and South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATeRS)

Participants decided that connecting science with policy and practice was the priority action point for Basin-wide information and experience sharing. The third Forum is to be held in Vienna in May 2018.

Current Composition of UIB-N's Strategic Committee

Chair – Khalid Mohtadullah

- Strategic Committee for Strategic Inputs to the Working Groups –
 - Arun Shrestha of ICIMOD
 - Babar Khan of WWF
 - Daniyal Hashmy of WAPDA
 - Ghulam Rasul of PMD
- Advisors for inputs to priority actions –
 - Asif Khan of Peshawar University
 - Matthias Winiger of University of Bonn
 - Nusrat Nasab of AKAH

ICIMOD headquarters and Pakistan Country Office support the UIB-N secretariat.

Technical Session 1: **Technical Working Group Progress Presentations**

Chair: *Eklabya Sharma, Deputy Director General, ICIMOD*

Group 1: **Data Collection, Quality, and Sharing**

Matthias Winiger presented the progress of the data collection, quality, and sharing work, including the hydrology meteorology assessment of cryosphere data as models and field-evidence scale data. He highlighted the comparability of different types and positions of sensors and the necessity to go into the field to obtain authentic data. He also suggested that, as with most international research programmes utilizing specific field manuals, UIB-N should develop some handbooks for its instruments to ensure uniform methodology and interpretation.



Group 2: **Climate and Air Pollution Variability and Trends**

Muhammad Riaz, on behalf of Ghulam Rasul, presented updates on the climate and air pollution variability and trends results in the warming process based on PMD activities in UIB, highlighting in particular the impact on glaciers of snow melting. He also emphasized trends in precipitation and temperature, as well as climate projections in the UIB. There are some challenges: UIB has one of the most complex terrains, so access is difficult overall and especially during winter, when most glaciers/snow areas are inaccessible. There are also limited resources (computational + skilled modeler) to carry out complex hydrological modelling. There is very limited modelling data to improve the accuracy and to conduct validation experiments.

Group 3: **Cryosphere and Black Carbon Monitoring and Modelling**

Adnan Shafique Rana highlighted the progress of the cryosphere and black carbon monitoring and modelling work, including the WB Project by WAPDA, extensive field activities, Permafrost Training by KIU, the ICIMOD/KIU-initiated glaciology course, and the initiation of the Glacier Inventory for Pakistan using SUPARCO HI-AWARE 2015 Images in Shimshal-PMD.



Group 4: Hydrology, Water Availability, and Demand Basin Scale

Arun Shrestha presented updates on hydrology, water availability, and demand basin scale work including westerly and summer monsoons and its hydrological effects; the process of glacier mass-energy balance and glacier melting; glacier/snow meltwater; and water balance in a typical basin. He also highlighted the effect of cryosphere change on water resources, climate change, and precipitation in Pakistan; measurement of precipitation and errors; and changes in variability patterns. Shrestha also shared updates on the work on solid state storage of Pakistan water tower-glacier ice volume estimation in UIB. A flood outlook is being developed for Chenab River Basin by PMD and ICIMOD, for which data preparation is complete and hydrological modelling has begun. PMD staff are scheduled to come to ICIMOD in May to jointly develop the flood forecast model. The upstream model has been connected with the downstream model. Moreover, research into climate change vs. socioeconomic development has also begun to assess future water availability in different scenarios.

Group 5: Hazards and Risk

Abdul Wahid Jasra, on behalf of Muhammad Asif Khan, presented the basin hazards and risks learnings based on the UIB Hazards agenda (2017-18). Hotspots have been identified, and risk mapping and monitoring of landslides are being done. Other progress includes work in early warning and monitoring systems combining scientific and community knowledge for GLOFs, flash floods, and debris flow; structural and biological measures to control erosion and sedimentation; and developing the Disaster Risk Management Plan of Gilgit Baltistan. The early warning systems have been successful in averting loss of lives as in the Sherqilla example.

Group 6: Managing Socioeconomic Impacts Through Adaptation Measures

Muhammad Zafar Khan provided updates on managing socioeconomic impacts through adaptation measures work. An overview of 2017-2018 progress included climate smart energy efforts; agriculture water management; river bank stabilization to minimize flood damages; hazards management; and academic and research workshops and publications.

Chair Remarks

Eklabya Sharma, Deputy Director General, ICIMOD, commended the progress of the six working groups and urged the good work to be extended into the Upper Indus Basin beyond Pakistan. He reiterated the hostile natural environment in the Basin and urged Network members to deliberate on potential technologies and approaches that can be utilized to optimize learnings and to allow monitoring to be done in the mountains, too. He suggested adopting technologies that help optimize the collection and representation of data. We also need to work on developing and implementing joint approaches and research. He further suggested that the issue of atmospheric pollution be revisited and mandated in relevant working groups for focused outputs. Others echoed these sentiments, urging the Network to think about how best to share research results of the work conducted and use it for effective planning in the UIB countries; ensuring balance within the diverse environments of the Network countries; moving from single country research into regional activities and studies; and including air pollution and black carbon monitoring beyond urban areas, which is complicated.



Technical Session 2: Scientific Knowledge Sharing

Chair: ER Ezatullah Sediqi, Afghanistan National Disaster Management Authority, highlighted the importance of scientific knowledge for decision making, especially for a region of developing countries vulnerable to climate change, droughts, etc. Science and policy are no longer separate but are increasingly integrated efforts to facilitate decision making, such as the SDGs and the Sendai Framework.

Climate Change Impact on Surface Water Availability in the Kabul River Basin

Fayezurrahman Azizi, Ministry of Energy and Water, Afghanistan, outlined efforts to overcome a 28-year data gap in Afghanistan in 2007 through rehabilitation of the hydro-meteorological network and hydrological activities. WRD operates and develops the hydro-meteorological network in the country to collect data through HYMEP (Project for Capacity Enhancement on Hydro-Meteorological Information Management). Thirty-seven new stations were also established. He said that hydro-meteorological data is mainly used for flood and drought forecasting and early warning, and climate change management and adaptation. Data from these stations are collected directly by staff, as well as indirectly through the WRD website, and indicate a decrease in surface water availability by 11.3% as observed from 1960-1980 (2008-2016) data. There was a decrease in peak flow, and flow regime was earlier.

The Joint Glacier Research in Hunza Valley, Pakistan Initiated by NSFC-ICIMOD

Liu Shiyin, Yunnan University, presented the NSFC-ICIMOD glacier research, which explores changes in glaciers and water resources in Hunza Valley through in-situ measurement, met-stations, GPS, GPR, remote sensing of snow-cover and glaciers, and glacier hydrological models. With glaciated areas in one third of the Basin, it is the source of about half of the meltwater in the HKH. Glaciers in the Karakoram respond differently, one-third of glaciers advancing in the last part of the century. He said applied modeling in the Eastern Tibetan Plateau indicate glacier sensitivity to climate change. The modified SWAT model presented results in different basins, with a reported increase in precipitation and runoff in the central part. The remote sensing-derived surface velocity of Batura, Pasu, Ghulkin, and Gulmit Glaciers show the upper parts are stable, while velocity is large in the south and some tributaries.

Perspectives on Water and Climate Change Adaptation in J&K State of UIB

Farhet A. Shaheen outlined the diverse physiography and agro-climate in Jammu and Kashmir (J&K) State and the impacts of climate change in the region as supported by a survey in 17 villages. He said that glacier retreat is prevalent in the region, and that if the observed change continues, it will have an adverse effect on the stream flows, water supplies, and other dependent sectors. 2017 experienced the lowest precipitation in the last 50 years, with rivers running almost dry. He stressed that trans-boundary implications are immense and permissible limits for the HP projects in the Indus Water treaty may need to be revisited. He outlined adaptation measures to cope with climate change, as well as research including natural resource mapping using RS & GIS and drought-resistant cropping.





Upper Indus Basin Flood Forecasting, Challenges, and Limitations

Muhammad Riaz, PMD, shared alarming projections of an increase in mean temperatures in western Afghanistan, exceeding 3.6 °C under RCP 4.5, and higher under RCP 8.5. Warming is more prominent in the western region. Projected changes in precipitation varied considerably spatially and in magnitude -- winter precipitation is projected to increase in the northern area but the frequency of rain is constant. With less rain, floods in the Basin are medium range, but with prominent meteorological conditions, they reach high flood conditions in the west. Inputs from numerical models are used in hydrological models. Rainfall, MODIS, snow cover, and GSMaP data are used for two-to-three-day forecasts. With limited rain gauges in the UIB, he cautioned that hydrological models don't allow sufficient time to control floods. Challenges to flood forecasting include lack of access to high resolution models; limited hydro-met observations; data communication and quality; accuracy of MODIS snow cover; distribution of precipitation; variation in lapse rate; forecasted temperature; and snow cover.

Chair Remarks

Ezatullah Sediqi, Afghanistan National Disaster Management Authority, said the progress in understanding the issues was remarkable in just one and half decades. The results indicate a decrease in water without a doubt; therefore, much more must be done to prepare and manage water resources. The produced data are commendable. But it is important to know who is using the data, and how to access and share it.

Technical Session 2 continued

Chair: Matthias Winiger

Climate Change Over Upper Indus Basin Using High Resolution Downscaled Models

Ashwini Kulkuarni, *Indian Institute of Tropical Meteorology*, presented information on climate change over the Indus Basin with observed temperature and precipitation trends in the Basin using high resolution downscaled models. She summarized that statistically downscaled models give more confidence in projected climate change over UIB. The rise in seasonal minimum temperatures may be more than the rise in seasonal maximum temperatures toward the end of the century under RCP8.5. She stated that there is not much change in winter precipitation, and that on a basin scale CDD, as well as CWD, do not show any trends. Due to the complex physiography and climate, the projections should be used with caution.

Climate Change Impact on Water Resource of Pakistan

Arshad Pervaiz, WAPDA Pakistan, introduced the significance of the Upper Indus Basin, as well as GMRC and its Present Role in UIB Monitoring and the Activities of the Glacier Monitoring & Research Center. He highlighted that glacier melting under the climate change is emerging as one of the greatest challenges for planners and managers of water resources and agriculture around the world. Therefore, better knowledge about the status of the cryosphere

is vital. He said that there is no significant change in the mean annual temperatures of the stations located in the Upper Indus Basin, and that most of the significant falling trends were seen in the months of July and August, which are glacier melt periods. September also showed significant falling trends for most of the stations. Additionally, for most of the stations, the winter months showed rising trends which for some were significant for January and February. Moreover, flow data of 1995-2005 showed an insignificant falling trend in the mean annual analysis.

Climate change and Water Resources Research Within CSIRO

Carmel Pollino, Commonwealth Scientific and Industrial Research Organization (CSIRO), presented CSIRO activities on the Climate, Hydrology, and Water Resource Assessment, including the newly launched SWarMA. He stated that CSIRO activities contribute to global basin data systems in data access, transformation, and visualization. He also informed participants that CSIRO conducts rapid basin scale assessments building to a national scale and scenario analysis of climate and development. The simplifying tools for water resource management are the visualization of climates and the visualization of water resources in the basin.

Experience Sharing on Understanding Water – CC Challenge and Policy Options on the Afghan-Pakistan Transboundary Kabul River

Hina Lotia, Lead Pakistan, presented the understanding of the water, climate change, and policy options in the Afghanistan-Pakistan transboundary area. She highlighted Lead Pakistan activities in transboundary management for the future based on optimizing the benefits. Lotia stated that exploring the collective challenges and developing a shared understanding was an entry point for regional cooperation. She also shared some of the transboundary work experiences of Pakistan and Afghanistan.

An update on the Karakoram Anomaly: Explaining the mechanisms through which regional atmospheric circulation variability drives summer temperatures and glacial melt in the western 3rd Pole

Nathan Forsythe, Newcastle University, stated that the study attempts to explain the Karakoram Anomaly, which is associated with the stagnation and provide a perspective on climate change in the western 3rd Pole. He pinpointed that a regional circulation index known as the “Karakoram Zonal Index” (KZI) quantifies the latitudinal position-intensity movement of the “westerly jet” upstream of the western 3rd Pole. This explains a substantial portion of the Karakoram variance in seasonal T2m and stream flows from heavily glaciated Upper Indus tributary catchments in recent decades. The Karakoram Vortex provides a physical mechanism for the response of Karakoram seasonal T2m to the KZI (warm high/cold low systems with strong vertical motion/adiabatic effects). He explained that this is due to sub-regional differences in JJA KZI-T2m response, and this climatic mechanism partly explains the Karakoram Anomaly through glacial melt (runoff). The global reanalysis reproduces the KZI influence, which suggests that global climate models are capable of KZI characteristics. Ongoing and future work are expected to add further insight into atmospheric processes linked to the Karakoram Vortex (quantified by KZI).



DAY 2

On Day 2, participants assessed the existing Network modality and structure against the current scenario four years after the formation of the Network, with a view to creating a framework that is conducive to regional collaboration efforts. It was agreed that Day 2, except for the closing session, would follow Chatham House rules. The day began by revisiting and revising the Network framework and modalities, leading to a revision of the governance structures and the formation of an interim regional Ad Hoc Strategic Committee through participatory processes. It was mutually agreed that each of the four basin countries would form Country Chapters from which to conduct their respective work, and that a Regional Strategic Committee would be formed with representation from each of the country chapters.

Revisiting the UIB-N Vision, Mission, and Objectives

Chair Khalid Mohtadullah led a brainstorming session on revising the Network mission, vision, and objectives. He outlined that Country Chapters will continue to operate as the Network functioned in Pakistan until now. The instruments and models used will be common and used to generate knowledge to tackle common issues.

Brainstorming Highlights:

- Working together will add more value in Upper Indus in all four countries. Working together is especially vital as the Upper Basin has different dynamics than in the rest of the Indus Basin.
- Management Strategy – mission to be developed for a 20-year span. A structure for the mission statement was suggested.
 - To promote coordination and collaboration
 - To develop solutions for various stakeholders from local to national levels to benefit the community
- Promote coordination and collaboration between and among organizations working in the Upper Indus Basin
- Focus on developing the UIB Network as a body comprising Country Chapters and a Regional Strategic Committee that would collectively work on national issues in all four countries at a national level, coordinate at regional level, and share learnings in the wider Indus Basin Forum.
- With the expansion of UIB-N from one country (Pakistan) to four riparian countries (Afghanistan, China, India, Pakistan), the Regional UIB-N and UIB Country Chapters should be formed. The UIB Country Chapter should have its own Strategic Committee and Thematic Working Group at country level. The representative from each country should be a part of Regional UIB-N SC and TWG.
- A time frame should be developed to link with sustainable development.
- The Mission Statement should be very concise.
- The Regional component is missing in the UIB-N discussion.
- A focus on disasters as an issue is missing in the current approach; water availability and disasters need to be included.
- Gender-sensitive solutions need to be included.



Vision

Suggestions for the Vision Statement from the floor are:

- To see each country of the Indus Basin live in peace and harmony with one another and enjoy the full fruits of its shared water resources.
- Socioeconomic protection and inclusive development of Indus Basin communities through science-based regional cooperation.
- To ensure resilient and sustainable Indus Basin communities in terms of water resource availability, demand, and hazards.
- Science-based regional cooperation for better water management and inclusive development
- Harvesting fruits from the shared waters of the Indus Basin through science-based regional cooperation focused on climate change.
- A resilient and empowered UIB region through science-based regional cooperation.
- Common understanding of the UIB water resources and water-induced hazards based on shared scientific knowledge
- Shared understanding, knowledge, and solutions for sustainable use of UIB water resources
- A network with enduring commitment to science, policy and cooperation on water resources and management for sustainable and inclusive development of people and institutions in Upper Indus Basin



Mission

Suggestions for the Mission Statement from the floor are:

- Promote coordination and collaboration among organizations working in the Upper Indus Basin for improved understanding of present and future water availability, demand, and hazards and to develop solutions for various stakeholders ranging from local to national levels.
- Promote coordination and collaboration among organizations working in the Upper Indus Basin for improved understanding of present and future water availability, demand, and hazards and to develop gender-sensitive solutions for stakeholders ranging from local to national levels.
- Improve the understanding of present and future water availability, demand, and hazards through coordination and collaboration between/among organizations working in the Upper Indus Basin and to develop gender sensitive solutions for various stakeholders from local to national levels.
- Foster local to regional GESI-responsive research and actions in UIB climate change, water resources, and water-induced hazard management through shared scientific knowledge and transboundary collaboration.
- Understand and promote water availability, demand, usage, solutions, and hazards in UIB through effective science and coordination among organizations working in the Upper Indus Basin, with due consideration to address gender.

Session I: Revisiting UIB-N Governance Structure

This session deliberated on the existing governance structure of the Pakistan UIB-N, formation of the Strategic Committee, advisors, and working groups. Through participatory sharing of ideas, Network members old and new deliberated on revisions to the existing UIB-N structures to enable expansion as a wider regional network.

Summary of the UIB-N Governance Structure Session

1. Retain governance structure of UIB-N in current form: SC, advisory group, and Technical Working Group.
2. Participants unanimously agreed to form an Ad Hoc Steering Committee, which will function for an interim six to eight months and establish a permanent Strategic Committee within three months of its formulation.
3. All the participants agreed on the following revised Ad Hoc Strategic Committee:
 - Chair: Khalid Mohtadullah
 - Members:
 - Afghanistan: Muhammad Hassan Faizee
 - China: Liu Shiyin
 - India: F. A. Shaheen
 - Pakistan: Ammara Farooq Malik
 - ICIMOD: Arun B. Shrestha
4. Ad Hoc SC will advise structure of UIB.
5. Tenure of Ad Hoc committee to be six months. Ad Hoc committee to share framework with UIB-N advisors.
6. Ad Hoc SC members will meet after six months.
7. Secretariat: ICIMOD Headquarters. Bases will be ICIMOD Pakistan and Afghanistan offices and ICIMOD focal points for China and India.

UIB-N countries were asked to clarify mechanisms, and allowed to select their SC, TWG, and advisors based on the new governance framework, before a regional UIB-N could be formed. The number of Strategic Committee members was deliberated and its work distinguished from that of Technical Working Groups.

Strategic Committee composition, tenure, and Secretariat were discussed. Suggestions to form an interim Ad Hoc Strategic Committee with representation of specialists in water use and demand from each country progressed to in-depth discussions on the value of the interim committee in laying the framework for the permanent SC within an agreed-upon timeline, the structure, and involvement with the Advisory Committee. A suggestion to establish a separate group for advocacy and dissemination of knowledge generated by all the groups also emerged.

Seven Technical Working Groups were formed based on their interest and expertise. As a result of revisiting the UIB-N governance structure, participants unanimously agreed to form an Ad Hoc Strategic Committee, which will function for six to eight months and help form a permanent strategic committee.

Session II: Group Work for Planning and Selection of Leads and Co-Leads of Technical Working Groups

Following the above discussions, all participants from the four member countries agreed on the revision of the Technical Working Groups:

Group 1: Framework of data collection, quality, and standardization

Group 2: Climate change, variability, air pollution, and black carbon

Group 3: Cryosphere monitoring and modelling

Group 4: Surface and groundwater hydrology, water availability, and demand

Group 5: Understanding and managing hazards and risks

Group 6: Managing gendered socioeconomic impacts through adaptation measures

Cross cutting theme – knowledge communication and gender

The seven Technical Working Groups were restructured as per member inputs. A breakout Group Work Session to chart the seven proposed working groups followed. Participants contributed to the group of their choice based on interest and expertise, ensuring gender inclusiveness and multi- nationality perspectives.

The first task for the groups was to select leads and co-leads based on the following guiding principles:

- Leads and co-leads of any TWG cannot be from the same country.
- The co-leads must be selected by the group members with mutual consent.
- The selected leads and co-leads must be willing to accept the role.
- Due consideration must be given to gender inclusion.

Through lively deliberations, members debated on a range of topics, including the validity of ensuring that Group leads and co-leads are from different countries, with some saying that this was necessary to balance outlooks on all issues, and others arguing that multi-sector balance was more important, as sector representative outlooks tended to be similar irrespective of nationality. The validity of mixing an Ad Hoc Steering Committee and long-term work groups was questioned, and a compromise reached to form a fixed term Regional Ad Hoc Strategic Committee to draft frameworks, which would serve as a base for national working groups. Members questioned the validity of regional-level Technical Working Groups if strong national working groups already exist, and suggested that national groups can themselves disseminate learnings at the regional level.



Participants deliberated on the distinction between regional and national group roles. Regional-level structure, policy, standardization of methodology, and framework were suggested to be of more importance than identifying representatives. The formation of a national network for regional goal fulfilment was deemed possible only if set up as a national platform for regional outcomes. The Chair in his remarks concurred with the deliberation that continuing the Technical Working Group modality at both national and regional levels would gradually give rise to effective modalities. He said that the discussions made it clear that a regional perspective of the basin is important and urged members to help define the roles of the Groups for the time being.

Session III: Group Work Presentations

Group 1: Framework of Data Collection, Quality, and Standardization

1. WMO precise standardization of stations
2. Regional or national; two baseline stations are needed
3. High quality equipment is needed.
4. Calibration of automatic weather stations after certain intervals
5. Careful site selection for equipment installation
6. Handbook to standardize practices across the region, including information on site selection, type of equipment, data collection/data treatment, and data management
7. Try to maintain annual trips to baseline stations at national and regional levels
8. Capacity building through cooperation with workshops, trainings, and summer schools

Group 2: Climate Change, Variability, Air Pollution and Black Carbon

1. Regional Technical Working Group 2 “Climate Change, Variability, Air Pollution and Black Carbon” could provide recommendations of suggested methodologies and choice of large-scale data sets (gridded historical/reference climatology, climate model projections).
2. The national-level working groups will be encouraged to adopt these suggestions to improve comparability of findings and provide added-value at the regional scale.

Group 3: Cryosphere Monitoring and Modelling

1. Standardize methodologies for cryosphere monitoring
2. Cryosphere mapping and change detection (remote sensing), including glacier and snow cover areas
3. Glaciological mass balance on selected benchmark glaciers in each country
4. Geodetic mass balance of greater number of glaciers
5. Monitoring meteorological parameters in different altitudes, especially precipitation and temperature
6. Energy balance processes in glaciated environments (modeling)
7. Snow depth and snow water equivalent (field-based)
8. Glaciological modeling and coupling with other models (e.g., hydrological models)
9. Glacier thickness measurements on selected glaciers at different altitudes
10. Permafrost initiative to better understand the spatial extent of permafrost
11. Geomorphological studies of the glaciated environments for historic variability
12. Ice core studies for climate history and pollution history

The above-mentioned research will help in:

- Improved understanding of the cryosphere contribution to the water resources in the UIB
- Improved understanding of the ongoing climate change and its spatial variability



Group 4: **Surface and Groundwater Hydrology, Water Availability and Demand**

- Hydrological Process Methods
 - Share methods and practices
 - Develop a platform, calibration, data, outputs
- Hydrological Measurements and Analysis
 - To enhance database compilation and set up data sharing policy – at least a meta database needs to be built for the modelers to be able to access
 - Policy on data and information exchange
 - Instrumentation – understanding what is used for measurements within each country and understanding the differences between these
- Models
 - What models or tools are used for water availability
 - To compare the glacio-hydrological approaches and models based on common datasets
 - To set up a platform for exchange of data, models, and progress
- Scenarios/Analysis
 - Flow regime analysis
 - Water availability scenarios and projections
 - Common use of climate scenarios: To avoid duplication and allow a regional perspective
- Reporting
 - Hydrological water yearbooks and formats; national to regional-scale
 - Building of a regional perspective for the UIB

Group 5: **Understanding and Managing Hazards and Risks**

- Standardization of methods for hazard inventory of disasters
- Technology teams for
- Replication of innovative solutions
- Temporal and spatial correlation of hydromet hazards and from one nation to another.
- Risk mitigation measures adopted across the region
- Consolidation of hazard and risk map at UIB level
- Linkages with SAARC disaster management institute effectively

Group 6: **Managing Gendered Socioeconomic Impacts Through Adaptation Measures**

- Exposure visits for the communities to learn from each other's experiences
- Joint regional research project/programs
- Impact of disaster on socioeconomic condition of communities
- Introduction of green and gender-specific business, entrepreneurship, and opportunities
- Vulnerability and livelihood assessments

Group 7: **Knowledge Communication**

Previously, this group was called Advocacy and Policy, but group members mutually agreed to having knowledge communication and gender as a cross cutting theme across all TWGs.

1. Help communication between the six groups and member countries.
2. Collect and convert/translate technical findings to possibly feed into policy documents.
3. Develop materials such as newsletter, brochures, policy briefs, presentations about UIB and its work, and information for ICIMOD's portals.
4. Level of maturity (in terms of years) of being a UIN national network
5. Consensus-making for development of TOR
6. Make UIB known
 - Propagate and communicate within UIB
 - Across and with other networks
 - Policy makers to help them negotiate
7. Why should work be communicated?
To make them supporters and make them recognize our work

Session IV: **SC Meeting; Discussion on Next Steps of the UIB Network**

The nominated Ad Hoc Strategic Committee and key advisors held the first Ad Hoc Strategic Committee meeting to discuss the next steps. Arun Shrestha moderated the meeting and presented the key decisions.

Ad Hoc Strategic Committee Decisions

1. **Framework:** To devise a 10 to 15-page framework that may include vision/mission, Country Chapters, members, leads and co-leads of Technical Working Groups, at the regional aspects. The first draft to be developed by late May 2018. This draft will be reviewed by the members of Strategic Committee attending the Indus Basin Knowledge Forum in Vienna, for the purpose of improving it. The resulting draft will be shared with the nominated Advisors:
– Mr Nisar A. Memon, Ms Nusrat Nasab, Dr Matthias Winiger and Dr David Molden

The revised version will be circulated to all UIB-N members for inputs with a 15-day deadline. It is expected that the final version of the document will come into shape by the end of June 2018.
2. **The Country Chapters:** The Afghanistan Chapter to be formed and meetings to be scheduled in July-August 2018. The Pakistan Chapter is to hold a meeting in the last week of June 2018. The Ad Hoc Strategic Committee will develop a strategy for the India and China Chapters.
3. To document the **experience and lessons learnt of UIB Pakistan 2014-15** by the end of May 2018 by Matthias Winiger.
4. The next UIB-N regional meeting are planned for September/October 2018. The tenure of newly formed Ad Hoc Strategic Committee will be until this meeting.

Closing Session

Closing Remarks

Chair of UIB-N Khalid Mohtadullah, Mr Mohammad Ebrahim Barekzai from Afghanistan, Dr Liu Shiyin from China, Professor Shaheen from India, Ms Nusrat Nasab from Pakistan, and Dr David Molden from ICIMOD delivered closing remarks. Key points were:

- Workshop participants have acknowledged the Network potential for sharing rich knowledge and experiences. This is a first step in a mechanism toward setting the regional UIB-N for sharing knowledge and experiences in the quest for better understanding and management of valuable resources.
- It would be in UIB-N's best interests to retain the informal structure, keeping in view the sensitivities among Indus Basin-sharing countries.
- Water is a very sensitive element, but it is necessary to focus on cooperation instead of conflicts. Regional cooperation would be vital for finding solutions through sharing scientific knowledge and experiences.
- UIB-N Country teams are thinking of initiating some collaborative research work on some issues of critical interest.
- During four years of UIB-N in Pakistan, it was very difficult for the experts from different organizations to agree on a single point, but this meeting brought together people who shared joint/collaborative work of UIB-N
- The mission of the UIB-N is now revised and improved, with everyone pondering together and bringing new definitions. It's a first step on a long journey for all four countries. The journey of the Pakistan Chapter has been wonderful.
- Other than achieving the objectives of the meeting, we made friends across the borders, which seems to be one of the major objectives of UIB-N: to make friendships that will take UIB-N ahead.

Dr Arun Shrestha delivered the Vote of Thanks. He expressed appreciation to workshop participants from Afghanistan, Pakistan, China, and India, as well international members from CSIRO, Newcastle University, and University of Bonn. He remarked that the very sound decisions taken together as the UIB-N team would not have been possible without such enthusiastic participation throughout the workshop. He acknowledged the generous support of DFAT, particularly the Australian Embassy in Kathmandu; thanked Chairman of UIB-N Mr Khalid Mohtadullah and ICIMOD DG Dr David Molden for steering the process; and appreciated the strategic guidance from Mr. Nisar A. Memon. In ending, he thanked the River Basin core team, along with the other ICIMOD colleagues who worked hard for several weeks to make this workshop a success.

Annexure

Annex 1: Agenda

Day 1 (24 April 2018)






Time	Programme	Facilitator
9:00–9:20	Registration	Ashmita Shakya, Indu Chitrakar and Smita Ghimire
9:20–10:50	Opening Session <ol style="list-style-type: none"> Welcome remarks: <i>David Molden</i>, Director General, ICIMOD (10 min.) Introduction of participants (20 min.) Objectives of the meeting: <i>Khalid Mohtadullah</i>, Chair UIB–N (10 min.) Opening remarks of country representatives (5 min. each) <ol style="list-style-type: none"> <i>Muhammad Hassan Faizee</i>, Ministry of Foreign Affairs, Afghanistan <i>Liu Shiyin</i>, Yunnan University, China <i>P. G. Jose</i>, National Institute of Hydrology, India <i>Nisar A. Memon</i>, Water Environment Forum, Pakistan Remarks by <i>H.E. Peter Budd</i>, Australian Ambassador to Nepal (10 min.) Introduction and status update of UIB–N, Arun Shrestha (20 min.) 	Arun Shrestha Rapporteurs: Mudassar and Nisha
10:50–11:20	Group Photo and Tea/Coffee Break	
11:20–12:40	Technical Session 1: Technical Working Group Progress Presentations Chair: <i>Eklabya Sharma</i> , Deputy Director General, ICIMOD Group 1: Data collection, quality, and sharing Group 2: Climate and air pollution variability and trends Group 3: Cryosphere and black carbon monitoring and modelling Group 4: Hydrology, water availability, and demand-basin scale Group 5: Hazards and risks Group 6: Managing socioeconomic impacts through adaptation measures	(7 + 5) min. each Rapporteurs: Madhav and Smita Matthias Winiger Muhammad Riaz Adnan S. Rana Yinsheng Zhang Abdul W. Jasra M. Zafar Khan
12:40–13:35	Lunch Break	
13:35–14:55	Technical Session 2: Scientific Knowledge Sharing Chair: <i>Ezatullah Sediqi</i> , Afghanistan National Disaster Management Authority <ol style="list-style-type: none"> "Climate Change Impact on Surface Water Availability in the Kabul River Basin," Ministry of Energy and Water, Afghanistan "The joint glacier research in Hunza Valley initiated by NSFC–ICIMOD," Yunnan University, China "Perspectives on Water and Climate Change Adaptation in the UIB," Kashmir University of Agricultural Sciences and Technology, India "Flood Modelling in the Upper Indus Basin: Challenges & Limitations," Pakistan Meteorological Department 	(12 + 5) Min. Each Rapporteurs: Mudassar and Nisha Fayezurrahman Azizi Liu Shiyin F. A. Shaheen Muhammad Riaz
14:55–15:20	Tea/Coffee Break	

15:20–16:50	Technical Session 2 (continued): Scientific Knowledge Sharing Chair: <i>Matthias Winiger</i> <ol style="list-style-type: none"> 5. “Climate change over Upper Indus Basin using high resolution downscaled models,” Indian Institute of Tropical Meteorology, Maharashtra, India 6. Climate Change Impact on Water Resources of Pakistan, WAPDA Pakistan 7. “Climate change and water resources research within CSIRO” Commonwealth Scientific and Industrial Research Organisation (CSIRO) 8. “Experience sharing on Understanding Water-CC Challenge and Policy Options on the Afghan-Pak Transboundary Kabul River,” Lead Pakistan 9. “An update on the Karakoram Anomaly: Explaining the mechanisms 10. through which regional atmospheric circulation variability drives summer temperatures and glacial melt in the western 3rd Pole” 	(12 + 5) min. each Rapporteurs: Madhav and Smita Ashwini Kulkarni Arshad Pervaiz Carmel Pollino Hina Lotia Nathan Forsythe
16:50–17:00	Summary of the Day	Arun Shrestha
18:00–20:00	Reception Dinner	


Day 2 (25 April 2018)

Time	Programme	Facilitator
9:00–10:15	Revisiting the UIB–N Vision, mission, and objectives <i>Existing mission to be discussed and refined. Also, draft the vision and objectives.</i>	Khalid Mohtadullah and David Molden Rapporteurs: Mona and Smita
10:15–10:35	Tea/Coffee Break	
10:35–11:50	Revisiting UIB–N Governance Structure What would be the governance structure? a. Strategic/Steering Committee b. Advisors c. Revisit TWGs and define their working and reporting mechanisms (Members will be divided into TWGs based on their interest and expertise. The groups will then select their lead and co-lead and plan their future activities and present in the next hour.)	Khalid Mohtadullah and David Molden Rapporteurs: Madhav and Saurav
11:50–12:50	Group Work for Planning and Selection of Leads and Co-Leads of TWGs (the following groups may change based on the previous session discussion) Group 1: Data collection, quality, and sharing Group 2: Climate and air pollution variability and trends Group 3: Cryosphere and black carbon monitoring and modelling Group 4: Hydrology, water availability, and demand-basin scale Group 5: Hazards and risks Group 6: Managing socioeconomic impacts through adaptation measures	Neera Shrestha Rapporteurs: Mudassar and Binu
12:50–13:40	Lunch Break	
13:40–14:40	Group Work Presentations (5 + 4 min. per group) Chair: P. G. Jose, National Institute of Hydrology, India Group 1: Data collection, quality, and sharing Group 2: Climate and air pollution variability and trends Group 3: Cryosphere and black carbon monitoring and modelling Group 4: Hydrology, water availability, and demand-basin scale Group 5: Hazards and risks Group 6: Managing socioeconomic impacts through adaptation measures	Neera Shrestha Rapporteurs: Mudassar and Binu
14:40–15:00	Tea/Coffee Break	
15:00–16:15	SC Meeting; Discussion of Next Steps of the UIB Network <ul style="list-style-type: none"> • Endorse UIB–N decisions • Set strategic direction for future interventions • How to capitalize on the regional dimension of UIB–N • How to influence national and regional policies and strategies related to the UIB 	Khalid Mohtadullah, UIB–N Chair Rapporteurs: Mona and Smita
16:15–17:00	Closing Session Concluding remarks by <ol style="list-style-type: none"> 1. UIB–N Chair 2. DG, ICIMOD 3. DFAT 4. Afghanistan Representative 5. China Representative 6. India Representative 7. Pakistan Representative Vote of thanks: Arun Shrestha	Arun Shrestha Rapporteurs: Mona and Smita




Annex 2: List of Participants

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Annex 3: Floor discussions, comments, and questions

Day 1

Technical Session 1: Technical Working Group Progress Presentations

Group 1: Data collection, quality, and sharing

- Q. How do you recreate the historical data that is destroyed? (For example, the data in Afghanistan that has been destroyed.)
- A. Basically, it is basic source. They are different from the ground data and we can develop time series. We should try to recollect the data and archive and can coordinate to data storage through the UIB-N.

Group 2: Climate and Air Pollution Variability and Trends

- Q. There is showed the temp is increasing, all stations rely on basin? Local effect or normal effect that station outside on basin?
- A. Pollution is a factor for increasing temperatures, but the most prominent factors are population growth, human activity, and definitely other factors as well. I agree that establishing the stations outside is needed.
- Q. Is temperature rise more in high altitude than in low altitude? What are the implications in flows?
- A. I have worked in flow, and flow is increasing in certain areas. And it is also my personal study, which shows flow is lightly increasing. Flow is increased because of increased temperature. That is my observation and I have measured the flow in two areas. Data is based on CI data, not station data.

Group 3: Cryosphere and Black Carbon Monitoring and Modelling

- Q. Pollution component is missing?
- A. The research is ongoing. A PhD candidate is working on the same and doing research in the black carbon.
- Q. Is there any linkage of irrigation with the cryosphere as in the human aspect?
- A. There is a paper published related to this.

Technical Session 2: Scientific Knowledge Sharing

Climate Change Impact on Surface Water Availability in the Kabul River Basin

Fayezurrahman Azizi, Ministry of Energy and Water, Afghanistan

- Q. What is the percentage of total inflow in Kabul River Basin that comes from Pakistan? How was missing data restored?
- A. Linear method was applied to nova satellite data. The results were then compared with the available data, correlation was found, and data was restored
- Q. Any plans in terms of building resilience for impending impacts in CC?
- A. EWS was established in Kabul. There are projects with FOCUS, agha Khan.

The Joint Glacier Research in Hunza Valley Initiated by NSFC-ICIMOD

Liu Shiyin, Yunnan University, China

- Q. I don't see key stakeholders in the group. They have 89 community-based local observations for avalanche forecasting, and the same data can be used for the work carried.
- Q. Is there any mass accumulation/surge in the area?
- A. Currently there are fewer members in the University. Planning to hold a workshop, in which local observation can be used.
- A. Study results showed mass slightly changes, as ISET data was used, lots of problems there.

Perspectives on Water and Climate Change Adaptation in J&K State of UIB

Farhet A. Shaheen

- Q. Has any study been carried out in Neelum/Jhelum River? What is the precipitation trend in those rivers?
- Q. Rice is a staple food; what is the alternative to it?
- A. Only 10-20 years of station data is available; however, the snowfall and rainfall in the long term shows a decreasing trend
- A. Droughts, more income from apples

Technical Session 2: Climate Change Over Upper Indus Basin Using High Resolution Downscaled Models

Ashwini Kulkuarni, Indian Institute of Tropical Meteorology

- Q. Do you still find bias in the data?
- A. Uncertainties in the data are negligible.

Climate Change Impact on Water Resources of Pakistan, WAPDA Pakistan

Arshad Pervaiz

- Q. Is there a formal or any particular mechanism for providing data?
- A. There is no proper mechanism, but data can be available to everyone.
- Q. Will a permafrost study be carried out in the region?
- A. Yes, it is a pilot project. We have the data and will release the results soon.

Experience Sharing on Understanding Water-CC Challenge and Policy Options on the Afghan–Pakistan Transboundary Kabul River

Hina Lotia, Lead Pakistan

- Q. We have common resources, but there is no sharing; how can you reach out there?
- A. We would like to engage with stakeholder better, and are very open to opportunities to contribute for share knowledge/learning

Day 2

Session I: Revisiting UIB-N Governance Structure

Brainstorming Outputs

- Two members to be selected from each country with one from the government sector and one from the non-governmental sector. The Chair should be selected from among these members and in the Strategic Committee. The committee tenure should be a staggered three-year term. Advisor numbers cannot exceed one-quarter of the total SC members. SC Secretariat should be in ICIMOD until there is stability; each country can then take turns hosting the Secretariat.
- We can learn from the HUC experience for the formation of the SC and TWGs. An Ad Hoc committee should be formed comprising four to five members to kickstart the process. This committee will develop the vision, mission, and the objectives for the permanent SC.
- UIB-N in Pakistan can be used as an example for the regional SC and advisory committee.
- There should be an odd number of members in the SC.
- First, mechanisms within each UIB-N of member countries should be sorted out. Only after that should the regional UIB-N be developed. SC should have either three or five members. The work of the SC should be distinguished from that of the TWG.

- There should also be involvement of the private sector in the UIB-N.
- The Ad Hoc Strategic Committee will set the framework for the permanent SC within one year.
- The timeframe of the Ad Hoc SC should be limited to six months so that all of the work would be completed to hand over to the permanent SC.
- A gender-inclusive Ad Hoc SC and short time frame is agreeable to India. Individuals/organisations already working in the UIB should be identified.
- In China, the SC would have a founding agency representative, which could be taken as an example for UIB-N.
- Individuals with knowledge in water use and demand should be in the SC.
- The Ad Hoc SC should be small, with four from member countries and one from ICIMOD.
- The discussions of this meeting should be built up in the meeting at Vienna scheduled for next month. A draft should be produced and circulated within the member countries. Meeting among the members in six months' time.
- Each country should be allowed to select the members for SC, TWG, and advisor as per their protocol. A request should be sent to each government to select respective members within one to two weeks with meeting minutes.
- There should be representatives for each country in the SC.
- The Ad Hoc committee should also have one advisor.
- The SC should produce a draft that goes through the Advisory Committee for refinement.
- There should be a group for advocacy and dissemination of knowledge from all groups to the policy makers.

Group Work for Planning and Selection of Leads and Co- Leads of Technical Working Groups

Floor Discussions

Dr Neera Shrestha facilitated the open floor brainstorming session on possible revisions to the existing Technical Working Group structure and roles.

- There is too much duplication within the groups. Some groups could be merged. Hydrology and Cryosphere can be merged as one group, and Black Carbon Monitoring and Modeling can be included in Group 2.
- Group 6 covers a large area, so it should be split into two or three groups; water use management and socioeconomic impact can be separated into groups, as they are two different topics. Within socioeconomic, gender-inclusiveness should be considered. Therefore, socioeconomic and gender-inclusive can be a new group. With the previous discussion, policy engagement and policy review must be introduced as a new group, as it is a very important issue. These research and learning outputs cannot reach the government unless they are communicated at relevant levels in our government. This can be fulfilled with policy documents that integrate these learnings into something that can impact our community.
- With the previous discussion, there was an agreement that the UIB network needs to be taken to the local level within each country. Hence, there is a need to take science-based data and information to communities, so a new group can be created which can be named as advocacy or dissemination. This group works along with other groups, takes their findings, and then advocates. Even though advocacy and dissemination come under other groups, as it is a cross-cutting topic, the new group formed will be a specialized kind of group.
- Renaming of Group 1 must be considered, as they are sensitive with partial and national level.
- Regarding Group 6, Managing Socioeconomic Impacts Through Adaptation is better. However, with regard to being gender-responsive, the issue cuts across all groups. Therefore, it can be emphasized in any group by adding it to the objectives.
- Consideration for renaming Group 1 is good as it can be included in Group 2, Group 3, and Group 4. Instead of having a separate group on Data Collection, Group 1 can be adjusted on topics like Climate Change, Glacier, or Water, as Data Collection Quality and Quantity will definitely come under them.

- Black Carbon Modelling and Monitoring can be merged with Group 2; i.e., Climate and Air Pollution Variability and Trends, as they all occur in atmosphere and are closely related. Cryosphere can be merged with Group 4; i.e., Hydrology Including Hydrogeology, as it is one of the important factors. This step will help in concentrating the expertise in the relevant Working Group.
- Separate groups for Air Pollution and Black Carbon may have increased the number of groups. Therefore, Air Pollution was included in Group 2 because it causes changes in climate variability, and Black Carbon was included in Cryosphere because it enhances melting of snow and glaciers.
- Even though gender issues are cross-cutting in all themes, it only tends to be an add-on. Therefore, gender should be pinned down across all groups, which can be done by collecting gender-aggregated data. It could be a good step for mainstreaming gender in each of the groups.
- Considering all the drivers in the Indus Basin, some logic has been used to partition the Working Groups as they are now. Even though data is inbuilt in all groups, the logic behind its collection method must be kept in mind. There are some issues behind regionalizing the data, which can be solved by the sharing of data. There is a flow between Group 3 and Group 4. Climate and air pollution are primary drivers of change, which impacts the cryosphere. The cryosphere region is a source of water in the Indus Basin, as it covers about 35% of it. Snow, glacier, and permafrost regions have lots of issues, so merging it with other groups might lose the detailed understanding of such processes. The term Hydrology in Group 4 is more comprehensive, which can be made more specific by including surface and ground water. Therefore, instead of lumping the groups together, a more detailed study can be done as lumping may lose the specific mission for forming these groups.
- The current structure of the Working Groups is the outcome of many experiences. Group 2, Group 3, and Group 4 are all related and must not be changed completely. Air Pollution is included in Atmosphere because it affects atmospheric temperature. Black Carbon is a type of air pollution but is put in Cryosphere because it is one of the steering factors for the melting of glaciers.
- Groups 3 and 4 are connected as they both have a water background. Cryosphere is indeed a huge field, which requires more study, and Hydrology is a quite different field. So, the structure of Working Groups should not be changed.
- Data collection and quality sharing cuts across all the groups. So, does it require us to have a separate group for it?
- Data collection serves all other groups, so it can be included in these groups. But there are some specific networks with a long-term history, which are linked with short-term new networks, especially with high altitude ones. So, splitting of the group will not be as helpful as it is now. So, the working group structure is more meaningful now.
- Unlike in other groups, where researchers share what kind of scientific frontiers have been discovered, Group 1 is concerned with what kind of data has been shared, which has been a big challenge. This group can be reformulated by revisiting its monitoring system, high-low altitude stations, and quality.
- The title of each group could be simpler. In Group 2, climate is a bigger issue compared to variability and trend, so it can be renamed as Climate and Climate Change. Similarly, Group 3 can be renamed as Cryosphere Change, and Group 4 as Hydrology and Water Resources.
- If it has been professionally prepared and colleagues are advocating for why it should not be changed, then why is it brought up for discussion here?
- Group 1 should be renamed. This UIB Network Workshop should work on standardization and consolidation of methodologies, as most of the UIB is mountainous, so data collection methodology in mountains must not be generalized like in other regions. Also, this group must work on adapting a framework imposed by this Network. In the case of Group 6, vulnerability along with gender must also be included, along with the socioeconomic management.
- There are lots of good suggestions, along with some conflicting suggestions. The revisiting of Working Groups is needed, but there is also a need to look at broader concerns.
- Any modifications and adjustments at the group level can also take place at the national level. But at the regional level, data collection and sharing might be problematic, as there might be different frameworks between nations.

- The data collection methodologies at the regional level must be standardized for comparison of results.
- Generally, the word Social refers to big social groups, farmers, and fishermen, and disregard the essence of what that means for men and women specifically. Since men and women have different adaptive and risk-taking capacities because of their roles, Group 5 could be renamed Managing Gendered Socioeconomic Impacts through Adaptation Measures to make it gender-inclusive as well.
- Group 5, Hazard and Risk, must be specified by clarifying whether it refers to managing, identification, profiling, or mapping of hazards.
- Policy doesn't refer only to science. The suggestion of all states, including economic people and other communities, must be included. So, Advocacy and Policy could be formed as Group 7.
- TORs of the Working Groups and Strategic Committee cover all the points included in Group 7. If there is a separate group for policy and advocacy, then they need to be integrated in each group, which might not be that effective. Policy and advocacy is a part of the strategic committee, which includes providing feedback to funding proposal development. But in Working Groups, such features may not have been included, which needs to be revised and added.
- For policy-level work, people committees must be considered at first. It is a science-based collaboration where strategic committees cover that work. They get information from different sectors and decide on dissemination of information, advocacy, and create policies. So, there is no need for a specific group for such a cross-cutting issue.
- Purposing of advocacy and policy doesn't mean framing any kind of policies, but it means sharing of the policies that are prevalent in UIB regions so that benefits can be taken. It is agreed that there must be advocacy about this Network so that it could be taken to the local level. Since the other six groups are more specific and technical in nature, the newly formed group will take care of these matters.
- The Advocacy and Policy group is important because policy takes years to be formulated. These kind of processes take a long-term engagement before producing any kind of results. If a separate group is not created, then the advocacy and policy will not be included at the implementation level but will only remain in words. Formation of a new group is important because that way the emphasis will be created to do separate work for this.
- There is always a gap that science cannot be translated to policy packages. So, Group 7 is needed to convert scientific findings from six groups into policy packages and later use them for advocacy.

Group Work Session Floor Discussions

- Why can Leads and Co-Leads not be from the same country?
- Leads and Co-Leads cannot be from the same country because if they are from the same country, then issues from that one country may be highlighted. So, to create a balance, Leads and Co-Leads need to be from different countries.
- There is a similar approach and mindset between academia across all countries. Similar in the case for nonprofit civil societies, public sector, and government, as well as of different countries. However, the private sector has a different approach. So, even within the same country, academia, or different groups might not consider all aspects of a thematic area. Similar is also the case in UIB network Technical Working Groups because all the thematic areas in TWG are overly broad. Therefore, the country logic doesn't seem that valid.
- This forum should realize that this group of same Lead and Co-Lead can work only at the national level but not at the regional level.
- With the current discussion for Lead and Co-Lead of all groups at the national level, Lead and Co-Leads can come automatically to the regional level. The Lead and Co-Leads must be selected according to the country and then they will automatically be a member of the Working Group at regional levels.
- Existing leads can be taken as starting points, but regional country balance should also be there within country different sectors. Realizing there are not many representatives from India, China, and Afghanistan, let's try to be more integrated.

- Instead of discussing the details in this workshop, the Ad Hoc Strategic Committee at the regional level should formulate these things or at least compose a draft and give work flow for the members. Each country could come back in three months or so for managing the Working Groups. Because having an Ad Hoc Strategic Committee and Working Groups which are not Ad Hoc doesn't make sense.
- As discussed earlier, given a period of six months, the Strategic Committee will produce a plan to form Working Groups and members. There was also an agreement on keeping the Strategic Committee for only six months and keeping the Technical Working Groups, so can't we all agree on this decision?
- Regarding the Country Chapter, these Technical Working Groups are fine, but at the regional level, the Lead and Co-Lead from each country should be under the regional Technical Working Group.
- Some of the current Technical Working Group Leads and Co-Leads are not as proactive as the Network demands. The Working Group in Pakistan is focused, not regional. With regard to regional Technical Working Groups, it is not possible to have full input with representation; they need to go back and consult. In the case of Pakistan, they need to hear all governance, advisors, and the entire frame and listen to the comments from all sectors to be inclusive.
- Lead and Co-Lead of Technical Working Groups should be replicated again and again with time.
- There is only six to eight months for the work of the Ad Hoc committee until the next UIB meeting. So, let's agree and suggest some names for Leads and Co-Leads, keeping in mind it is best to have country representation and gender inclusiveness. Then take six to eight months from now until the next meeting and form a group Lead and Co-Lead. There might also be a chance for countries to identify people.
- Is it still necessary to have Working Groups at the regional level if we have strong national Working Groups? This national Working Group can come and share their outcomes at the regional level. Instead of forming a regional Working Group, different mechanisms like capacity building and dissemination can go around with national Working Groups.
- The formation of a national Network for regional goal fulfilment is possible, but it needs to have a national platform for managing it as a regional outcome.
- There is some confusion between the regional and national groups. There can be national Working Groups and the learning from this group can be shared at regional levels, where there will be cross-cutting sharing of the regional exchange of knowledge. Also, it will be logistically difficult to collaborate and cooperate at the regional level. At this point, it is difficult to find the names of those willing to be Lead and Co-Lead because the consent of these people is required. So, those who like to volunteer can give their name and then later the Ad Hoc committee can scrutinize from within that pool.
- At the regional level we should not talk about names but should talk about structure, like how practical and beneficial it could be. The policy, standardization of methodology, and framework can be regional level tasks. So, identification of such cross-cutting themes that can be taken to the regional level should be done and we should try to fit the structure at the national and regional levels as well.
- Having a Technical Working Group in the same manner as for the national level may not be problematic. We need to rethink this matter. Look at smaller groups and analyze what other things are possible based on available information and knowledge and use it for understanding what future structures are needed for technical integrating of country Working Groups at the regional level. With today's discussion, at least it has been made clear that looking at the Basin with a regional view is quite important. Even if we cannot come up with definite names for Lead and Co-Lead for the Working Groups, at least we can come up with what each Working Group will do.

Closing Session

Closing Remarks

Khalid Mohtadullah: The objectives of the regional meeting have been achieved. All participants have acknowledged the Network potential for sharing rich knowledge and experiences. This is a first step in a mechanism toward setting the regional UIB-N for sharing knowledge and experiences in the quest for better understanding and management of valuable resources. It would be in UIB-N's best interests to retain the informal structure, keeping in view the sensitivities among Indus Basin-sharing countries.

Mr Mohammad Ebrahim Barekzai from Afghanistan: The Afghanistan delegation has learnt a lot from these three days, including the shared scientific knowledge and experiences on various important topics like water. Water is a very sensitive element, but it is required to focus on cooperation instead of conflicts. Finding the solutions to climate change and its impacts is a unique opportunity for regional cooperation. The Afghanistan Government has always encouraged regional cooperation on water. The country is facing many challenges, like climate change and its consequences and population growth. Under this scenario, regional cooperation would be vital for finding solutions through sharing scientific knowledge and experiences. This meeting has been a great opportunity to learn about the regional experiences. It is hoped that we will have good feedback from our Afghanistan colleagues.

Dr Liu Shiyin from China: It has been a successful and important meeting in terms of China's perspective, as well as the regional aspects. It is now expected to adhere together to solve the issues in the Indus Basin. Being a member of the Ad Hoc Strategic Committee, I look forward to better planning of the regional level UIB-N. It is hoped that UIB-N will be strengthened and enhanced.

Prof. Shaheen from India: Since we are newer to the UIB-N, the Indian delegation benefited by the work shared by the colleagues from across the borders. It is a great platform to share our own experiences while being part of the UIB. This meeting provided opportunities to build contacts and will be very helpful for future collaboration. The Indian delegation is now thinking of initiating some collaborative research work on some issues, particularly with Pakistani experts, which are very critical for survival and sustainability of the water economy.

Ms Nusrat Nasab from Pakistan: I have been engaged with UIB-N since its inception and it has come a long way. Indeed, it is a great platform at the regional level to mutually learn and share experiences. Initially, it was very difficult for the experts from different organizations within a country to agree on a single point, but this meeting brought scientists and other professionals together to collaborate and share knowledge and experiences. In my opinion, over the years, the Pakistan chapter has progressed so well, and it could be a good example for other countries to collaborate not only within countries but also on cross-border initiatives. During this workshop, the amazing talent and expertise present in this room were willing to discuss issues related to climate change, the environment, and community vulnerability with the provision of scientific solutions.

Dr David Molden from ICIMOD: This has been a great, interesting, and inspiring gathering. The mission of the UIB-N is now altered, and now it's better than previously, with everyone pondering together and bringing new definitions. It's a first step on a long journey for all four countries. The journey of the Pakistan Chapter has been wonderful. Other than achieving the objectives of the meeting, we made friends across the borders, which seems to be one of the major objectives of UIB-N: to make bonds and friendships that will take UIB-N ahead. The constructive deliberations and dialogues made joint decisions, which shows that together we can move ahead. The UIB-N will take it step by step to move ahead, but it should not take too much time. Thank you all to for participating in the UIB-N meeting and being a valuable member of the regional UIB-N.

Dr Arun Shrestha delivered the Vote of Thanks, thanking participants from Afghanistan, Pakistan, China, and India, as well international members from CSIRO, Newcastle University, and University of Bonn. He remarked that the very sound decisions taken together as the UIB-N team would not have been possible without such enthusiastic participation during the workshop. He acknowledged the generous support of DFAT, particularly the Australian Embassy in Kathmandu; thanked Chairman of UIB-N Mr Khalid Mohtadullah and ICIMOD DG Dr. David Molden for steering the process; and appreciated strategic guidance from Mr Nisar A. Memon. In ending, he thanked the River Basin core team along other ICIMOD colleagues, who worked hard for several weeks to make this workshop a success.



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