

IUCN Seminar

**IMPACT OF CLIMATE CHANGE
ON AGRICULTURE IN PUNJAB**

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Keynote Address *by*
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INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE(*IPCC*)

Climate Change 2007

Synthesis Report(AR-4)

General Conclusion

“Warming of the climate system is unequivocal, as is now evident from observations of *increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level*”

IPCC-AR4

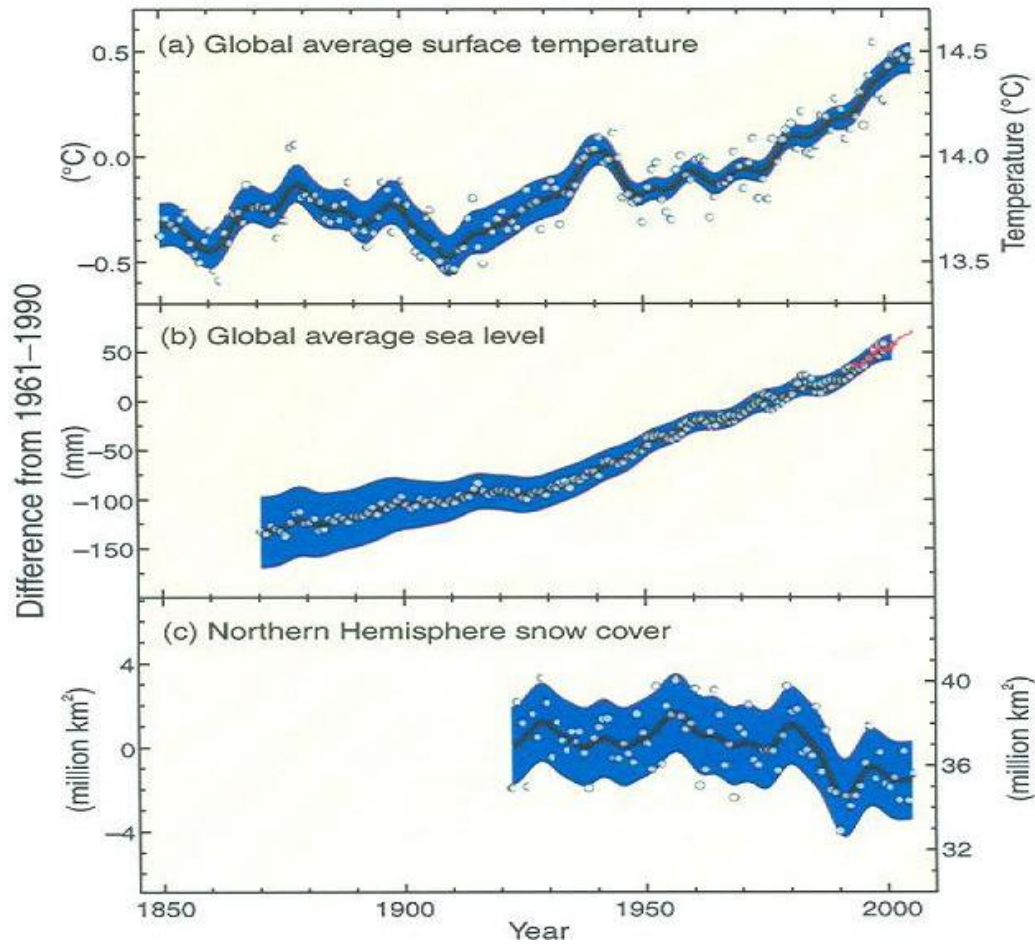
Main Observations

- Eleven of the last twelve years (1995-2006) rank among the twelve warmest years since 1850.
- Temperature increase widespread, greater at higher northern latitudes.
- Land regions have warmed faster than the oceans.
- Global average sea level rise 1.8 [1.3 to 2.3]mm per year (1961 to 2003) and 3.1 [2.4 to 3.8]mm per year(1993 to 2003).
- Arctic sea ice shrunk by 2.7 [2.1 to 3.3]% per decade, with larger decreases in summer of 7.4 [5.0 to 9.8]% per decade.
- Mountain glaciers and snow cover have declined by about 7% in the Northern Hemisphere since 1900.
- Precipitation over the period 1900-2005 tended to decline in the Sahel, Mediteranean, Southern Africa and parts of ***south Asia***

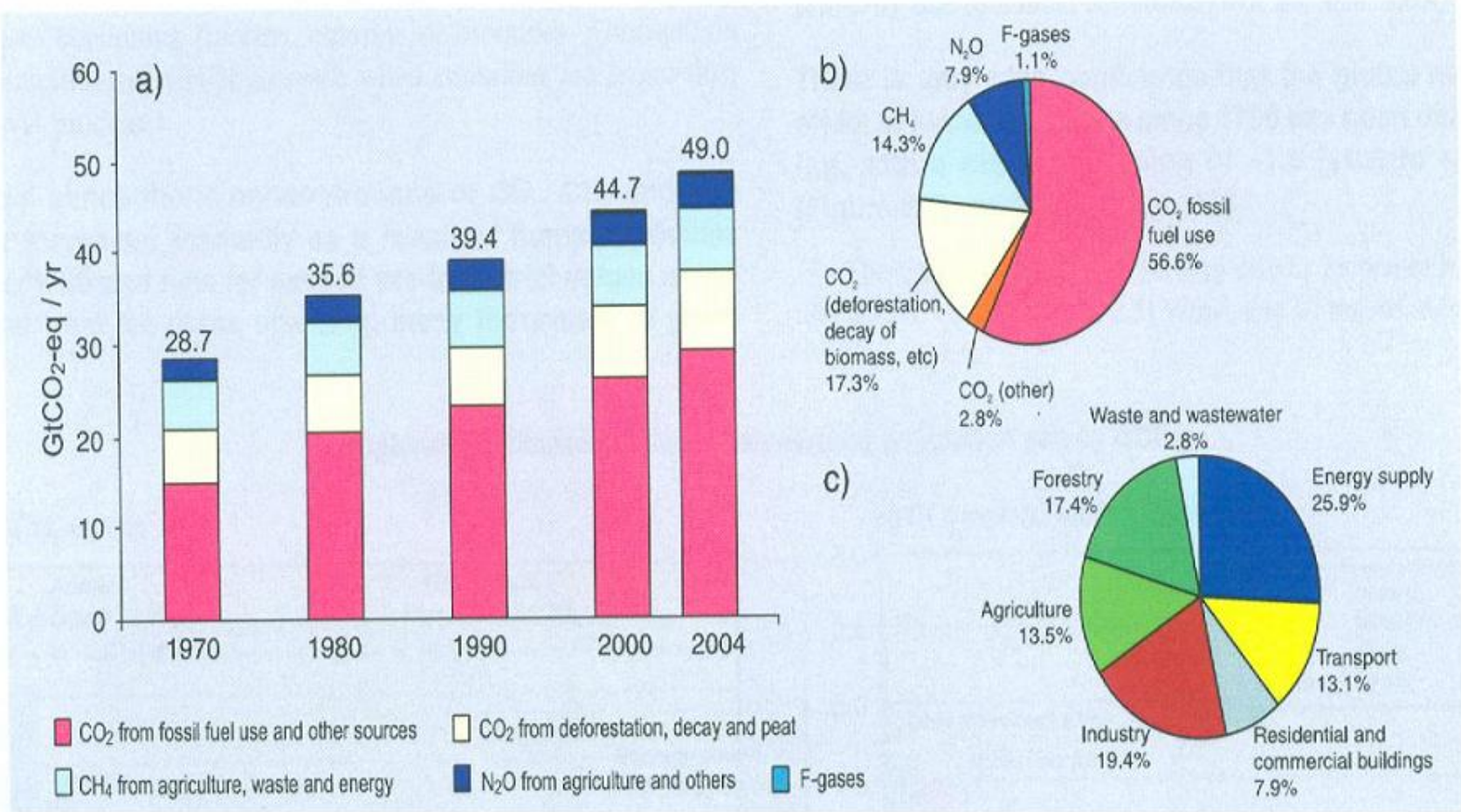
Main Observations -*contd*

- Cold days, cold nights and frosts have become less frequent over most land areas, while hot days and hot nights have become more frequent.
- Heat waves have become more frequent over most land areas.
- Frequency of heavy precipitation events (or proportion of total rainfall from heavy falls) has increased over most areas.
- Incidence of extreme high sea levels has increased at a broad range of sites worldwide since 1975.
- increase in intense tropical cyclone activity in the North Atlantic since about 1970
- Average Northern Hemisphere temperatures during the second half of the 20th century highest in at least the past 1300 years.

Changes in temperature, sea level and Northern Hemisphere snow cover



Global anthropogenic GHG emissions



Impact of CC on Food Systems

- Crop productivity projected to increase slightly at mid- to high latitudes for temperature increases of 1 to 3°C depending on the crop, and then decrease beyond
- At lower latitudes, especially in seasonally dry and tropical regions, crop productivity is projected to decrease for even small local temperature increases (1 to 2°C), which would increase the risk of hunger.

Climate change and water

- Climate change to exacerbate current stresses on water resources from population growth and economic & land-use change including urbanization.
- Widespread mass losses from glaciers and reductions in snow cover to accelerate throughout the 21st century, reducing water availability, hydropower potential, and changing seasonality of flows in regions supplied by melt water from Hindu-Kush, Himalayas, Andes.
- Drought-affected areas projected to increase in extent, with the potential for adverse impacts on multiple sectors, e.g. agriculture, water supply, energy production and health. Regionally, large increases in irrigation water demand due to CC projected.
- Significant increase in heavy rainfall events; mean rainfall to decrease in some regions. Increased flood risk.
- Increases in the frequency and severity of floods and droughts are projected to adversely affect sustainable development.

Overwhelming Importance of Agriculture Sector in Pakistan Economy

(2007)

Kg/ha

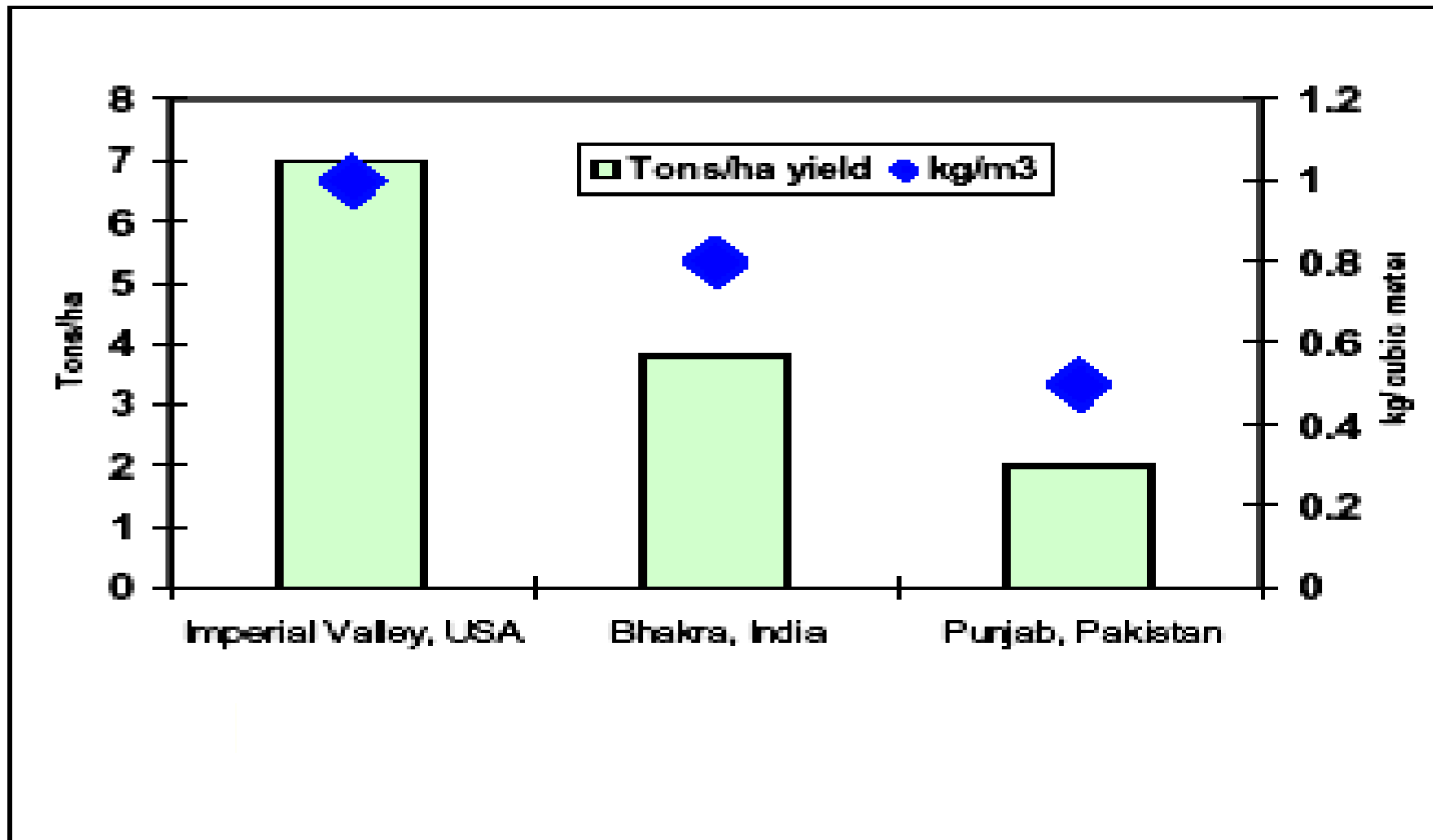
CROP/ COUNTRY	RICE (PADDY)	MAIZE	SUGARCANE	SEED COTTON
Pakistan	3.19	3.24	53.29	1.99
Egypt	9.97	8.11	119.55	2.33
France	5.17	8.85	--	--
Mexico	4.99	2.88	74.53	3.75
India	3.21	2.16	72.56	1.02
China	6.35	5.41	86.25	4.21
USA	8.05	9.48	77.62	2.83
World	4.15	4.97	66.07	2.14

Source: FAO web page :[http:// www.fao.org](http://www.fao.org)

WHEAT YIELD COMPARISON (2005)

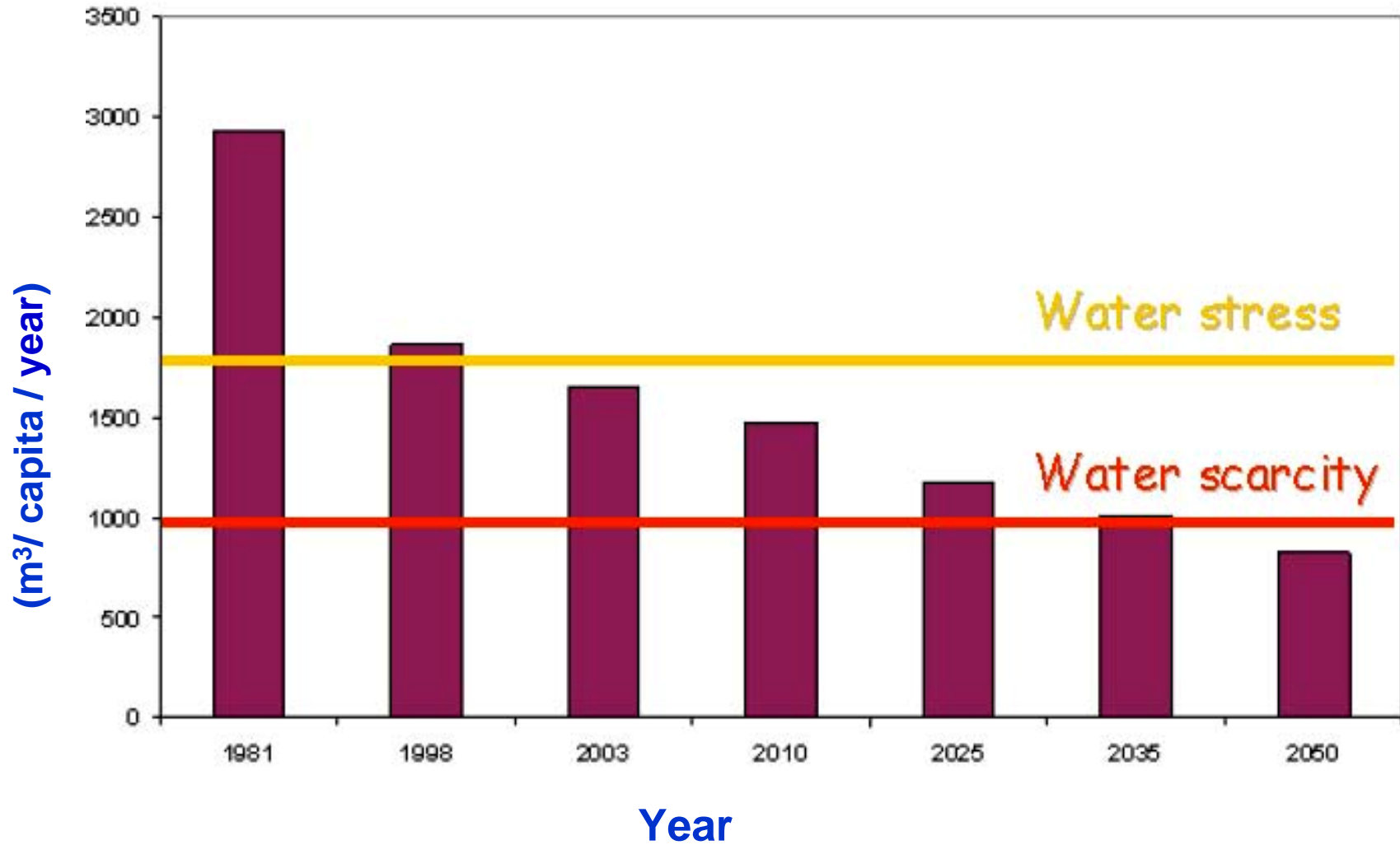
Country	Yield (t/ha)
UK	(7.99)
France	6.98
Egypt	6.45
Mexico	5.00
Punjab (India)	4.21*
Punjab (Pak)	2.72**

WHEAT YIELDS PER UNIT OF LAND AND WATER

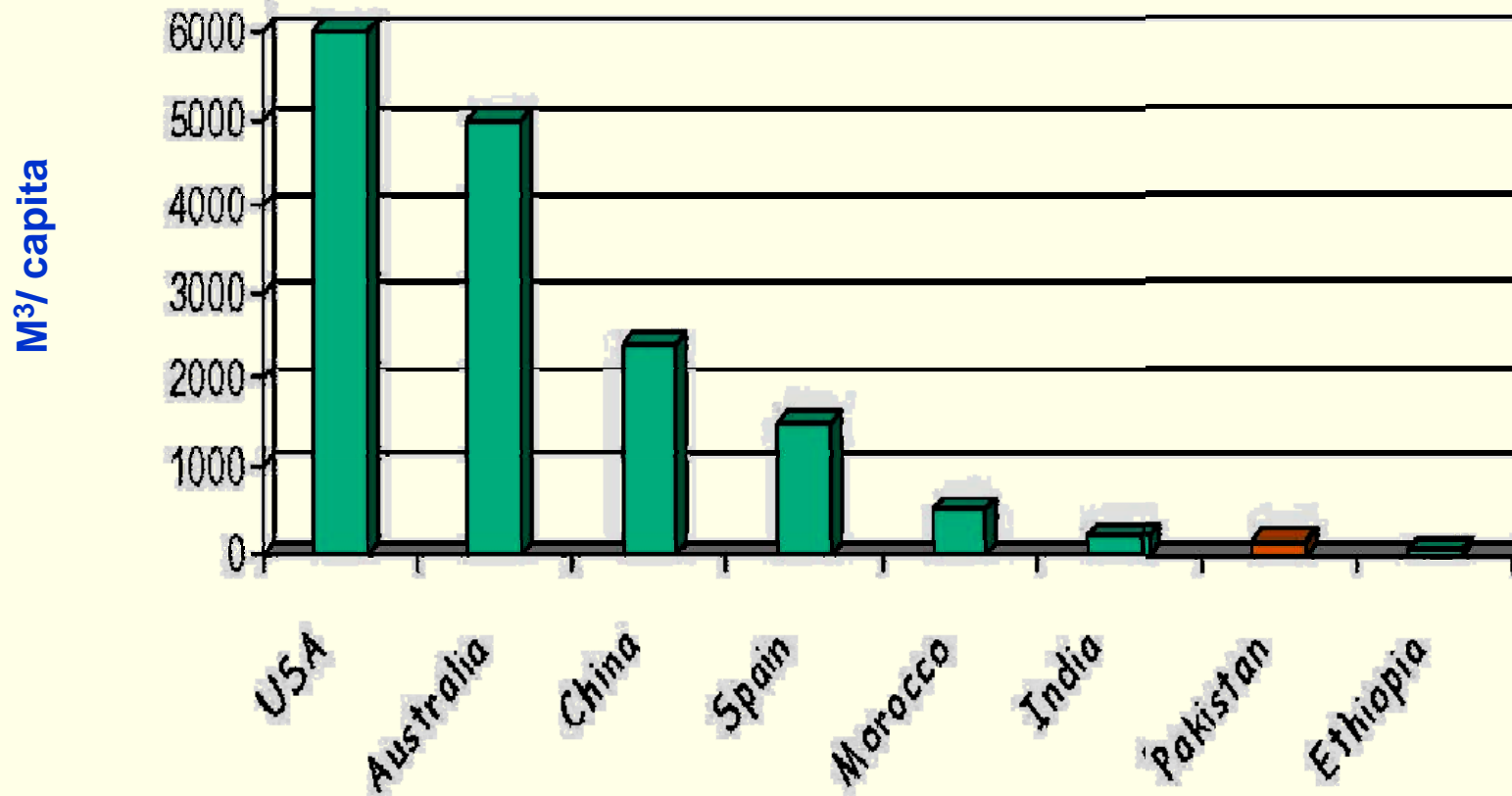


*Source: Pakistan's Water Economy: running dry – report
by THE WORLD BANK*

DECLINING PER CAPITA AVAILABILITY OF WATER IN PAKISTAN



STORAGE IN SEMI-ARID COUNTRIES



*Source: Pakistan's Water Economy: running dry – report
by THE WORLD BANK*

Source: World Bank analysis of ICOLD data

Mitigation and Adaptation Measures

- Establish a climate change unit in Agriculture Department
- Reduce GHG emissions and environmental pollution
- Undertake extensive physical measurement of meteorological parameters [temperature(*24 hr basis*), solar intensity, precipitation and wind velocity
- Determine climate change trends for future and prepare agro-ecological zones based on CC trends, water availability, soil type
- Determine land use capabilities in the identified zones based on biological needs of the commodities and especially marketing opportunities to optimize net income from sustainable land use
- Develop crop varieties and introduce animal breeds adapted to changing climatic conditions
- Develop detailed agronomic practices to suit the selected varieties, environmental conditions, and water availability.

Concluding observations

- Performance of Punjab agriculture a determining factor in economic development and poverty alleviation of the whole country.
- Climate already changing in the region. Need to carefully study the IPCC projections
- Climate change will affect crop zoning and the suitability of different crops for production in various parts of Punjab
- Need to develop land use capability in light of changing climate and economic opportunities
- Large scope for improving productivity in agriculture-bridge yield gap.
- Livestock a major component of agriculture sector-relatively neglected. Need to study impacts of climate change on livestock.

Concluding observations- *continued*

- Irrigated agriculture seriously threatened by climate change and the impending water famine.
- Step up research on water use efficiency- *crop per drop*
- Need immediate action to develop additional storages
- Groundwater precious resource; urgent need to regulate its use to avoid damage to aquifer