Water and Climate Change

A WORLD BANK PERSPECTIVE

Workshop on Nonstationarity, Hydrologic Frequency Analysis, and Water Management
15 January 2010
Motivation

- Sufficient evidence that cc is real
- A priority for the Bank (DCCSF) and the sector
- Climate change is more than an unprecedented environmental challenge. It is a massive development, economic and social challenge
- Water sector is among most affected
- Implications for Bank clients and investments can be serious
- Guidance is needed for incorporating increased hydrologic variability and change in investments
Water sector ... consistent with Development and CC Strategic Framework

• Accelerate and broaden current investments in water resources management and development

• Focus on adaptation ... and mitigation where relevant
  • Example: renewable resources -- Hydropower

• Develop a menu of adaptation options for water systems
  • Policies, Institutions
  • Technology
  • Infrastructure
  • Risk: Instruments for spreading and sharing

• Enable better decision-making under risk and uncertainty
  • Water services delivery and resource management
  • Assessing impacts, vulnerability, and adaptation options
Questions to address

• What are the impacts of climate variability and change on water systems?
  – Delivery of services
  – Management of the resource

• What are potential adaptation options to reduce vulnerability of water systems to these impacts?

• How can the Bank assist client countries in making informed decisions regarding adaptation options in their water investments?
GCMs and WB

- No Standard
- From Downscaling to 9 grid filtering
- There tends to be consistency within Regions
- Some Water Anchor and Africa have been looking at the
- Extreme scenarios of Wet and Dry as defined by Climate Moisture Index
- Some use Multi-model mean
CMI Historic and Range of 2050 Climate Change Impacts

- Globe
- WB Regions
- Non WB

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## GLOBE v. REGIONS

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Exposure to % change in runoff .... only by region
What we have learned so far ...

- Climate change is only one of many factors. Future pattern of water availability/use will depend significantly on non-climate factors.

- GCMs can project general trends (T, P, extreme events) with some degree of confidence. Downscaling to high enough resolution for use in project preparation (analysis and design) can be done with relatively little confidence.

- Translating trends into runoff is not a straight-forward exercise, as many claim.

- Consequently, there is significant uncertainty in changes in the hydrologic drivers.
  - The past cannot be used as the only guide for the future. Hydrologic non-stationarity
What we have learned so far ...

• We know much less than we should, but must make investment and financing decisions none-the-less.
• Waiting until science advances far enough is not an option.
• Pushing models beyond their intended limits is dangerous and can lead to actions that are “precisely wrong”.
• Uncertainty is a given in the sector. We just have to deal with it better.
• The decision process in dealing with risk and uncertainty is essentially the same with and without climate change.
• Bottom-up and Top-Down approaches are complimentary.
  – Top down approach (projections to vulnerability to adaptation) is not in all cases useful for decision making in operations.
  – Bottom up approach (vulnerabilities of water systems: reliability, resilience, robustness) is far more useful in most cases.