

Workshop Proceedings

Stakeholders' Prioritization of Climate Change Adaptations in Water, Agriculture, and Energy Sectors

10 November 2016, Gilgit, Pakistan



Consortium members



About HI-AWARE

The Himalayan Adaptation, Water and Resilience Research (HI-AWARE) Consortium conducts research and pilot interventions, capacity building and policy engagement to enhance the climate resilience and adaptive capacity of poor and vulnerable people living in the mountains, hills and flood plains of the Indus, Upper Ganga, Gandaki and Teesta river basins in Pakistan, India, Nepal and Bangladesh.

HI-AWARE aims to influence policy and practice to aid the climate resilience and adaptation of poor and vulnerable populations in the region by generating evidence based knowledge on geophysical, socioeconomic, gender and governance drivers and conditions leading to climate vulnerability, as well as monitoring and assessing adaptation measures. It focuses on identifying 'critical moments' when communities are most vulnerable to climate risks, 'adaptation turning points' when existing adaptation strategies no longer work, and "adaptation pathways", sequences of policy actions that address both short-term responses to climate change and longer term planning. It looks at strengthening the expertise of researchers, students and science-practice-policy networks to conduct as well as use research on climate/ social vulnerabilities, resilience, and adaptation.

HI-AWARE comprises of five consortium members: The International Centre for Integrated Mountain Development (ICIMOD), the Bangladesh Centre for Advanced Studies (BCAS), Pakistan Agricultural Research Council (PARC), The Energy and Resources Institute (TERI)-India, and Wageningen Environmental Research (Alterra).

Acknowledgement

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HI-AWARE internal Report

Stakeholders' Prioritization of Climate Change Adaptations in Water, Agriculture, and Energy Sectors

10 November 2016, Gilgit, Pakistan

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Organized by:

Pakistan Agriculture Research Council (PARC) under the Himalayan Adaptation, Water and Resilience (HI-AWARE) Research Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA)

Himalayan Adaptation, Water and Resilience (HI-AWARE) Research

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In addition we also acknowledge the support and collaboration by the Mountain Agriculture Research Centre (MARC), Karakorum International University (KIU), International Centre for Integrated Mountain Development (ICIMOD), WWF Gilgit Baltistan office, and Gojal Rural Support Organization (GRSO)

List of Acronyms

CAEWRI	Climate Change Alternate Energy and Water Resources Institute
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CISCAA	Citizen Science Climate and Adaptation Ateliers
DG	Director General
GB	Gilgit Baltistan
HEIS	High Efficiency Irrigation System
HI-AWARE	Himalayan Adaptation Water and Resilience Research
ICIMOD	International Centre for Integrated Mountain Development
IWRM	Integrated Water Resources Management
KIU	Karakorum International University
MARC	Mountain Agriculture Research Centre
NARC	National Agricultural Research Centre
NGO	Non-Governmental Organization
PARC	Pakistan Agricultural Research Council
PMD	Pakistan Meteorological Department
WWF	World Wide Fund for Nature

Executive Summary

Pakistan Agricultural Research Council (PARC) under its Himalayan Adaptation, Water and Resilience (HI-AWARE) Research project conducted a stakeholder consultation workshop in Gilgit on 10 November, 2016 at Karakorum International University (KIU). The workshop was organized to consult local stakeholders for HI-AWARE's planned work in high altitude areas of Gilgit Baltistan (GB), and to get feedback from the participants on effective research and development in GB and to prioritize climate change adaptation measures in agriculture, water, and energy sectors of GB. The underlying purpose of the workshop was to introduce HI-AWARE to the key stakeholders in the GB region and explore options for future collaboration among partners and stakeholders.

The workshop was inaugurated by the Vice Chancellor of the host institution, the KIU. He lauded PARC's efforts in organizing the event there, emphasized the role of high quality research on climate change, and expounded on the significance of climate change in high-mountain settings such as GB. The PARC Chairman then addressed the audience and expressed his gratitude to the hosts for providing PARC the opportunity to share its work with the young minds of the university. He stressed on the importance of the climate change concept for Pakistan and appreciated the professionals for taking out time to share their knowledge on the subject on this occasion.

Dr. Munir Ahmad outlined PARC's efforts in developing climate resilience in Pakistan through effective research and pilot interventions. Dr. Bashir Ahmad, Principal Investigator of HI-AWARE, introduced the project and highlighted some of its major achievements to date. Mr. Zeeshan (Water Resource Specialist) explained HI-AWARE's pilot efforts in the agriculture, water, and energy sectors in the Soan basin and discussed options for replicating suitable technologies in GB.

A Question-Answer session after the presentations was followed by an address of the Honourable Minister for Food and Mining, GB. He applauded the gathering of intellectuals and professionals for addressing a key issue of his province, i.e. climate change. He stressed that climate change is a global reality and the harmful effects of anthropogenic activities such as carbon emission have already set this change in motion. However, through effective adaptation strategies and public-private partnership we can develop resilience to climate change in Gilgit Baltistan.

A technical discussion session commenced after lunch, which comprised of senior officials of government, local NGOs, and policy makers in GB. The session was moderated by the DG NARC, Dr. Azeem Khan. The session was highly productive which discussed the opportunities and challenges in agriculture, water, and energy in a climate change scenario.

The workshop concluded with a vote of thanks from Dr. Khan. He considered the workshop successful in getting substantial feedback from stakeholders on prioritization of climate change adaptation options. Moreover, good working linkages were established between HI-AWARE and the local administration, which would be useful for smooth research and development of the project in this region in future.

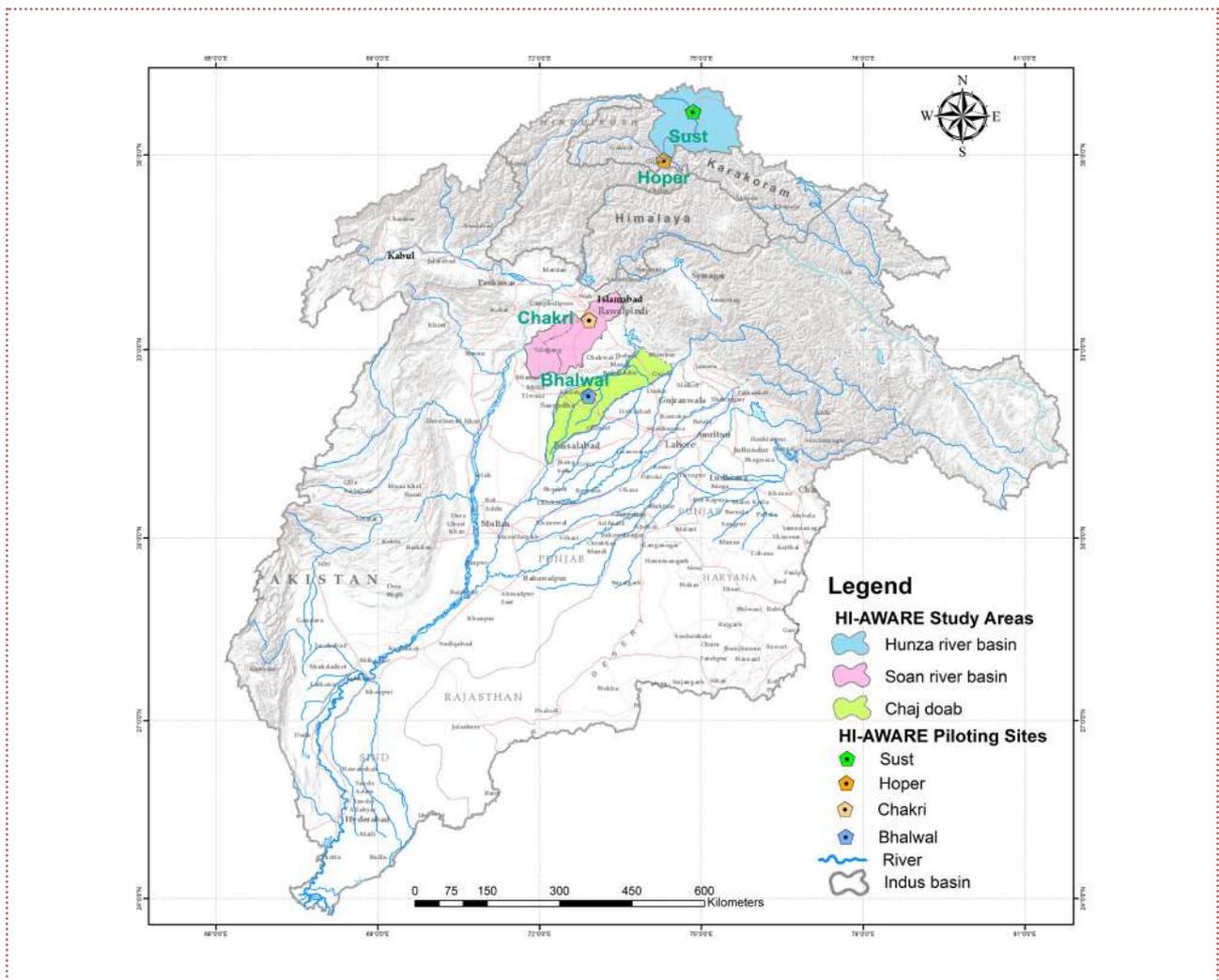
Introduction

The Himalayan Adaptation, Water and Resilience (HI-AWARE) Research on Glacier and Snowpack Dependent River Basins for Improving Livelihoods programme has three work packages: knowledge generation, research into use, and strengthening expertise. It is implementing these in 12 study areas in the Indus, Upper Ganga, Gandaki and Teesta river basins. All four basins have been divided into three geographical areas representing their upstream, midstream, and downstream parts.

HI-AWARE is conducting research on water, energy, food security, human health, water-induced hazards, and extreme events in the area. It is also testing adaptation measures in Citizen Science Climate and Adaptation Ateliers (CISCAAs) at various sites and designing adaptation pathways for out-scaling and up-scaling.

Situational analysis is HI-AWARE's first field activity to examine upstream, midstream, and downstream areas for a rapid appraisal of livelihoods, climate change impacts, vulnerabilities of local people and systems, and adaptation measures.

In Pakistan, the HI-AWARE project is being implemented by the Pakistan Agriculture Research Council (PARC) in three sub-basins of the Indus River, namely the Hunza River, the Soan River, and the Chaj Doab. These study areas correspond to an upstream, mid-stream, and downstream sub-divisions of the entire Indus river basin.



A stakeholders' consultation workshop was conducted in Gilgit on 10 November 2016, under the auspices of the Pakistan Agriculture Research Council, which is leading the HI-AWARE project in the country. The Hunza River basin in the province of Gilgit Baltistan (GB) is one of the study areas under this HI-AWARE project in Pakistan. The Hunza River is a tributary of the Indus and represents the upstream/water tower of the river. The high mountains and glacier-fed rivers of GB make it a unique landscape, which is now facing particular impacts of climate change.

The workshop was organized to consult all relevant stakeholders in these high-altitude areas of the Indus basin. It had the following three, primary objectives:

- To introduce the HI-AWARE project to all stakeholders in the Gilgit Baltistan Province
- To share key insights and achievements of the project to date
- To consult stakeholders for prioritization of climate change adaptation options in the water, energy, and agriculture sectors

The workshop was conducted at Karakorum International University and stakeholders from diverse backgrounds attended the event. A total of 203 participants were at the workshop including practitioners, professionals, members of the academia, media personnel, government officials, representatives of NGOs, and various policy makers (See Annexure 4 for details).

The workshop consisted of two sessions: an opening session, which introduced the project to the audience, and a technical panel discussion comprised of experts from the agriculture, energy, and water sectors. The panel discussed some key impacts of climate change on these key sectors as also various adaptation options, which could be adopted to avert the climate change impacts.

Opening Session

The provincial Minister for Mining and Food, Mr. Haji Akbar Taban, dignified the workshop with his presence, thereby contributing to the effort of this workshop of bridging the considerable science-policy gap in Pakistan. The government of Gilgit-Baltistan had recently taken charge of the administration of the new province. This new government is enthusiastic about progress of the province and keen to discover opportunities for sustainable development. There is also an urge to consult and support different institutions, which are generating scientific knowledge on the mountain areas.



Inauguration of the Workshop and Opening Session

Address by VC KIU

The session was inaugurated by Dr. Asif Khan, Vice Chancellor, Karakorum International University (KIU). He expressed his gratitude to the Chief Guest, the Honourable Minister, for finding time to attend the workshop. He considered it a privilege for KIU to host this important event. He added that PARC's initiative to convene a multi-stakeholder event to discuss the issue of climate change at provincial level is highly commendable.



The Vice Chancellor KIU, Dr. Muhammad Asif Khan, addressing the audience

He thought that climate change is a reality that is affecting all aspects of the world – be they human activities, natural phenomena, ecosystems, or occurrence of extreme events. Communities living in mountain areas are largely dependent on various ecosystem services and forest products. Climate change is adversely affecting them making their lives 'harsh'. Dr. Khan further said that public ownership of local issues will contribute greatly in developing trust among the communities and will convince them to play an active role in their development. He wished the project achieve its output on time, and offered full support by the KIU in future ventures.

Address by Chairman PARC

After the formal inauguration, the Chairman PARC took the stage. He addressed the students in the auditorium and thought them lucky to be part of this consultation, in which they could observe some high quality research that was being conducted under the HI-AWARE project. He encouraged them to be motivated to study the multifaceted issues faced by Gilgit-Baltistan. He said that PARC envisages the strengthening of local expertise and, therefore, awards fellowships under HI-AWARE to students at KIU as well as other



Chairman PARC addressing the audience, particularly the students at the workshop

national universities. He also thanked the professionals participating in this event, whose presence bolstered the idea of bringing research into use.

Dr. Yusuf added to the words of the Vice Chancellor, observing that, although climate change is here, the acceptance of this reality is still missing in some sections of the country. The trend of drastic change in climatic pattern is now being seen every year, which is an alarming situation. Reduced snowfall in the mountainous areas is affecting agriculture, pastures, and water resources there. The impact of climate change on glaciers is evident to all. In such circumstances, PARC under this project is making efforts to develop awareness about issues in these sections and trying to sensitize policy makers, both at national and provincial levels so that informed policy level decisions may be made.

The Chairman concluded his address with the wish to see more collaborative events like this in future.

PARC Experiences in developing Climate Resilience by Dr. Munir Ahmad

The Climate Change Alternate Energy and Water Resources Institute (CAEWRI) of PARC is implementing the HI-AWARE project in Pakistan. Dr. Munir Ahmed, Director of the institute, shared a few experiences of CAEWRI in water management for agriculture. The institute has an experience of more than 30 years in providing technical solutions in this field and completed hallmark projects in Pakistan.



Dr. Munir Ahmad explaining CAEWRI's achievements so far

These include but are not limited to an inventory of glaciers and glacial lakes in the country, the introduction of micro-catchments and rain water harvesting for agriculture, and provision of water diversion structures at farm gates for better water management of farmers' fields, an estimation of potential of run-off water harvesting for spate irrigation, and the introduction of high-efficiency irrigation systems including drip, bubbler, micro sprinkler, and rain gun, and centre-pivot irrigation systems.

The mandate of the institute has grown over the years and now covers aspects of climate change and alternate energy further including water resources management in its projects. CAEWRI, for the past decade, has been working on a food-water-energy nexus. It has introduced solar water pumps for agriculture, which culminates the concept of clean energy, efficient water usage, and enhanced productivity for farming communities.

Dr. Ahmad thought that the HI-AWARE project will add to CAEWRI's experience of water management and alternate energy, and will help explore adaptation options in Pakistan through the lens of climate change.



Dr. Bashir Ahmad introducing the HI-AWARE project to the participants

Introduction to HI-AWARE by Dr. Bashir Ahmad

DR. Bashir Ahmad, Principal Investigator of the HI-AWARE project in Pakistan, introduced the project to the audience. He presented the overall structure of the programme and explained its work packages.

The project is generating knowledge in multiple areas including research on biophysical drivers, socio-economic and gender drivers, climate change adaptations, critical moments and turning

points in climate change, and the design of sustainable adaptation pathways.

Dr. Bashir explained that HI-AWARE is making efforts to develop future, climate change scenarios for the Indus basin, an important part of which are the climate and hydrological scenarios of the high-altitude areas of Gilgit Baltistan. It is also piloting climate smart technologies and interventions in its study areas. These interventions are piloted and demonstrated in these areas to develop people's resilience to the adverse impacts of climate change and reduce their vulnerability to subsequent hazards.

The project is not only generating evidence based knowledge from its study areas, but also trying to bring this knowledge into effective use through its Research into Use work package. This focuses on the development of strong linkages with stakeholders and relies on a consultative process such as this workshop, to see if the fruits of high quality research actually reach people. Through its research-into-use efforts

HI-AWARE is soliciting a shift in policy paradigm and trying to bridge the

science-policy gap in Pakistan. HI-AWARE hopes to achieve similar milestones in the province of Gilgit Baltistan.

Dr. Bashir concluded his presentation with an emphasis on HI-AWARE's goal of strengthening expertise in its study areas. He commended the students at Karakorum International University, who had secured fellowships from the HI-AWARE project to carry out their postgraduate research and encouraged other students to follow in the steps of their seniors.



Mr. Zeeshan explaining the concept of piloting to the audience

Piloting in Chakri – Options for Hunza Valley by Zeeshan Tahir Virk

Mr. Zeeshan Tahir Virk, working as a water resources specialist in the HI-AWARE project, opened his presentation with a brief introduction of HI-AWARE's midstream study area, the Soan River Basin. The basin covers 55% of the Potohar Plateau and is the only major hydrological unit in the area. Most of the basin's area is arid and relies on rain-fed agriculture.

Mr. Virk then turned to piloting in

HI-AWARE. It amounts to testing of already developed innovative, climate-smart technologies in the study areas to demonstrate effective climate change adaptation options. HI-AWARE is working on developing a physical model farm based on a food-energy-water nexus at Chakri in the Soan basin. It has interventions for Integrated Water Resources Management (IWRM), which includes conjunctive use of water, High Efficiency Irrigation Systems (HEIS), irrigation monitoring and scheduling, and on-farm water management.

Furthermore, it also has interventions for climate smart agriculture, which includes crop diversification, high value fruit orchards, offseason vegetable farming in tunnels, livestock rearing, and aquaculture development.

In terms of supporting the energy needs of the farm, the interventions for energy include portable solar water pumping, on-farm solar electrification, solar geysers and solar heating, energy efficient stoves, fodder chopping with solar energy, and economical bio-gas generation with farm manure.

Two model farms have been set-up at Chakri, one representing small farms (4 acres) and the other medium-sized farms (11 acres). Most of the cost of these interventions has been paid for by farmers themselves; HI-AWARE is providing limited financial support along with complete technical assistance for the development of these farms.

Mr. Virk discussed a list of planned interventions for Chakri. HI-AWARE's approach is not only limited to technology transfer, but also includes farmer trainings, local vendor and service provider trainings, and stakeholder outreach to achieve effective out and up-scaling. HI-AWARE is aiming to develop similar models in Gilgit Baltistan.

After his presentation the floor was open for an interactive session among participants to discuss viable climate smart options and interventions in Gilgit Baltistan.

Question-Answers: Interactive Session

The session commenced with a question from Dr. Abdul Wahid Jasra, Country Representative of ICIMOD in Pakistan. He asked what plans were in place with the

HI-AWARE team to incorporate indigenous knowledge and adaptation strategies of local people in the study areas in Gilgit Baltistan. Dr. Bashir responded that indigenous knowledge for adaptation is an asset in any working area. The knowledge of the people of Gilgit Baltistan would be incorporated into project activities. Since there is no 'one-model-fits-all' approach in HI-AWARE, each intervention will be tested and tailored according to local environments.



Dr. Abdul Wahid Jasra expressing his comments over use of indigenous knowledge in HI-AWARE



Mr. Fida Hussain asking about ecosystem services in Gilgit Baltistan

Mr. Fida Hussain, a Human Development Specialist in Gilgit Baltistan, observed that people in Gilgit Baltistan rely much on ecosystem services, which come in various shapes and forms, sometimes as wildlife viewing and eco-tourism, sometimes as valuable forest products. He asked what efforts the project would undertake to ensure sustainable development of these ecosystem services.

Dr. Jasra responded that many organizations in Gilgit Baltistan are working to conserve and develop them. ICIMOD has already effectively worked for the development of indigenous eco-system services, together with the development of value-added products from Seebuck Thorn and of Yak rearing practice as sustainable livestock farming for communities resident in high altitude areas.

Dr. Munir added that ICIMOD is a valuable partner in the HI-AWARE consortium. He stressed upon the knowledge and experience of ICIMOD along with other partners such as the Karakorum International University (KIU), Pakistan Meteorological Department (PMD), and WWF are essential assets to the project and will assist in research and development activities in Gilgit Baltistan.



Dr. Munir explains the importance of local partners and stakeholders in project implementation



Dr. Ijlal Hussain expressing his concerns on overgrazing in the pastures

Mr. Ijlal Hussain, Deputy Director Livestock Department, Gilgit Baltistan, observed that care should be taken in development activities in livestock, because an increase in livestock population will adversely affect the rangelands and pastures of the area, since open grazing is followed in Gilgit Baltistan.

The session concluded with Dr. Bashir's remarks that utmost effort will be made by the project team to incorporate the valuable feedback from all stakeholders while executing project activities.



Minister for Food and Mining, Gilgit Baltistan Government, delivering his address

Address by Minister

The minister for Food and Mining, Mr. Haji Akbar Taban, addressed the audience after the question/answers session. Subsequently, expressing his gratitude to the organizers of the event, he observed that climate change is a global reality. Today, it's not only an environmental problem but a challenge for multidimensional development. It is likely to affect all sectors of Pakistan's economy and society. Although Pakistan is a small contributor to global climate change, yet it is one of the most climate affected countries in the world. The

drastic increases in temperature and rainfall are some of the visible impacts of climate change in the country.

In such conditions, marginalized groups are often the most vulnerable to climate induced hazards and disasters. Although international organizations are increasing their efforts to reduce emissions from greenhouse gases through clean technologies, we cannot invert the changes that have already occurred to our climate in the past few decades. A viable solution at this point is to adapt to this climate change and improve our understanding of the climate. This is only possible if such kind of efforts like today's consultation and people-centred projects of HI-AWARE are promoted and appreciated, both at provincial and national levels. He expressed his content with

HI-AWARE's community based approach in its efforts in Gilgit Baltistan and prayed for the success of the project's long-term aims and objectives.

Technical Panel Discussion

The technical session of the workshop commenced after lunch. The session was subdivided into discussion groups on climate change adaptation in water, energy, and agriculture. The Director General, National Agriculture Research Center (NARC), Dr. Azeem, moderated the session.

Dr. Babar Khan, Head WWF Gilgit Baltistan, began the discussion on climate change and agriculture by stating that climate change impacts can be felt all



Dr. Babar explaining the impacts of climate change on mountain agriculture

across Pakistan, ranging from coastal areas to high-altitude mountainous areas. However, the glaciers in the Hindu-Kush Himalayan Karakorum region of Gilgit Baltistan (GB) are the true indicators of climate change in the country. He said that a significant rise in both temperature and precipitation has been recorded in GB and associated areas. This is an unusual phenomenon, since GB has its own micro-climate, which in previous decades usually remained unaffected by the changes in the climate of the low lands and plains.

The gravity of the situation may be assessed from the fact that the temperature increase in GB in the summer season is twice as much as compared to other areas of Pakistan. This is an alarming situation, especially for communities inhabiting small hamlets and villages in high-altitude valleys, locally called 'Nallas'.

Another unusual phenomenon for GB is the increase in liquid precipitation, which generally is limited to a few millimetres in July and August. However, in 2015 unexpected heavy showers in April and May caused flash flooding in many areas of Gilgit, Hunza, and Sakardu districts.

The increasing vulnerability of people is also associated with the direct impacts of precipitation and temperature on the agriculture and vegetation in GB, which not only reduces productivity from the crops, but also affects the quality of food production. The agriculture and livestock in GB are dependent on hill torrents, pastures, and rangeland. With the increase in temperature the glaciers are melting quickly, generating a situation of either too much or too little water in GB. There is a need to identify adaptation options, which can address both short and long-term water problems in the area. It also calls for the climate resilient varieties for forest and agriculture there. The current cash crop trend may provide a temporary solution for food security, but it may prove harmful for the eco-system in the long run. In a nutshell, to address the multifaceted problems of GB, there is a need to adopt a pragmatic and integrated approach.

Mr. Muhammad Ali, Chief Engineer of the Gilgit Baltistan Water and Power Department, began the discussion on climate change and energy challenges of GB. He explained that the installed power generating capacity of the province is 132 MW, but it is not connected to the National Grid. The estimated potential for hydro-electric power in GB is estimated at around 40,000 MWs. The power demand of GB is much greater than the installed capacity: the current shortfall is 120 MW in summers and about 80 MW in winters. The federal government has introduced a single power project for GB in 'Naltar' with a design capacity of 500 MW, but flash flooding in the area has made development work in the area extremely difficult. The floods damaged construction implements and machinery, and progress of the project has been hampered greatly.

Accessibility to the project site is such a major issue, that the total cost of the project has increased 1.5 billion to 5 billion. Such flash floods were never reported in the area a decade ago; they are most likely resulting from changes in climate.

Similarly, the unexpected rains in destroyed 80% of the power houses, due to sediment load in the penstock. The prevalence of such vulnerable conditions and surges in project costs has made the federal government reluctant to invest in hydro-power projects for GB.

To address the situation, the GB power department is relying on the introduction of innovative micro and macro pico-hydel power projects. The Chief Engineer was confident that through the efforts of his department they would get rid of the power shortfall in GB by 2022 and would generate surplus electricity by 2025. As a short-term adaptation measure, to fulfil energy requirements (most of which is for heating), the department has provided subsidy on the purchase of alternate fuels such as kerosene oil.

Mr. Ali was optimistic that if their initiatives of public-private partnership bear fruit, they would be successful in adapting to climate change impacts on the energy sector of GB.

Mr. Fida Hussain Human Development Specialist added to the discussion on energy by suggesting the solution for power related issues in Pakistan would be clean renewable energy such as hydro-electric power. While the federal government is spending much money on the development of coal powered plants, the carbon footprint of such power houses is too much. Nearly 11 tons of carbon is emitted in only the cooling process of a single coal power house.



Participants noting down valuable advice from sectoral experts

So, the future of energy in Pakistan, particularly GB, is alternate energy. So far, through effective collaboration with local people 16 biogas plants have been tried out in different areas of GB. However, lack of technical awareness in the communities has made maintenance of such systems difficult.

In addition, power generation through wind has been tested in Shishkat and Hussaini. It was also tried to replicate the concept of climate smart villages of Nepal in Ghulkin, by the use of solar electrification and solar geysers. However, the community adoption

rate had been limited. It is the prerequisite to educate people about the benefits of alternate energy, and projects such as HI-AWARE can play a positive role in this regard.

Mr. Maisoor, a specialist in management of water resources in GB, started the discussion on water challenges. He observed that perhaps the most directly affected sector by the impacts of climate change is water. Each year flash floods and glacial movements desiccate most of the farmer managed irrigation networks in GB. The situation is not very different for the provincial capital Gilgit, where the two main channels had been recently affected, in quantity and quality. Such conditions are limiting the municipal supply of water in the city. The use of pesticides and insecticides for agriculture in the Nalla areas is affecting the quality of water downstream, where Gilgit City is also located. Besides, the use of animal waste for agriculture, without proper composting, is a serious issue as it is contaminating water and causing serious health problems. There is a need to improve local agricultural practices and reduce the existing contamination of water in Gilgit as well the rest of GB.

Dr. Azeem Khan, moderator of the technical session, concluded the session by stating that climate induced challenges faced by the people of GB are far greater than in other areas of Pakistan, because the vulnerability of people living there is very high. There is a need for integration in our efforts and to work in collaboration to see substantial improvement in the area. The participation of key stakeholders from the agriculture, water, and energy sectors of GB is highly appreciated. It shows the concern of local institutions for sustainable development of the region.



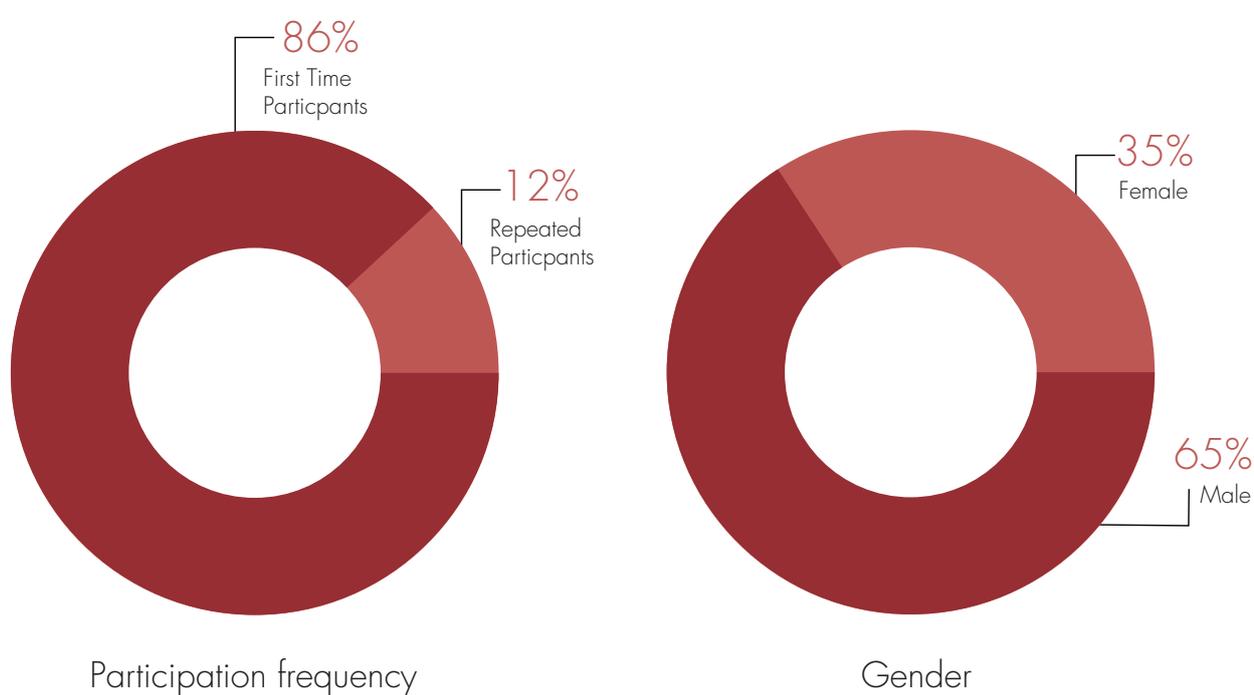
Technical discussion in progress

He was optimistic that with such support from local stakeholders the HI-AWARE project would see guaranteed success in GB.

Annexure 1

Purpose of the Event

A Stakeholders' Prioritization workshop had been organized to consult with local partners and stakeholders in Gilgit Baltistan for the prioritization of climate change adaptation options in the agriculture, water, and energy sectors. The event also aimed at familiarizing the local administration with HI-AWARE's work in Gilgit Baltistan and hoped to get an insight from the participants into achieving robust adaptation to climate change and to explore options for sustainable development in the region.

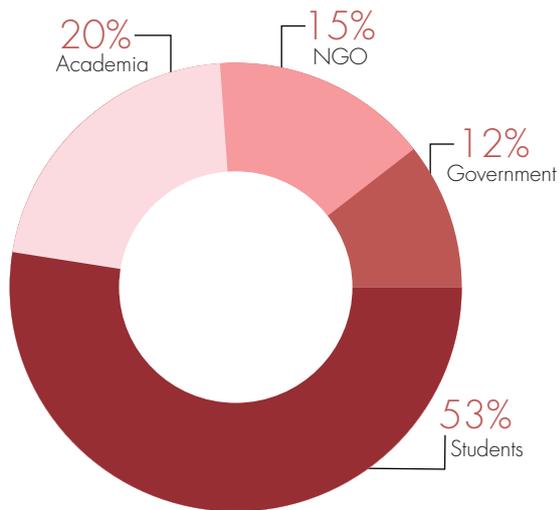


Contribution to HI-AWARE Results

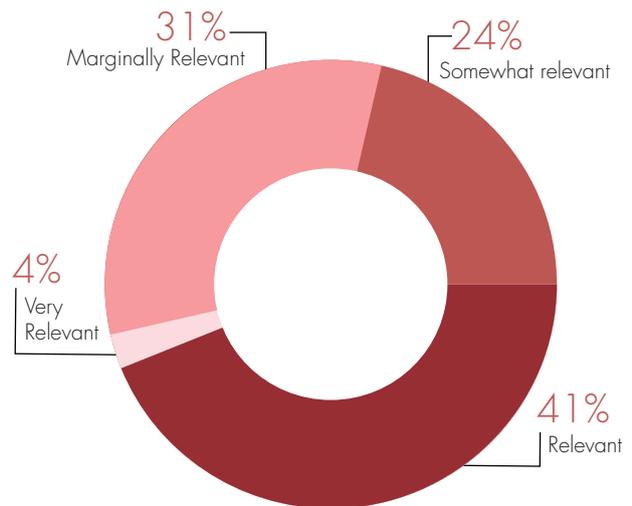
The workshop had been arranged as a part of HI-AWARE's work on Research Component 3 (RC-3) and Research Component 5 (RC-5). These envisage effective consultation with stakeholders for the prioritization of climate change adaptations and the development of sustainable adaptation pathways. Findings of this report will provide important insights for activities 3.2.1 and 5.2.1.

Event Statistics

A total of 203 participants had attended the workshop, out of which 156 were students from various departments of the KIU. The remaining 47 participants were policy makers, government officials, professionals, members of the academia, local media and NGOs. Almost all participants had been attending a HI-AWARE event for the first time.



Participation disaggregated by affiliation



Relevance to the event

Many reported the event to be highly relevant to their existing efforts on climate change adaptation and mitigation in mountain areas. Professionals, and students were eager to discuss and replicate HI-AWARE interventions in their respective areas of interest.

Annexure 2

Programme

Session I: Inauguration

09:00 - Welcome to Participants

09:30 - Arrival and Registration of Participants

10:00 - Recitation from Holy Verses of Quran

10:10 - Welcome address by Vice Chancellor, KIU Gilgit

10:20 - Remarks By Chairman PARC

10:30 - PARC's Experiences in Developing Climate Resilience (PARC Dr. Munir Ahmad)

11:20 - Introduction of HI-AWARE Project (PARC – Dr. Bashir Ahmad)

11:50 - HI-AWARE 'Piloting in Soan Basin' – Options for Hunza Valley (Mr. Zeeshan Tahir Virk, Water Resources Specialist - HI-AWARE)

12:15 - Question/Answers and Interactive Session

12:40 - Address by the Minister

01:00 - Lunch & Prayer Break

Session II: Technical Panel Discussion (1400-1600)

Climate adaptations and their prioritizations in water, agriculture, and energy sectors to improve livelihoods and enhance resilience

Moderator of discussion, Dr. Muhammad Azeem Khan, DG NARC, Islamabad

Active participation from:

- Water Management, Agriculture, Livestock, Forestry, Environment, Irrigation, Energy Department of Gilgit Baltistan
- NGOs: AKRSP, FOCUS, WWF, ICIMOD, EV-K2-CNR
- KIU, MARC-PARC
- CBOs

Vote of Thanks, Dr. Azeem Khan

Closure

Annexure 3

Prioritization Pro Forma

Stakeholders' Consultation Workshop

Thank You Note and Feedback

We thank our distinguished guests, experts and participants for attending the Stakeholders' Consultation workshop for Prioritization on Climate Change Adaptation in the Water, Agriculture, and Energy Sectors held on 10 November, 2016 at the Karakorum International University, Gilgit.

Our purpose was to engage all existing and potential stakeholders in a consultative event to prioritize among a variety of adaptation measures and innovative technologies available to us for our project sites. Your feedback will help us include your expertise and ideas in our project interventions. This will ensure that our demonstration sites and interventions are sound in all aspects and able to adapt to the challenges of climate change.

We once again thank you and request a small amount of your time to share your valuable feedback in this regard.

Personal Information

Name:	_____		
Organization:	_____		
Designation:	_____		
Gender:	Male <input type="checkbox"/>	Female <input type="checkbox"/>	
Area of Expertise:	Water <input type="checkbox"/>	Agriculture <input type="checkbox"/>	Energy <input type="checkbox"/> Food Security <input type="checkbox"/>
	Others (Please Specify) _____		
Functional Area:	Governmental Organization <input type="checkbox"/>	Non-Governmental Organization (NGO) <input type="checkbox"/>	
	Private Sector <input type="checkbox"/>	Academia <input type="checkbox"/>	
	Farming/Community <input type="checkbox"/>	Student/Trainee <input type="checkbox"/>	
	Others (Please Specify) _____		
Contact Details:	Phone: _____	Email: _____	

Feedback

Below is a list of interventions for adaptation against climate change in the Energy, Agriculture, and Water sector respectively. Fill this survey form according to the sample shown below.

Sample

Interventions	Ranking
Solar Water Pumping for Irrigation	8
Energy Efficient Stove	1
Other (Please sepcify)	Aquifer Recharge to Improve Ground Water availability.
Comments:	More focus is required on Ground Water recharge in Mid hills and Plain areas.

Prioritization of Climate Change Adaptations in Water, Agriculture, and Energy sectors

Prioritization of Climate Change Adaptations in Energy

Kindly give your valuable feedback for prioritization of adaptation measures against climate change
Please rank these interventions from 1 to 15 on the basis of their relevance in high-altitude areas of Pakistan

S.NO	Interventions	Ranking
1.	Solar water Pumping for Irrigation	
2.	Solar water Pumping for Drinking	
3.	Solar water Pumping for Drainage	
4.	Solar Farm Electrification	
5.	Solar Desalinization	
6.	Micro-Hydel	
7.	Peco-Hydel (Household level Hydel power generation)	
8.	Efficient Stove	
9.	Solar Cooker	
10.	Biogas for Cooking	
11.	Biogas for Heating	
12.	Solar Gas for Pumping	
13.	Hybrid Alternate Energy	
14.	Solar Dryers	
15.	Bio-Char (A type of Bio-Mass used as a fuel)	

Other (Please specify)	
Comments:	

Prioritization of Climate Change Adaptations in Energy

Kindly give your valuable feedback for prioritization of adaptation measures against climate change
Please rank these interventions from 1 to 19 on the basis of their relevance in high-altitude areas of Pakistan

S.NO	Interventions	Ranking
1.	Rodkhai (hill torrent) water harvesting	
2.	Rooftop water harvesting	
3.	Ridge/ Furrow-bed irrigation	
4.	Snow water harvesting	
6.	Rain water harvesting	
7.	High-efficiency irrigation systems (drip irrigation, sprinkler irrigation, bubbler irrigation)	
8.	Conjunctive use of water surface and ground water combined use)	
9.	Supplement irrigation	
10.	Check dams (Gabion structures)	
11.	HDPE (Drip-Flexible pipe) networking for irrigation, (Corrugated HDPE pipe)	
12.	On-farm drainage	
13.	On-farm water storage	
14.	Precision irrigation (according to crop requirement)	
15.	In-situ water conservation	
16.	Dug-well water harvesting	
17.	Mulching (use of polythene sheets to prevent moisture loss)	
18.	Laser land-leveller	
19.	Canal/ water-course lining	

Feedback

Would you like to attend similar events in future?

Yes No

Was this event useful to you and your organization?

Yes No

How can we improve future HI-AWARE events?

Annexure 4

List of Participants

OFFICIALS			
S.No	Name	Organization & Designation	Gender
1	Ikram Hussain	AD, Fisheries Gilgit Fisheries Deptt, GB	Male
2	Anila Ajmal	WWF Climate Change Officer	Female
3	Sobia Mustafa	WWF Research Associate	Female
4	Dr. Babar Khan	WWF Pak (GB) Head	Male
5	Faridullah Pso	M.A.R.C PSO	Male
6	Munir Hussain	M.A.R.C PSO	Male
7	Shafiullah	M.A.R.C PSO	Male
8	M.Zafar Khan	KIU, AP	Male
9	Kamal ud Din	PMD-Gilgit	Male
10	Dr. Smina Mumtaz	KIU	Female
11	Deedar Karim	Focus Pak	Male
12	Muhammd Ali	WAP GB	Male
13	Fida Hussain	WAPD GB	Male
14	Sherbaz Ali Khan	AKRSP	Male
15	Haleem Mgsi	KIU	Male
16	Arif Hussain	KIU	Male
17	Dr. Ijlal Hussain	DD livestock	Male
18	Mubashar Karim	Programme Manager	Male
19	M.Raza	KIU Physics	Male
20	Dostdar Hussain	KIU	Male
21	Riaz Ali	Director Agr Research GB	Male
22	Azhar Hussain	KIU	Male
23	Dr.Sher Dil Khan	Programme Producer PBC Gilgit	Male
24	Rehmat Ali	WCS-Pak Conservative Manager	Male
25	Adnan Wali	WCS (Wildlife Conservative Society)	Male
26	Walayat Noor	Conservator Forest	Male
27	Sher Ahmed	DG MARC	Male
28	Dr.Sajjad	MARC	Male
29	Nadeem Khan	Avt Khyber	Male
30	Junaid Abbas	KIU	Male
31	Jafar Baig	KIU	Male
32	Bulbul Nazar	WMO. Water mgt	Male
33	Munibullah	WMO.Water mgt	Male
34	Rashid Mir	KIU	Male

35	Farhan Karim	KIU	Male
36	Mirza Fahim	KIU	Male
37	Ali Abbas	KIU	Male
38	Faiza Ali	KIU	Female
39	Adil Hussain	KIU	Male
40	Khalid Amin	KIU	Male
41	Yasir Hussain	KIU	Male
42	Qamar Abbas	KIU	Male
43	Ali Zaman	KIU	Male
44	Dr.Shaukat Ali	KIU	Male
45	Umair - uddin	KIU	Male
46	Munir Kazimi	KIU	Male
47	Muzzamil Ahsan	KIU	Male

STUDENTS

S.No	Name	Department	Gender
1	Aftab Alam	Env.Sc	Male
2	Akhter Hussain	Env.Sc	Male
3	Farhan Naseem	Env.Sc	Male
4	Abu Lais	IR	Male
5	Maleuzammil Ahsan	IR	Male
6	Shehzad Hussain	MBA	Male
7	Imran Ali Khan	MBA	Male
8	M.Ashraf	IR	Male
9	Eshrat Hussain	MBA	Female
10	Ehsan Ali	MBA	Male
11	Atif Hussain	Env.Sc	Male
12	Wasser Ahmad	Env.Sc	Male
13	Sujudia	Env.Sc	Female
14	Yasir	Env.Sc	Male
15	Tahira	Env.Sc	Female
16	Seema	Env.Sc	Female
17	Asima	Env.Sc	Female
18	Mehwish	Env.Sc	Female
19	Ishtiaq	Agr.Engg	Male
20	Fawad Majeed	M.Sc Mechanics	Male
21	Shehzadi	MBA	Female
22	Fazeela	MA Lit	Female
23	Rasit	Env.Sc	Male
24	Imran Ali	Env.Sc	Male
25	Mubina Ghazi	Env.Sc	Female
26	Safina Aman	Env.Sc	Female
27	Nahida Karim	Env.Sc	Female
28	Najat Ali	Env.Sc	Female

29	Shams-ul-Zahra	Env.Sc	Female
30	Kamran Ali	Earth.Sc	Male
31	Kashif Ali	Earth.Sc	Male
32	Farhan	Env.Sc	Male
33	Islam-ud-din	Earth.Sc	Male
34	M.Nasir	Env.Sc	Male
35	Ashiq Hussain	Env.Sc	Male
36	Muneer Alam	Env.Sc	Male
37	Gulfam	Env.Sc	Female
38	Jubilee Rani	Env.Sc	Female
39	Kamila	Env.Sc	Female
40	Fehmida Kiran	Env.Sc	Female
41	Sehrish Khan	Env.Sc	Female
42	Nusrat Jehan	Env.Sc	Female
43	Saeed Ahmed	Env.Sc	Male
44	Sajid Ali	Env.Sc	Male
45	Basharat Ali	Food.Sc	Male
46	Ali Sher Khan	Food.Sc	Male
47	Rizwana	IR	Female
48	Nazia	IR	Female
49	Sofia Kareem	Env.Sc	Female
50	Sabila	Env.Sc	Female
51	Faryal Afsar	Env.Sc	Female
52	Gulnaz Shah	Env.Sc	Female
53	Nauman Ali	Earth Sc	Male
54	Amina Wali	Env.Sc	Male
55	Shahid Ali	Earth Sc	Male
56	Sajid Ali	Physics	Male
57	Farhan Nasseem	Env.Sc	Male
58	Faryal Kulsoom	Env.Sc	Female
59	Nahida Mirza	Env.Sc	Female
60	Arif Hussain	Env.Sc	Male
61	Syed Murad Shah	Env.Sc	Male
62	Salman-ud-din	Env.Sc	Male
63	Wajid Ullah	Env.Sc	Male
64	Wajahat Shah	Env.Sc	Male
65	Basharat Ali	IR	Male
66	Saira	IR	Female
67	Mehraz	IR	Female
68	Zahid Ahmed	IR	Male
69	Samina Mehmood	Food.Sc	Male
70	Shama Surat Jan	Food.Sc	Female
71	Danish Ali	Env.Sc	Male

72	Haider Abbas	Env.Sc	Male
73	Aaqib Zaman	Env.Sc	Male
74	Salma	Behav.Sc	Female
75	Naila Jabeen	Behav.Sc	Female
76	Atiqa	Behav.Sc	Female
77	Bushra	Env.Sc	Female
78	Wasim Akram	Food.Sc	Male
79	Israr Hussain	Env.Sc	Male
80	Misbah Dar	Env.Sc	Male
81	Faryal	Env.Sc	Female
82	Kashif Hussain	Env.Sc	Male
83	Fozia Gul	Env.Sc	Female
84	Afsana	Env.Sc	Female
85	Zunaira Muzaffar	Behav.Sc	Female
86	Sadia Bano	Env.Sc	Female
87	Rukhsana	Env.Sc	Female
88	Safia Kulsum	Env.Sc	Female
89	Jameela Parveen	Env.Sc	Female
90	Samreena	Env.Sc	Female
91	Sobia Rehman	Food.Sc	Female
92	Rabia Karim	Food.Sc	Female
93	Uzma	Env.Sc	Female
94	Amir Ahmed	Math	Male
95	Sidra	Env.Sc	Female
96	Izhar Karim	BBA	Male
97	Zulfiqar Ali	BS (IT)	Male
98	Rameez Ali	BS-IR	Male
99	Khoja	BS-IR	Female
100	Khalid	BS-IR	Male
101	Adnan	MBA	Male
102	Maqsud Murad	MBA	Male
103	Inam-ur-rehman	Mass Com	Male
104	Haseeb Anwar	IR	Male
105	Asif Ali	IR	Male
106	Heera Nargis	Food Tech	Female
107	Shamsi Kiran	Food Tech	Female
108	Maqbool Hussain	Math	Male
109	Rojuddin	BS (IT)	Male
110	Ali Akbar	Mass Com	Male
111	Noor Ullah	BS (IR)	Male
112	Sartaj Ali	BS (IR)	Male
113	Kashif Ali	Math	Male
114	Qadir Baig	Math	Male

115	Ehsan Ali	Math	Male
116	Azfar Ali	Math	Male
117	Muazzam Ali	Math	Male
118	Ghazanfar Ali	Math	Male
119	Azhar Ali	MA Lit	Male
120	Sakhawat Din	Env.Sc	Male
121	Shabbar Raza	Earth Sc	Male
122	Danish Ali	Earth Sc	Male
123	Jamil	Earth Sc	Male
124	Basharat Ali	Earth Sc	Male
125	Sadiq Hussain	Env.Sc	Male
126	Zubair	Env.Sc	Male
127	Shoaib Abbas	Mass Media	Male
128	Sunail Qureshi	Env.Sc	Male
129	Ali Raza	Env.Sc	Male
130	Sidra Hussain	Comp.Sc	Female
131	Saima	Earth Sc	Female
132	Sakina Abbas	Bio-Sci	Female
133	Seema Ali	Bio-Sci	Female
134	Ajab Noor	IR	Female
135	Ohm Chadher	Earth Sc	Female
136	Arif Hussain	IR	Male
137	M.Wasim	Education	Male
138	M.Zeeshan	Env.Sc	Male
139	Hidayat Hussain	Env.Sc	Male
140	Fozia Mir	Comp.Sc	Female
141	Tauqeer Hassan	Env.Sc	Male
142	Reshma Shazadi	Behav.Sc	Female
143	Hajat Hussain	English	Male
144	Abid Hussain	Physics	Male
145	Tahir Jabeen	Bio-Sci	Male
146	Roshan	Bio-Sci	Male
147	Halima	Bio-Sci	Female
148	Tasneem	Media Sc	Female
149	Zuhra Bano	Bio-Sci	Female
150	Atifa	Bio-Sci	Female
151	Mehwish	Bio-Sci	Female
152	Sajida	Bio-Sci	Female
153	Haseeb Iftekhar	Earth Sc	Male
154	Humera	Bio-Plant	Female
155	Maryam	Bio-Plant	Female
156	Seema	Bio-Plant	Female

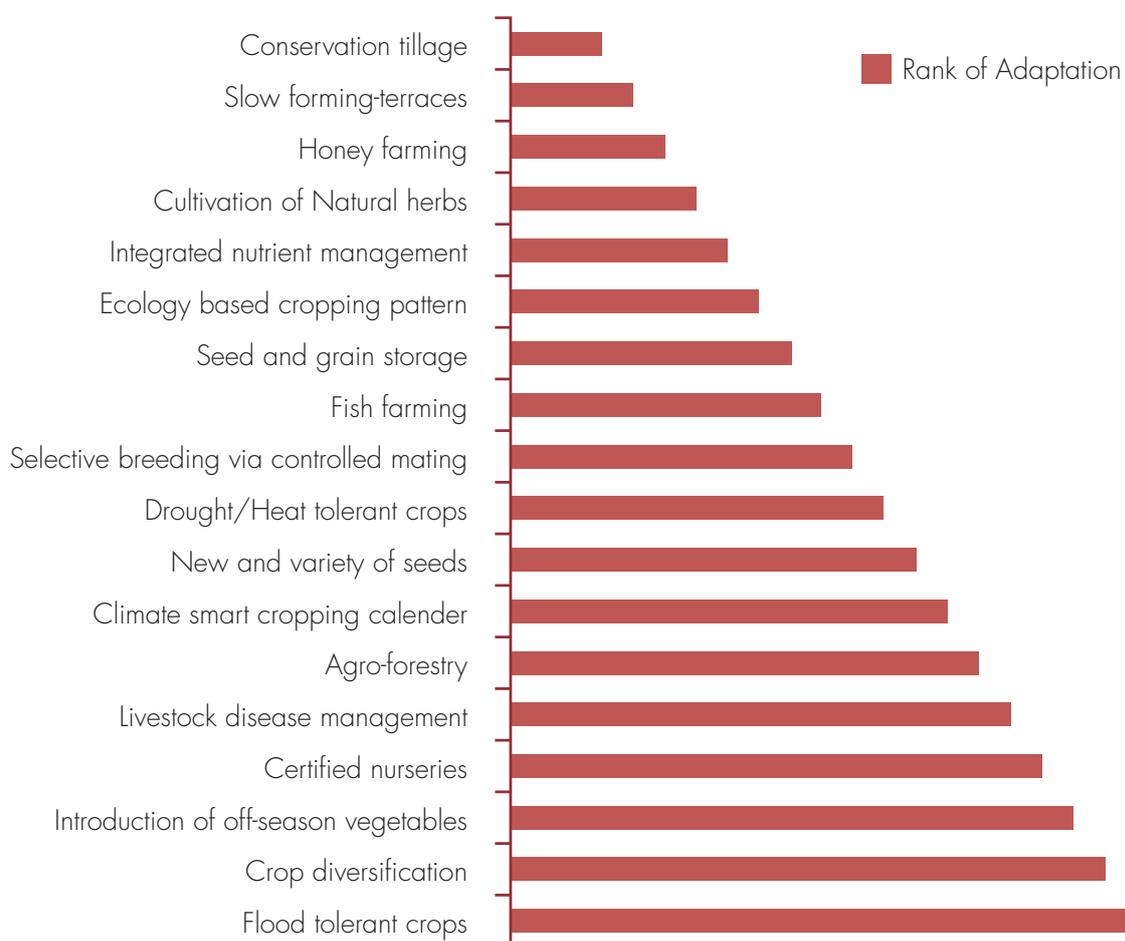
Annexure 5

Prioritization Statistics

Most Preferred Adaptation in Agriculture = Flood Tolerant Crops

Least Preferred Adaptation in Agriculture = Conservation Tillage

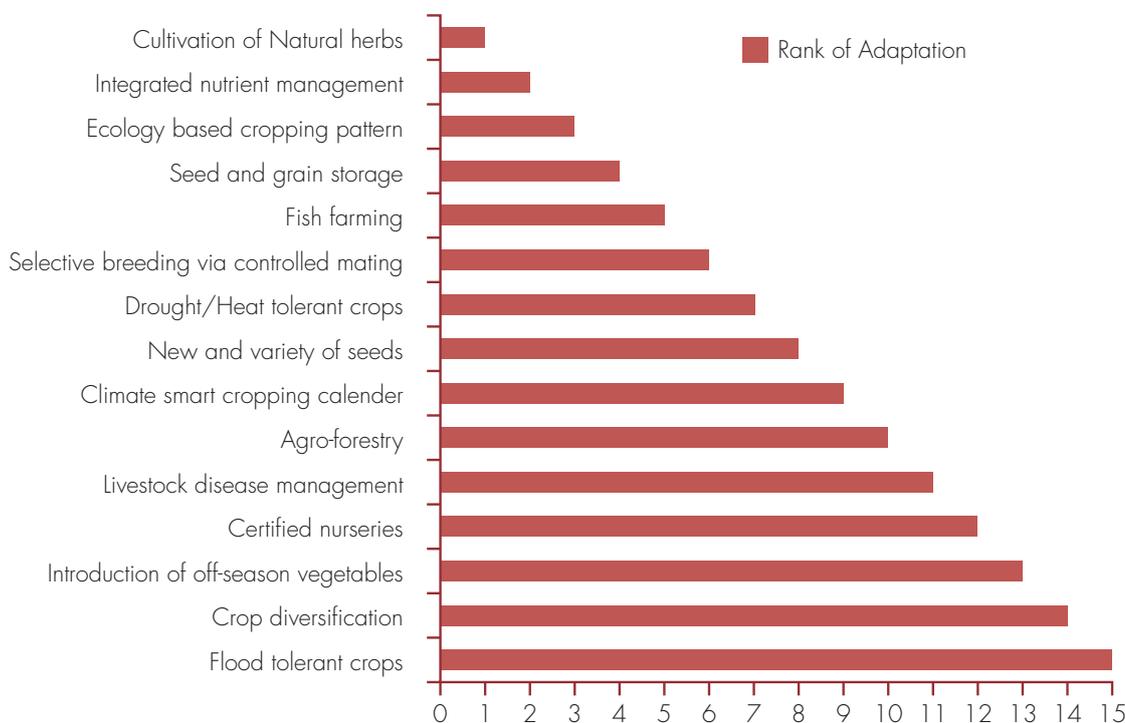
Prioritization of Climate Change Adaptation in Agriculture Sector



Prioritization of Climate Change Adaptation in Energy Sector

Most Preferred Adaptation in Energy = Bio-gas for Cooking

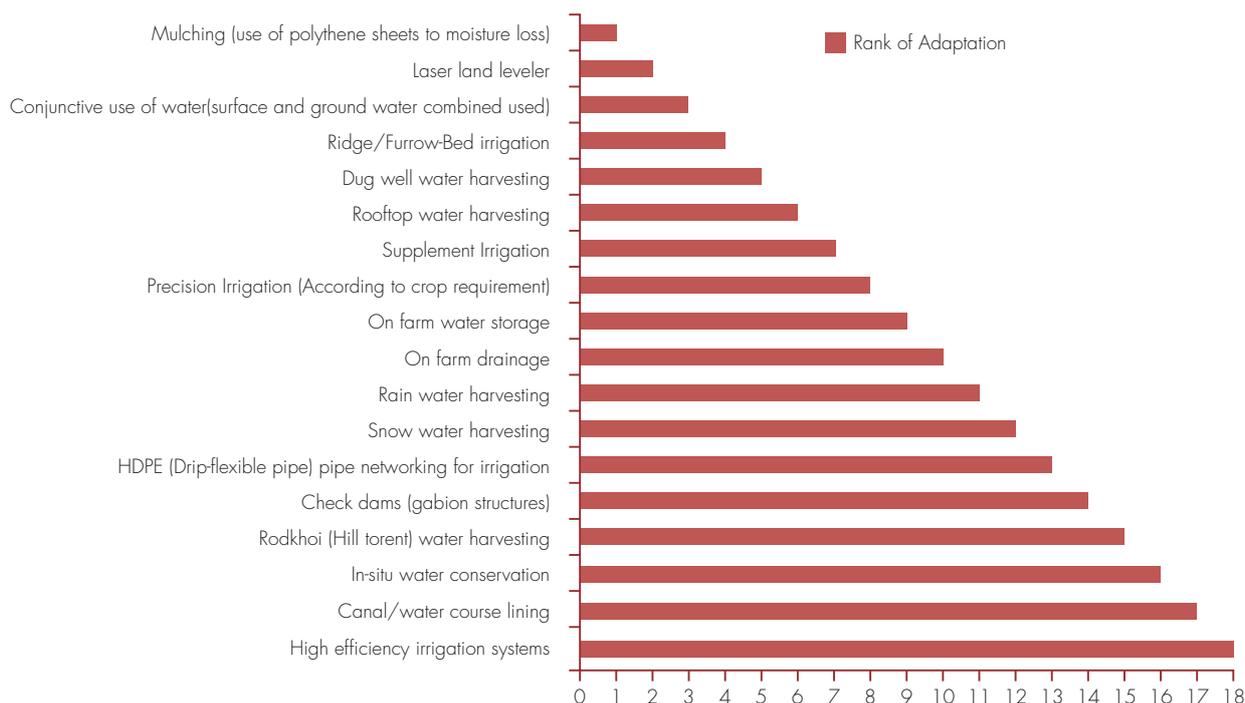
Least Preferred Adaptation in Energy = Hybrid Alternate Energy



Prioritization of Climate Change Adaptation in Water Sector

Most Preferred Adaptation in Water = High Efficiency Irrigation Systems

Least Preferred Adaptation in Water = Mulching



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