

CLIMATE CHANGE AND WATER VULNERABILITY AT THE HOUSEHOLD LEVEL INDIA

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Water, Poverty and Gender

- Water an important natural resource
- Water and Poverty- Two way relationship
- Almost two –third population lacking access to clean water survive on less than \$2 a day
- Access to safe water imperative for sustainable development and poverty alleviation
- **Women and water are very closely associated**
- **All MDG's are related to water, some are linked to water and women**

Millennium Development Goals (MDG's) Women and Water dependent

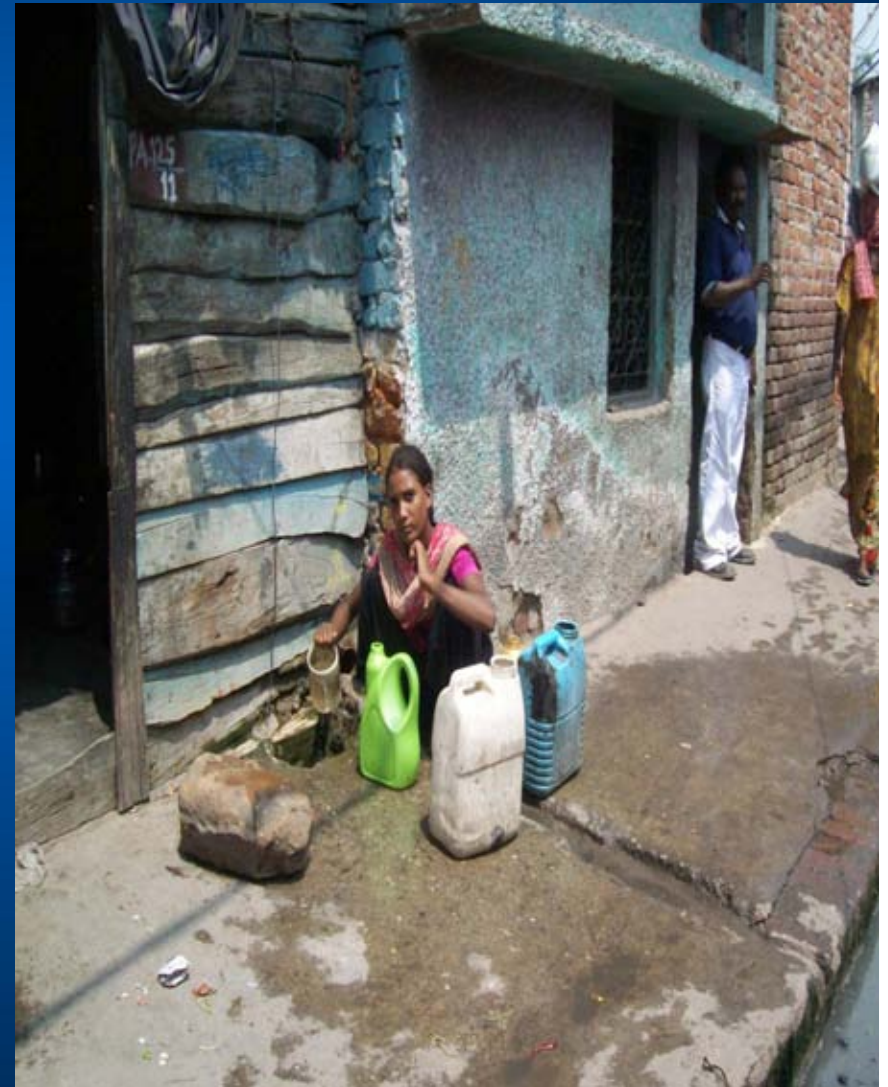
Goals	Contribution of improved drinking water and Sanitation
Achieve Universal primary education	Reduced water carrying burden and improved sanitation in schools improves school attendance of girls
Promote gender equity and empowerment	Improved water services more time for productive activities education and leisure
Reduce child mortality	Improved drinking water and sanitation reduce child morbidity and mortality
Improve maternal health	Basic hygiene practices can be ensured after delivery reducing the risk of maternal mortality.

(Source: WHO)

Water and Women



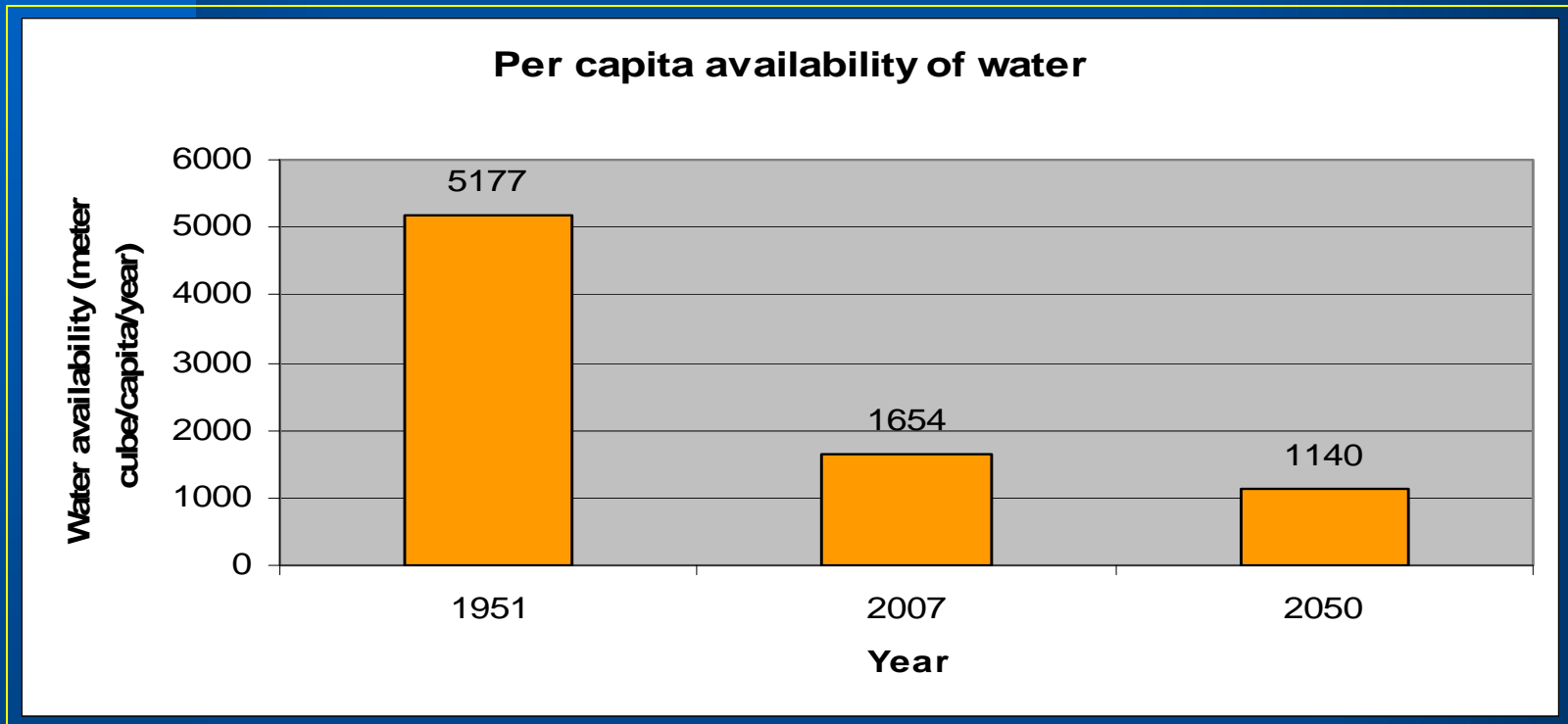
Water collection: A challenge



Climate change and water availability

- Global mean temperatures have risen by 0.74°C in the past century and likely to increase by 1.1 to 6.4°C (**IPCC, 2007**)
- Climate change will account for about 20% increase in global water scarcity. (**WWDR, 2003**)
- Varying impacts at different temperatures and in different regions (**World Development Report, 2010**)
- Globally 1.1-3.2 billion people will suffer from water stress by 2050's
- Of these 0.2 to 1 billion will be from Asia (**IPCC Technical paper VI, 2008**)

Availability of water is likely to decline in future



In India total water consumption is expected to rise by 20-40% in the next 20 years (India Vision, 2020)

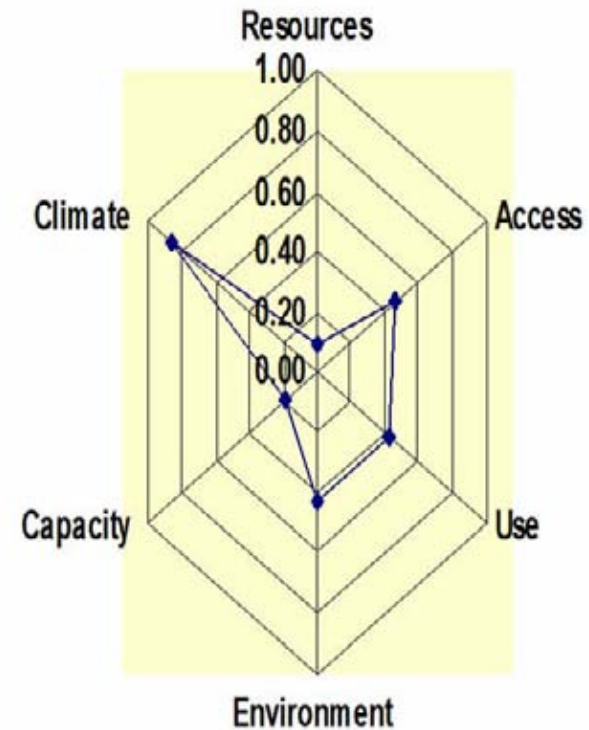
Need for indicators for Household Water Poverty

- HDI/HPI assess overall development but do not capture water related poverty problems.
- An index needed to integrate
 - Physical Resources
 - Capacity of households/ communitiesfor water access, management and utilization.
- Water Poverty Index, (WPI) Climate Vulnerability Index (CVI): holistic water management tools

Climate Vulnerability Index

- **Key components:**
- Water resources availability
- Access to supply
- Use in different sectors
- Capacity to manage
- Environmental integrity
- Geospatial

Components of of Climate Vulnerability Index



Components of Climate Vulnerability Index



Methodology for computing CVI

- The sub components were divided into two categories-: Negative indicators, and positive indicators.
- Normalization method
- Index Value $(X_i) = (X(E_i) - X_i(\min)) / (X_i(\max) - X_i(\min))$ {For positive indicators}
- Index value of a component is the average of all the sub-components

Climate Vulnerability Index at the Household level (CVI-WH)

CVI-WH=

$$\begin{aligned} & (1 - \text{Resource}) + (1 - \text{Capacity}) + \\ & (1 - \text{Access}) + (1 - \text{Environment}) + \\ & (1 - \text{Use}) + (1 - \text{Climate}) / 6 \end{aligned}$$

Data sources of Sub-components of CVI-WH selected to assess vulnerability in 2025

Average Annual Rainfall, Temperature
(A1B Scenario)



**Indian Institute of Tropical Meteorology
(IITM, Pune)**

Per capita:
Length of rivers total replenishable
ground water, ground
water for domestic, industrial and
irrigation



**Computed using the population figures
from Registrar General
of India (2025-26)**

Percent population with access to safe
water, safe toilet facilities, Literacy rate,
per capita consumption expenditure



**Computed from rate of Change
1991-2001**

Life Expectancy at birth



Registrar General of India (2025-26)

CVI-WH values for time slices 2000 and 2025

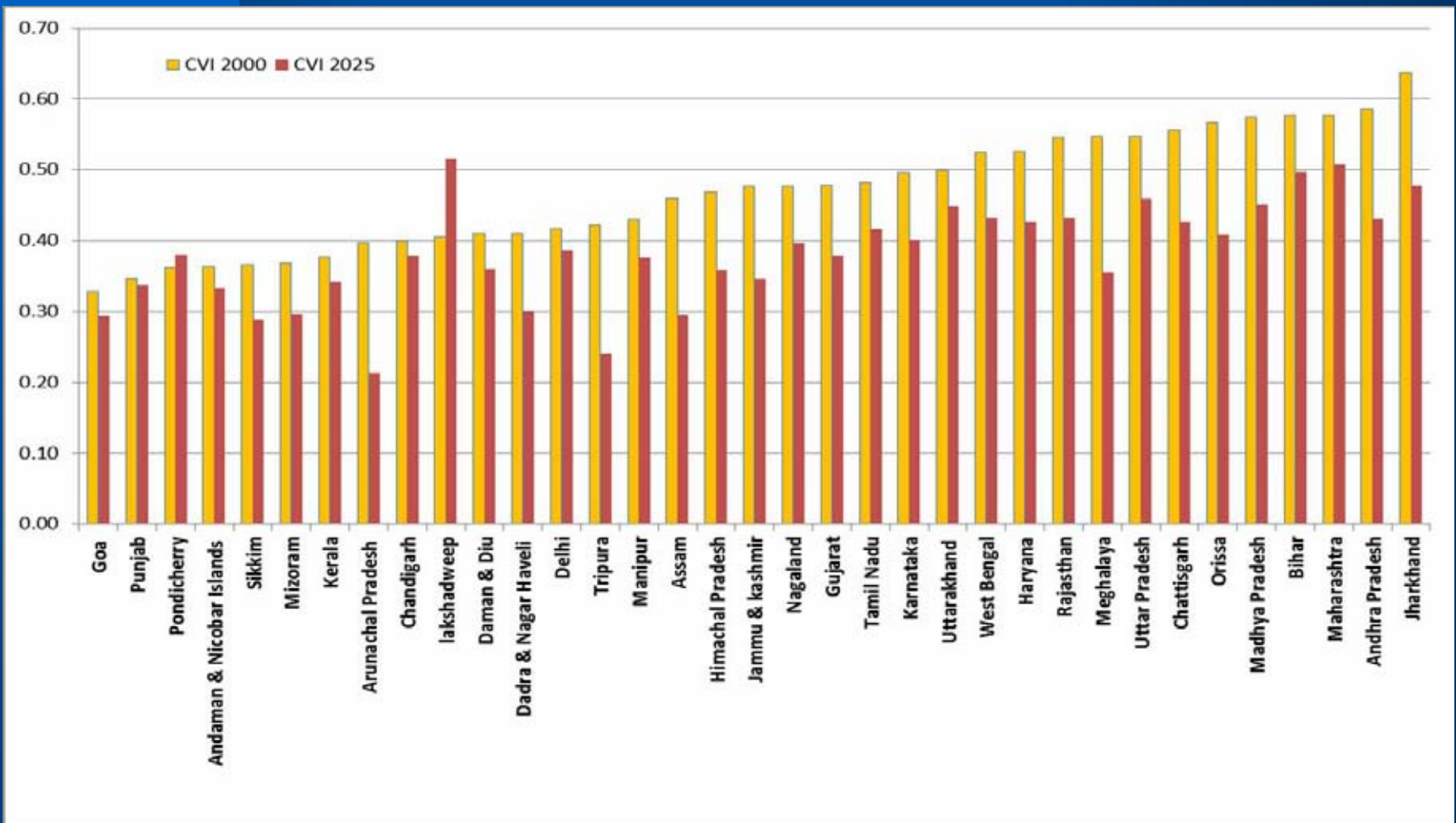
CVI-WH 2000

Ranges from as low as 0.33 to as high as 0.64

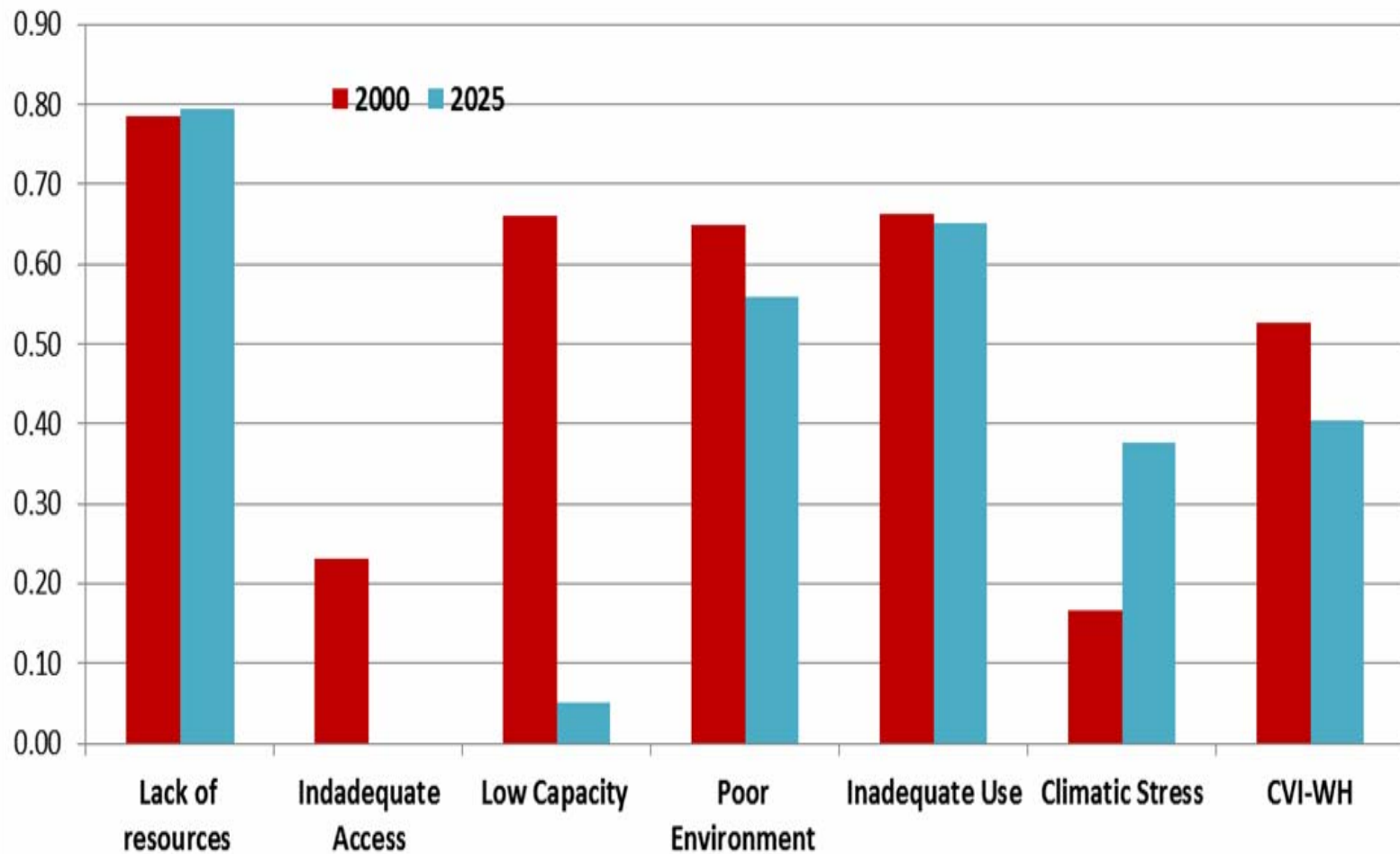
CVI-WH 2025

Ranges from as low as 0.24 to as high as 0.52

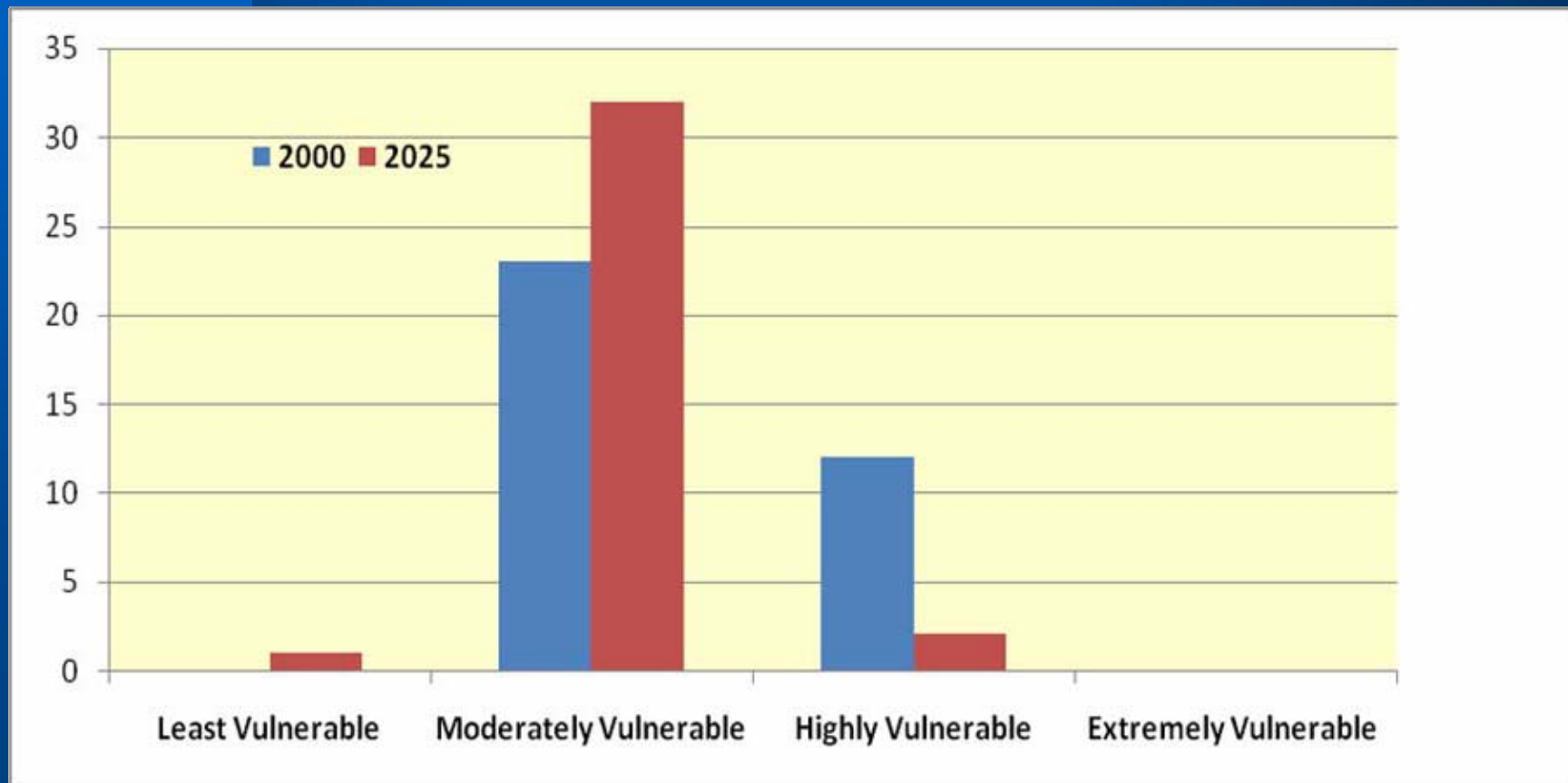
Comparison of CVI-WH values in different States & UT's in India in 2000 and 2025 (A1B Scenario)



Comparison of components of climatic vulnerability of India for water at the Household Level in 2000 and 2025 (A1B scenario)



Comparison of Level of Vulnerability of Indian States & UT's for time slices 2000 and 2025



Conclusion

- WPI and CVI are useful tools to monitor water management at regional level and to trigger targeted action
- Overall vulnerability will decrease in future
- However, there will be substantial increase in vulnerability to climatic stress
- Majority of states will still be moderately vulnerable to climatic and water related stresses despite developmental efforts in different sectors