ASIAN WATER CYCLE SYMPOSIUM
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An Overview of Water Resources of Pakistan

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Mandate of PCRWR

- Conduct, organize, coordinate and promote research on all aspects of water resources including irrigation, drainage, reclamation, navigation, drinking water, industrial water, and sewerage management and to set up national research centres wherever necessary
- Design, develop and evaluate water conservation technologies for irrigation, drinking and industrial water
- Conduct and coordinate research on desertification, drought and flood mitigation
- Develop and maintain national water resources database for use by the planning, implementing agencies and public
- Advise the government and submit policy recommendations regarding water quality, development, management, conservation and utilization of water resources
- Commercialize its R&D results from sale of products, patents and services as well as collaboration with other organizations
- Publish scientific papers, reports and periodicals, as well as to arrange seminars, workshops and conferences on water related issues
- Establish liaison with other related national and international research and development organizations, universities and NGOs

Major Water Management Issues

- Low system efficiency (30%)
- Low water productivity
- Unutilized surface water resources (below Kotri: 36 MAF)
- Inadequate storage
- Sedimentation in storage reservoirs (0.2 MAF/Yr)
- Over exploitation of groundwater
- Improper disposal of drainage effluent

Resource Base (Water)

Surface Water:	175 Bm^3
Total Available Storage:	20 Bm^3
Sedimentation in Storage:	0.2 Bm^3
Canal Diversions:	130 Bm^3
Groundwater Availability:	82 Bm^3
Groundwater Withdrawal:	62 Bm^3
Irrigated Area:	18 Mha
Available for Additional Cultivation:	12 Mha

Water Availability and Demands

	Year 2001	Year 2004	Year 2011 (Bm³)
Water Availability at Farm gate:			
Surface water	104	105	119
Groundwater	62	62	62
Total	166	167	181*
Water Requirement:			
Irrigation	166	177**	209**
Other Uses	7	8	11
Total	173	185	220
Shortfall	**5%**	**11%**	**21%**

In 2025 Shortfall up to 50% (PWP, 2000)

* Watercourse improvement (7.39 Bm^3), Raising Mangla (3.82 Bm^3), Kurram Tangi Dam (1.48 Bm^3), Small Dams (0.37 Bm^3), Gomal Zam (1.4 Bm^3), Mirani (0.37 Bm^3)

** Population Growth 2.6 to 1.9, increased food requirements and land reclamation

PER CAPITA WATER AVAILABILITY IN SELECTED COUNTRIES (m3)

Country	1955	1990	2005	2025
China	4,597	2,427	2,000	1,818
Mexico	11,396	4,226	3,300	2,597
Philippines	13,507	5,173	3,800	3,072
Iraq	18,441	6,029	3,800	2,356
USA	14,934	9,913	8,900	7,695
Pakistan	2,490	1,672	1,200	837

Water Cycle Variability Prediction

- Conventional method - weather charts
- Numerical models – up to about 2 weeks
  - Global circulation model
  - Regional model
  - Limited area model
- Seasonal models – 70 to 80% confidence level

Major Floods and Impacts

Year	Property Damaged (Billion Rs.)	Lives Lost (Nos.)	Villages Affected (Nos.)
1950	11.282	2190	10000
1956	7.356	160	11609
1957	6.958	83	4498
1973	118.684	474	9719
1976	80.504	425	18390
1978	51.489	393	9199
1988	25.630	508	1000
1992	69.580	1008	13208
1995	8.698	591	6852
2001	0.450	219	50
Total	380.631	6051	84525

Droughts in Pakistan

Province	Cities	Period	Frequency
Punjab	Lahore	1953-2000	13
	Jhelum	1950-2000	7
	Rawalpindi	1959-2000	7
	Murree	1960-2000	4
NWFP	Peshawar	1950-2000	10
	Balakot	1961-2000	6
Sindh	Nawabshah	1954-2000	20
	Jacobabad	1931-2000	32
	Badin	1931-2000	27
	Chhor	1931-2000	18
Balochistan	Sibbi	1931-2000	20
	Nokundi	1957-2000	17
	Dalbadin	1931-2000	23
	Panjgur	1931-2000	25
	Ormara	1961-2000	12
	Kalat	1931-2000	15

Impact of Recent Drought (1998-2004)

- Affected over 3.3 million people
- Hundreds people died
- 30 million livestock affected
- Over 2 million livestock died
- Water table dropped at 3.5 m per annum
- 200 tubewells, 180 karazes and 75 springs dried up

Effect of Climate Change on Water Cycle

- Rise in temperature – 0.4 to 1°C in 30 years (1961-90)
- Increase in highest annual rainfall at 20 locations - 12.8 to 604.9 mm
- Decrease in lowest annual rainfall at 21 locations – 7.6 to 287.8 mm
- Rise in sea level

Glaciers in Pakistan

- **Total glaciers: 15000**
  - **Contributing to Indus river system: 202**
  - **Advanced across streams: 67**
- **Challenges to glaciers**
  - **Rapid advancement**
  - **Depletion due to global warming**

Promotion of Efficient Use of Water Resources

- Growing rice and cotton on bed and furrows
- Growing rice and wheat with sprinkler irrigation
- Growing corn with rouni irrigation

Thanks

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