People Perception about Climate Change and Adaptation in the Arid Region of Pakistan

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Scheme of Presentation

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Introduction

The paper analyzes public perception regarding climate change and adaptation in the arid region of Pakistan 1961-2000 in terms of surface water, coastal management, overgrazing, deforestation, agriculture and livestock, drought and desertification, public awareness, emergency response, early warning system and monitoring, landuse change, waterlogging, and sources of energy etc.

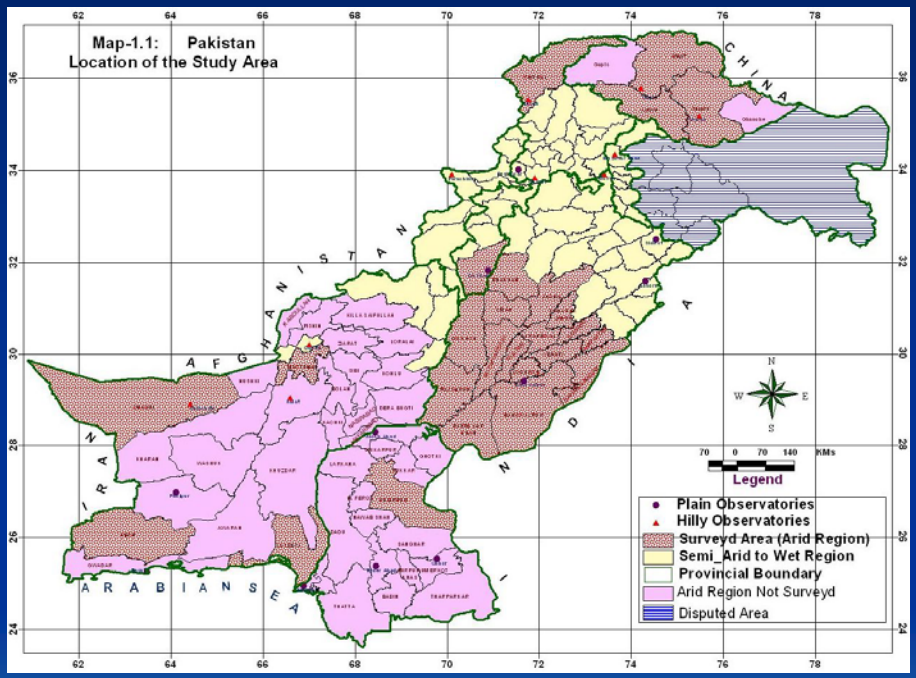
Research declaration:

- The gross per capita water availability in Pakistan was 5300 m^3/year (1951) that decline to 1200 m^3/year (2000).
- Due to decrease in precipitation of about 0.05inches (-1.27mm) and increase in temperature of 1.6 ^{0}C (1961-2000), the climate in Pakistan shows a more vulnerable condition from 1961-2000.

Study Area Location

- **Aridity prevails over 676,400 sq.km area of Pakistan. The current arid region of Pakistan comprises of Gilgit-Baltistan province in the north, southern Punjab, whole of Sind, central and southern Baluchistan, and parts of Chitral and Dera Ismail Khan Districts in Khyber-Pakhtunkhwa province.**

- **Arid region extends northeast to southwest from latitude 37^{0}N into 23 1/2^{0}N and longitude 60^{o}E to 75^{o}East.**



Methodology

Variables

- Precipitation
- Temperature
- Surface water
- Coastal Management
- Natural Disasters
- Agriculture
- Drought and Desertification
- Energy Sector

Objectives

The main objective of the study is to know the public opinion and awareness about the climate change, causes, and adaptation in the arid region of Pakistan.

Research Questions:

- what is the public opinion regarding climate change, its impacts and how to cope with the problem?
- Are people of the arid region aware about this issue and willing to participate on the actions required?

Research Hypothesis

Changes in the temperature and precipitation in Pakistan have affected agriculture in arid lands of Pakistan severely and people perception is need for the adaptation strategies to cope with the situation.

Methodology

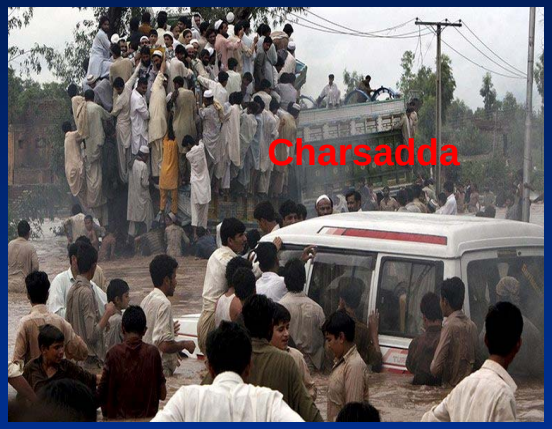
Data collection

The work is based on primary data collected from the field questionnaire survey and personal interviews. The major questions are about temperature and precipitation fluctuation, deforestation, overgrazing, drought, desertification, landuse change, wars, crop production, population growth, construction of water reservoirs, river flow, environment policies, and willingness to cope with the climate change issue. As the security situation is not good in the entire arid region. Therefore, a questionnaire survey was conducted in the arid region of the lower *Punjab,* parts of *Balochistan*, *Sind*, *Gilgit-Baltistan*, and Upper and lower *Khyber Pukhtunkhwa* provinces taking into account random sampling method. The sample areas covers about 25 districts having different kind of desert landforms like pure desert, piedmont plains, irrigated desert, sand dunes, steppe, and barren mountains.

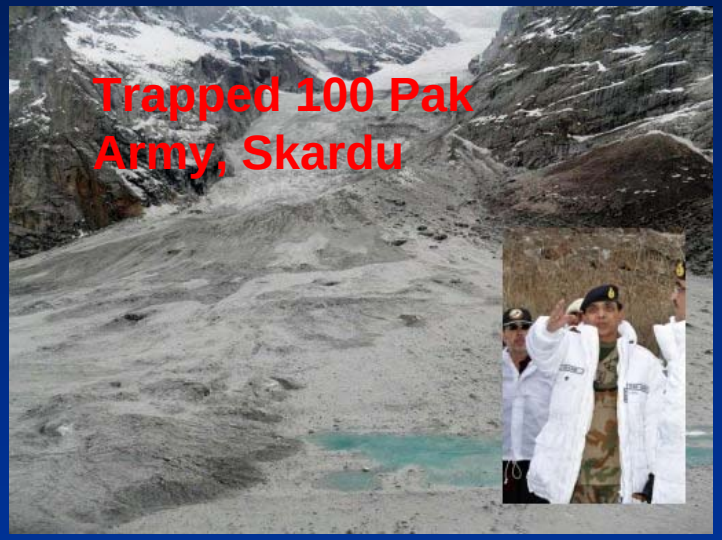
Analysis of Data

The work is based on primary data collected from the field questionnaire survey and personal interviews. The major questions are about temperature and precipitation fluctuation, deforestation, overgrazing, drought, desertification, landuse change, wars, crop production, population growth, construction of water reservoirs, river flow, environment policies, and willingness to cope with the climate change issue. As the security situation is not good in the entire arid region. Therefore, a questionnaire survey was conducted in the arid region of the lower *Punjab,* parts of *Balochistan*, *Sind*, *Gilgit-Baltistan*, and Upper and lower *Khyber Pukhtunkhwa* provinces taking into account random sampling method. The sample areas covers about 25 districts having different kind of desert landforms like pure desert, piedmont plains, irrigated desert, sand dunes, steppe, and barren mountains. It represents a clear picture of the entire arid region of Pakistan. The questionnaires were distributed among the students and teachers of the University of Bahawalpur, Peshawar, Karachi, and Quetta. The people who are surveyed and interviewed are including professors, lecturers, M.Sc and M.Phil students, farmers, lawyers, and statisticians. Total of 150 questionnaires were distributed in which 130 questionnaires were returned with complete answers (Graph-1) and used for the analysis. Generally, approximately 6 questionnaires were collected from each district. A master sheet has been prepared from the public opinion that classified into tables and charts for the purpose of analysis and conclusion.

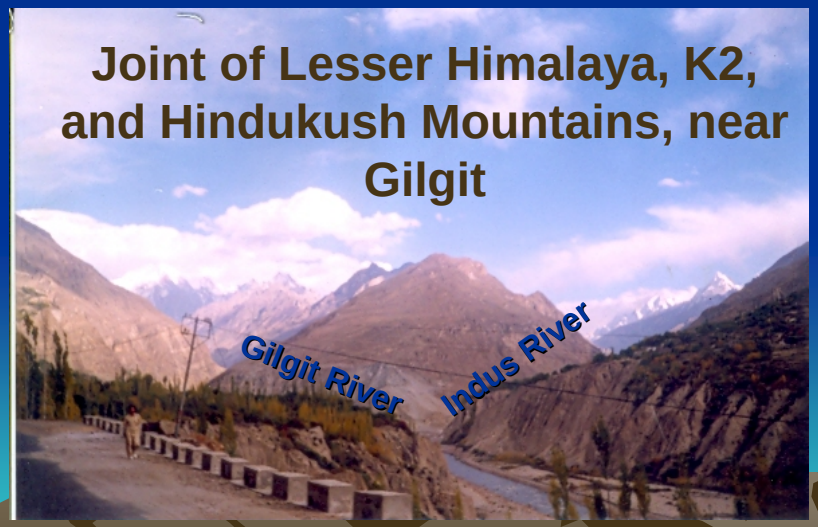
Natural Disasters (Floods) As Evidence of Climate Change



Natural Disasters (Land Slide, Snow Avalanches & Tectonic Moment)



Physiography: Gilgit-Baltistan



Physiography and Natural Vegetation, Sind, Punjab, and Baluchistan

Arid Baluchistan

Mir Chakar Khan Fort


Chagai, Baluchistan


Kech, Baluchistan

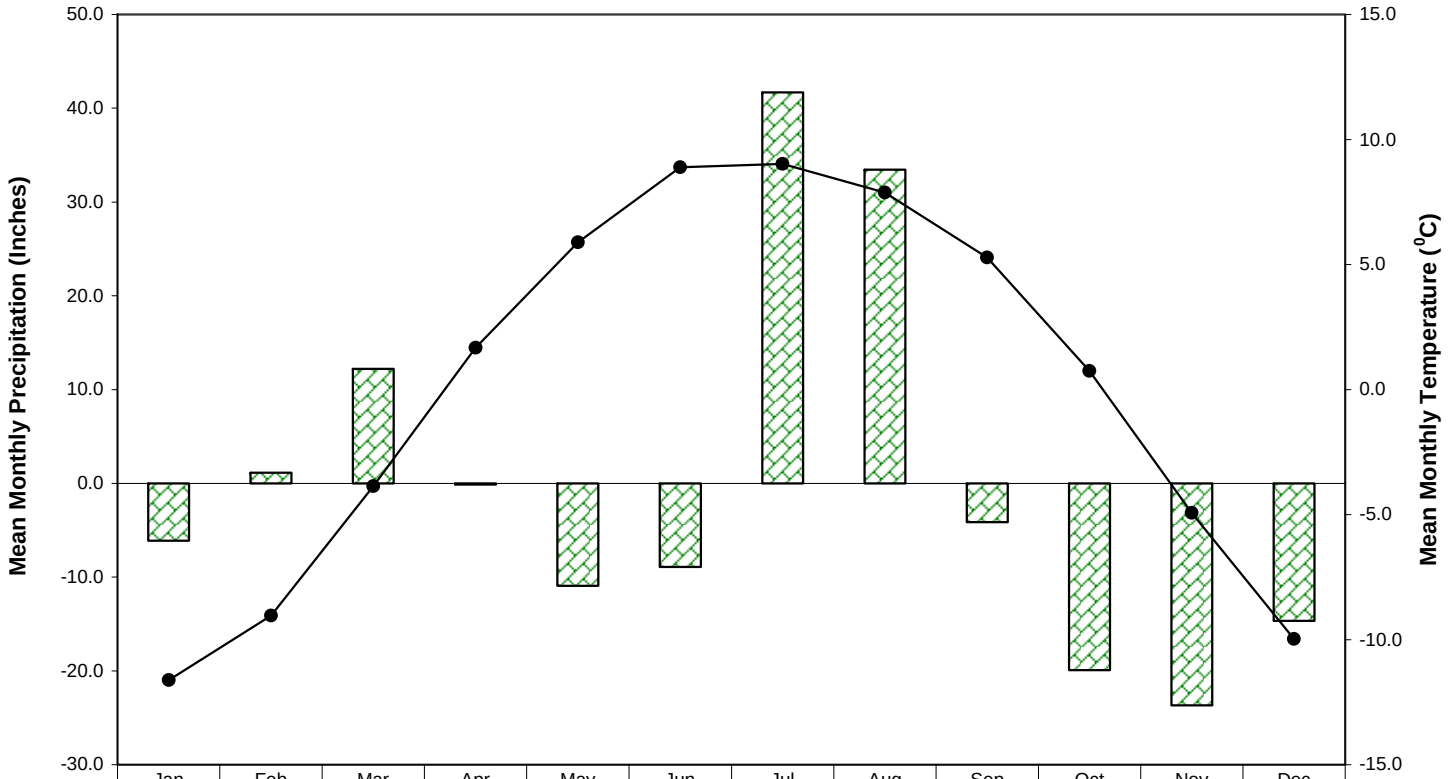

Gawadar Highway

Baluchistan Coastal Region

Precipitation Distribution

Annual Precipitation and Temperature

Graph-4.2: Arid Region
Deviation of Mean Monthly Temperature and Precipitation from the Mean

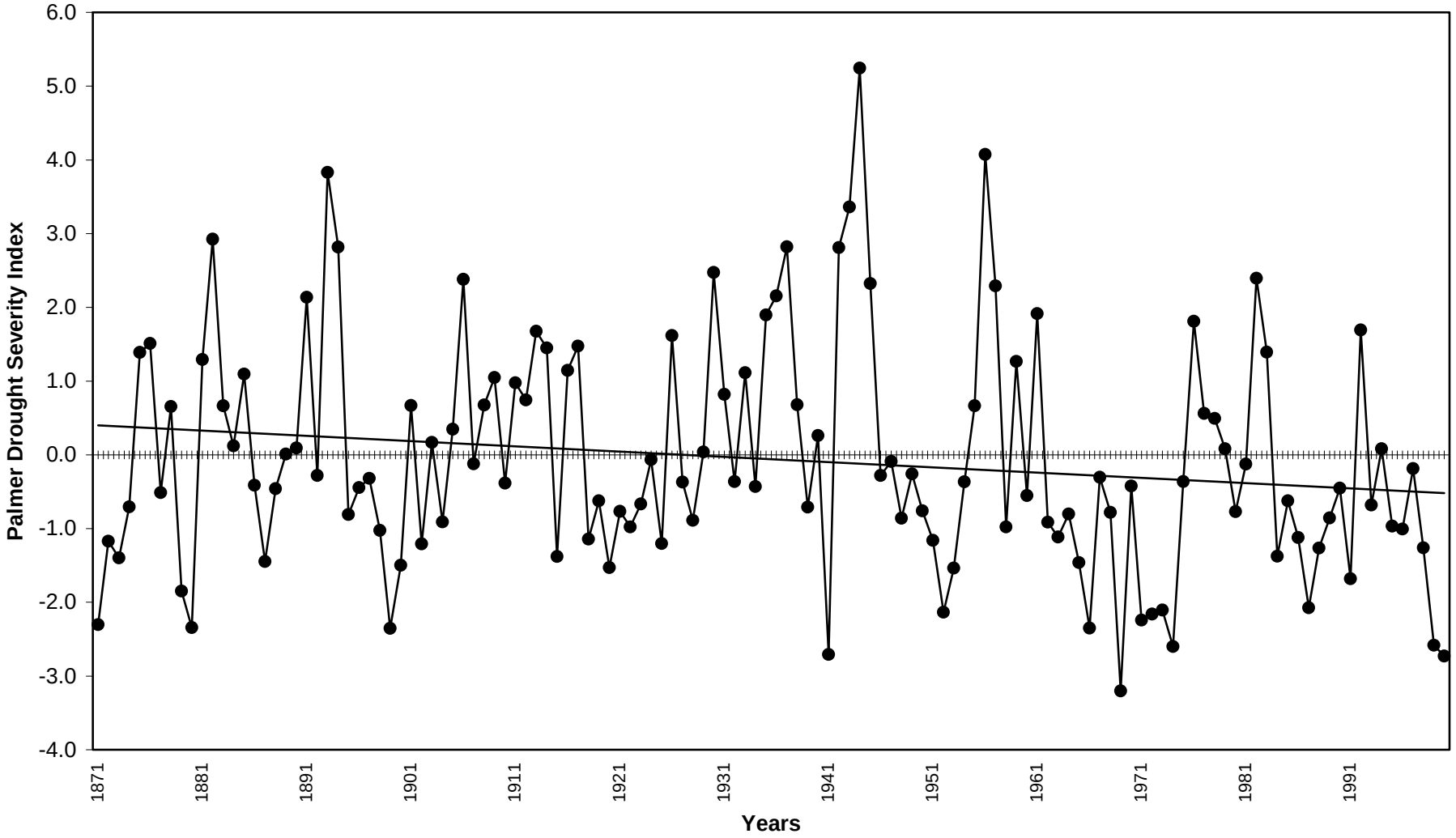


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation	-6.1	1.1	12.2	-0.1	-10.9	-8.9	41.7	33.4	-4.1	-19.9	-23.7	-14.7
Temperature	-11.6	-9.0	-3.9	1.7	5.9	8.9	9.0	7.9	5.3	0.8	-4.9	-10.0

Months

Graph-6.1: Arid Region

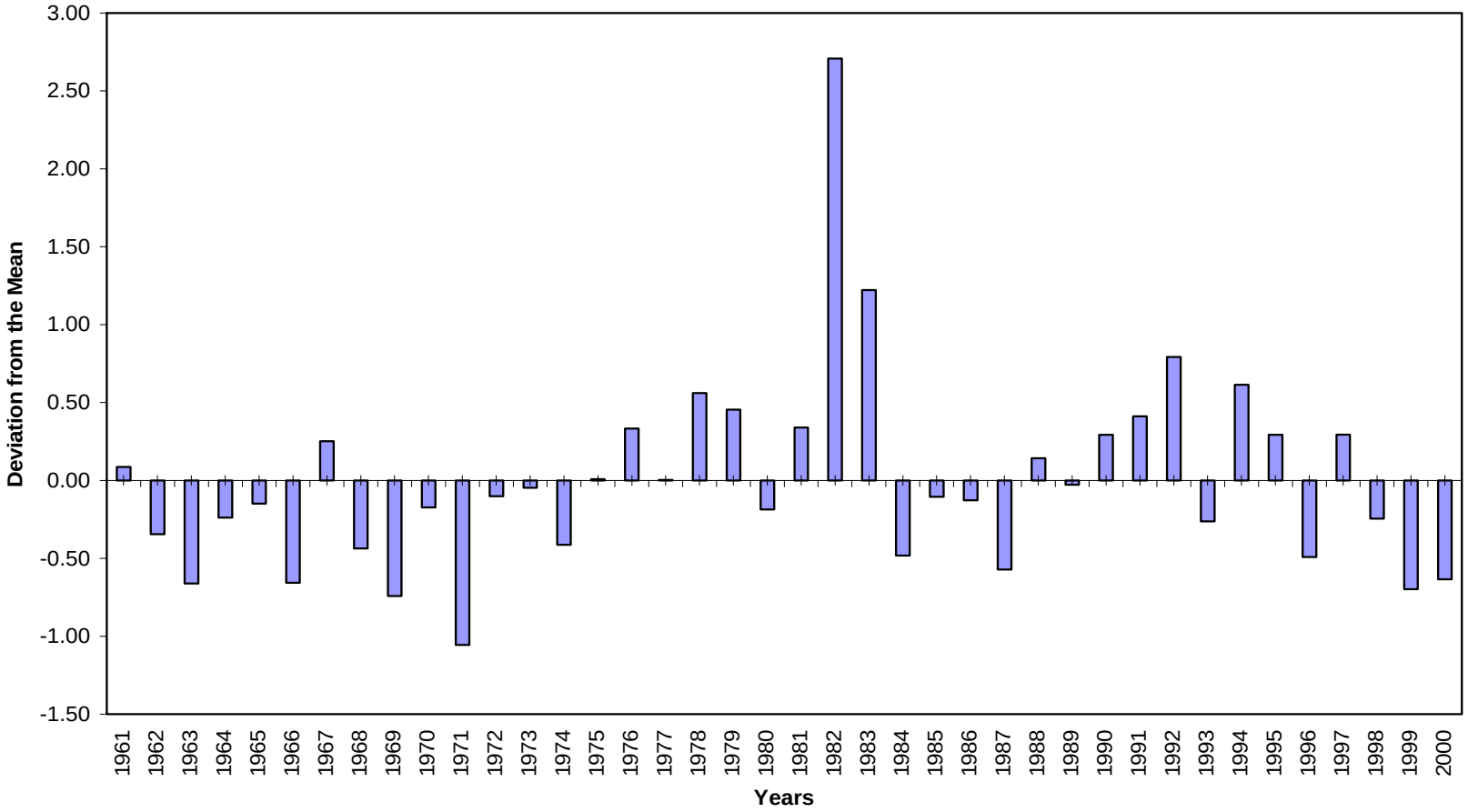
Palmer Drought Severity Index Latitudes 25^0-30^0 North and Longitudes 62^0-72^0 East (1871-2000)



Results and Discussions

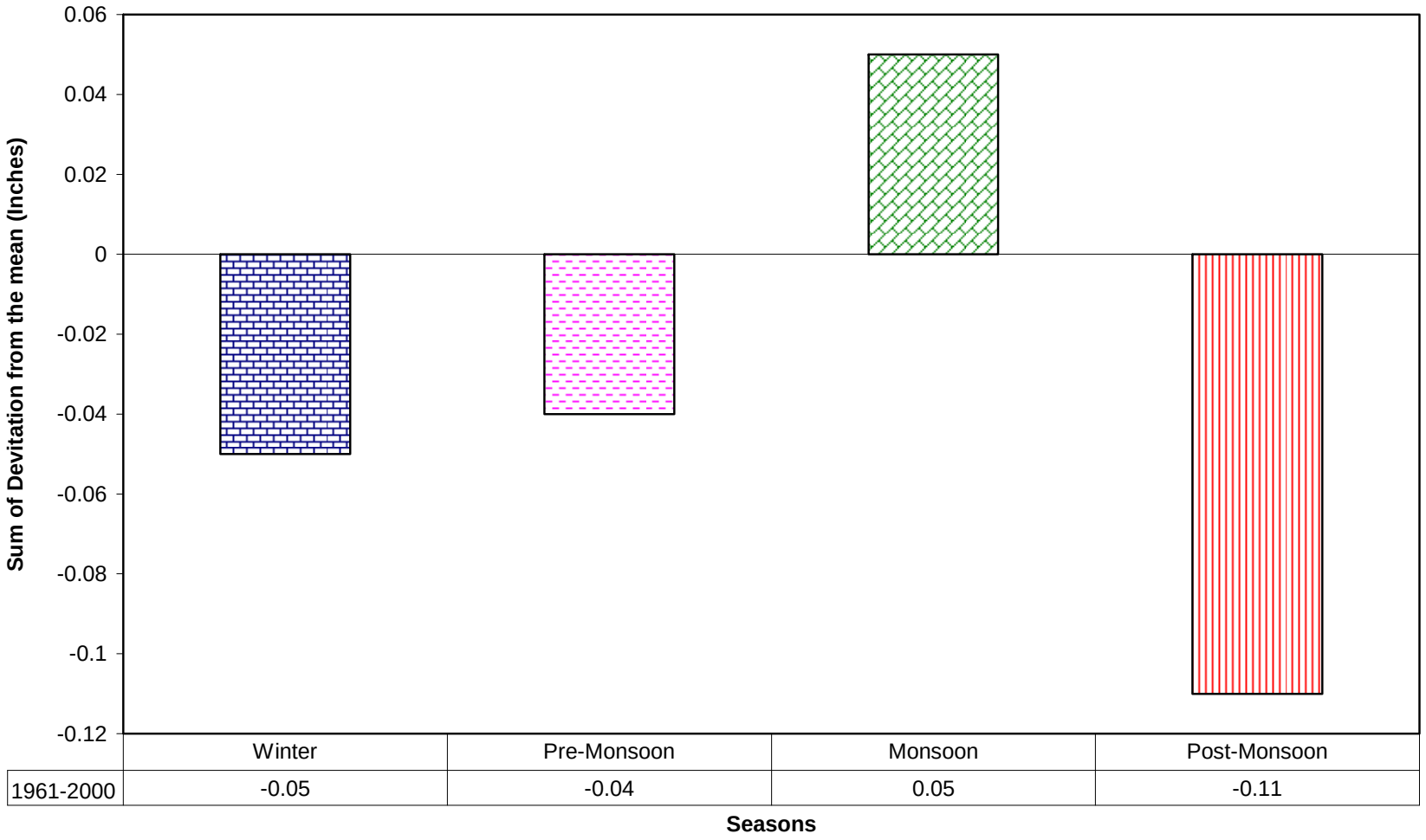
Annual Decline in Precipitation

Graph-1: Arid Reigion
Annual Trend of Precipitation (1961-2000)



Total Seasonal Fluctuation

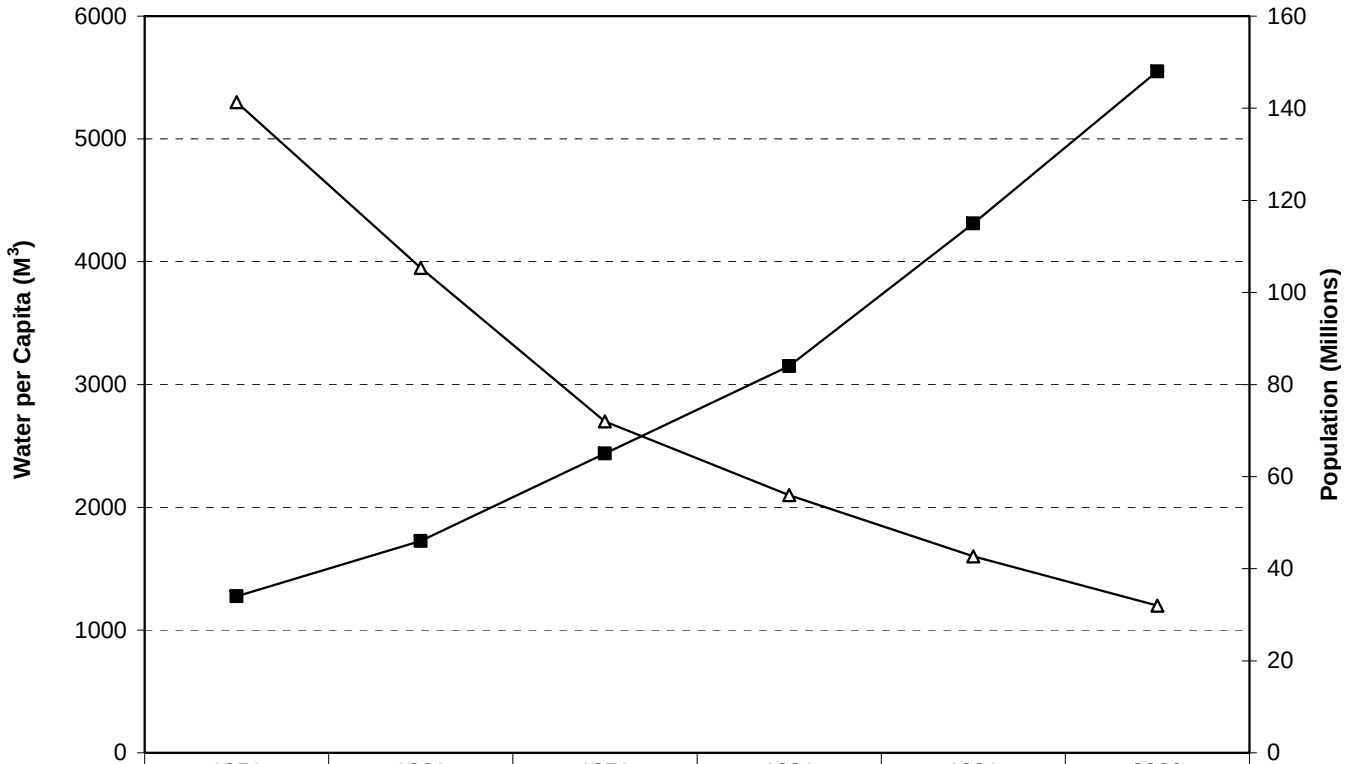
Graph-13: Arid Region
Total Oscillation of Seasonal Precipitation (1961-2000)



Results and Discussions

Gross per capita Availabilty

Graph-6: Pakistan
Per Capita Availability of Water Resources 1951-2000



	1951	1961	1971	1981	1991	2000
Per Capita Availability	5300	3950	2700	2100	1600	1200
Population	34	46	65	84	115	148

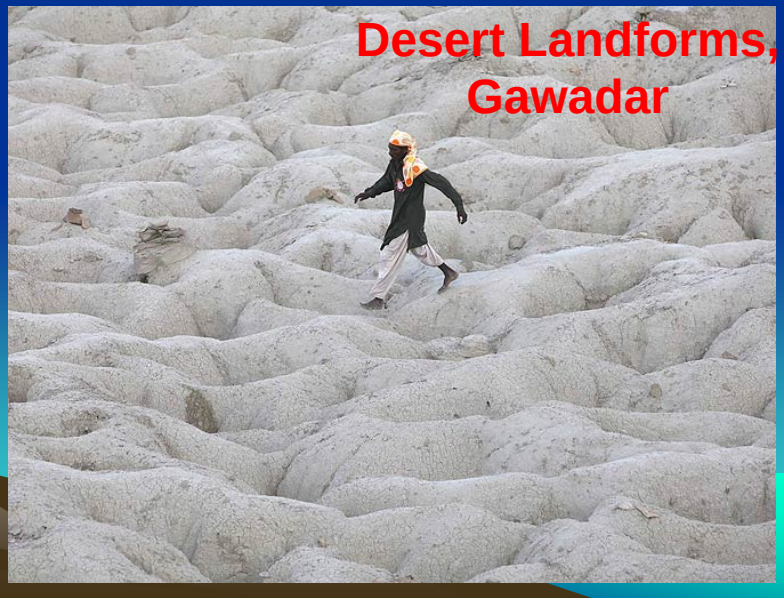
Years

Hina Lake, Quetta Baluchistan

Hina Lake,Winter

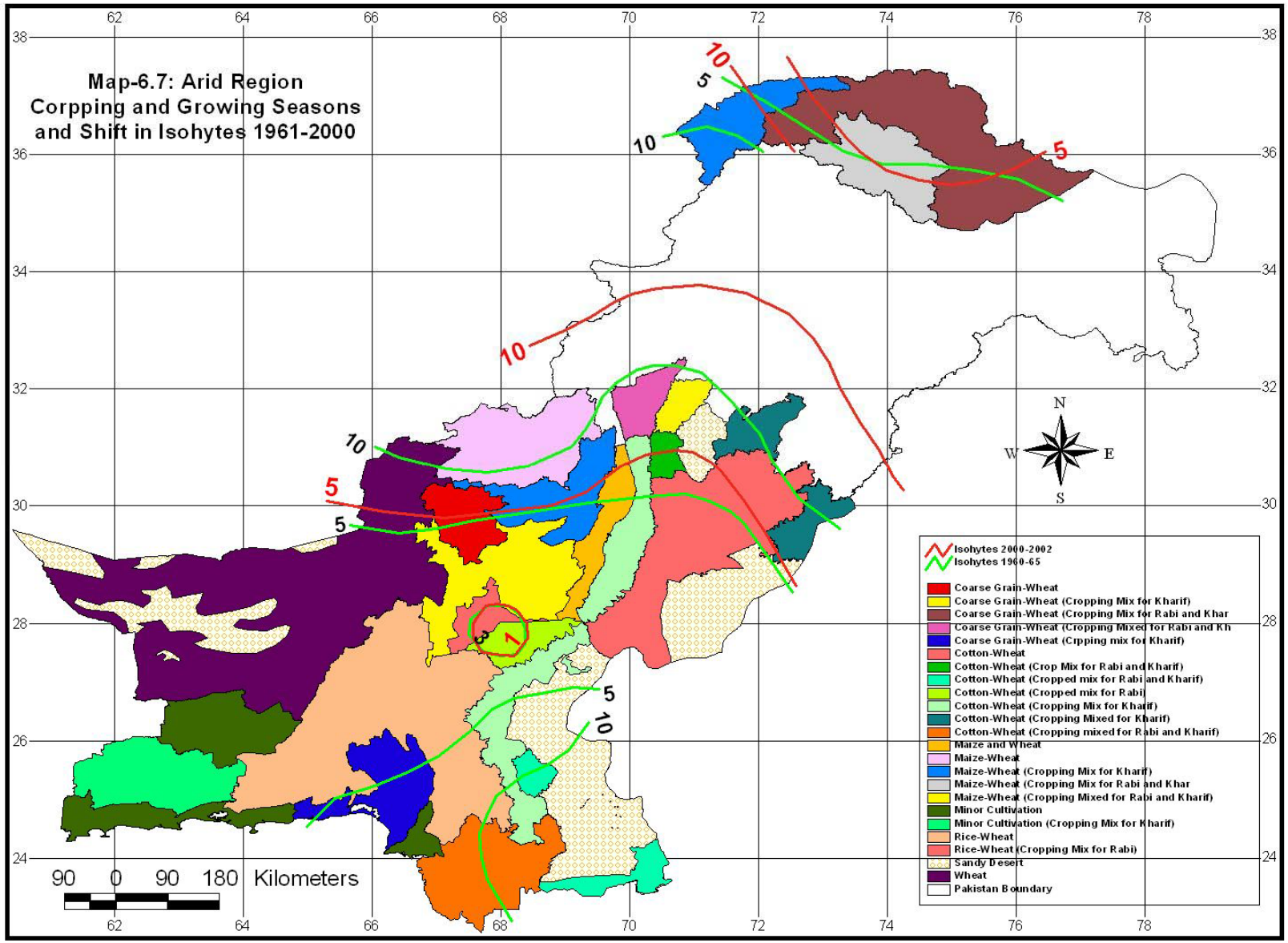
Hina Lake, Spring Season

Hina Lake, Dry Summer



Desert Landforms, Gawadar

Expansion in the Arid Region 1961-2000



Water Sector Adaptation

- Water Conservation
  - Construction of new Water Reservoirs
  - Construction of Seasonal Reservoirs
  - Construction of Small Dams
  - Construction of Inland Dams/lakes:
  - Construction of Inland Ponds
- Construction of River Embankments
- Well planned Drinking Water Supply
- Improvement in the Irrigation system
- Public Awareness Using Mass media
- Policy for Water Management
- Establishment of Research and Development fund
- Planning for water resources
- Foundation of Arid region development Center

Adaptation to Coastal Management

- **To build up coastal management regulations.**
- **Early-warning and response systems regarding erosion, deposition, change in the coastal land forms, floods, cyclones etc.**
- **Designing of mega projects for the purpose to purify the salt and to save the costal region from water logging and salinity**
- **To develop airborne irrigation system for the entire arid areas of *Baluchistan* and *Sind* provinces using ocean water.**
- **To design projects for improvement of the sea beaches for the tourism purposes in *Baluchistan* and *Sind*.**

Adaptation to Agriculture

- Development of agricultural infrastructure
- Crop choice
- Investment in irrigation infrastructure:
- Water saving technologies:
- Basic technology needs
- Crop yield and water management
- Expansion in irrigation system

Adaptation to Forestry

- National level forest policy and laws.
- Comprehensive monitoring system for forests resources and ecosystem
- Protection of existing forest resources and other natural ecosystems.
- Strengthen controls on forest fires, insects and diseases.
- Biodiversity conservation and restoration
- Establish National Center for Forests and Wildlife on Federal and provincial level.
- Implementation of climate change adaptation taxes on industrial sector.
- Educate locals about the impacts of deforestation on the physical environment using mass media and community program.

Early warning system and monitoring

- To counter flood and storms, local governments are required to develop city flood control and water drainage plans.
- To introduce new technologies for the monitoring and early warning system for flood, surface water, earthquakes, cyclones etc.
- To improve the forecasting of weather for agriculture and also to develop new forecasting centers throughout the arid region to control drought and desertification, water flow etc.

Raising Public Awareness

- All level of governmental officials, decision-makers and educational institutions should be exposed to climate change information and work toward raising public awareness.
- Pakistan is required to employ the power of the mass media to disseminate information about climate change through books, newspapers, periodicals, audio and video products, and the Internet. Government is needed to integrate knowledge about climate change into the education curriculum of the arid region.
- To establish an incentive mechanism to encourage public and enterprise participation, increase the transparency of decision-making processes related to climate change issues, promote public supervision, and encourage social groups and NGOs to play active roles in the adaptation of climate change especially in *Baluchistan*.
- To strengthen international cooperation on public awareness related to climate change issues, especially good practices on climate change information dissemination and education.

Improving R&D Facilities

- Establish of *Dry Land Research and Development Funds* on federal and provincial level.
- R&D should be run through experts and highly specialized people.
- Promote scientific research and technological development .
- Establish effective incentive and competition mechanisms and a favorable academic environment for researchers, foster academic leaders and eminent candidates.
- Establishment of arid region climate change science and technology management Center.
- Use of the multilateral funds from foreign governments and international organizations.

Adaptation to Drought and Desertification

- Awareness of the serious deterioration of the natural resources in the areas around the deserts.
- Mobilization and exploitation of water resources in different parts of the arid region.
- Control on the far reaching change in the land use of the arid region.
- Establishment of emergency response plan.
- Storage of rainy water in pools or artificial ponds.
- Plantation of drought resistant crops and vegetation.
- To introduce comprehensive soil management techniques and technologies.
- Matching of soil types with appropriate crops and to educate the locals regarding the crops and soil matching process.
- To grow plantation forests, especially the acacia tree, in the surroundings of the arid region to control desertification.

Conclusion and Recommendations

- To control deforestation, population growth, and over grazing.
- To control atmospheric pollution, addition of chlorofluorocarbons, wars in the entire region, nuclear conflicts, and vehicle emissions.
- To introduce early warning system for floods and drought.
- To prefer construction of new dams and barrages for the storage of flood water.
- To take action for the depletion of underground water.
- To aware the public regarding the impact of climate change using mass media and to include climate change concept in the curriculum at school level.
- To reserve funds for reforestation on mountains and to control deforestation in the entire region.
- To convince people for individual struggle and to preserve the national resources.
- To decrease the multiple cropping on agriculture land in the arid region.
- To introduce modern machinery for the cultivation of crops in the arid region.
- To encourage usage of natural gas or solar energy instead of petroleum, coal, and forests.
- To increase literacy ratio and community based programs for the awareness of people regarding climate change.
- To revise environmental policy and to make sure Implementation of environmental laws on national level.

Thank You