

# Proceedings Report

**WEF National Conference, Islamabad, 17th - 19th October 2016**

## Water and Environment: Sustainable Development in Changing Climate



**Conference Co-Hosts:**



**THE WORLD BANK**  
IBRD • IDA | WORLD BANK GROUP

**ICIMOD**

FOR MOUNTAINS AND PEOPLE



Water Environment Forum

## Water Environment Forum

The Water Environment Forum (WEF) is a platform for water environment professionals of Pakistan, to protect water environment interests of Pakistan for the benefit of its people.

It was registered in 2014 as a Trust under the laws of Pakistan in Islamabad by the Pakistan participants of South Asia Water Initiative (SAWI). It is a non-profit and non-governmental organization to discuss national, regional and international water related issues and provide suggestions and feedback to policy making and research institutions.

The mission of the WEF is “to acquire, disseminate and manage knowledge, policy making in relation to Pakistan's water resources, contribute to public discourse through a programmatic approach in integrated management of Pakistan's water resources and providing a platform for professionals to come together and take actions to achieve sustainable development of water environment”.

After a successful co-hosting of SAWI - Indus Forum regional meeting in March 2015 at Lahore in collaboration with WAPDA, Federal Ministry of Water & Power, Pakistan Meteorological Department (PMD) and WEF; it was decided by WEF Board of Trustees to launch an awareness and dialogue campaign on 'Climate Change Challenges'.

The journey started from the north to the length and breadth of Pakistan. The universities selected one from each of the provinces of Pakistan as well as from Gilgit Baltistan (GB) and Azad Jammu & Kashmir (AJK) regions - the lands of major glaciers and founta in of Indus River. The campaign included the two HEC Centers of Excellence; Center of Excellence for Food - University of Faisalabad and Center of Excellence for Water - Mehran University of Engineering & Technology. Dr. Ghulam Rasul from PMD and Nisar A. Memon from WEF participated in seminars at various universities of Pakistan. In addition to universities, Nisar A. Memon addressed the civil society and business forums such as Rotary and Overseas Investors Chamber of Commerce and Industry in this campaign.

The campaign led to organizing a National Conference on “Water and Environment for Sustainable Development in Changing Climate” from 17<sup>th</sup>-19<sup>th</sup> October, 2016 at Marriott Hotel, Islamabad.

The founding and current Trustees are: Nisar A. Memon, Dr. Arshad M. Khan, Syed Raghieb Abbas Shah, Dr. Ali Tauqeer, Dr. Ghazanfar Ali, Dr. Shakil Ahmad, Dr. Qamar Uz Zaman Chaudhry and Advocate Rabel Z. Akhund.

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**17<sup>th</sup> -19<sup>th</sup> October 2016**

## Water and Environment: Sustainable Development in Changing Climate

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### Conference Co-Hosts:



Ministry of Climate Change



**THE WORLD BANK**  
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Water Environment Forum

### Conference Support:



The Agricultural  
Model Intercomparison  
and Improvement Project



**SDPI**  
Sustainable Development Policy Institute

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We acknowledge with thanks the following organizations and professionals in planning, execution, and closing of the National Conference in October 2016:

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Mr. Zahid Hamid, Federal Minister for Climate Change accepting our invitation to be a co-host with the active support of Mr. Syed Abu Ahmad Akif, Secretary, Ministry of Climate Change (MoCC).

The WEF Board of Trustees for approving the plan and support.

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All the Participants, Speakers and Session Chairs for their time to travel from various cities of Pakistan and abroad with active participation for three days,

The Government of Pakistan was well represented by Federal Ministers for Information, Food Security, and Climate Change; Minister of State/Chairperson, Benazir Income Support Programme (BISP) and the Federal Secretaries.

Parliamentarians also joined, despite parliament in session on same days.

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All co-hosts gratefully acknowledge the contribution of all towards holding this Conference and hope it will be of value to the government in its policy formulation and others in their work in the service of people.

Nisar A. Memon  
Chairman  
Water Environment Forum  
Islamabad

March 2017

# Acronyms

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AJK	Azad Jammu & Kashmir
AgMIP	The Agricultural Model Intercomparison and Improvement Project
BIISP	Benazir Income Support Programme
CEO	Chief Executive Officer
CPEC	China-Pakistan Economic Corridor
CO <sub>2</sub>	Carbon Dioxide
COP	Conference of the Parties
°C	Degree Celsius
DG	Director General
EWS	Early Warning Systems
EEZ	Exclusive Economic Zone
FATA	Federally Administered Tribal Areas
FNSC	Food and Nutrition Security Council
FOCUS	Aga Khan Development Network Organization
GCF	Global Climate Fund
GDP	Gross Development Product
GLOF	Glacial Lake Outburst Flood
GoP	Government of Pakistan
HKH	Hindukush, Karakorum, and Himalayan Region
HIES	Household Integrated Economic Survey
HEIS	High-Efficiency Irrigation Systems
ICIMOD	International Centre for Integrated Mountain Development
IPCC	Intergovernmental Panel on Climate Change
INDCs	Intended Nationally Determined Contributions
IWRM	Integrated Water Resource Management
KIU	Karakorum International University, Gilgit
KPK	Khyber Pakhtunkhwa
LPG	Liquefied Petroleum Gas
MAF	Million Acre Feet
MoCC	Ministry of Climate Change
MUET	Mehran University of Engineering & Technology, Jamshoro
NAMAs	National Adaptation Plan, Nationally Appropriate Mitigation Actions
NGOs	Non-governmental Organizations
PD	Planning Department
PDGs	Pakistan Development Goals
PMD	Pakistan Meteorological Department
%	Percentage
RCP	Representative Concentration Pathways
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RSPN	Rural Support Program Network
Rs	Rupees (Pakistani Currency)
SDGs	Sustainable Development Goals
SDPI	Sustainable Development Policy Institute
UNEP	United Nations Environment Program
VC	Vice-Chancellor
UIB	Upper Indus Basin
WAPDA	Water & Power Development Authority (Pakistan)
WB	World Bank
WEF	Water Environment Forum (Pakistan)
WWF	World Wide Fund

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# Executive Summary

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Climate change is a global phenomenon, irrespective of cultures and national boundaries. Rising temperatures, changing precipitation patterns and glacier melt impacts are resulting in floods in some regions whereas water shortage in some other areas is causing droughts.

Climate change hence complicates water resource management and planning by increasing disaster risk. Water availability is becoming increasingly and unpredictably sensitive to climatic variations.

Water is an area of interlinked nature, which has implications that range from the local to the national and the international scales. In an increasingly interdependent world, the earth community has a common destiny. Population growth and the rising per capita consumption of water, food, and energy are driving up the global demand for water resources. The tension between increasing demand and limited supply is increasing the competition for water resources from local up to international levels. Keeping in mind the multifaceted and complex challenge of water, it is imperative to develop an integrated approach to sustainable water management for our present and future.

Water has no boundaries and hence any approach to water governance and management needs to be hinged on the principals of cooperation and building trust. Water is a resource that energizes all sectors of society and is unrestrained by international borders. However, it is the presence of the national boundaries that make water issues political and a very complex problem. As a natural resource, surface and ground water does not respect political boundaries, which means the states need to cooperate on water management rather than acting as a basin leader and pursuing its own interests unilaterally. Countries must share responsibilities for managing water, protecting water quality, managing environmental flows and promoting harmony among states.

Water Environment Forum, Pakistan (WEF), in collaboration with the Government of Pakistan (GoP), The World Bank (WB) and International Centre for Integrated Mountain Development (ICIMOD), organized a three-day National Conference on “Water and Environment: Sustainable Development in Changing Climate” from 17<sup>th</sup> to 19<sup>th</sup> October 2016 at Marriott Hotel, Islamabad. Educationists, scientists, policy makers and practitioners from different disciplines got an opportunity to share experiences and best practices in meeting the water and environmental challenges.

The first day of National Conference was dedicated to media personnel representing the key media houses of the country with an underlying objective to initiate a broader dialogue, as to how media can: a) effectively contribute towards raising the awareness about climate change; b) orient the general masses by translating the complex scientific concepts related to climate change; and c) recommendations to formulate the requisite plan of action to mitigate the impact of climate change.

The second day of the conference, 18<sup>th</sup> October 2016, was thematically arranged around the group and plenary discussion in key areas such as a) climate change, ground water, IWRM & environmental degradation, b) socio-economic impact on mountain & coastal areas in changing climate and c) hydro-meteorological disaster, mitigation and adaptation in changing climate.

The third day of the conference, 19<sup>th</sup> October 2016, brought three days National Conference to close with special session addressed by Mr. Zahid Hamid, the Federal Minister for Climate Change, who shared details of the government policy and actions planned and achieved. The day covered: a) integrated modeling approach for urban flooding in the context of changing climate and pollution; b) research on sea-level rise, water intrusion and Indus delta challenges in climate change; c) water-energy-food nexus in changing climate and corporate governance; d) the Government of Australia's views on agriculture and climate change in Pakistan and Moroccan acting Ambassador briefing on COP 22; and e) special moderated session on outcome of the conference, best practices, lessons learnt and recommendations as way forward.

The conference concluded on the common understanding that Pakistan today faces several major risks related to climate change like glacial melt, uncertain monsoons, recurrent floods, rising sea level, temperature hikes and frequent droughts. Such abrupt changes affect millions of people causing recurrent damages. In order to address these extreme climate changes, Pakistan must develop comprehensive policies and plans that cater for preventive, adaptive and mitigating measures. The Ministry of Climate Change (MoCC) must take the lead role in formulating and implementing these policies. The Government of Pakistan is aware of these challenges and has already started taking steps in the right direction. However, still much more is to be done and demonstrated by all of the stakeholders, in the government, communities, private sector, and international partners.



# Background & Introduction

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Climate change continues to be one of the most important global issues confronting the international community. Freshwater resources are undergoing a chronic transformation as a consequence of global warming. Glaciers, rivers, wetlands, aquifers and other water bodies are gradually depleting with the expansion in population and economies. The magnitude of the issue could be assessed by the quality and volume of surface and groundwater bodies shrinking continuously. People and communities, species and ecosystems dependent on these resources for their livelihoods have begun to witness the impact of climate change.

Pakistan is categorized as one of the most water-stressed countries in the world where water demand far outstrips supply. The water storage capacity for Pakistan is only 30 days; 40 - 50 million Pakistanis do not have access to safe drinking water, and by current projections, the per capita availability of water will decline to a mere 800 m<sup>3</sup> by 2025. In this critical situation, improved water governance, management, and conservation will not only play a critical role in Pakistan's economic development, food security, energy needs and health requirements, but will also lead to environmental sustainability and safeguard the social/cultural value of water. The challenge for a water-scarce country like Pakistan is to safeguard access to a sustainable and adequate amount of water for multiple values a society derives from its use while preserving equity and social justice in its provision and distribution.

Climate change is now a core part of the global development agenda and governments are recognizing the need to adopt low carbon economies and build the resilience of the poor and those vulnerable to climate change. Pakistan faces particularly inflexible challenges in adaptation and developing community resilience. The impact of climate change cut across several aspects of life. Water, health, energy and food security are increasingly stressed, and in some areas, can pose genuine concerns for livelihoods and even survival. These concerns particularly affect the poorest in society. Some of the key water challenges Pakistan faces are: comprehensive policy framework; energy and food insecurity; preservation of water environment and ecology; infrastructure development; climate change impact; research and education; water quality for health, hygiene and sanitation; trans-boundary (international and inter-provincial) water management; urban water supply; sustaining groundwater, agriculture productivity, etc.



# Day-1: Media Workshop on Capacity Building, Dialogue, and Recommendations

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17<sup>th</sup> November 2016

## ▪ Session-1: Inauguration of Media Workshop

Welcome & Inaugural Session		
1.	Welcome & Conference Introduction	Mr. Nisar A. Memon, Chairman, Water Environment Forum, Pakistan
2.	Keynote Address on 'Climate Change and Media'	Mr. Javed Jabbar, former Federal Minister for Information
3.	Chief Guest Address: Role of Media in Preparing People to Meet Pakistan's Climate Change Challenges	Senator Pervaiz Rashid, Federal Minister for Information, Broadcasting & Heritage

### Welcome and Introduction

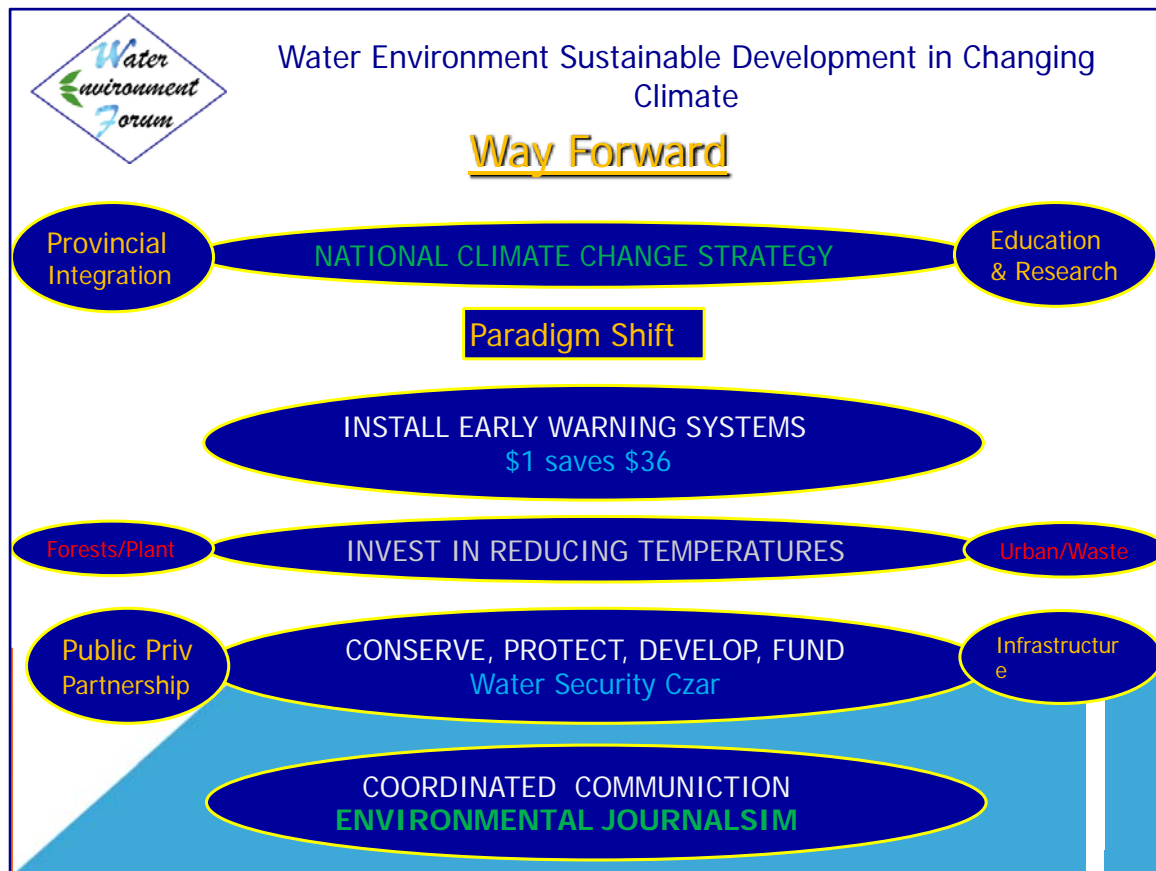
Considering the significance of challenges imposed by climate change and its consequent implications, the national conference kicked off with a 'Media Workshop' on the first day. Mr. Nisar A. Memon, Chairman, Water Environment Forum, Pakistan welcomed the distinguished guests, speakers and participants on behalf of the organizers and co-hosts, i.e. Government of Pakistan (GoP), MoCC, WB, ICIMOD and WEF, Pakistan.

The first day of national conference was dedicated to media personnel representing the key media houses of country with an underlying objective to initiate a broader dialogue, as to how media can: a) effectively contribute towards raising the awareness about climate change; b) orient the general masses by translating the complex scientific concepts related to climate change; and c) recommendations to formulate the requisite plan of action to mitigate the impact of climate change. Mr. Nisar A. Memon briefed the participants about the overarching objectives of the National Conference, which was as follows:

1. **Development of Water, Food Security, and Energy Nexus:** To provide platform to water environment experts, practitioners, researchers and planners to identify climate change and associated hazards to livelihood and biodiversity in water scarce areas of Pakistan;
2. **Facilitate Government Planning for Climate Change:** To develop policy recommendations and strategies to mitigate the risks of climate change in Pakistan's context, especially for COP-22.
3. **Creating Mass Awareness about Climate Change:** To create awareness among media about sustainable development under climate change and perceived challenges;
4. **Introducing Water Environment Journalism:** To encourage water environment journalism for greater public awareness of the issues confronting the society, penetrating all the segments of society.

..... 'Key risks for Asia are increased riverine, coastal and urban flooding, leading to widespread damage to infrastructure, livelihoods, and settlements (medium confidence) and increased risk of heat-related mortality (high confidence) and increased risk of drought-related water and food storage causing malnutrition (high confidence)'..... **Mr. Nisar A. Memon, Chairman, Water Environment Forum, Pakistan**

He also highlighted, climate change causing decline in agricultural productivity in regions like Asia, adversely affecting the rice crop. Pakistan being an agrarian and a developing economy is subject to the severe adversities of this global phenomenon. A pragmatic way forward to combat this recurring challenge was presented to the participants for further discussion, as explained in the figure below:



**Figure 1: Way Forward for Mitigating Climate Change in Pakistan**

### Keynote Address

Mr. Javed Jabbar, former Federal Minister for Information & Media Development, delivered the keynote address. He explained the 'genesis' of the relationship between human-induced climate changes and media commenced since 1890s. He mentioned two Swedish scientists, Svante Arrhenius and Arvid Hogbom, pioneers in climate change, who measured the presence of industrial carbon in the atmosphere during 1890-1910 and apprehended its impact on climate and weather.

Awareness grew gradually, with periodic media coverage for the next 70 years. First UN conference on the environment was held in 1972 in Stockholm, Sweden. Another two decades saw increasing media coverage along with the evolution of consensus among scientists about global warming. During 1990 – 2016, regular, extensive coverage by mass media about the environment and climate change began to grip pace. Initial crucial contribution for creating awareness was led by conventional mass media via print, radio, TV, cinema, books.

..... *'An apt convergence– every person is a medium. Climate change impacts every person– and all the species'* ..... **Mr. Javed Jabbar, former Federal Minister for Information and Media Development, Government of Pakistan.**

Onwards in the 1990s, there was an evolution of new media in the form of internet and later smartphones in 2016. Unprecedented global concern about climate change started getting traction and visibility. However, still, the communications challenge is to expand and deepen public understanding of diverse aspects of climate change. Despite exceptions, general media coverage and general awareness associate climate change mainly with new erratic weather trends. Aspects such as: a) ocean toxicity; and b) biodiversity; and c) conservation are neither covered regularly in detail nor widely recognized.

He explained the challenges shared by conventional and new media, which revolve around deepening the understanding about, subject-matter and changing mindset (behaviours). In a world enthralled, entrapped by market-driven consumption, there is a room for serious dialogue to: a) moderate and reduce heedless consumption, replacing it with conservation and balance; and b) encourage and popularize new paradigms such as prosperity without growth.

He highlighted media's demonstrated capacity to change attitudes even as some historic biases abide but the threats from climate change demand a new collective response at both the individual and media level. Owners of mass media and content controllers bear primary responsibility– as does each human being, who has the power to originate media content.

The keynote address concluded with a strong emphasis on 'climate change in media'.

### **Chief Guest Address**

Senator Pervaiz Rasheed, the Federal Minister for Information, Broadcasting and Heritage, Government of Pakistan, was the chief guest. He said global climate change, being the greatest environmental risk of times, has the potential to affect all the earth's inhabitants in unpredictable ways. In developing countries like Pakistan, local media briefly covers climate change, and consequently, the general public lacks understanding of both the science and the policy implications of the issue. Rural communities, which are particularly vulnerable, are often the least informed. Therefore, media has the profound role to play in educating the public about climate change stressed the need for practical ways to increase public understanding of the issues and shape up a public policy through informed decision-making.

A majority of global citizens are unable to learn about the implications of climate change from the scientific discoveries, research or journals unless simplified to laymen per se with the help of mass media. It is increasingly the responsibility of media to simplify the complex scientific concepts and jargons for the general public.

People across Pakistan are experiencing unpredictable rainfall, increased temperatures and changes to the seasons. Heavy rains and flash floods in the recent past have been witnessed. Some changes vary by regions, such as increased rainfall and extreme weather events in Sindh or decreased rainfall in Balochistan. People encounter issues related to health, education, sanitation, terrorism, etc. almost daily. The same are highlighted on different forums by the government, individuals, civil society/ NGOs and media. For instance, a tribesman living in the extreme end of Federally Administered Tribal Areas (FATA) or a resident of Chaman in Balochistan will be reasonably aware of the gaps or challenges in education or health systems. However, the same cannot be said when it comes to awareness about climate change and its impact on Pakistan. More important, is what role a citizen of this country can play, individually and collectively, to mitigate the adverse impacts. Forget about FATA or the wilderness of Balochistan or Thar, most of the urbanized and educated populace living in a metropolis like Lahore, Karachi etc. are unaware of the exigencies of climate change and its impact on our future generations. .



Figure 2: Government of Pakistan's Vision 2025 for Climate change

The role and effectiveness of media, especially the electronic media, has revolutionized in Pakistan, in the last decade. Media has the capacity and responsibility to deliver the message on



climate change effects to the length and breadth of Pakistan. Climate change is not about culture, religion neither ideology nor it recognizes any territorial or language barriers. This makes its way easy for media to propagate and spread the awareness by picking the right information from the ground and making it widely available in simple language with inputs from the stakeholders concerned. This can be done through both ways, from top-down to (policymakers to grass-roots) and bottom-up (grassroots to policy makers) approaches. Recently, media has started facilitating dialogues among the stakeholders, which will facilitate policy makers to get better evidence to make effective policies.

..... *‘The Government of Pakistan has a comprehensive policy to deal with climate change impact and is fully committed to reducing emissions and cope with negative fallouts’..... Senator Pervaiz Rasheed, Federal Minister for Information, Broadcasting and Heritage.*

The keynote address concluded with a resolve of balanced media reporting and coverage of the climate change impact. Media houses, media persons, and managers were urged to create awareness among people about climate change and associated threats. Education and accountability of mass media owners for their content are necessary.

## ■ Session-2: Climate Change, Hazards & Issues

Sr. No.	Theme	Speakers
1.	Paris Climate Agreement and Post 2020 World	Dr. Qamar-uz-Zaman Chaudhry, International Climate Change Specialist UNEP, Lead-Author Pakistan Climate change Policy
2.	Climate Change and Water Resources in the HKH Region	Dr. Philippus Wester, Chief Scientist, ICIMOD
3.	Climate Hazards and Issues of Pakistan	Dr. Ghulam Rasul, Director General, Pakistan Meteorological Department, (PMD)

The event proceeded with the second session themed around ‘climate change, hazards and issues’. Following is the gist of the discussion held:

### 1. Paris Climate Agreement and Post 2020 World

Dr. Qamar Uz Zaman Chaudhry, the International climate change specialist, UNEP, and lead-author of Pakistan Climate Change Policy, briefed the audience about Paris Climate Agreement 2015, where 195 countries adopted the first ever universal, legally binding global climate deal. The agreement, which is formally enforced on 4<sup>th</sup> November 2016, sets out a global action plan to put the world on track to avoid climate change hazards by limiting global warming to well below 2°C. For the transparency and global stocktaking purposes, the countries agreed to: a) come together every 5 years to review the national climate action plans and set more ambitious targets as required by science, b) report to each other and the public on how well they are doing to implement their targets, and c) track progress towards the long-term goal through a robust transparency and accountability system. So far, 187 nations formally submitted Intended

Nationally Determined Contributions (INDCs) – national climate action plans, whereas Pakistan being signatory to the agreement hasn't been able to do so.

## Paris Agreement 2015- The World Unites to Fight Climate Change

*Countries agreed to 'Mitigate-Reduce Emissions' with the help of following key strategies:*

- a) Have a long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels;*
- b) Aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impact of climate change;*
- c) Need for global emissions to peak as soon as possible, recognizing that this will take longer for developing countries;*
- d) Undertake rapid reductions thereafter in accordance with the best available science<sup>1</sup>.*

The countries also shared commitments to reduce global emissions by around 11 gigatons by 2030, further limiting the global temperature increase at 1.5 °C. It was also agreed to mobilize Green Climate Fund (GCF) \$100 billion annually by 2020 to support developing countries. Moreover, Microsoft has announced the creation of the Breakthrough Energy Coalition, the largest ever multibillion-dollar clean energy fund. The African Union and the African Development Bank rolled out a plan to deliver at least 300 gigawatts of renewable energy to their continent by 2030 - twice the amount currently generated from all energy sources combined. Almost 53 global companies, including Apple, Google, Microsoft, Philips, Unilever, and Walmart, announced their plans to shift to 100 % renewable energy.

## 2. Climate Change and Water Resources in the HKH Region

The next thematic area was about '**Climate Change and Water Resources in the HKH Region**'. Dr. Philippus Wester, Chief Scientist, ICIMOD, highlighted the impacts of climate change on water resources of Hindukush Himalayan Region (HKH). The HKH is home to largest ice and snow reserves outside pole, and serves as a source of water for about 210 million people. According to IPCC studies, the rate of air temperature rise in the HKH region is higher than a global average trend. The entire Asian region has undergone warmer temperatures, with an average global temperature rise ranging from 1.5 – 2 °C. Rising temperatures in HKH region are expected to increase by 3 – 4 °C till 2100 - way above global average. Moreover, winter precipitation is projected to increase in Tibetan Plateau, whereas summer monsoon is generally likely to increase in the South Asian region. Extreme rainfalls and droughts are expected to increase in coming years.

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<sup>1</sup>[www.ec.europa.eu](http://www.ec.europa.eu)

### ***Key Challenges in HKH Mountain Region***

- a) *An average increase in 2 °C global temperature will severely hit the HKH mountains with an increase in temperature by 3-4 °C;*
- b) *Lack of adaptation measures and climate projections for spatial variability especially in the case of Upper Indus Basin;*
- c) *The absence of risk assessments for community resilience and downstream vulnerability for holistic planning and policymaking.*

In Tibetan Plateau, temperature escalates with elevation. Similar is the condition in Pakistan; however, the country lacks the high altitude meteorological stations to acquire a realistic assessment of the confronting challenge. Presently, in few areas of Balochistan, a number of nights have a temperature above 30 °C, but based on RCP 4.5 almost whole Indus Basin will have nights with a temperature above 30 °C. Climate change will affect more to Pakistan in HKH region because 60% of Indus river flow is generated due to the melting of snow and glacier, while in rest of region flow depends upon the rainfalls.

### **3. Climatic Hazards and Issues of Pakistan**

Third thematic area revolved around ‘**Climatic Hazards and Issues of Pakistan**’. Dr. Ghulam Rasul, the Director-General, Pakistan Meteorological Department, (PMD), said that the climate change drivers are categorized as ‘natural’ and ‘anthropogenic’. According to Pakistan Meteorological Department research, 14 out of 15 warmest years occurred during the 21<sup>st</sup> century, while 2016 is observed to be the warmest year of all. The climate change can be broadly gauged through the fluctuating hydrological cycle. Pakistan is experiencing greater fluctuations in rainfall pattern, distribution, and duration of Monsoons, recurring heat waves reaching above 40 °C several times during summers.

*..... Monsoons have already reached the high altitude glaciated area of Pakistan, resulting in torrential rainfalls and flash floods in Chitral, Gilgit-Baltistan and surrounding areas, a significant contributor of recurring natural disasters in Pakistan.... Dr. Ghulam Rasul, Director General, Pakistan Meteorological Department, Government of Pakistan.*

In the last century, 5 tropical cyclones were detected near the coastal areas of Pakistan, whereas in last 12 years almost 11 cyclones have stretched towards the coastal areas. Glaciers are melting rapidly; subsequently, glacier lakes are triggering Glacial Lake Outburst Floods (GLOFs) in Gilgit-Baltistan. Ironically, Pakistan lacks the enabling infrastructure for water conservation crucial for irrigation and recharging of ground water aquifers, in comparison to the other countries of the region. At present, Pakistan has the storage capacity of 30 days, substantially low compared to China, India and other regional economies.

### ■ Session-3: Group Discussion ‘Challenges Faced by Media in Coverage of Climate Change’

Group Discussion Moderated by Syed Anwar Mahmood, former Secretary, Ministry of Information & Broadcasting	
1. Challenges faced by Media in Coverage of Climate Change	1. Dr. Ghulam Rasul, Director General, Pakistan Meteorological Department, Government of Pakistan 2. Dr. Philippus Wester, Chief Scientist, ICIMOD 3. Syed Anwar Mahmood, former Secretary, Ministry of Information & Broadcasting, Government of Pakistan 4. Mr. M. Ziauddin, Sr. Editor, Express Tribune 5. Mr. Rana Qaisar, Sr. Anchor, PTV
2. Group Conclusions & Recommendations	Syed Anwar Mahmood, former Secretary, Ministry of Information & Broadcasting, Government of Pakistan
3. Closing Remarks	Syed Abu Akif, Federal Secretary, Ministry of Climate Change (MoCC), Government of Pakistan

The distinguished panelists expressed some of their views on the subject-matter prior to opening the floor for group discussion. Mr.M. Ziauddin, Senior Editor from Express Tribune, said that media has not done enough for the issues of climate change. Media should coin words in other languages for the terms like ‘climate change’ and ‘global climate’ change. NGOs should finance dramas and stories related to the problems rather than focusing on the news, etc. There is no management for storing water so conservation of water is very important. River Ravi is a serious problem for Lahore; hence cleansing Ravi is important, as it is to clean Chenab and other rivers. Civil service, military, judiciary, and police all should be educated and understand climate change.

Mr. Rana Qaisar, senior journalist and an anchor of Pakistan Television (PTV), discussed the status quo of media covering the issues related to climate change. He said media is preoccupied with politics and print media do not find enough space for climate issues. Advertising hungry media does not focus on climate change problems instead highlights political issues. If the editors do not encourage reporters, they will not focus on issues related to climate change instead they will try to find more crispy news to report. He stressed the media personnel to engage all sectors of society, as media could play an important role, if used properly, to convey the message across.

The floor was later opened to an all-inclusive moderated group discussion. Panel members and participants, primarily the media personnel, comprehensively discussed the challenges encountered by the media in the coverage of critical areas such as climate change.

### **Recommendations of Group Discussion**

The session concluded with the following set of recommendations agreed by the participants, at large:

- a) Media can play an instrumental role in educating the public about climate change, practical ways to increase public understanding of the issues and helping to shape public policy through informed decision-making;
- b) Media can broadcast and spread the awareness by picking the right information from the ground and making it widely available in simple language with inputs from the stakeholders. This can be done both ways, from top-down (policymakers to grass-roots) and bottom-up (grassroots to policy makers) approaches.
- c) Media could initiate dialogues on climate change amongst all the stakeholders, which will facilitate policy makers to get better evidence to make effective policies.
- d) Media houses should encourage the beat reporters to cover the issues related to climate change adaptation and mitigation.

### **Conclusion of 1<sup>st</sup> Day of National Conference**

The first day of National Conference concluded by the closing remarks of Mr. Syed Abu Ahmad Akif, Secretary, MoCC, Government of Pakistan. He formally thanked the audience and acknowledged the role of WEF, WB, and ICIMOD for their contribution in organizing the event. The Secretary committed the collaboration of MoCC with provincial governments, the general public, professional organizations, and media to raise awareness about the potential impacts of climate change in Pakistan and formulation of effective mitigation strategies to overcome the challenge systematically.





## Day-2: ‘Water and Environment: Sustainable Development in Changing Climate’-National Conference

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18<sup>th</sup> October 2016

### ▪ Session 1: Inauguration of National Conference

Sr. No.	Theme	Guest Speakers
1.	Conference Introduction	Mr. Nisar A. Memon, Chairman, Water Environment Forum, Pakistan
2.	Food & Climate Change in Pakistan	Mr. Sikander HayatKhan Bosan, Federal Minister for National Food Security & Research, Government of Pakistan
3.	Role of Gender in Combating Against Climate Change	Ms. Marvi Memon, Minister of State/ Chairperson, Benazir Income Support Programme (BISP), Government of Pakistan
4.	Building a Climate Resilient South Asia	Dr. Patchamuthu Illangovan, Country Director, The World Bank, Pakistan
5.	Climate Plus Change Adaptation in Hindukush and Karakorum Himalaya (HKH) Region	Dr. David Molden, Director-General, ICIMOD

The second day, 18<sup>th</sup> October 2016, of the National Conference commenced with the welcome note by the co-host, Chairman of Water Environment Forum, Pakistan. The Federal Minister for National Food Security and Research was the Chief Guest on the occasion. Minister of State and Chairperson of BISP, Country Director for the World Bank, Pakistan, and Director- General of ICIMOD were amongst the distinguished guest speakers to formally inaugurate the second day of National Conference. Guests representing federal and provincial governments, development partners, think tanks, academia, researchers, scientists, and students from leading universities were the key participants of National Conference. The chief guest briefed the participants about the efforts and resolve of the present government for the national food security by stating **‘right to food is the food right of every person’**. He mentioned the findings of a5<sup>th</sup> annual report by IPCC, which indicates severe issues arising in near future impacting biodiversity such as floods and heat waves in the country.

The geographical conditions of Pakistan are highly vulnerable to climate change and resources like water, energy, and food are related to change in climate. Thus, Pakistan may face food shortage, water scarcity, and energy shortage in future decades and catastrophic economic fell down. Cognizant of the real challenges as an outcome of the Government of Pakistan resolves to work for the national food security and develop effective policies ensuring food security and access to nutrition to all.

Dr. Patchamuthu Illangovan, Country Director of World Bank, said that Pakistan is among the top 10 countries most affected by climate change. According to IPCC and many other organizations, an increase in average global temperature by 2°C is expected in coming years which pose threat to human security, food security, and ecological security. We are thankful to the World Bank for its contribution over the past 30 years such as Tarbela dam and Dasu dam, a sustainable hydropower project in the country. The World Bank always stands with the countries to protect their environment. The Punjab government has agreed upon a climate resilient agriculture future in Pakistan. He concluded climate change has become clear so no more wait for future. I would like to thank World Bank, Government of Pakistan, academia, and civil society for their climate-friendly green role.

Ms. Marvi Memon briefed the participants that climate change is not just critical now, but it has been for the past many years. We need to strengthen the triangle, which includes the local community, scientist and policy makers and improve the interaction among them for effective policies. It is the question of information to come out to policy makers because local people hold a lot of information about the issues such as Glacial Lake Outburst Floods (GLOF) in northern areas.

*... 'We need to strengthen the triangle, which includes the local community, scientist and policy makers to improve the interaction among them for effective policies' ...Ms. Marvi Memon, Minister of State, Chairperson, Benazir Income Support Program (BISP).*

Flood Smart Villages should be made by imparting knowledge at grass root level and women should be empowered, as women could deal better with the climate change. She concluded by saying that BISP would like ICIMOD to come up with effective and low budget projects to facilitate more people. She offered BISP database to researchers for use in their studies to develop appropriate programmes for different regions.

Mr. Sikandar Hayat Khan Bosan, Federal Minister for National Food Security and Research, addressing the conference said that one of the biggest challenges facing the planet, in the new millennium is climate change, which cuts across territorial boundaries and socio-ethnic fault lines. It has progressed from an issue of marginal significance to one of central importance to the future of humanity. As per findings of the 5th Assessment Report of Inter-Governmental Panel on Climate Change, the average global temperature of the earth increased by 0.6 degree Celsius during the last century and is expected to rise further by 1.0 to 4.0 degree Celsius by the end of this century. As a result, there will be considerable climatic changes in different regions of the world, manifested by changes in average temperatures, changes in precipitation patterns, increase in frequency and intensity of extreme climate events i.e., floods, droughts, cyclones, melting of glaciers, sea level rise, adverse health impacts and loss of bio-diversity.

Pakistan is a country which, owing to its peculiar geographical circumstances, is highly impacted by any changes in climate making it one of the most vulnerable countries despite the smallest contributors to the problem of climate change. Pakistan contributes 0.8% of the total global Green

House Gas emissions and ranks 135<sup>th</sup> globally, on a per capita basis. However, the low carbon emission status of the country provides no safety from impacts of climate change. Annual mean temperature showed a warming trend. Average annual precipitation during the last century has reportedly increased by 25 %. The mean sea level has risen to an estimated 19 cm during the last century. Glaciers in the Himalaya are reportedly receding and a significant decrease by the year 2050 is likely. The most vulnerable sectors to climate change in Pakistan are Agriculture, Water Resources, Energy, Coastal, and Marine.

*...’ Pakistan may confront the prospects of food shortages, water crisis, and catastrophic flooding. This would have direct and indirect implication on our national security...Mr. Sikander Hayat Khan Bosan, Federal Minister for National Food Security and Research (MNFS&R).*

Climate change results in variety of natural disasters, reduced yield, and energy production which contribute to economic meltdown and liquidation. According to the Pakistan Strategic Environment Assessment Report by World Bank, the annual cost of environmental degradation in Pakistan has been estimated at 6% of GDP. According to a study on Flood Assessment damage, 2010 floods alone cost the economy up to US\$ 10 billion. Unless addressed, the impact of climate change on the economy of Pakistan will continue to have adverse effects. As per an estimate of Government of Pakistan, climate change could cost the economy up to US\$ 14 billion annually due to natural disasters and other losses, which will be almost 5% of the GDP. Hence, the impact of climate change on the economic security of Pakistan, unless addressed, will have far-reaching effects such as over-reliance on foreign aid and accumulating debt.

Climate change will affect water resources through its impact on the quantity, variability, timing, form, and intensity of precipitation. A first step in understanding how the National Water Program should respond to climate change is to understand the basic science of climate change and the its consequences for water resources. With 18<sup>th</sup> Constitutional Amendment, subject of Environment has been devolved from Federal to Provincial domain which has created void between policy and its implementation due to obvious ground realities like: absence of overarching National Security Policy and National Water Policy; Financial, institutional and Human Resource inadequacies; Inadequate R&D facilities; Capacities of disaster management institutions and authorities; and incapacities of provincial governments/institutions. The traditional operational procedures and inefficient irrigation methods need to be revised and updated for increasing our productivity from the same piece of land and available water. The government has thus focused on agricultural growth by introducing farmer-friendly policies, enhancing farm profitability and ensuring competitiveness amongst various food crops. It aims at providing food at affordable prices which are a pre-requisite for fighting malnutrition.

The government is also putting high priority on various aspects of food security in short as well as long-term scenarios. The Ministry of National Food Security and Research is in the process of finalizing the National Food Security Policy in consultation with the provincial governments and other stakeholders. The policy is based on establishing institutional structures which could

facilitate a process involving federal and provincial authorities through the establishment of a Food and Nutrition Security Council (FNSC) at national, provincial and district level. The policy will ensure that people of Pakistan have physical and economic access to enough nutritious food for an active and healthy life. The policy will also envisage efficient management to improve and ensure food security in changing climate scenarios.

There is a need to integrate measures in respective national level policy documents of respective departments, to ensure that Pakistan remains relevant to the international community in order to safeguard National Security and wellbeing of its people.

Dr. David Molden, the Director-General of ICIMOD, said that the HKH has about 1.3 billion population living downstream and is associated with the risks arising due to climate change. Indus basin supports some of the most populated areas on the globe. There are 5,400 glaciers in HKH with 6000 km<sup>3</sup> water stored. Some of the impacts of climate change include a shift in precipitation patterns, increase the risk of floods and air pollution. Owing to the melting of glaciers, water resources in the region are affected and have its impacts on local communities. The Indus river is more affected by the melt of glaciers. Some of the solutions and adaptations to these changes include afforestation, promote clean energy, mountain resilient solutions, and water and energy resilient solutions and cross learning between local communities, scientists and policy makers. We are working on the community-based flood early warning system. Promotion of regional cooperation, timely sharing of information and data is needed to prevent the losses.

Mr. Shoaib Sultan Khan, the Chairman of Rural Support Programme Network, said that the two administrative pillars of a country are not enough to reduce poverty, food security and climate change; we need a third pillar that is the socio-economic pillar. There are over 18 million rural people in Pakistan and we need to engage them to organize the community. The people of northern areas cut trees for burning and construction of houses, so there is a need to create climate change awareness among the people of Gilgit-Baltistan while providing them alternative wood to conserve natural forest resource. He concluded that to achieve something meaningful, it should reach grass roots level. The Rural Support Program Network (RSPN) works on this triangle (rural community, scientists and policy makers), which is important for sustainable development.

*..... 'the two administrative pillars of a country are not enough to reduce poverty, food security and climate change; we need a third pillar that is the **socio-economic pillar**'...Mr. Shoaib Sultan Khan from Akhtar Hameed Khan Resource Centre.*

Mr. Syed Abu Ahmed Akif, Secretary, MoCC was of the view that we should not take the blessings like water for granted as many people do not have access to clean drinking water. These are the blessings of Allah and we should be thankful and care for it before nature reminds us. Pakistan is the worst water utilizing country in the world. Each one of us must take care and create awareness about sustainable development.

## ■ Session 2: Climate Change, Ground Water, IWRM & Environmental Degradation

Sr. No.	Theme	Speakers
1.	‘Ground Water Management & Climate Change Adaptation - Case for Balochistan’	Dr. Shahid Ahmad, Water Consultant
2.	‘Groundwater Sustainability in Indus Basin Pakistan under Global Climatic Changes’	Mr. Ghulam Zakir Hassan Sial, Director, Irrigation Research Institute, Lahore
3.	‘Community Compensation: REDD+ Project’	Mr. Nasir Mahmood, IG Forest, Ministry of Climate Change (MoCC)
4.	‘Environmental Degradation in the Context of Climate change’	Dr. Aurangzeb Khan - DG Climate change Centre, AJK.
5.	Concluding Remarks by Chair	Dr. Qamar-uz-Zaman Chaudhry

The plenary session was themed around ‘climate change, ground water, IWRM and environmental degradation’. Guest speakers deliberated on the respective areas that are discussed as follows:

### 1. ‘Ground Water Management & Climate Change Adaptation’-The Case of Balochistan

Dr. Shahid Ahmed told the participants about the plethora of challenges faced by the population in Balochistan when it comes to groundwater management and climate change adaptation. He was of the view that prevailing challenge is a combination of climate variability, human-induced disasters, and climate change. Human induced disaster being the foremost ones including deforestation of watersheds, overgrazing of rangelands, shifting from Spate Irrigation (Sailaba Irrigation) and Runoff Farming (Khushkaba Farming) to Tubewell Irrigation and exponential growth in population leading to rapid urbanization has left the natural resource to envelop shrunken. The province was naturally a livestock region for cattle grazing, etc., However, it has been converted into an irrigated region which cannot last long.

*....’Nature has created Balochistan as Livestock Region and human interventions have converted it to an Irrigated Region, how long it is going to last.....Dr. Shahid Ahmed, Water Resource Management Consultant.*

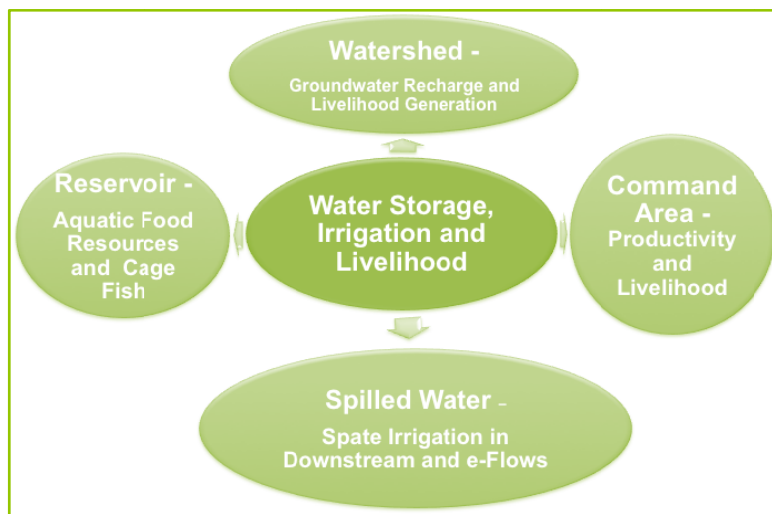
Secondly, mismanagement of groundwater has significantly led to depletion of natural water resources in Balochistan. In the 1970s, ground water was in a state of hydrological equilibrium for the province. **Karez Irrigation** - a technology to maintain the hydrological equilibrium of groundwater with the tendency of surviving over 5000 years - was adopted for Irrigation. With

the advancement of technology, installation of tube wells, provision of subsidized electricity and urban expansion has resulted in depleting state of water table.

Federal Government has earmarked an annual subsidy of Rs28 billion for 30,000 tube wells of the province. This arrangement allows financial gains for the farmers, where they have to pay Rs6,000 monthly and in certain cases owning about 20-30 tube wells, excluding economic gains for the state, which bear a cost of Rs78,000 monthly per tube well, to keep the system operational. Balochistan's water table is lowering by 1-6 meters per annum, highlighting the real challenge of technology based tube well irrigation system not sustaining while hitting the bottom of the aquifer in near future.

The discussion concluded with the following key recommendations:

- a) Systematic zone out of tube well subsidies and replacing them with smart water and electricity subsidies- linking it with efficient and productive utilization;
- b) Imposition of ban on agricultural activities in Quetta sub-basin and restricting the usage of groundwater only for urban consumption;
- c) Integration of groundwater recharge and livelihood generation in watersheds;
- d) Exploration and development of new aquifers in potential recharge areas;
- e) A paradigm policy shift from:
  - i. Groundwater to internally generated floodwater;
  - ii. Tubewell Irrigation from Sailaba Irrigation and Khushkaba Farming.



## 2. 'Groundwater Sustainability in Indus Basin Pakistan under Global Climatic Changes'

Distinguished speaker, Mr.Ghulam Zakir Hassan Sial, the Director of Irrigation Research Institute, Irrigation Department, Government of Punjab, briefed the audience about the consequences of

*... 'The real crisis is the management of groundwater resources instead of quantity of ground resources available'...*

**Mr. Ghulam Zakir Hassan Sial, Director, Irrigation Research Institute, Government of Punjab.**

global climate change and its effects on national groundwater resources, specifically the Indus Basin. The importance of groundwater resource is pivotal for the irrigation, as indicated that an



estimated 40% of irrigation is through groundwater. Cropping intensity with the changing climate has increased from 63 to 160% in 2015 due to overexploitation of groundwater. In order to accommodate the surge in crop production, additional tube wells are installed to meet the ever-increasing demands, further leading to depleting water resources due to excessive pumping and causing extra burden on energy resources of the country. For example, in Vehari district, groundwater has alarmingly depleted and water table has reached 70 feet below the natural land surface. Speaker highlighted the contribution of the Punjab Government, especially Irrigation research institute to mitigate the crisis with the establishment of Ground Water Management Cell in 2013 along with groundwater regulatory policies and monitoring network. Pakistan, ranked at the 4<sup>th</sup> largest user of groundwater followed by bigger economies like India, USA, and China, has the following set of challenges for groundwater management in Indus Basin:

- a) Lack of holistic approach for groundwater management in Indus Basin;
- b) Haphazard pumping, irrational cropping trends and ineffective design of tube well irrigation;
- c) Absence of policy framework and regulatory authority for groundwater management;
- d) Lack of community involvement and awareness in groundwater resource management;
- e) Seawater intrusion in coastal aquifers;
- f) Inefficient rainwater harvesting and absence of planning for aquifer replenishment;
- g) Disposal of solid, industrial and municipal waste in the groundwater.

### **3. Community Compensation: Reducing Emissions from Deforestation and Forest Degradation (REDD+) Project**

Mr. Nasir Mahmood, Inspector General (IG) Forest from MoCC, briefed the participants about the efforts undertaken by Pakistan to reduce the emissions from deforestation and degradation. 'REDD+ stands for countries' efforts to reduce emissions from deforestation, forest degradation, foster conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries.

It has been observed, deforestation and forest degradation are the second leading cause of global warming, responsible for about 15% of global greenhouse gas emissions, which makes the loss and depletion of forests a major issue for climate change. Almost 80% of the Earth's above-ground terrestrial carbon and 40 % of below-ground terrestrial carbon is in forests. In addition to the large contribution of deforestation and forest degradation to global emissions, combating both has been identified as one of the most cost-effective ways to lower emissions.

In Pakistan's context, during 2010, the availability of forests was 0.3 hectares per capita on average, which is almost half as compared to 0.6 hectares per capita globally<sup>2</sup>. The major drivers of deforestation include poverty and use of wood fuel; expansion of agricultural land, rapid urbanization, mining, oil pumping, etc. Hethen discussed the REDD+ readiness preparation in Pakistan; highlighted the national strategy developed addressing the drivers of deforestation and degradation; land tenure issues, governance issues, and gender mainstreaming and community participation. Ministry of Climate Change (MoCC) has established robust and transparent 'Forest Monitoring System'- provides information to address the safeguard measures.

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<sup>2</sup> [www.fao.org](http://www.fao.org)

#### 4. ‘Environmental Degradation in the Context of Climate Change’

Dr Aurangzeb Khan, the Director-General, Climate Change Centre, AJK, provided the provincial perspective in the context of climate change. Khyber Pakhtunkhwa, Azad Jammu & Kashmir, and Gilgit-Baltistan have expansive forests as compared to rest of the parts. Mangroves (4.9 %), Irrigated Plantations (2.4 %), Riverine (4.1 %) Coniferous (45.3 %) and Scrub (28.2 %) are the main types of forests sprawling in abundance, providing i) fodder, shelter, fuel wood, timber and habitat to diverse species (livestock, birds); ii) protects from natural disasters and impacts of climate change and; iii) reduce erosion and supply sediment free water for electricity, agriculture and domestic usage besides balancing the ecosystem.

During 1990-2000, the rate of deforestation was 1.8%, which has plummeted to 2.1% (2000-2005) in Pakistan. This deforestation leads to climate change, further endangering the native species. Mitigating the problem of deforestation, Climate Change Centre of AJK is planting 2300 acres per year still faces the shortfall both financially and access wise. He also briefed the audience about the significance of watersheds in AJK, home to Jhelum and Chenab rivers, and largest contributor to irrigation water supply and hydropower generation in the country.

Unfortunately, despite the crucial importance of AJK’s Watersheds, they are not managed efficiently because of insufficient financial resources, hydropower plants downstream infrastructure investment, sectoral assessments, strategic planning, etc. Recommended solutions to deforestation include afforestation and reforestation, soil erosion control, low-cost hydropower energy for cooking and heating, LPG alternatives, etc.

#### 5. ‘Concluding Remarks by the Chair’

The chair, Dr. Qamar uz Zaman Chaudhry, concluded the session by saying that concession for fuel wood and timber can affect the economy of Pakistan negatively, so there should be no concession in order to protect forests. Furthermore, watershed management can serve the purpose of forest protection as it is far better than other conservation techniques.

### Session-3: Socio-Economic Impact on Mountain & Coastal Areas in Changing Climate

Sr. No.	Themes	Speakers
1.	‘Understanding Climate Change Implications on Poverty and Shared Prosperity’	Dr. Thomas Mosier, Water Resources and Climate Specialist, the World Bank
2.	‘Climate change Impact on Coastal Economy’	Dr. Ijaz Ahmad, WWF
3.	Concluding Remarks by Chair	Dr. Abid Q. Suleri, SDPI
4.	The Upper Indus Basin Network: collaborating to reduce knowledge gaps and water sector investment risks in the Upper Indus Basin	<i>Chair:</i> Mr. Khalid Mohtadullah, UIB Network Chair <i>Facilitator:</i> Dr. Philippus Wester, ICIMOD <i>Panelists:</i>

-Dr. Ghulam Rasul, DG-PMD  
-Mr. Arshad Pervaiz, PD, WAPDA  
-Dr. Asif Khan, VC, KIU  
-Ms. Nusrat Nasab, Focus

The third session of the day was planned to discuss “**Socio-Economic Impacts on Mountain & Coastal Areas in Changing Climate.**” Mentioned below is the extract of discussion:

### **1. Understanding Climate Change Implications on Poverty and Shared Prosperity**

Following the opening remarks of the moderator, the session proceeded while discussing the theme of “**Understanding Climate Change Implications on Poverty and Shared Prosperity**”. Preliminary findings from a report published by the World Bank called “Pakistan Hotspots” were presented to analyze the theme for a case specific to Pakistan. The report stated that although the economic growth rate of Pakistan has been very strong in recent decades while simultaneously accounting for big decreases in poverty, at the same time, the threat of climate risks exists in the region particularly putting Pakistan in a very vulnerable position. The climate risk index by country shows Pakistan is in the top 10 countries with the greatest climate risk.

However, given the glaciers in the north and the groundwater and irrigation in the southern region accompanied by the fact the monsoon does not hit the entire country, the case of Pakistan presents a very diverse climate. To assess the existing impact of climate change on Pakistan, the example of Balochistan was cited as it has experienced an increase of 15-25°C from 1951. The report aimed to study the relationship between climate change and the welfare of the people of the region. The model used data from the Household Integrated Economic Survey (HIES) and consumption expenditure as a proxy for welfare. In the study, 11 different climate models were analyzed and the average findings of these models were presented. Two impacts were studied, and categorized by timeframe; the near-term and the mid-term changes in the two variables of temperature and precipitation across the country were analyzed. The aggregated near-term impact of climate change on consumption expenditure showed values of -1.2% to -2% across the country, with the two provinces of Punjab and Balochistan being affected severely. The aggregated mid-term impact showed the impact values of -2.1% to -2.9% across the country. The impacts of the temperature variable in isolation were much less than the impact of precipitation alone. In the temperature only model, Balochistan was seen to be affected the worse, followed by the Sindh province.

The key findings of the presented study showed that most parts of Pakistan are already experiencing significant climate change with temperature increases by greater than 1°C for many districts. The study predicted that the current climate is expected to continue changing adversely. Climate models studied show that the temperature will increase substantially, whereas the changes in precipitation are much more uncertain. Keeping in mind the relationship being studied, it was found that climate change has a direct impact on welfare as measured by the consumption expenditure of the households.

## **Key Findings – ‘Pakistan Hotspots’ Climate Change in the Context of Poverty Reduction ‘**

*The key findings of the study are as follows:*

- a) Pakistan is already experiencing significant climate change with temperature increases by greater than 1 degrees Celsius for many districts;*
- b) The current climate is expected to continue changing adversely;*
- c) Temperature will increase substantially whereas the changes in precipitation are much more uncertain;*
- d) Climate change has a direct impact on welfare as measured by the consumption expenditure of the households.*

## **2. Climate change Impact on Coastal Economy**

The event proceeded with the third session of the day. The underlying theme of the session was to discuss “**Socio-Economic Impacts on Mountain & Coastal Areas in Changing Climate**”. The session began with highlighting the importance of climate change in determining the social and economic level activity in the affected regions. Unfavourable climate change directly impacts a variety of factors such as reduction in crops yield, the risk of disasters and other factors that affect the livelihood of the community in the region. The vulnerability of the ecosystems in the two main geographical areas, namely coastal and mountainous regions, was also discussed.

Coastal and mountainous regions are given special geographical importance while discussing climate change and its impacts, as they are most vulnerable to the adverse impact of climate change. Climate change is critical in determining the socio-economic activities in the affected regions. Unfavorable climate conditions directly impact a variety of factors such as reduction in crops, the risk of disasters, community livelihood, etc. The moderator highlighted the “Blue Economy” of the coastal areas and the relatively little significance given to it in a case specific to Pakistan. A recent study released by the World Bank was cited as an example to state that the coastal areas are unable to tap merely even 20% of their true potential owing to neglect in policymaking. Referring to the mountainous regions, the problems pertaining to the poor management of water resulting in floods and the melting of various glaciers was also highlighted. Coastal and mountainous regions are given special geographical importance while discussing climate change and its impact as these regions are the most vulnerable to the adverse impact of climate change.

Pakistan has 1050 kilometers long coastal belt of Sindh and Balochistan, two-thirds of which is in Balochistan and is home to a large fraction of the population. Pakistan also has a 250,000 square kilometer Exclusive Economic Zone (EEZ), which presents vast untapped potential. The coastal areas and related activities, including fisheries provide a source of livelihood for more than

300,000 people, excluding Karachi. However, these areas are economically poor with populations living below a \$2 poverty line. The range of challenges borne by these coastal regions includes habitat degradation, increased pollution, limited market access, unregulated fishing, non-compliance with international regulations, weak monitoring, control and surveillance, poverty etc.

*.....'The significance of the coastal regions and related activities for the economy of Pakistan can be seen by the facts that the fish and seafood industry of the country is worth \$1.2 billion, with exports worth \$300 million per annum'..... WWF Pakistan*

The significance of the coastal regions and related activities for the economy of Pakistan can be seen by the facts that the fish and seafood industry of the country is worth US\$1.2 billion, with exports worth US\$300 million per annum. The infrastructure of the region comprises important projects, including the Gwadar Port and the CPEC. A Coastal Highway along the Makran coast was established in 2003 as well. However, there is an absence of an all-weather reliable road in the province of Sindh, and the infrastructure of the households in the region is also poor. The Indus delta with its rich ecosystem has an ecological and economic significance for the country as locals of the region are mainly dependent on it.

Pakistan has the largest cover of Mangrove forests in the world with an arid climate. They serve as a nursery for fish and shrimp species, thereby increasing its significance for the communities who are economically dependent on these resources. Industrial expansion in the region has led to extensive degradation of the habitat. Around 600 million gallons of fluids are dumped into the Arabian Sea on a daily basis, resulting in rapid deterioration of the ecosystem. Increased pollution, uncontrolled fishing, wastage owing to catch and discards, and high post-harvest losses are also common issues faced by the region. The impact of climate change exposes the coastal areas to a range of vulnerabilities including coastal erosion, seawater intrusion, droughts and floods and increased crop water requirement. It also enhances the vulnerability of the Indus Delta which is a fertile region located in a climatically arid zone of intense heat and highly variable annual rainfall.

## **Strategies to Mitigate the Impacts of Climate Change in Coastal Regions**

These include:

1. Regulate and modernize of the fishing industry, undertaking investment in aquaculture ponds for fish and shrimps;
2. Developing policy to Protecting mangrove forests and researching the potential of 'Carbon Credit';
3. Exploring medicinal and commercial value of seaweeds;
4. Encourage both Public-Private Partnerships and Private Sector Investments in tourism development and associated infrastructure, energy production, strengthening of fisheries industry and crab farming to support the -economic livelihood of coastal communities;
5. Need to develop gender-related policies to minimize the impact on women in marginalized communities.

Chann Creek is the pertinent example to observe the impact of climate change. According to a study, the erosion rate of the Creek has increased to 9.28 feet per month, which poses a serious threat to its stability. Climate change has also adversely affected the agricultural activities of the region, for example, the 'Red Rice' –an export quality rice which is grown in the region. It is a major source of income for the local community and is no longer found due to the non-availability of fresh water sources. 1.2 million acres of land in the Indus Delta has been deemed wasted due to seawater intrusion.

Other existing impacts of climate change in the coastal areas of Pakistan include a gradual increase in the temperature of the sea surface, deterioration of the coral reefs and an increase in the sea level resulting in coastal erosion, salinization, and loss of habitat. In Thatta, 0.5 million hectares of fertile land has been affected by sea intrusion. This directly threatens the lives and livelihood of 400,000 fishermen. The threats posed by increasing sea level can be seen in Keti Bundar in the Indus Delta which has changed position three times till date. The sea has intruded more than 60 kilometers of land inside the Indus Delta and has altered the ecology of the river completely.

After establishing the adverse impacts of climate change currently being experienced, a few options for mitigation and avoiding the risk were proposed. These include the modernization of the fishing industry, undertaking investment in aquaculture ponds for fish and shrimps, protecting mangrove forests and researching the potential of 'Carbon Credit', exploring medicinal and commercial value of seaweeds, developing tourism related facilities, investing in energy-producing projects, encourage private sector investment and partnerships and introducing crab farming to increase income of the communities of the region.

### **Concluding Remarks by Chair (Dr. Abid Q. Suleri)**

To conclude the session, the chair of the session highlighted the key findings of the discussions undertaken. Both the ecosystems, i.e. mountainous and coastal have vast untapped potential. However, the prevailing level of poverty and inequality in the region becomes a major obstacle in the face of realizing that potential. The significance of the CPEC was identified as the project will affect both the mountainous systems in the north as well as the coastal systems in the south. In order to counter the existing level of inequality, the need to devise policies to ensure inclusive growth was also discussed. The aspect of migration was also discussed as it serves as both a pull as well as a push factor, and is directly influenced by climate change. There is a need to explore the positive side of migration and devise focal strategies to reap its full benefits.

There is an urging need to establish climate resilient development options. The role of existing governance structures as a hindrance in the path of such development, especially water governance, was also discussed as a man-made problem that needs to be rectified. In order to reduce the socio-economic impact of climate change, there is a need to develop gender-related policies to minimize the impact on women in marginalized communities. The impacts of climate change pertain specifically to human activities. Policymakers need to make informed decisions when formulating policies to counter the adverse impact of climate change.

### **3. The Upper Indus Basin Network: collaborating to reduce knowledge gaps and water sector investment risks in the Upper Indus Basin**

The Upper Indus Basin (UIB) Network was represented by Mr. Khalid Mohtadullah, the Chair of UIB Network, Dr. Philippus Wester of ICIMOD, Dr. Ghulam Rasul, Director General of PMD, Mr. Arshad Pervaiz, Project Director of Glacier Monitoring Research Centre of Water and Power Development Authority (WAPDA), Dr. Asif Khan, Vice-Chancellor of Karakorum International University (KIU) and Ms Nusrat Nasab, the Chief Executive Officer of Focus Humanitarian Assistance. The theme of this session was “The Upper Indus Basin: collaborating to reduce knowledge gaps and water sector investment risks in the Upper Indus Basin”. The UIB Network Chair expressed gratitude on the presence of UIB Network members. Mr. Mohtadullah shared the importance of this session during the Water and Environment Conference. He also shared the history of UIB Network and his association with the forum. Mr. Mohtadullah put the basic questions on the basis of which UIB Network was formed: “Where are we? How will we do? When shall we do? What are the scenarios of future assessments in upstream and downstream developments?” It is an institutional collaboration of more than 14 organizations and the expansion of network, in Pakistan as well as all three other countries sharing the basin, has been planned.

This session was facilitated by Dr. Philippus Wester, who asked from Dr Rasul the importance of UIB in Pakistan. “It is a very important forum regarding the UIB that covering more than 5000 glaciers have been badly affected by the global warming. Over last 85 years, the temperature raised in a Southern part of the country by 1C°. Similarly, in UIB region the temperature raised by 1.8 C° during the period”, said Dr. Rasul. The study carried out in UIB during 2006 revealed that snowline has shown a significant increase. He also shared his thoughts about Karakorum



Anomaly. “PMD has been studying the Karakorum Anomaly on 10 glaciers since two years,” Dr. Rasul said, emphasizing on the importance of study the glaciers under retreating behavior because only 1% of glaciers were observed advancing. The PMD has met station network in UIB and it is planning to install state-of-the-art unmanned Automatic Weather Stations at high altitudes.

Mr. Arshad Pervaiz shared the GMRC of WAPDA role in UIB. “The status of cryosphere is important and it requires regular monitoring and our organization has been doing it for decades?” He informed that out of 14 stations in UIB, they observed 9 stations showing temperature decreasing with the time that supports the Karakorum Anomaly. He also shared that GMRC is doing snout studies on more than 50 glaciers in UIB. It also has been studying mass balance of five glaciers.

Dr. Asif Khan highlighted the importance of youth role in climate change studies in UIB. He recalled his long association with Network since 2010. “This forum provided a platform to share data based on a protocol developed by the Network itself.” He also recalled the April 2014 field trip. He shared the reactions of KIU students when they first-time met the glacier expert. “They asked a lot of questions till an hour as they live in glacier environment and they know a lot” informed: Dr. Khan. The UIB Network has been supporting the KIU for faculty development.

Ms. Nusrat Nasab highlighted the importance of involving the stakeholders (communities) in development initiatives. She shared the point of view of mountain communities that depends on each other and natural resources. The opportunities also bring difficulties for the mountain communities. “Development should be done however, the environment impact assessment, selection of appropriate adaptation and mitigation measures and alternative means of locals’ livelihood must be considered”.

The UIB Chair emphasized the importance of water management. He shared the saving of freshwater resources for irrigation by China and India. “It will be very difficult for an agro-economic country whose agriculture depends on irrigation water supplies,” said: Mr. Mohtadullah. He invited all other organizations to join UIB Network.

#### ▪ **Session-4: HYDRO METEOROLOGICAL DISASTER, MITIGATION & ADAPTATION IN CLIMATE CHANGE**

<b>Sr. No.</b>	<b>Theme</b>	<b>Guest Speaker</b>
<b>1.</b>	Climate Change Disaster Risk Reduction- Reference to Water & Agriculture	Dr. Ghulam Rasul, DG-PMD
<b>2.</b>	Community Centric Disaster Risk Reduction & Climate Change Resilience: AKDN approach	-Ms. Nusrat Nasab, CEO-FOCUS
<b>3.</b>	On the ground: Adaptation to Climate Change with Special	Ms. Arjumand Nizami, CEO-Intercooperation & Chitral Community
<b>4.</b>	Concluding Remarks by Chair	Mr. Irfan Elahi, Secretary Aviation



The session began with the discussion around global warming and its impact on Pakistan. The chair of the session, Mr. Irfan Elahi, the Secretary Aviation, deliberated that global warming is on the rise, despite Pakistan being one of the least contributing countries to this phenomenon, unfortunately, is counted as the most affected ones. Deforestation is higher due to timber mafia; dams have not been built to mitigate the recurring flash flooding in northern areas of the country for the past couple of years. Groundwater resources are constantly depleting and ecosystems getting damaged with every passing day. Climate change has resulted in a great loss in income from the agriculture sector, Pakistan's largest sector, whose output is being reduced greatly by the detrimental effects that climate change has on groundwater, crop quality, etc. Similarly, fish and shrimp are also one of the major exports of the country, which have been reduced due to rising heat and water pollution. According to the Paris Agreement 2015, greenhouse gasses in the atmosphere need to be reduced rapidly in order to counter the effects of climate change. Therefore, Pakistan needs to conduct research on ways to do so, besides being mindful of the fact that such disasters will only increase if an appropriate action is not taken timely. Following are the excerpts of discussion from the thematic session:

### **1. Climate Change Disaster Risk Reduction:**

The phenomenon of climate change did not exist before the industrial era. However, following the industrial revolution, the economic development race has rapidly increased the concentration of greenhouse gasses. Although these are responsible for life on earth, their concentration has damaged the ozone layer causing immense heat from the sun and therefore resulting in climate change. The most common greenhouse gas is CO<sub>2</sub> and during the last decade, its concentration has been increasing by 2 units per year, but this year it has increased by 3.5 units. Every year the temperatures of the earth will keep on increasing. At this point in time, there are 67,000 weather stations operational, as there is a consensus throughout the world that temperatures should be kept within 2°C. Some of the causes of climate change include oceanic circulation, solar activity, and orbital changes.

Dr. Ghulam Rasul, Director-General of PMD, Government of Pakistan, said that as Pakistan falls in a heat surplus zone, the country is vulnerable to increasing temperatures. The last 10 years' data indicate temperatures in Balochistan, Azad Kashmir, and Gilgit-Baltistan have been increasing rapidly throughout the years, while Sindh has been stable and temperatures in Punjab and KPK have been increasing slightly. While heat has been increasing, therefore, snowfall has decreased. A large amount of precipitation has caused a lot of surface runoff with no recovery. This has caused flooding as snow does not become ice due to lack of time but simply melts and becomes water, resulting in the rapid melting of glaciers. Similarly, monsoons within the country have been intensified and occurring in parts of the country where they never occurred, such as the northern areas causing the melting of the glaciers. He indicated the shift of epicenter of tropical cyclones from the Bay of Bengal (now having dropping temperatures) towards the Arabian Sea, with rising temperatures, because of climate change.

### **2. Community Centric Disaster Risk Reduction & Climate Change Resilience: AKDN approach**

Dr. Nusrat Nasab spoke about her experience about civil society organization, 'FOCUS', within the Aga Khan Development Network. Having started in the mid-90s, FOCUS outlines and focuses on four aspects of anticipation, preparedness, response, and rehabilitation. She said that

30% of the workers and rescue teams in the community comprises women. They keep a tab on the temperatures of places in the northern areas and let the local people know so that they may prepare themselves timely. Dr. Nusrat said that the lessons learned from her experience have been that preparedness comes from capacity building and a local government command center with the sole focus of preparing the locals and aiding them in getting through disasters. FOCUS has covered 660 villages in Chitral and Gilgit-Baltistan. Among them, there are 125 villages with barely any green area due to deforestation and thus no runoff where 50,000 people live with risk. FOCUS has recognized 900 landslides and given them the status of either active or not so active. Furthermore, an early warning system has been set up and being strengthened with the help of ICIMOD.

### **3. Community Discussion- ‘Adaptation to Climate Change in Context of Water and Agriculture’**

This unique Community Discussion session was the highlight of National Conference. It was conducted by Ms. Arjumand Nizami, CEO Intercooperation, Pakistan. Local Community members from Chitral (remotely accessible sole pagan valley of Pakistan located in up north in KPK towards Afghanistan) were specially invited to explain and discuss the impacts of climate change on their habitat and livelihood. The geographical location of the area makes it prone to landslides and floods creating havoc for road infrastructure and dismal of communication or access channels to the remote villages. According to them, in past five years’ colder weather has decreased in their areas due to a reduction in snowfall and intensification of heat.

Community members were mainly farmers, and potato is the primary cash crop in the region. They explained the hardships of cultivating the crop in increasing temperatures and amid humid climate, which is causing the low quality, contaminated and reduced amount of production (from 5 barrels to 2 barrels). The reason behind such devastation is the destruction of almost 80% of cultivable agricultural land because of flash floods. Magnitude of the recurring natural disasters have raised a) sense of duty amongst the local community; b) created an urge to understand the fundamental causes, types, and intensity of such disasters; c) how as a community they can develop some holistic strategies for adaptability and resilience against climate changed) capacity development of the community members to address these challenges at local level etc. The community also emphasized the instrumental role of community women in climate change adaptation, e.g. the leading role by women in rural water management and preservation, and the associated measures adopted by them to improve the quality of drinking and groundwater.

### **4. Conclusion**

The second day of the National Workshop concluded with the closing remarks of Mr. Nisar A. Memon, the Chairman of WEF. He appreciated the confidence and willingness of the remote community to fight the threats to their livelihoods and sustenance in rapidly changing global climate and temperatures. He thanked Dr. Arjumand Nizami of Intercooperation for arranging Chitral community to join the conference especially Ms. Zardana - community member and councilor Madaglasht Chitral, Mr. Abdul Malik – community member Arandu Chitral, Mr. Fazle Mahboob of Cutkoh, Mr. Ahmed Drosh and Mr. Hussain Gobor from Chitral. In the end, he thanked all speakers, chairs, participants for their active participation during the day.

# Day-3: Conclusion of National Conference

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19<sup>th</sup> October 2016

## Opening Session

On the third day of National Conference, Mr. Nisar A. Memon, the Chairman of WEF, gave a quick recap of the sessions held on day 1 and 2 of the conference. He acknowledged the increasing awareness about the climate change and considered the active participation by academia, media, and representatives of provincial governments in the national conference indicative of the commitment to improve environmental degradation and mitigate the impacts caused by global warming. Moreover, depleting groundwater and coastal degradation of land need to be prevented, and afforestation should be encouraged up to a maximum possible scale. He brought the attention of the audience to the 'Early Warning Systems' set up by PMD in helping to save lives of many people. The need for increased capacity building, community reforms, encouraging women participation in all fields, integrated water management, upgrading education system, and environment-strengthening programs with assistance from Government was stressed.

Mr. Khalid, the Chair of Upper Indus Basin (UIB) emphasized upon the role of youths in climate change and he expressed his delightfulness that a large number of students are taking interest in this emerging field of Environment and Climatology. Mr. Khalid also applauded the efforts that national and international NGOs are making in this regard. He summed up his speech by saying that UIB is a very inclusive network and it welcomes input from all of you regarding Climate change and its impact on various natural resources particularly water resources.

## Session 5: SCIENCE & EDUCATION, AIR POLLUTION, TECHNOLOGY

Sr. No.	Theme	Guest Speakers
1.	Integrated Modelling Approach for Urban Flooding in the Context of Changing Climate	Dr. Shakil Ahmad, NUST
2.	Water Pollution: Its Impacts on Public Health and Remedies"	Dr. Ashraf Chairman, PCRWR
3.	Concluding Remarks by Chair	Syed Raghieb Abbas Shah, former Chairman WAPDA, Government of Pakistan

## **1. Integrated Modeling Approach for Urban Flooding in the Context of Changing Climate**

In the context of solar radiation, Dr. Shakil Ahmad explained the four different ways by which the heat could emit back to the sun by a) Net Long Way Radiation; b) Sensible heat; c) Latent heat; and d) surface reflection. Owing to the increasing level of heat caused by the thinning of the ozone layer, oceanic evaporation is now more than precipitation. Increase in knowledge development in terms of climate change, scientists are trying to find the climate change component on the increasing natural disasters in recent years, to try to reverse the situation or counter it if possible. For example, by growing trees in areas, those have become prone to increased flooding in the past couple of years.

Talking about Pakistan, he explained how in the past couple of years flooding had increased due to a dramatic and ever-escalating rise in temperatures. As temperatures increase, the surface temperature gets warm as the core becomes heated, causing increased evaporation and cloud formation resulting in rapid rainfall. The scarcity of dams and reservoirs, deforestation and rising temperatures in the country have led to river flooding and flash flooding cause harm to nearby land and population. For example, the situation of the Nullah Leh Basin was described. It is located at the foothills of the Margalla Hills and passes through Islamabad and Rawalpindi, flooding in this basin causes devastation to the nearby twin cities, recently this loss had been calculated at Rs 23 billion. Furthermore, hydrological modeling integration takes place by using climate change data for the past couple of decades gathered by climate stations throughout the country. From 2011 to 2040, precipitation will increase by 24%, while, the flood extent will keep on increasing by 11% during peak flows and the water depth has increased by 1.5 meters. Adaptation strategies include community ponds, flow diversion, and deforestation.

## **2. Water Pollution, It's Impact's on Public Health and Remedies**

Dr. Ashraf, the Chairman of PCRWR opened the session with an emphasis that Pakistan has one of the largest contiguous irrigation systems in the world. Besides, having largest groundwater reserves, after the US, China, and India. In Pakistan, groundwater accounts for over 60% of the surface water supplies of the country, while it accounts for over 90% of drinking water and 100% of industrial water. While being one of the largest, unfortunately, it is subject to quality degradation due to constant use and contamination. Two most important pollutants in this country are sewerage and industrial waste, accounting for about 3.6 MAF wastewater from the major cities of Pakistan. Out of this, 1.4 MAF of untreated waste water is disposed of directly into the rivers. While groundwater is also being polluted via agricultural lands by using harmful chemical pesticides, 5.6 million tons of fertilizer and 70,000 tons of pesticides are consumed in the country in the year. Major contaminants of water are arsenic for the Punjab, whereas fluoride and nitrate for Balochistan, KP, and the Punjab. Surface water has serious consequences for downstream users; groundwater is a major source of drinking water and therefore should be protected. Contaminated soils, crops and fish all enter the food chain causing deterioration to the ecosystem.

The most common contaminants found in drinking water are arsenic, fluoride, bacteria, nitrate and other toxic metals. High concentration of Arsenic in drinking water can cause keratosis, lung bladder and skin cancer, whereas bacteria can cause typhoid, diarrhea, cholera and hepatitis; and nitrate can put infants at risk for the blue baby syndrome. Data analyzed the past decade pointed

out that 40% of most common diseases had been water born, infant mortality has increased to 250,000 per year and the medical costs have increased to Rs.16 billion per year.

### Concluding remarks by Chair

Mr. Syed Raghieb Abbas Shah, former Chairman of WAPDA, concluded the session by stating that water preservation and hygiene is a major concern for both the present and future generations. It was mentioned that the Pakistan vision 2025 promises the provision of a minimum baseline of suitable water to every person in the country. The session concluded with the strategies which the government should consider for sectorial planning. They include a) Protect resources; b) assess them constantly; c) restore them; and d) manage them well.

## 3. Special Session: Address by the Federal Minister for Climate Change

Sr. No.	Theme	Guest Speaker
	Pakistan Climate Change Challenges & Government Policy & Actions- Address by Guest of Honour	Mr. Zahid Hamid, Federal Minister: Ministry of Climate Change (MoCC)

**Mr. Zahid Hamid**, Federal Minister for Climate Change, who was chief guest of the conference, addressed the special session on “**Pakistan Climate Change Challenges & Government Policy & Actions**”. He said climate change is a global issue, which is acquiring attention of the entire international community. Harmful effects of anthropogenic global warming are now evident worldwide. However, for Pakistan, the adverse impacts of climate change are of immense concern. Pakistan contributes only 0.8% to total annual global greenhouse gas emissions, ranking 135th in the world. Yet, it is faced with severe climate changes. In the Global Climate Risk Assessment Index, Pakistan is ranked 8<sup>th</sup> amongst the countries most vulnerable to climate change for the twenty-year period 1992-2011 and 3rd most affected country for the year 2011. Approximately one-fifth of Pakistan's total land area came under water in the unprecedented floods in 2010, forcing 20 million people to leave their homes, the biggest human displacement caused by a single climate-induced event in history.

Pakistan stands at the crossroads of several major risks related to climate change, including glacial melt, variable monsoons, recurrent floods, the and rise in sea level, higher average temperatures and higher frequency of droughts. Millions of people are affected and colossal damage is caused on a recurring basis. Economic losses incurred during floods in 2010 and 2011 surpassed US\$ 15 billion. These threats pose major survival concerns for Pakistan, particularly in relation to the country's water security, food security, and energy security. They have enormous adverse consequences for all the socio-economic sectors, including agriculture and livestock, water resources, marine and land ecosystems, forests and biodiversity, infrastructure, and human health. To cope with these extreme climate change impacts, Pakistan has developed comprehensive policies and plans that include both adaptation and mitigation measures. However, availability of adequate finance is at the core of the battle to confront these adverse impacts. Assessments vary, but the magnitude of the required financing is enormous. In Pakistan alone, we require an additional US\$ 14 billion annually to adapt to climate change impacts.

Securing such levels of investment is, of course, a major challenge. We hope that the financial commitments in the Paris Agreement regarding the availability of at least US\$ 100 billion per year by 2020 will be realized.

The Government of Pakistan has been keen on strengthening the institutional and policy responses for the subject matter. The MoCC supervises and coordinates specific activities and responsibilities concerning climate change and supervises the work of organizations such as the Global Change Impact Studies Centre, the National Disaster Management Authority, the Pakistan Environmental Protection Agency and the Zoological Survey Department of Pakistan. A number of policy initiatives have also been taken to tackle climate change issues. The National Climate Change Policy <sup>3</sup> and National Disaster Risk Reduction Policy were adopted in 2012, clearly identifying policy goals and objectives as well as proposed policy measures, with a view to mainstreaming climate change concerns in decision-making at national and provincial levels in all sectors of the economy.

In 2013, the government launched the Framework for Implementation of the Climate Change Policy <sup>4</sup> (2014-2030) which lists priority, short-term, medium-term and long-term adaptation and mitigation actions required to be taken in various sectors. Preparation of a National Adaptation Plan, Nationally Appropriate Mitigation Actions (NAMAs) and a Second National Communication to the United Nations Framework Convention on Climate Change Secretariat are also envisaged. All the Provinces are also developing their own Action Plans to facilitate implementation of policy. Technical Need Assessment for mitigation of climate change impacts is being prepared with the cooperation of the United Nations Environment Programme. The agriculture, energy and transport sectors offer huge potential for mitigation, subject to adoption of appropriate technologies and availability of finance.

Pakistan is also fully committed to the Sustainable Development Goals (SDGs) agenda for 2030. Prime Minister Muhammad Nawaz Sharif, in his address at the UN summit for the adoption of the Post-2015 development agenda in New York in September last year, pointed out that the global SDGs agenda complemented Pakistan's perspective plan "Vision 2025", which is reflective of the country's development needs and priorities and provided a policy framework for the integration of the new goals in Pakistan's national economic and development planning. Out of a total of 17 Sustainable Development Goals, 12 are directly related to climate change, addressing social needs in several sectors, including education, health, social protection, and job opportunities. Climate change also has its own SDG. Goal no. 13 of the SDGs requires that a government should "take urgent action to combat climate change and its impacts". Actions taken to address climate change are therefore largely the same as for implementing the SDGs.

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<sup>3</sup>[http://www.lead.org.pk/cc/attachments/Resource\\_Center/NAP/pakistan.pdf](http://www.lead.org.pk/cc/attachments/Resource_Center/NAP/pakistan.pdf)

<sup>4</sup><http://www.ccportal.org.pk/index.php/resources/item/292-framework-for-implementation-of-climate-change-policy-2014-2030>

On 19th February 2016, Pakistan became the first country in the world where National Assembly passed a unanimous resolution adopting the SDGs Agenda as its own national development agenda. The resolution not only reflects the broad political support for the SDGs but also clearly indicates that SDGs Agenda is now Pakistan's Development Agenda. The SDGs are PDGs (Pakistan Development Goals). The MoCC has also developed a National Sustainable Development Strategy (NSDS) to define sustainable development and the pathway to a "green economy" in Pakistan's context while keeping it aligned with globally accepted targets such as SDGs.

Prime Minister's Green Pakistan Program, which will be formally launched, aims at arresting natural resource degradation and mitigating climate change impacts. It envisages plantation of more than 100 million trees over the next five years all over the country. Apart from reclaiming and developing forest areas, the Program also seeks to protect and manage wildlife resources of the country, in line with the best international practices. The initiative will ensure far-reaching reforms in forestry and wildlife sectors and make a significant contribution to the ecology, biodiversity, food security and economic growth of the country. The Green Pakistan Program reflects the commitment of the present Government to effective environmental governance, including sound management of natural resources, which will lay the foundation for achieving sustainable development and green growth, for the benefit of our future generations.

## **Session 6: Research on Sea Level Rise, Water Intrusion & Indus Delta Challenges in Changing Climate**

<b>Sr. No.</b>	<b>Theme</b>	<b>Guest Speaker</b>
<b>1.</b>	Climate Change Impact on Sea Level Rise, Water Intrusion & Socioeconomic Activities	Prof. Dr. Altaf Ali Sayal, Pak-US Center, MUET
<b>2.</b>	Indus Delta Challenges in the Wake of Climate change	Engr. Sohail Ali Naqi - WWF
<b>3.</b>	Importance of Water in Agriculture Sector	Mr. Seerat Asghar – Former Secretary National Food Security and Research
<b>4.</b>	Closing of Session	Prof. Dr. Mukhtar Ahmed, Chairman-HEC

The sessions began with the discussion on impacts of climate change on polar ice caps that result in a rise in sea water level and seawater intrusion. Following is the gist of the discussion.

### **1. Soil, Water, Environment and Socio-Economic Conditions of Indus Delta under Seawater Intrusion and Climatic Change Scenario**

Following the opening remarks of the chair, the session proceeded with discussing the theme of "Soil, Water, Environment and Socioeconomic conditions of Indus Delta under seawater intrusion and climatic change scenario". Prof. Dr. Altaf Ali Sayal from Pak-US Center MUET explained the Indus Delta being fifth largest delta system in the world, which stretches about 170



kilometers along the coast of Arabian Sea. It comprises 17 major and many minor creeks, with a wide area of marshy lands and mangrove forests. Out of total mangrove population in the coastal belt, about 97% of the total mangrove forests of Pakistan are in the delta which ranks it as the seventh largest mangrove forest system. The Indus Delta occupies almost 0.6 million hectares active area, stretched mainly in Thatta and Sujawal districts of Sindh Province. In Thatta and Sujawal districts, thousands of land acres are salt affected while rest is flood plain area. The widening of creeks due to accelerated annual erosion is the biggest problem. Fishermen sell the small fishes to poultry industries.

A study has been carried out in the area to determine the spatial and temporal crop cover changes in the area. It also revealed that most of the domestic water pumps are installed at banks of water channels that pump saline water during water scarcity periods. This project also covered studies on water quality, socioeconomics, soil texture analysis and remote sensing analysis of images for land cover changes. The water quality survey revealed: bore depth was in the range 20-30 meter for 44% area; electrical conductivity of 78% boreholes was above permissible limits, and arsenic level for 64% of boreholes was within the permissible limit. The remote sensing analysis has verified sea water intrusion in Indus Delta. Rainfall in the study area has a general decreasing trend for all month except July. Almost 69% residents of study area claimed that seawater intrusion is due to low flow at downstream of Kotri Barrage and due to the non-existence of protective embankment.

## **2. Indus Delta Challenges in the Wake of Climate change**

The session proceeded with a comprehensive presentation by Engineer Sohail Ali Naqvi from WWF on “**Indus Delta Challenges in the Wake of Climate Change**”. Pakistan is a water scarce country with 964 m<sup>3</sup>/capita water availability, while 55% and 40% of the population have no access to sanitation and safe drinking water respectively. Intensive water extraction has depleted groundwater level i.e.; groundwater table has decreased to 40 meters. Disposal of 8 Mm<sup>3</sup>/day untreated effluents in Ravi River has polluted the fresh water resources. The development impacts of climate change should not be neglected. Although water is important for business, it is on top of the risk for the sustainable business. WWF has introduced the concept of Stewardship that is the management of public goods, like freshwater, on the premise that we all are accountable for the sustainability of the resource.

Under WWF's Water Stewardship Initiatives Businesses (WSP), corporate sector for stewardship tools and multi-stakeholders have been engaged. These initiatives have been implemented in Lahore, Sheikhupura, Kasur, Faisalabad, Gujranwala and Sialkot where 400 industries related to paper production, textile, leather, and sugar has been targeted. The study adopted the concept of Water Footprint that is industrial operation including the direct water footprint of the water consumed in the factory but also indirect water used in the production of raw materials. A study revealed that these 4 sectors Blue water footprint (BWF) is about 29,000 Mm<sup>3</sup>/year. The study revealed that these initiatives have produced positive outcome: almost 178 million investment savings per year; water utilization reduction 4.46 Mm<sup>3</sup>/year; water-related energy reduction of 6.6 MW/year; chemical utilization reduction of 1088 tons/year; and reduction of CO<sub>2</sub> reduction of 11,000 ton/year.



### 3. Importance of Water in Agriculture Sector

The session proceeds with the theme on “**Importance of Water in Agriculture Sector**”. Mr. Seerat Asghar, Former Secretary National Food Security, and Research, explained nature has blessed Pakistan with abandoned resources however we never potentially utilized them. The government must invest sufficient financial resources for water resources development. Sugar cane and rice are water intensive crops and their exports have decreased with time as prices have lowered to 35%. With changing the climate, Pakistan has to reduce high delta crops and it has to introduce low delta crop varieties. Potohar and Khyber Pakhtunkhwa should be converted into fruit basket of Pakistan. Chair of the session, Chairman, Higher Education Commission of Pakistan concluded that future wars would on attainment of clean air and water. Cooperation and understanding the impacts of climate change on natural resources are the need of the hour.

### 4. Concluding Remarks by Chair

Prof. Dr. Mukhtar Ahmed, the Chairman of Higher Education Commission Pakistan, concluded the session by stating that clean water and air are essential elements required for healthy life. The future wars shall be for clean water and air. It is important to cooperate for understanding the impacts of climate change on natural resources.

## Session 7: Water-Energy-Food Nexus in Changing Climate

Sr. No.	Themes	Guest Speakers
1.	Climate change Impact Assessment: Initiative by AgMIP-Pakistan	Prof. Dr. Ashfaq Ahmad Chattha, University of Agriculture, Faisalabad
2.	Corporate Governance in Water Sector in Pakistan	Mr. Istaqbal Mehdi- Former President Zarai Taraqiati Bank of Pakistan.
3.	Australia’s Approach to Water, Energy and Food Nexus in South Asia	Mr. David Preston, First Secretary Development Cooperation Australian High Commission, Islamabad
4.	Climate change in Adaptation in International River Basins	Dr. Christina Leb, Sr. Water Resource Specialist, World Bank
5.	Water Strategic Directions for Food Security	Syed. Raghieb Abbas Shah, former Chairman WAPDA, Government of Pakistan
6.	Concluding Remarks by Chair	Mr. Shafqat Kakakhel, former Ambassador of Pakistan

### 1. Climate change Impact Assessment: Initiative by AgMIP-Pakistan

Prof. Dr. Ashfaq Ahmed Chattha from the University of Agriculture, Faisalabad, briefed the participants about the impacts of climate change on food security specifically rice, wheat and cotton examined in a study carried by the University of Agriculture Faisalabad. Further

explaining, the objective of this study was to incorporate state-of-the-art climate products and agriculture trade model for improvements in collaboration with regional experts in agronomy, economics, and climate to build a strong basis for applied research and develop a framework to identify climate change adaptation strategies.

The scope of the study was rice and wheat cropping system conducted in five districts of the Punjab namely Hafiz Abad, Gujranwala, Nankana Sahib, Sheikupura, and Sialkot. Rice is the staple food of Pakistan, contributing to 0.7% of GDP, occupies 2.8 million hectares with 0.7 million tons of production. On the other hand, wheat contributes up to 2% of GDP, occupies 9.1 million hectares with 25.4 million tons of production. The cotton-wheat cropping zone is a source of food and fiber in Punjab and receives an annual rainfall of 110-250 millimeters, supplemented through a well-developed irrigation system. It comprises of a 2.2 million hectare area and 1.5 million farm families. Cotton is the major cash crop and source of foreign exchange; it contributes 7.1% in value addition and occupies around 2.9 million hectares with 13.9 million bales of production.

The findings of this study were as follows:

- a) An increase in average temperatures by 2.8 °C during the day and 2.2 °C at night for Punjab during 2040-2069 and 5 °C by the end of century;
- b) 17% reduction in rice yields and 14% wheat reduction in the rice-wheat cropping zone;
- c) 42% reduction in cotton yield and a 20% reduction in wheat yield;
- d) 33 - 52 % decrease in rainfall during cotton growing season and 36 - 42 % during wheat season;
- e) Farm household will have to incur an 83% economic loss if they continue to use current production technology in a changing climate;
- f) Finally, there will be a 5 - 6% reduction in poverty among farm households if climate change adaptation takes place.

## **2. Corporate Governance in Water Sector in Pakistan**

Mr. Ishaqbal Mehdi, the former President of Zarai Taraqati Bank of Pakistan, highlighted the importance of water and its optimal utilization for Pakistan's economy of water for increased value of agriculture output and for clean and low-cost hydropower. He pointed out that the dependence of the urban economy on groundwater being a major source of water supply in the major cities as well as catering to increasing agricultural demand. This demand could be met with reforms in Management of Water. However, appropriate utilization of this infrastructure is the key determinant for optimal utilization of water sources. In order to attain this optimality, the systems of management, originally developed for the corporate sector, may be applied in the water sector.

The main features of these management systems could be: i) Each component of the water infrastructure should be developed as independent and autonomous entities and controlled and managed within the framework of the national water management program. ii) The enterprises/units of water may be managed within the framework of well thought out strategic

plans; iii) Each unit/enterprise may be appropriately evaluated by way of setting targets, monitored and evaluated against the target and good performers provided the incentives.

### **3. Australia's approach to Water, Food, and Energy Nexus in South Asia**

Mr. David Preston, First Secretary of Development Cooperation Australia High Commission in Islamabad said that Pakistan had two sets of rivers, the western rivers (that include the Indus, Jhelum, and Chenab) and eastern rivers (that include the Ravi, Sutlej and Bias). The average rainfall the country receives is 290 mm per annum, while the average annual flow is 145 MAF, glacier and snow melt at 110 MAF and hill torrents 6 to 7 MAF. More than 9% of this water is used for agricultural purposes, 4-5% for domestic and 5% for industrial purposes. He explained the water distribution mechanism adopted in Pakistan. The biggest problem that the country faces is the depletion of ground water, which is due to the fact that it is freely available for anyone who can bore in the ground to pump out.

Thus for sustainable usage, infrastructure needs to be developed that increases the revenue by way of water pricing. Farmers can be encouraged to preserve water on an individual basis as well. For example, by laser leveling technology, using drip and sprinkler irrigation systems, a plantation in furrows, rationalizing delta and cropping pattern and therefore getting more crop for every drop of water. He presented data that about 50 MAF ground water is being pumped annually and due to canal water shortage and increase in cropping intensity, the groundwater abstraction in sweet water zone area has increased considerably. Furthermore, the government subsidy on tube wells has encouraged an increased depletion of water resources.

In addition, as the recharge has also reduced in the river Ravi, Sutlej and Bias command, the water table is lowering at an unsustainably rapid rate. Therefore, ground water extraction should be regulated and controlled otherwise the consequences will be disastrous. The discussion concluded by outlining several actions that were essential to be taken in order for water sustainability for Pakistan. These included water management, construction of more medium and mega dams, control of water loss, construction of carrying over dams, proper maintenance of infrastructure, control of untreated water and pricing regulation.

### **4. Climate Change in Adaptation in International River Basins**

Dr. Christina Leb, Sr. Water Resource Specialist from the World Bank, Washington started off by explaining the importance of water - being the center of urban, food, energy and environmental needs. In the future, for a population of 9 billion, the present output will cover 40 % of agricultural needs, 50-70% of urban needs, and 50% of energy needs. Furthermore, despite the rising demand, there will be a 40% water deficit by 2050. Such a scenario is likely to lead to major water-related tensions throughout the world. The speaker mentioned a couple of projects that have been carried out by the World Bank and other development partners. The community-based climate change adaptation in the Kagura Basin was able to empower community groups and non-state actors to mitigate climate change risks through appropriate climate change adaptation activities.

Such actions included improved compost making, prevention of soil erosion, rainwater harvesting, reforestation and restoration of plant cover. The Sava River Basin project on flood management took into account climate change impacts under different scenarios and potential adaptation measures. This took the form of flood vulnerability, estimation of vulnerability and preliminary identification of possible adaptation measures. Speaker urged the participants for climate change adaptation- a long process that needs to address and coordinate at all levels of stakeholders.

## 5. Concluding Remarks:

Chair of the session, Mr Shafqat Kakakhel, former Ambassador of Pakistan, concluded the discussion saying that Pakistan needs a holistic water and food policy. Moreover, to achieve this goal, inter-ministerial capacity building regarding water issues was essential. A national action and mitigation plan need to be put into place and to be given the utmost importance, as without food and water we would cease to exist. According to him, the only way to achieve this goal was by better mobilization of resources that would come about as a result of better coordination and political ownership.

## Session 8: Outcome, Best Practices, Lessons Learnt & Success Stories – A Group Discussion

Sr. No.	Theme	Moderators
1.	Outcome, Best Practices, Lessons Learnt & Success Stories	Dr. Philippus Wester, Chief Scientist, ICIMOD
2.	Summary	Mr. Nisar A. Memon, Chairman, WEF

Dr. Philippus Wester, Chief Scientist of ICIMOD moderated the session. The group discussion was planned to get feedback from conference participants. The participants were grouped into four units and asked for a response to the three questions. Following is the summary and findings of group discussion:

### Q. ‘For meeting the water, environment and climate change challenges of Pakistan, what are?

#### 1. *The most interesting finding/message/lesson learned during conference*

- Pakistan is the third most vulnerable country to climate change with less than 0.08% contribution to global CO<sub>2</sub> emissions. Climate change is obviously affecting water resources of country and triggering water scarcity;
- Groundwater regulation is required for sustainable groundwater table. Enforcement of environmental laws for safe disposal of industries effluents.

2. *The most important solution\best practices learned during conference*
  - c) Additional water storage reservoirs based on watershed management approach;
  - d) Water conservation and management at household (through water pricing), industry (stewardship approach) and farm level (improved irrigation systems and HEIS);
  - e) Awareness rising among all stakeholders.
3. *The most important action as way forward for GoP/what should be the agenda of WEF'*
  - f) Effective water governance and policy development as well implementation. Especially, groundwater regulation establishment and enforcement. Appointment of one custodian to implement or enforce regulations and policies;
  - g) More awareness among all stakeholders (policy makers, industry owners, farmers and mass population);
  - h) Water pricing policy.

## Session 9: Closing Session

Sr. No.	Theme	Honorary Guest Speakers
1.	Opportunities and Challenges in UIB	H.E. Mr. Jurek Juszczak , Acting High Commissioner of Australia.
2.	Global Perspective for Cooperation COP21 to COP 22	H.E. Dr. Mohammad Kalakhi, Acting Ambassador of Morocco.

### 1. Opportunities and Challenges in Upper Indus Basin

The closing session of the event featured an address from H.E. Mr. Jurek Juszczak, the Acting High Commissioner of Australia, in Pakistan. He appreciated the efforts of the participating and organizing organizations that contributed towards the successful execution of the event. He stated that the conference occurred at a time of dire need as the water-food-energy nexus is currently being threatened by climate change in Pakistan. The importance of this can be seen in the fact that 193 million people of the nation depend on these sources for their irrigation, electrical, agricultural and livestock needs. The changing climate has posed many challenges for the policy-making experts, particularly those that deal with water. There is a need to understand that policymaking and scientific knowledge go hand in hand. It is important to involve the communities of the affected regions in the policymaking. He emphasized the existing partnership between Australia and Pakistan. In 2014, Australia partnered with the Ministry of Water and Power in Pakistan.

The Government of Pakistan has received continued support from Australian scientists to develop forecasting models for the Indus River and in research areas to help enhance the capacity of water management in Pakistan. Australia has also helped train key government managers from provincial departments for the various provinces of Pakistan. Both the working teams for the projects undertaken are hopeful that the model will help improve the water management systems in Pakistan and help to support Early Warning Systems (EWS). Australia plans to continue

working with multilateral and civil society organizations in Pakistan for the various projects being currently undertaken and also for new projects being developed for the related areas. He appreciated the important findings presented over the course of the conference, especially those that addressed the impacts of climate change on social and economic factors of the country and its residing communities.

To conclude his address, the guest speaker suggested a few priority areas to decide the future course of action. He stated that conferences and events such as this should be encouraged and should be designed to also include a focus on the impacts of climate change and natural disasters on women and children. He addressed the adverse impacts of water resources of Pakistan and the vast socio-economic impacts on the economy of Pakistan especially at a time where the country is making its journey towards sustainable development. From a policymaking perspective, he stated that there is a need to balance priorities in order to include economic, ecological, sustainability and socio-economic gains. On behalf of the Australian nation, he very enthusiastically stated that Australia extends its support to Pakistan for the stated goals in the future.

## **2. Global Perspective for Cooperation COP21 to COP22**

H.E. Dr. Mohammad Kalakhi, Acting Ambassador of Morocco, who participated on behalf of the Kingdom of Morocco, delivered an address about the global perspective for cooperation COP21 to COP 22. According to him, the event (COP22) was expected to be a litmus test for climate diplomacy, as many leaders will give collective agreement to formulate a course of action based on mutual decisions. The policies adopted to combat the adverse impacts of climate change by the member countries of the United Nations have not been sufficient to achieve the set goals. He was of the opinion that all the countries involved; need to have policies and innovative technology to make sure that they are being implemented properly. Priorities set for COP 22 will focus on major areas including the mobilization of funds and technological development to achieve the policy goals resulting in mutual benefit. In a very short span of time, the Paris Agreement has set a benchmark for the future course of action that needs to be undertaken. There is a need to encourage participation from all heads of state and other participants to formulate a course of action in order to focus on and achieve a greener planet.

All the involved and affected stakeholders need to focus on protecting the planet to ensure an environment that is beneficial for all member countries. The Maracas Marrakech Climate Change Conference 2016 (COP22) will present mechanisms and discuss opportunities extending from the findings and propositions from COP 21<sup>5</sup>. In order to achieve this mutual benefit with combined cooperation, there is a need to establish a reduction of emission, financial reinforcement of capacities and facilitate the transfer of technology from all member countries. The Kingdom of Morocco shows its solidarity with those who are most vulnerable, from island states to Africa and marginally to all the developing countries as well. In the current state of affairs, rapid transformations are taking place all around the world as a variety of unprecedented challenges are currently being faced. Some of these are a scarcity of water, depletion of natural resources and desertification. Given the current scenario, many of the developing countries need a rational management of their ecosystems. However, this will not be possible without further enhancing

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<sup>5</sup><http://www.cop21paris.org/>

cooperation between countries to facilitate the transfer of technology from one to the other. He also highlighted the need to develop new and improved models of prediction.

### **Concluding Remarks**

Following his address, to formally conclude the event, Chairman Water Environment Forum briefly summarized the key findings of the sessions. He said that climate change has severe adverse impacts on water resources, thus highlighting the need to regulate groundwater sources and usage. Additionally, there is also a pressing need to create awareness among the various stakeholders involved, especially the communities to ensure that policy making is done in a way that facilitates inclusive growth. While discussing the possible solutions, and proposed best practices, he stated that there is a need to incorporate food and water policy making as well as policies focusing on groundwater regulation into legislative practices and agenda. There is also a need to develop more water reservoirs based on a watershed approach.

Awareness needs to be created at local level and water conservation practices at household and farm level need to be encouraged. While discussing the way forward to formulate future policy decisions and incorporation into the agenda of WEF for the future, he emphasized the need of a custodian for groundwater regulation and legislation on food and water policy as well as groundwater regulation. There is also a need to create awareness campaigns through practices such as water pricing at the household level. He said that in the future, WEF will be encouraged to play its role to create awareness at all levels to further the objectives and recommendations of this conference and highlight the importance of legislation on food and water policy as well as ground water regulations.





# Conclusion & Recommendations

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## ■ Conclusion

The conference concluded on the common understanding that Pakistan today faces several major risks related to climate change like glacial melt, uncertain monsoons, recurrent floods, rising sea level, temperature hikes and frequent droughts. Such abrupt changes affect millions of people causing recurrent damages. In order to address these extreme climate changes, Pakistan must develop comprehensive policies and plans that cater for preventive, adaptive and mitigating measures. The MoCC must take the lead role in formulating and implementing these policies. The Government of Pakistan is aware of these challenges and has already started taking steps in the right direction. However, still much more is to be done and demonstrated by all the stakeholders, in the government, communities, private sector, and international partners.

Conferences and events such as this shall be encouraged and held more frequently in all territories of Pakistan to focus on the impacts of climate change and natural disasters on human habitat. It is high time to address the depleting water resources of Pakistan and its vast socio-economic impacts on the economy of Pakistan especially at a time when the country is making its journey towards the attainment of sustainable development goals (SDG). There are no two thoughts on the fact that climate change has severe adverse impacts on water resources, thus highlighting the need to regulate ground water sources and usage.

There is also a pressing need to create awareness among the various stakeholders involved, especially the communities to ensure that policy making is done in a way that facilitates inclusive growth. Awareness about climate change and its impact on masses is something still missing despite having a widespread media. At present, the media is highlighting the importance of climate change but more assertiveness is needed to escalate the issue in its true spirit. Media has the capacity and responsibility to deliver the message on climate change and its adverse consequences to the length and breadth of Pakistan.

## ■ Recommendations

The speakers and participants of the conference acknowledged that Pakistan is extremely vulnerable to climate change hazards and effects. Interestingly, Pakistan is the 3<sup>rd</sup> most vulnerable country to climate change with less than 0.08% contribution to global CO<sub>2</sub> emissions. Climate change is obviously affecting water resources of the country and triggering water scarcity along with other threats like depletion of glaciers, rising sea level, and average temperature increases.

The common understanding of the conference was that it is imperative for Pakistan to prepare itself to face the challenge that has global implications. Pakistan must brace on the climate change challenges by devising both adaptive and mitigating strategies, policies and plans.

Strategic recommendations of the conference are summarized as under:

### **1. Water infrastructure and Management:**

- a) Assess and address the needs for additional water storages and distribution infrastructure;
- b) Ensure early rehabilitation and up-gradation of the existing irrigation infrastructure to make it resilient to climate change hazards;
- c) Ensure water conservation, reduction in irrigation system losses and provide incentives for adaptation of more efficient irrigation techniques;
- d) Introduce regulatory frameworks to protect groundwater and adopt integrated water resources management concepts;
- e) Ensure rationale groundwater exploitation by avoiding excessive pumping;
- f) Promote public awareness campaigns to underscore the importance of conservation and sustainable use of water resources.
- g) Pollution of water, by the discharge of industry chemicals and agricultural drainage, is an increasing threat to the health of humans and all living beings as such enforcement of laws to address pollution is of utmost importance especially when coupled with climate change effects.

### **2. Protection of Forests, Agriculture, and Livestock:**

- a) Develop new varieties of crops which are high yielding, resistant to heat stress, drought tolerant, less vulnerable to heavy spells of rains;
- b) Develop and introduce better breeds of livestock which have higher productivity of milk and meat and are less prone to heat stress and more drought tolerant;
- c) Develop quality datasets on climate-related parameters to identify ideal cropping patterns for each region and facilitate research work on climate change impact assessment;
- d) Encourage empirical research on forests, biodiversity and forest management systems adapting to climate change;
- e) Enhance the research capacity of relevant organizations to make reliable predictions of climatic parameters, for timely information on floods, dry and wet spells and erratic monsoons etc.

### **3. Coastal Ecosystem:**

- a) Build natural barriers, plantations and mangroves, coastal palm and other trees suitable for the area to control sand and soil erosion and to minimize the disastrous impacts of cyclones and tsunamis;
- b) Reduce and control solid and liquid pollution and waste disposal into the sea.

### **4. Human lives and Gender sensitivities**

- a) Study and access health vulnerabilities of the communities in areas prone to climate change;
- b) Ensure that appropriate measures to address health-related climate change issues are incorporated into national health strategies and plans;
- c) Universal access to clean drinking water and sanitation must be the core resolve of the government;

- d) Reduce the vulnerability of women to climate change impacts, particularly in relation to their critical roles in rural areas;
- e) Develop and implement climate change vulnerability reduction measures that focus particularly women's needs.

#### **5. Mass Awareness Campaigns**

- a) Media must play an imperative role to inform people about the hazards of climate change;
- b) The MoCC must spearhead the awareness campaign by holding conferences/seminars/workshops/talks at various forums.



# Annexure

## ■ Annexure-1: Agenda of National Conference

**Water and Environment: Sustainable Development in Changing Climate**  
 WEF National Conference Islamabad, 17-19 October 2016

### DAY 1: Monday 17 October 2016

**Media Workshop Objectives:** Media Capacity Building, Dialogue, and Media Recommendation

Time	Activity	Speaker
09:30 – 10:00	Registration	
<b>Welcome &amp; Inaugural Session</b>		
<i>Rapporteur: Tallat Ara and Uzma Afridi</i>		
10:00 – 10:05	Recitation of Holy Quran	Qaari Muhammad Azeem
10:05 – 10:20	Welcome & Conference Introduction	Mr. Nisar A. Memon, Chair-WEF
10:20 – 10:40	Keynote Address on 'Climate Change and Media'	Mr. Javed Jabbar, former Federal Minister of Information
10:40 – 11:00	Chief Guest Address: Role of Media in Preparing People to Meet Pakistan's Climate Change Challenges	Senator Pervaiz Rashid, Federal Minister of Information, Broadcasting & Heritage
11:00 – 11:15	Tea & Group Photo	
<b>Climate Change, Hazards &amp; Issues</b>		
<i>Rapporteur: M. Mudassar and Kanwal Waqar</i>		
11:15 – 11:45	Paris Climate Agreement and Post 2020 World	Dr. Qamar-uz-Zaman Chaudhry, International Climate Change Specialist UNEP, Lead-Author Pakistan Climate Change Policy
11:45 – 12:15	Climate Change and Water Resources in the HKKH Region	Dr. Philippus Wester, ICIMOD
12:15 – 12:30	Climate Hazards and Issues of Pakistan	Dr. Ghulam Rasul, DG-PMD
<b>Group Discussion: Moderator - Syed Anwar Mahmood, former Secretary, Ministry of Information &amp; Broadcasting</b>		
<i>Rapporteur: Tallat Ara and Uzma Afridi</i>		
12:30 – 13:15	Challenges Faced by Media in Coverage of Climate Change / Policy/ Water / Food / Energy- Panel Discussion	Dr. Ghulam Rasul, PMD Dr. Philippus Wester, ICIMOD Syed Anwar Mahmood Mr. Rana Kaisar, PTV Mr. M. Zia-Uddin, Express Tribune
13:15 – 13:25	Group Conclusions & Recommendations	Syed Anwar Mahmood
<b>Closing Session:</b>		
13:25 – 13:45	Climate Change Challenges & Pakistan – SDGs, INDCs, and Preparation for COP22 Closing Remarks	Mr. Syed Abu Ahmad Akif, Secretary, Ministry of Climate Change
13:45 – 14:45	Lunch & Prayers	All

## DAY 2: Tuesday 18 October 2016

Time	Activity	Speaker
09:00 – 10:00	Registration	
<b>Session 1: Welcome &amp; Inaugural Session</b>		
<i>Rapporteur: Tallat Ara and Uzma Afridi</i>		
10:00 – 10:05	Recitation of Holy Quran	Qari Muhammad Azeem
10:05 – 10:20	Welcome & Conference Introduction	Mr. Nisar A. Memon, Chair WEF
10:20 – 10:40	Building a Climate Resilient South Asia	Dr. Patchamuthu Illangovan - Country Director – WB
10:40 – 11:00	Chief Guest of the Day - Food & Climate Change	Mr. Sikandar Hayat Khan Bossan, Federal Minister for National Food Security & Research
11:00 – 11:20	Guest of Honour– Role of Gender in Combating Against Climate Change	Ms. Marvi Memon, Minister of State, Chairperson, BISP
11:20 – 11:30	Group Photo	All
11:30 – 12:00	Climate Plus Change Adaptation in HKH Region	Dr. David Molden – DG ICIMOD
12:00 – 12:20	Tea / Coffee Break	
<b>Session 2: Climate Change, Ground Water, IWRM &amp; Environmental Degradation – Chair: Dr. Qamar-uz-Zaman Chaudhry</b>		
<i>Rapporteur: Bhawal Abbasi and Kanwal Waqar</i>		
12:20 – 12:35	-Ground Water Management & Climate Change Adaptation - Case for Baluchistan	-Dr. Shahid Ahmad, Water Consultant
12:45 – 13:00	-Groundwater Sustainability in Indus Basin Pakistan Under Global Climatic Changes	-Ghulam Zakir Hassan Sial Director. Irrigation Research Institute, Lahore
13:00 – 13:15	-Community Compensation: REDD+ Project	-Mr. Nasir Mahmood, IG Forest of Climate Change Ministry
13:15 – 13:30	-Environmental Degradation in the Context of Climate Change	-Dr. Aurangzeb Khan - DG Climate Change Centre, AJK.
13:30 – 13:40	Concluding Remarks by Chair	Dr. Qamar-uz-Zaman Chaudhry
13:40 – 14:15	Lunch / Prayer Break	
<b>Session 3: Socio-Economic Impact on Mountain &amp; Coastal Areas in Changing Climate – Chair: Dr. Abid Q. Suleri, Executive Director, SDPI</b>		
<i>Rapporteur: Ridah and M. Mudassar</i>		
14:15 – 14:30	-Understanding Climate Change Implications on Poverty and Shared Prosperity	-Mr. Thomas Mosier - WB invited International Speaker
14:30 – 14:45	-Climate Change Impact on Coastal Economy	-Dr. Ijaz Ahmad, WWF
14:45 – 15:00	-Concluding Remarks by Chair	-Dr. Abid Q. Suleri
15:00 – 15:45	The Upper Indus Basin Network: collaborating to reduce knowledge gaps and water sector investment risks in the Upper Indus Basin	Chair: Mr. Khalid Mohtadullah, UIB Network Chair Facilitator: Dr. Philippus Wester, ICIMOD Panelists; -Dr. Ghulam Rasul, DG-PMD

		-Mr. Arshad Pervaiz, PD, WAPDA -Dr. Asif Khan, VC, KIU -Ms. Nusrat Nasab, Focus
<b>15:45 – 16:00</b>	Tea / Coffee / Prayer Break	
<b>Session 4: Hydro-Meteorological Disaster, Mitigation &amp; Adaptation in Changing Climate – Chair: Mr. Irfan Elahi, Secretary Civil Aviation</b> <b>Rapporteur: Tallat Ara and Uzma Afridi</b>		
<b>16:00 – 17:30</b>	Addresses & Community discussion: -Climate Change Disaster Risk Reduction -Community Centric Disaster Risk Reduction & Climate change Resilience: AKDN approach -Socio-economic Benefits of Multi-hazard Early Warning System -On the Ground: Adaptation to Climate Change with Special Reference to Water & Agriculture -Concluding Remarks by Chair	-Dr. Ghulam Rasul, DG-PMD -Ms. Nusrat Nasab, CEO-FOCUS  -Mr. Ahmed Kamal, Member-NDMA -Ms. Arjumand Nizami, CEO-Intercooperation & Chitral Community -Mr. Irfan Elahi
<b>19:00 – 20:30</b>	Conference Dinner (Marriott Hotel, ISB)	AgMIP

### DAY 3: Wednesday 19 October 2016

Time	Activity	Speaker
<b>09:00 – 09:05</b>	Recitation of Holy Quran	
<b>09:05 – 09:15</b>	Recap Day-Two Deliberations	WB/WEF
<b>Session 5: Science &amp; Education, Air Pollution, Technology – Syed. Raghieb Abbas Shah, former Chairman-WAPDA</b> <b>Rapporteur: Tallat Ara and Uzma Afridi</b>		
<b>09:15 – 10:15</b>	-Integrated Modeling Approach for Urban Flooding in the Context of Changing Climate -Water Pollution: Its Impacts on Public Health and Remedies" -Concluding Remarks by Chair	-Dr. Shakil Ahmad, NUST  -Dr. Muhammad Ashraf, Chairman- PCRWR - Syed Raghieb Abbas Shah, WAPDA
<b>10:15 – 10:50</b>	Tea / Coffee Break	
<b>Special Session: Address by the Federal Minister for Climate Change</b>		
<b>10:50 – 11:10</b>	Chief Guest of Day- Pakistan Climate Change Challenges & Government Policy & Actions	Mr. Zahid Hamid, Federal Minister for Ministry of Climate Change
<b>Session 6: Research on Sea Level Rise, Water Intrusion &amp; Indus Delta Challenges in Changing Climate – Chair: Prof. Dr. Mukhtar Ahmed Chairman HEC</b> <b>Rapporteur: Kanwal Waqar and M. Mudassar</b>		
<b>11:10 – 12:10</b>	-Climate Change Impact on Sea Level Rise, Water Intrusion & Socioeconomic Activities -Indus Delta Challenges in the Wake of Climate Change -Importance of Water in Agriculture Sector	-Prof. Dr. Altaf Ali Sayal, Pak-US Center, MUET -Engr. Sohail Ali Naqi - WWF  Mr. Seerat Asghar – Former Secretary National Food Security

	-Concluding Remarks by Chair	and Research -Prof. Dr. Mukhtar Ahmed, Chairman-HEC
<b>Session 7: Water-Energy-Food Nexus in Changing Climate – Chair Mr. Shafqat Kakakhel, former Ambassador and Deputy Executive Director of UNEP</b> <b>Rapporteur: Bhawal Abbasi and Kanwal Waqar</b>		
<b>12:10 – 13:30</b>	-Climate Change Impact Assessment: Initiative by AgMIP-Pakistan  -Corporate Governance in Water Sector in Pakistan  -Australia’s Approach to Water, Energy and Food Nexus in South Asia  -Climate Change in Adaptation in International River Basins -Water Strategic Directions for Food Security  -Concluding Remarks by Chair	-Prof. Dr. Ashfaq Ahmad Chattha University of Agriculture, Faisalabad -Mr. Istaqbal Mehdi- Former President Zarai Taraqati Bank of Pakistan. -Mr. David Preston, First Secretary Development Cooperation Australia High Commission, Islamabad -Dr. Christina Leb, World Bank  -Syed. Raghbir Abbas Shah, former Chairman-WAPDA -Mr. Shafqat Kakakhel
<b>13:30 – 14:30</b>	Lunch / Prayer Break	
<b>Session 8: Group Discussion</b> <b>Moderator: Dr. Philippus Wester</b> <b>Rapporteur: M. Mudassar</b>		
<b>14:30 – 15:45</b>	Outcome, Best Practices, Lessons Learnt & Success Stories	Groups
<b>15:45 – 16:00</b>	Summary	Mr. Nisar A. Memon
<b>16:00 – 16:30</b>	Tea / Coffee / Prayer Break	
<b>Session 9: Closing Session</b> <b>Rapporteur: Bhawal Abbasi</b>		
<b>16:30 – 16:50</b>	-Global Perspective for Cooperation COP21 to COP 22	-H.E. Mr. Rene Consolo, Deputy Ambassador of France -H.E. Dr. Mohammad Kalakhi, Acting Ambassador of Morocco -H.E. Mr. Jurek Juszczak, Acting High Commissioner of Australia
<b>16:50 – 17:00</b>	-Opportunities and Challenges in UIB	
<b>17:00 – 17:15</b>	Vote of Thanks	Dr. Abdul Wahid Jasra, Country Representative, ICIMOD Pakistan.
<b>17:15 – 17:30</b>	Closing Remarks	Mr. Nisar A. Memon



## Annexure-2: List of the Participants

### I- List Participants of Media Day

17 October 2016

S. No.	Name	Organization
<b>Ministry of Climate Change</b>		
1.	Mr. Syed Abu Ahmed Akif	Secretary, Ministry of Climate Change, LG&RD Complex, G-5/2, Islamabad
2.	Dr. Syed Mehmood Nasir	Inspector General of Forests, ENERCON Building, Ground Floor, G-5/2, Islamabad
3.	Ms. Zile Huma	Ministry of Climate Change, LG&RD Complex, G-5/2, Islamabad
4.	Ms. Iqra Saeed	Assistant to PRO, Ministry of Climate Change, LG&RD Complex, G-5/2, Islamabad
5.	Ms. Maryam	Ministry of Climate Change, LG&RD Complex, G-5/2, Islamabad
6.	Ms. Mishal Fatima	Internee, Ministry of Climate Change, LG&RD Complex, G-5/2, Islamabad
<b>Pakistan Meteorological Department-PMD</b>		
7.	Dr. Ghulam Rasul	Director General, PMD
8.	Mr. Akram Anjum	Chief Meteorologist, PMD (R&D) Headquarters Office, Sector H-8/2, Islamabad, Pakistan
9.	Dr. M. Afzaal	Director, PMD (R&D) Headquarters Office, Sector H-8/2, Islamabad, Pakistan
<b>Other Participants</b>		
10.	Dr. M. Bashir	DG, EPA KPK
11.	Mr. Waqas Manzoor Bhutta	Research Officer, University of Faisalabad
12.	Mr. Sherbaz Ali	Specialist, AKRSP
13.	Dr. Aurangzeb Khan	DG, Climate Change, P&DD, AJK
14.	Mr. Khurram Khan	Consultant, World Bank
15.	Dr. Zafar Iqbal	Associate Professor, Punjab University
16.	Dr. Fahim Khokhar	Associate Professor, NUST
17.	Ms. Nusrat Nasab	CEO, FOCUS
18.	Mr. Syed Anwar Mahmood Khawaja	Former Secretary, Information, and Broadcasting
19.	Mr. Shafiqullah	Coordinator, AKRSP
20.	Mr. Naeem Ahmed Mughal	DG, EPA Sindh

21.	Dr. Imtiaz Khan	Director, RRI, NARC
22.	Mr. Meraj Bhutt	IT In charge, Alliance French Embassy
23.	Ms. Uzma Afridi	Rapporteurs, Islamic International University
24.	Ms. Talat Ara	Rapporteurs, Islamic International University
25.	Mr. Akram Rashid	Professor, Air University
26.	Ms. Nazima Shaheen	Climate Change Focal Person, ActionAid
27.	Dr. M. Munir	Director, CAEWRI, NARC
<b>Media</b>		
28.	Mr. Shabir	Photographer, PID
29.	Mr. Samarat	Engineer, 92 News
30.	Mr. Idrees Javed	Photographer, APP photo
31.	Mr. Maqbool Naqi	APP
32.	Mr. Rana Saeed	DAWN News
33.	Mr. Mudassar Ali	Cameraman, Waqt News
34.	Mr. Anjum Shahzad	Cameraman, AbbTak News
35.	Mr. Mati ur Rehman	Reporter, APP
36.	Mr. Amjad	Cameraman, 92 News
37.	Mr. Shakeel	PTV News
38.	Mr. Noman Kiani	Photographer, NARC
39.	Mr. Masood Yousaf	Cameraman, Samaa TV
40.	Mr. Saqib Virk	Reporter, Waqt News
41.	Mr. Zeeshan Bhatti	Reporter, Channel 24 News
42.	Ms. Shakila Jalil	Mag. Editor, Joint Secretary, National Press Club
43.	Mr. Ibrar Hussain	Reporter, Daily Voice of Pakistan
44.	Mr. Abdul Shakoor	News One
45.	Mr. Umar Khatab	News One
46.	Mr. Muhammad Saeed	Neo TV
47.	Ms. Rodaba	7 News

48.	Mr. Mubashir	ARY News
49.	Mr. Saleem	Neo News
50.	Mr. Bahazad Saleem	News One TV
51.	Mr. Abdul Wahid	AAJ TV
52.	Ms. Sana Jamal	
53.	Ms. Naheed Akhtar	APP
54.	Mr. Nisar Ahmad	Mahasib
55.	Mr. Rehan	Such TV
56.	Mr. Tahir	Journalist, Daily Nawai Waqt
57.	Mr. Raza	Roz TV
58.	Mr. Muhammad Taimor	Express TV
59.	Mr. Wahab Khawar	Samaa TV
60.	Mr. Nayyer Iqbal	Media
61.	Mr. Akram Khan	Reporter, Radio Pakistan
62.	Mr. Shabir	PID
63.	Mr. Zia Ud Din	Media
64.	Mr. Naeem Asghar	Reporter, Express News TV
65.	Mr. Waseem	Express News TV
66.	Mr. Javed Jabbar	
67.	Mr. Saqlain	Geo News
68.	Mr. Farrukh	Reporter, ARY
69.	Ms. Asiya	Reporter, Geo News
70.	Mr. Bilal	Reporter, ARY News
71.	Mr. Shafqat	ARY News
72.	Mr. Amjad Ali	GEO TV
73.	Mr. Tahir Dhindsa	Head, SDTV
74.	Mr. Abrar	Reporter, Roze TV
75.	Mr. Muhammad Ali	Reporter, Roze TV

<b>76.</b>	Mr. Zubair Niazi	Executive Editor, ADFLUX News
<b>77.</b>	Mr. Kamran	Reporter, Daily Kashmir Press
<b>78.</b>	Mr. Javed Baloch	Chief Reporter, Neo News
<b>79.</b>	Mr. Shabbir Hussain	Reporter, Daily Express
<b>80.</b>	Mr. Wasim Nazir	Photographer, Daily Express
<b>81.</b>	Mr. Shahid Ali	Reporter, ANN
<b>82.</b>	Mr. Salman Rao	Reuters TV
<b>83.</b>	Mr. Sohail Khan	Daily Dunya
<b>84.</b>	Mr. Nouman	Kashmir Times
<b>85.</b>	Mr. Sohail M. Khan	Chief, Agri. Policy Newspaper
<b>86.</b>	Mr. Ahmed Sohail	Technical Advisor, USPCASE
<b>87.</b>	Mr. Rizwan Tahir	Reporter
<b>88.</b>	Mr. Tariq	Al- Akhbar Islamabad
<b>89.</b>	Mr. Farhan	Al- Akhbar Islamabad
<b>90.</b>	Mr. Nadeem Umar	Chief Reporter, Daily News
<b>91.</b>	Mr. Haseeb Hanif	Staff Reporter, Daily Ausaf
<b>92.</b>	Mr. Inam	Producer, PBC
<b>93.</b>	Mr. Ali	Producer, PBC
<b>94.</b>	Mr. Abdullah	Bureau Chief, Daily Sindh
<b>95.</b>	Mr. Shehzad Anwar	Reporter, Express Tribune
<b>96.</b>	Mr. Farooq Ahmed	Reporter, Newsmart
<b>97.</b>	Mr. Safdar	Reporter, Capital TV
<b>98.</b>	Mr. Shakir Abbasi	Reporter, Neo News
<b>99.</b>	Mr. Tallat Farooq	Senior Cameraman, Geo News

## II- List of Conference Day 2 & 3 Participants 18-19 October 2016

S. No.	Name	Organization
<b>Ministers</b>		
1.	Mr. Zahid Hamid	Federal Minister for Climate Change and Law, Justice& Human Rights
2.	Mr. Sikandar Hayat Khan Bossan	Federal Minister of National Food Security and Research (NFS&R)
3.	Senator Pervaiz Rashid	Minister, Minister for Information, Broadcasting and National Heritage
4.	Ms. Marvi Memon	Minister of State, Chairperson BISP
<b>Member National Assembly Standing Committee on IPC</b>		
5.	Mr. Siraj Mohammad Khan	Member National Assembly Standing Committee on IPC, KPK
<b>Member National Assembly- Climate Change Committee</b>		
6.	Ms. Naeema Kishwer Khan	MNA, Standing Committee on Climate Change
7.	Ms. Musrat	MNA, PTI
<b>Ministry of Climate Change</b>		
8.	Mr. Syed Abu Ahmed Akif	Secretary, Ministry of Climate Change, LG&RD Complex, G-5/2, Islamabad
9.	Dr. Syed Mehmood Nasir	Inspector General of Forests, ENERCON Building, Ground Floor, G-5/2, Islamabad
10.	Ms. Zile Huma	Ministry of Climate Change
11.	Mr. Muhammad Saleem	Director, Ministry of Climate Change
<b>Ministry of National Food Security and Research</b>		
12.	Mr. Tahir Anwar	Director General, Water Management Cell, Ministry of National Food Security and Research
<b>Planning Commission</b>		
13.	Mr. Naseer Gilani	Chief, Water, Planning Commission P-Block Pak Secretariat, Islamabad, Pakistan
<b>Ministry of Water and Power</b>		
14.	Mr. Alamgir Khan	Chief Engineer, Flood Cell Federal Flood Commission, Plot#, 06, Sec G-5/1 near old MNA Hostel, Islamabad

15.	Mr. Javed Bukhari	Ministry of Water and Power
<b>National Disaster Management Authority- NDMA</b>		
16.	Commander Yousuf	Deputy Director Response, NDMA
<b>WAPDA</b>		
17.	Mr. Arshad Pervaiz	PD, WAPDA
18.	Mr. Mian Waqar Ali Shah	Junior Engineer, WAPDA
<b>Pakistan Meteorological Department- PMD</b>		
19.	Dr. Ghulam Rasul	DG, PMD
20.	Mr. Akram Anjum	Chief Meteorologist, PMD (R&D) Headquarters Office, Sector H-8/2, Islamabad, Pakistan
21.	Dr. M. Afzaal	Director, PMD (R&D) Headquarters Office, Sector H-8/2, Islamabad, Pakistan
22.	Mr. Burhan Ahmed	Meteorologist, PMD (R&D) Headquarters Office, Sector H-8/2, Islamabad, Pakistan
<b>Pakistan Agricultural Research Council/National Agricultural Research Centre</b>		
23.	Dr. Muhammad Azeem Khan	DG,NARC
24.	Dr. Ahmad Bakhsh Mahar	Member, PSD/DG, P&DD
25.	Dr. Muhammad Munir Ahmad	Director, CAEWRI, NARC/PARC, Islamabad
26.	Dr. Arshad Ashraf	PSO, CAEWRI, NARC/PARC, Islamabad
27.	Dr. Ghani Akbar	SSO, CAEWRI, NARC/PARC, Islamabad
28.	Dr. Sarfraz Ahmad	Director, RM&F, NRD, PARC
29.	Ms. Nusrat Batool	Angora Rabbit Value Chain Specialist, NARC, Islamabad
30.	Ms. Ya Sakina	Angora Rabbit Value Chain Specialist, NARC, Islamabad
31.	Mr. Saqib Shakeel Abbasi	SO, SSRI, NARC
32.	Dr. Shahid Rafique	Member (Animal Sciences Division), Pakistan Agricultural Research Council, 20-Atta Turk Avenue, G-5/1, Islamabad.
33.	Dr. Altaf Sher	Director (IC), Pakistan Agricultural Research Council, 20-Atta Turk Avenue, G-5/1, Islamabad.
34.	Dr. Rehana Kausar	SSO, NARC
<b>Government of Khyber Pakhtunkhwa-KPK</b>		
35.	Dr. Bashir Khan	Director General, Environmental Protection Agency, Govt. of KPK

<b>Irrigation Department, Punjab</b>		
36.	Mr. Ghulam Zakir Hassan Sial	Director, Irrigation Research Institute, Irrigation Department, Govt. of the Punjab, Old Anarkali Lahore, Pakistan
<b>Mehran University of Engineering and Technology, Jamshoro</b>		
37.	Dr. Bakhshal Khan Lashari	Mehran University of Engineering & Technology, Jamshoro, Pakistan
38.	Prof. Dr. Altaf Siyal	Mehran University of Engineering & Technology, Jamshoro, Pakistan
<b>Fatima Jinnah Women University</b>		
39.	Dr. Shaheen Begum	Assistant Professor, Department of Environmental Sciences, FJWU
40.	Dr. Sofia Khalid	Assistant Professor, Department of Environmental Sciences, FJWU
<b>COMSATS</b>		
41.	Prof. Dr. Amir Haider Malik	Advisor- CCRD
42.	Dr. Saeed A Asad	Assistant Professor- CCRD
43.	Dr. Toqeer Ahmed	Assistant Professor –CCRD
44.	Ms. Zainab	Assistant Programme Officer, COMSATS
45.	Dr. Humaira Tariq	SRO, COMSATS
<b>PIDE</b>		
46.	Ms. Memona Saddaf	Ph.D. student, PIDE
<b>NUST</b>		
47.	Dr. Kamran Haider Syed	RVF, NUST
48.	Dr. Muhammad Fahim Khokhar	Institute of Environmental Science and Engineering, Sector, NUST, H-12, 44000 Islamabad
49.	Dr. Sofia Baig	Assistant Professor, NUST
50.	Ms. Naila Zeb	PhD student, NUST
51.	Ms. Zara Maqsood	PhD student, NUST
52.	Mr. Asadullah Shoaib	MS. Student
53.	Ms. Maryum Sarfraz	MS. Student
54.	Ms. Tehreem Mustansar	MS. Student

55.	Mr. Awais Javaid	MS. Student
56.	Ms. Marium Fiaz	MS. Student
57.	Mr. Rashid Ansari	Consultant, NUST
58.	Ms. Aneela Bibi	Student, Environmental Sciences
<b>Riphah University</b>		
59.	Dr. Rashid	Director, Riphah University
60.	Ms. Sana Naseem	Research Associate, Riphah University
<b>Others</b>		
61.	Mr. Nazir Ahmad	General Manager, SIDA Sindh
62.	Mr. Babar Wazarat	Brig. GHQ
63.	Mr. Naeem Ahmed Mughal	DG,EPA
64.	Dr. Shakeel Ahmad	SDPI
65.	Mr. Mehr Sikandar	Manager, IWF
66.	Mr. Bilal Jan	AHKMT
67.	Mr. Ata ur Rahman	PD,SRBC, Irrigation Department
68.	Dr. Arshad M. Khan	Former Executive Director, GCISC
69.	Dr. Jawad	Director, UAP, Helvetas
70.	Ms. Nazima Shaheen	Climate Change Focal Person, ActionAid
71.	Ms. Rukhsana Zuberi	President Tech Education Foundation
72.	Mr. Ijaz Mahdi	DFA, Ministry of Finance
73.	Dr. Azeem Chaudhry	Lawyer
74.	Ms. Maryam Tanveer	Student, Environmental Sciences
75.	Ms. Farzana Yasmin	Researcher
76.	Dr. Amir Muhammad	Rector, FAST University
77.	Mr. Omer Ali	Program Manager, Hanns Seidel Foundation
78.	Mr. Iftikhar Ullah Babar	Former Secretary, Senate of Pakistan



<b>Federal Flood Commission</b>		
<b>79.</b>	Mr. Javed Bokhari	Eng. Adviser, Federal Flood Commission
<b>University of Wah</b>		
<b>80.</b>	Dr. Zulfiqar Ahmad	Uni. of Wah
<b>81.</b>	Ms. Mamoonah Kareem	Uni. of Wah
<b>University of Punjab</b>		
<b>82.</b>	Dr. Zafar Iqbal	Department of Zoology, University of the Punjab, Quaid-E-Azam Campus, Lahore
<b>Institute of Space and Technology</b>		
<b>83.</b>	Mr. Taimoor Tariq	Institute of Space and Technology- IST
<b>Air University</b>		
<b>84.</b>	Mr. Syed Asad Abbas	Assistant Professor, Electrical Engineering Department, Air University
<b>85.</b>	Engr. Akram Rashid	Assistant Professor, Electrical Engineering Dept. Air University
<b>AKRSP</b>		
<b>86.</b>	Mr. Sherbaz Ali	Specialist Capacity/Linkage Development, Aga Khan Rural Support Programme (AKRSP)
<b>87.</b>	Mr. Shafiqullah Khan	Coordinator Water Management and Environment, Water & Energy Security Project, Aga Khan Rural Support Programme (AKRSP)
<b>US Embassy Pakistan</b>		
<b>88</b>	Ms. Gul-E-Afshan	Economic Specialist
<b>Karakoram International University</b>		
<b>89</b>	Dr. Muhammad Asif Khan	Vice Chancellor, Karakoram International University, University Road, Gilgit (15100) Pakistan
<b>FOCUS Humanitarian Assistance</b>		
<b>90</b>	Ms. Nusrat Nasab	Chief Executive Officer, Focus Humanitarian Assistance (FOCUS), Pakistan, Level 9, Serena Business Complex Opposite Convention Centre, Khayaban-e-Suhrwardy,

		Islamabad
<b>Helvetas Intercooperation</b>		
<b>91</b>	Dr. Arjumand Nizami	Country Director, Helvetas Intercooperation
<b>Sustainable Development Policy Institute- SDPI</b>		
<b>92</b>	Dr. Abid Qaiyum Suleri	Executive Director, Sustainable Development Policy Institute (SDPI), 3rd Floor, Taimur Chambers, 10-D, West, Fazal-e-Haq Road, Blue Area, Islamabad
<b>93</b>	Ms. Ridah Ellahi	Rapporteur, SDPI
<b>94</b>	Mr. Bahawal Abbasi	Rapporteur, SDPI
<b>95</b>	Mr. Shakeel Ahmad Ramay	Head, Centre for Future Policy and Strategic Studies
<b>96</b>	Mr. Saeed Rashid	Web Developer
<b>97</b>	Mr. Imran Khan	Cameraman
<b>98</b>	Mr. Manzoor Ahmad	Web Developer, SDPI
<b>EU Delegation to Pakistan</b>		
<b>99</b>	Mr. Imran Ashraf	Development Advisor, Infrastructure / Energy & Climate Change, European Union Delegation to Pakistan, House 9, Street 88, G-6/3, Islamabad
<b>Australian High Commission</b>		
<b>100</b>	Mr. David Preston	First Secretary, Australian High Commission, Diplomatic Enclave, Islamabad
<b>101</b>	Mr. Hamza Khalid	Program Manager, Australian High Commission, Diplomatic Enclave, Islamabad
<b>DFID</b>		
<b>102</b>	Dr. Undala Alam	Regional Water Resources and Climate Adviser, Asia Regional Team, DFID, British High Commission, Diplomatic Enclave, Ramna 5, Islamabad, Pakistan
<b>Aga Khan Foundation</b>		
<b>103</b>	Mr. Izhar Ali Hunzai	H. No. 284, Upper Portion, St. 27, F-11/2, Islamabad
<b>WWF-Pakistan</b>		
<b>104</b>	Mr. Hammad Naqi	Director General, WWF
<b>105</b>	Dr. Babar Khan	Head, WWF

106	Mr. Sohail Naqvi	Coordinator Water
<b>International Islamic University</b>		
107	Dr. Waqar-Un-Nisa	Assistant Professor, Department of Environmental Science, International Islamic University, Islamabad
108	Ms. Tallat Ara	MS student, Department of Environmental Science, International Islamic University, Islamabad
109	Ms. Uzma Afridi	MS student, Department of Environmental Science, International Islamic University, Islamabad
110	Ms. Ayesha Qasim	MS Student, Department of Environmental Science, International Islamic University, Islamabad
111	Ms. Anila Bibi	MS student, Department of Environmental Science, International Islamic University, Islamabad
<b>Pakistan Council of Research in Water Resources- PCRWR</b>		
112	Dr. Muhammad Ashraf	Chairman, PCRWR
113	Dr. Manzoor Ahmed	Project Director, PCRWR
114	Mr. Muhammad Azam	Director, PCRWR
115	Mr. Shakeel Badshah	Assistant Director, PCRWR
116	Dr. Fouzia Altaf	RO, PCRWR
<b>RSPN</b>		
117	Mr. Shoaib Sultan Khan	RSPN
<b>UNDP</b>		
118	Mr. Shehryar Khan	Coordinator, UNDP
<b>Foundation University</b>		
119	Dr. Shoaib Ahmed	Senior Associate Academic (Arts & Media)
120	Ms. Sana Irfan	Assistant Professor Business & Economics
121	Engr. Sharjeel Farooqui	Assistant Professor Electrical Engineering
<b>Alliance Française d'Islamabad</b>		
122	Ms. Farah Rahman	CEO, Alliance Française d'Islamabad
<b>Benazir Income Support Programme- BISP</b>		
123	Mr. Mohsin Yousuf	BISP
124	Mr. Ishaque Naich	Protocol Officer

<b>Chairs &amp; Speakers</b>		
<b>125</b>	Mr. Javed Jabbar	Former Federal Minister of Information, Media Specialist
<b>126</b>	Senator Pervaiz Rashid	Federal Minister for Information, Broadcasting & Heritage
<b>127</b>	Dr. Qamar Uz Zaman Chaudhry	International Climate Change Specialist UNEP, Lead-Author Pakistan Climate Change Policy & <b>WEF</b> Member Board of Trustees
<b>128</b>	Mr. Syed Abu Ahmad Akif	Secretary, Ministry of Climate Change
<b>129</b>	Dr. Shahid Ahmad	Water Consultant
<b>130</b>	Dr. Aurangzeb Khan	DG Climate Change Centre, AJK
<b>131</b>	Mr. Irfan Elahi	Secretary Civil Aviation
<b>132</b>	Prof. Dr. Mukhtar Ahmed	Chairman-HEC
<b>133</b>	Mr. Seerat Asghar	Former Secretary Agriculture
<b>134</b>	Mr. Istaqbal Mehdi	Former President Zarai Taraqati Bank of Pakistan.
<b>135</b>	Dr. Ashfaq Ahmad Chattha	University of Agriculture, Faisalabad
<b>136</b>	Mr. Syed Raghieb Abbas Shah	Former Chairman, WAPDA & <b>WEF</b> Member Board of Trustees
<b>137</b>	Mr. Rana Kaisar	PTV
<b>138</b>	Mr. Syed Anwar Mahmood	
<b>139</b>	Mr. Khalid Mohtadullah	Chair UIB, ICIMOD
<b>140</b>	Mr. Rene Consolo	Deputy Ambassador of France
<b>141</b>	Prof. Dr. Rai Niaz Ahmad	VC, UAAR
<b>142</b>	Dr. Ejaz Ahmad	WWF
<b>143</b>	Dr. Shakeel Ahmad	NUST & <b>WEF</b> Member Board of Trustees
<b>144</b>	Dr. Arshad M. Khan	NUST
<b>Capital Development Authority-CDA</b>		
<b>145</b>	Ms. Fozia Khan	Director, CDA
<b>World Bank</b>		
<b>146</b>	Dr. Patchamuthu Illangovan	Country Director – WB
<b>147</b>	Mr. Thomas Mosier	

148	Dr. Christina Leb. World Bank	World Bank
149	Dr. Sheikh Javed Ahmed	World Bank, Islamabad
ICIMOD		
150	Dr. David Molden	DG, ICIMOD
151	Dr. Philippus Wester	ICIMOD
152	Mr. Farid Ahmad	ICIMOD
153	Dr. Abdul Wahid Jasra	Country Representative
154	Ms. Kanwal Waqar	Research Officer
155	Mr. Haris Ayub	Finance Officer
156	Mr. Muhammad Mudassar Maqsood	UIB Coordinator
157	Mr. Muhammad Aslam	Office Assistant
Water Environment Forum		
158	Mr. Nisar A. Memon	Chairman, WEF
159	Dr, Arshad M. Khan	Former Exec Director GCISC, Member WEF Board of Trustee Coordinator, WEF
160	Ms. Sana Ikram	
Volunteers		
161	Mr. Basit Ali &	Student, Arid Agriculture University
162	Mr. Atif Ali Khan	Student, Arid Agriculture University
163	Mr. Hafiz Sajid	Student, Arid Agriculture University
164	Ms. Masooma	Research Fellow, CAEWRI, NARC
165	Mr. Mansoor Ali	Research Fellow, CAEWRI, NARC
Media		
166	Mr. Sohail	Reporter, SDTV
167	Mr. Rizwan Rathore	Reporter/ Producer, PTV News
168	Mr. Farkhand Iqbal	Reporter, Aitraaf Magazine

169	Mr. Shahid Ali	Reporter
170	Mr. Syed Wasif Kazmi	Reporter, Daily appeal
171	Mr. Nouman	Staff Reporter, Daily Kashmir Times
172	Mr. Junaid Arslan	Neo TV
173	Mr. Zarar Farid	Cameraman, APP
174	Mr. Peer Muhammad	Express Tribune
175	Mr. Muhammad Karim	Reporter, daily Kashmir post
176	R.A. Taj	LAO
177	Mr. Shahid Munir	Reporter
178	Mr. Maqbool A. Bhatti	CEO, HITECH Crop
179	Mr. Abdullah	Bureau Chief, Daily Sindh
180	Mr. Sohail Khan	Daily Dunya
181	Mr. Munir Ahmad	DEVCOM Pakistan
182	Mr. Noman Kiani	Photographer
183	Mr. Aimad Ahmed	Reporter, INP
184	Mr. Rizwan	Daily Asas
185	Mr. Farooq Ahmed	Daily News
186	Mr. Umar	Cameraman, PTV News
187	Mr. Hanif Raja	Journalist, Neo News
188	Mr. Aamir Lashari	Bureau Chief, Daily Malakand
189	Mr. Tahir Malik	ON TV
<b>Community Members (Chitral)</b>		
190	Mr. Zahir Dana	
191	Mr. Nadir Shah	
192	Mr. Ahmed Faqir	
193	Mr. Bahauddin	
194	Ms. Shaheen Gul	
195	Ms. Salma	



## ■Annexure-4: Conference Pictures

WEF National Conference, Islamabad  
17th - 19th October 2016, Day-1





WEF National Conference, Islamabad  
17th - 19th October 2016, Day-2





WEF National Conference, Islamabad  
17th - 19th October 2016, Day-2





WEF National Conference, Islamabad  
17th - 19th October 2016, Day-3





## ■Annexure -5: Newspaper / Magazine Clippings



روزنامہ جنگ، دہلی پبلشڈ 9 نومبر 2016ء



واٹر انوائرمینٹ فورم پاکستان کی روزہ نیشنل کانفرنس  
پانی، ماحول اور ماحولیات کی تعمیرات، پائیدار ترقی کا حصول

[illegible]

ظہورِ حق کی علامتِ ناک کے ساتھ ہے شریکِ حق

[illegible]

## Pakistan needs \$14bln/year to overcome climate change impacts



ISLAMABAD: Pakistan needs to spend annually \$14 billion, more than the country's main textile exports, to avert the adverse impacts of climate changes on the economy, a minister said. "We require an additional \$ 14 billion annually to adapt to climate change impacts," Federal Minister for Law, Justice and Climate Change Zahid Hamid said, speaking at a conference titled, "Pakistan Climate Change Challenges and Government Policy and Actions," Hamid said the country faces several major risks related to climate change, including glacial melt, variable monsoons, recurrent floods, rise in sea level and higher average temperatures and frequency of droughts. Economic losses suffered during floods in 2010 and 2011 alone surpassed \$15 billion, he said. "These threats pose major survival concerns for Pakistan, particularly in relation to the country's water, food and energy securities," he said. "They have enormous adverse consequences for all socioeconomic sectors, including agriculture and livestock, water resources, marine and land ecosystems, forests and biodiversity, infrastructure and human health."

The country contributes only 0.8 percent to the global greenhouse gas emissions, ranking 135th in the world. Between 1992 and 2011, the country ranked 8th amongst the countries most vulnerable to climate change, according to the Global Climate Risk Assessment Index developed by German Watch. However, it was the 3rd most affected country for 2011.

Minister Hamid said the government developed policies and plans, including both adaptation and mitigation measures, to cope with the climate change impacts. "A number of policy initiatives have also been taken to tackle climate change issues," he said.

The national climate change and national disaster risk reduction policies, adopted in 2012, identify the goals and objectives as well as the proposed policy measures to mainstreaming climate change concerns in decision-making at national and provincial levels in all sectors of the economy.

"Preparation of a national adaptation plan, nationally appropriate mitigation actions and a second national communication to the United Nations Framework Convention on Climate Change Secretariat is also envisaged," the minister said. "All the provinces are also developing their own action plans to facilitate the implementation of policy." He said the ministry of climate change also developed a national sustainable development strategy to define sustainable development and the pathway to a green economy in Pakistan's context, while keeping it aligned with globally accepted targets, such as sustainable development goals agenda for 2030. The minister said the government will formally launch the Prime Minister's Green Pakistan Program. "It aims at arresting natural resource degradation and mitigating climate change impacts," he said.

*The News 20th October 2016*



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