



**Asian Water Cycle Initiative**  
9<sup>th</sup> International Coordination Group Meeting  
Tokyo, 29-30 September, 2012

# **ADB's Approach to Water and Climate Change Adaptation**



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**Charles Rodgers**  
Asian Development Bank



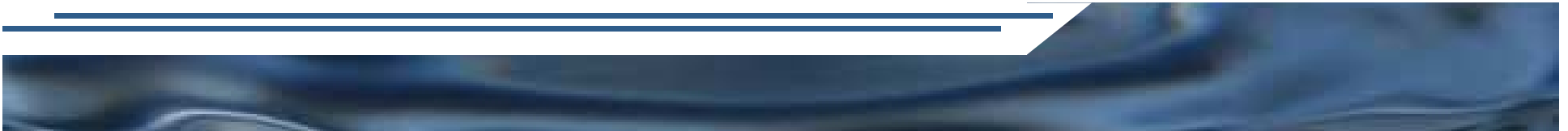
# Outline of Presentation

- 1. Overview of Climate Change and Water-Related Impacts in Asia**
- 2. ADB's Response to Water and Climate Change Risks**
- 3. Examples Water and Climate Change Adaptation Projects**
- 4. Water Security and Sustainable Asia**

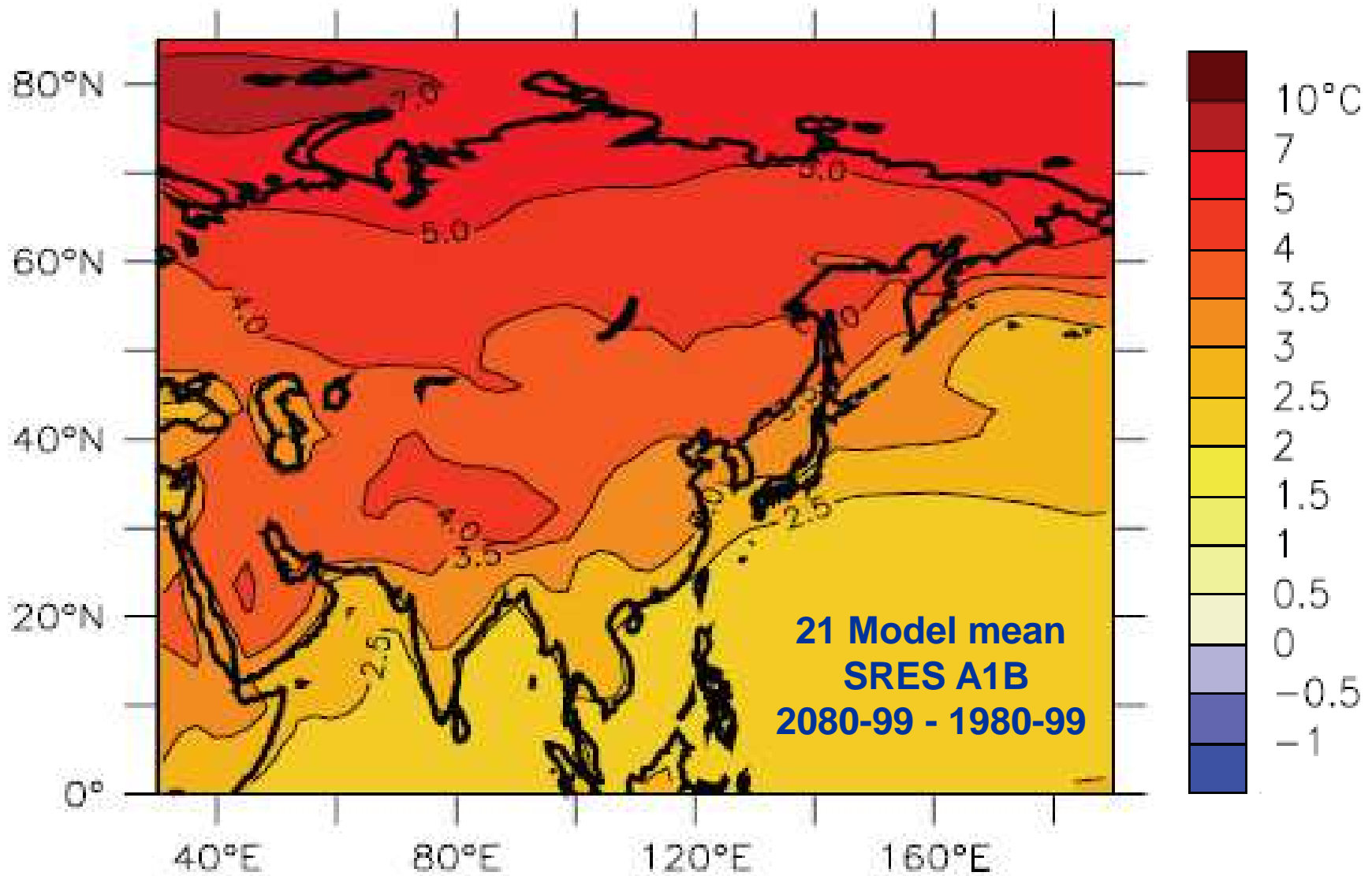




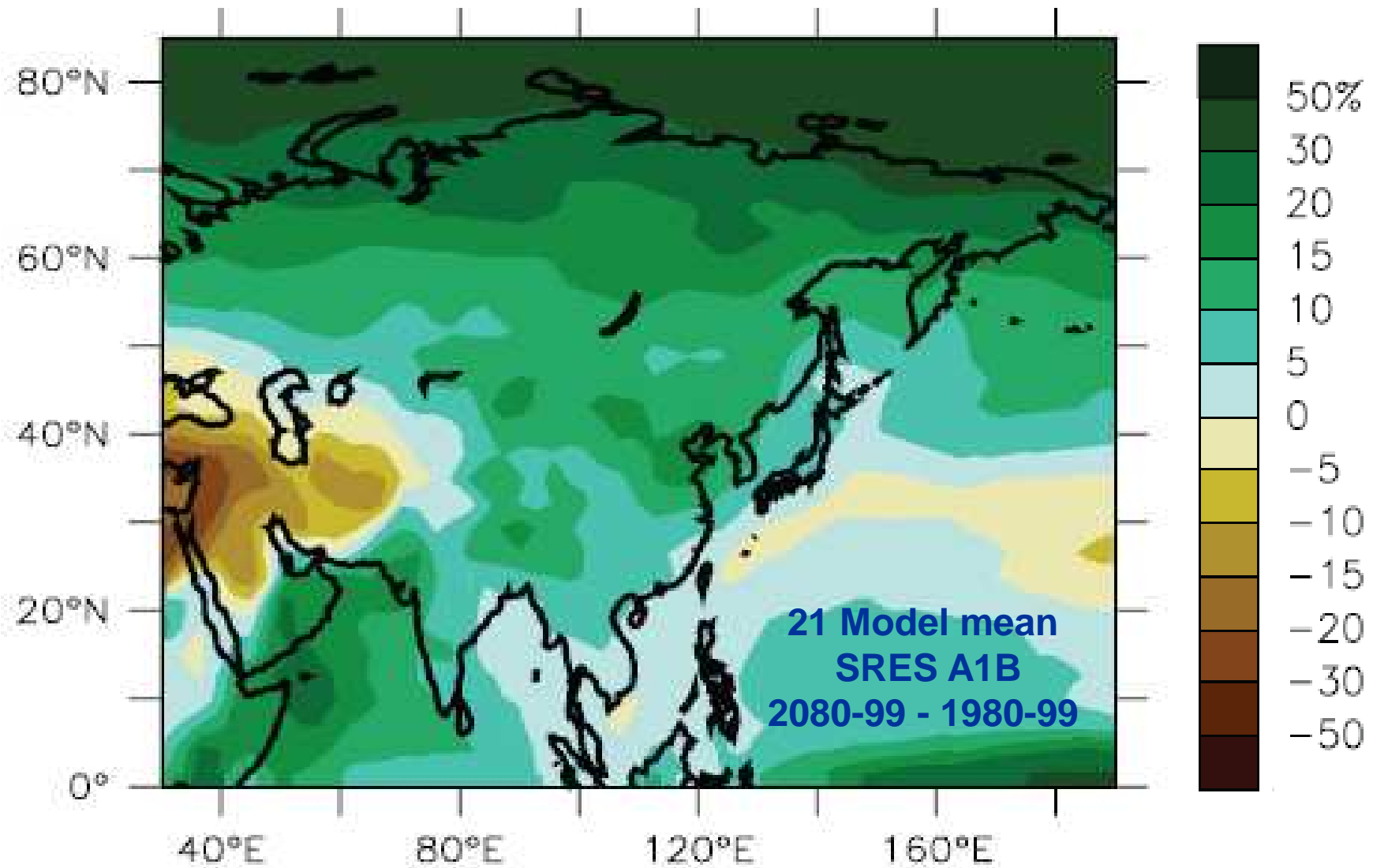
# **1. Overview: climate change and water impacts in Asia**



# Getting Warmer! Annual Temperature Response (°C)



# Getting Wetter? Annual Precipitation Response (%)



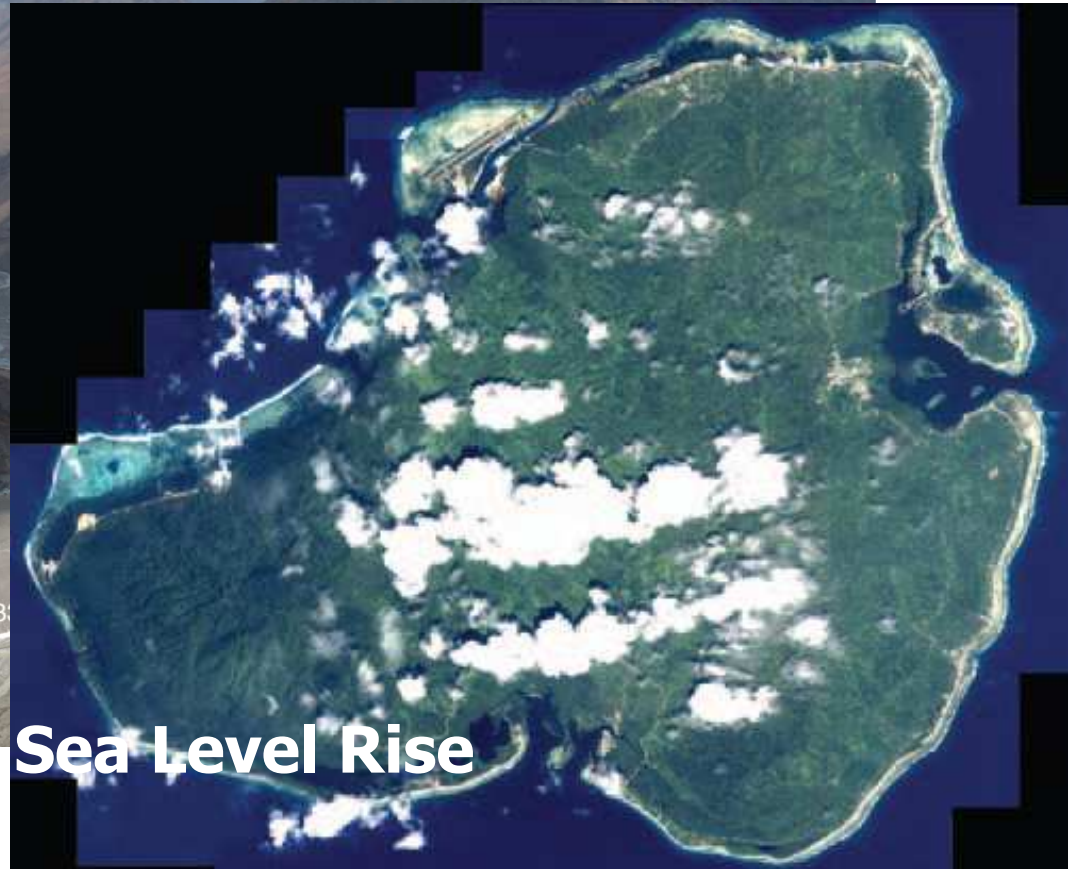
# Hydrologic Intensification:

Flooding

Drought



Glacial retreat



Sea Level Rise

Temperature-driven changes:

Shrinking of Fedchenko Glacier in the Pamirs of Tajikistan. (June 2007). In *UNEP/GRID-Arendal Maps and Graphics Library*. <http://maps.grida.no/go/graphics/shrinking-of-the-fedchenko-glacier-in-the-pamirs-of-tajikistan>.

## Climate Disasters: Flood, Drought

**For the 30-year period 1975-2005, Asia witnessed**

- 37% of the world's recorded natural disasters
- 57% of deaths
- 89% of populations affected
- 44% of property and infrastructural damage

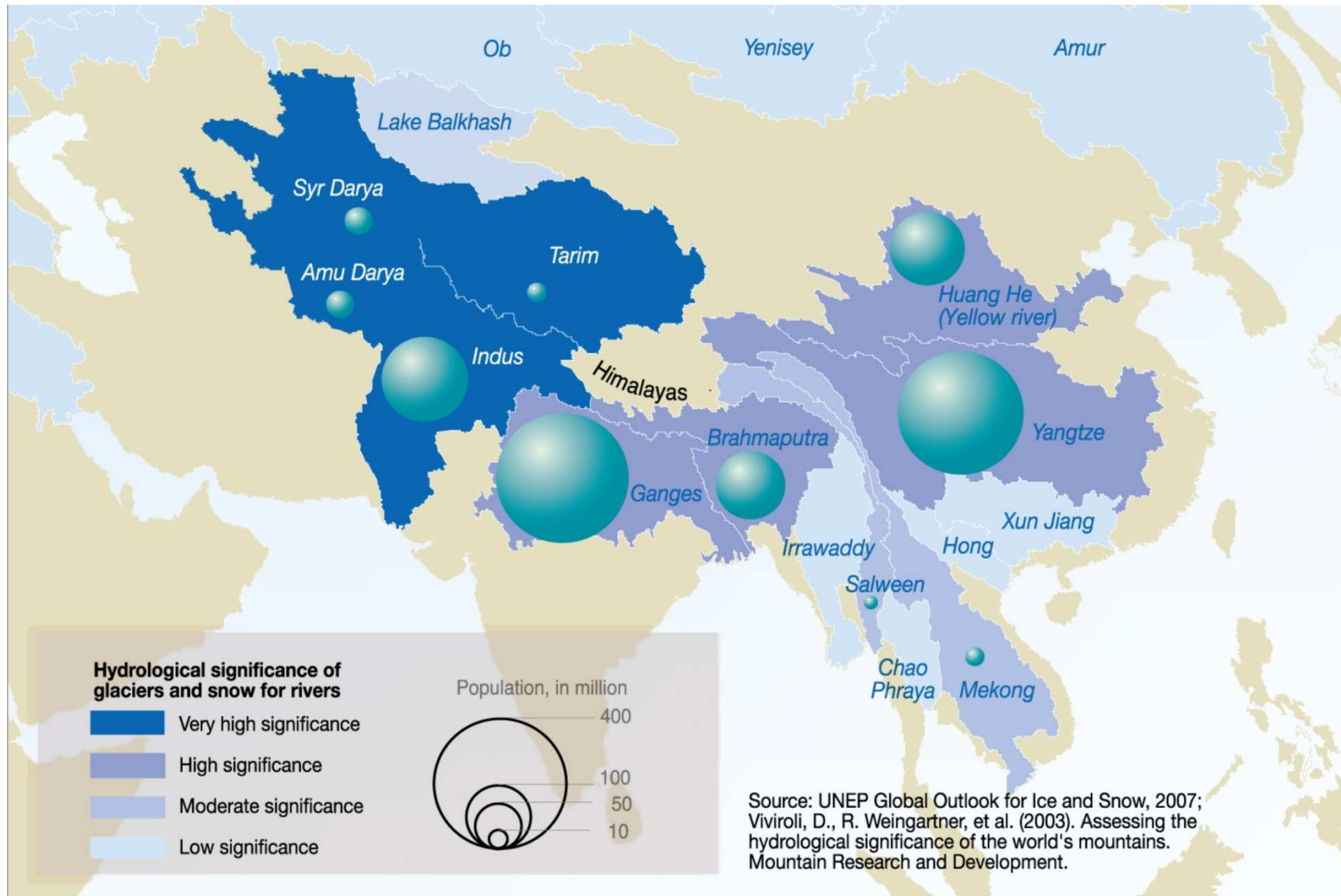
Two-thirds of the number of natural disasters in the Asia-Pacific region are weather-related

### **Other impacts of increased variability:**

- One billion at increased risk of water insecurity
- Increased incidence of waterborne disease

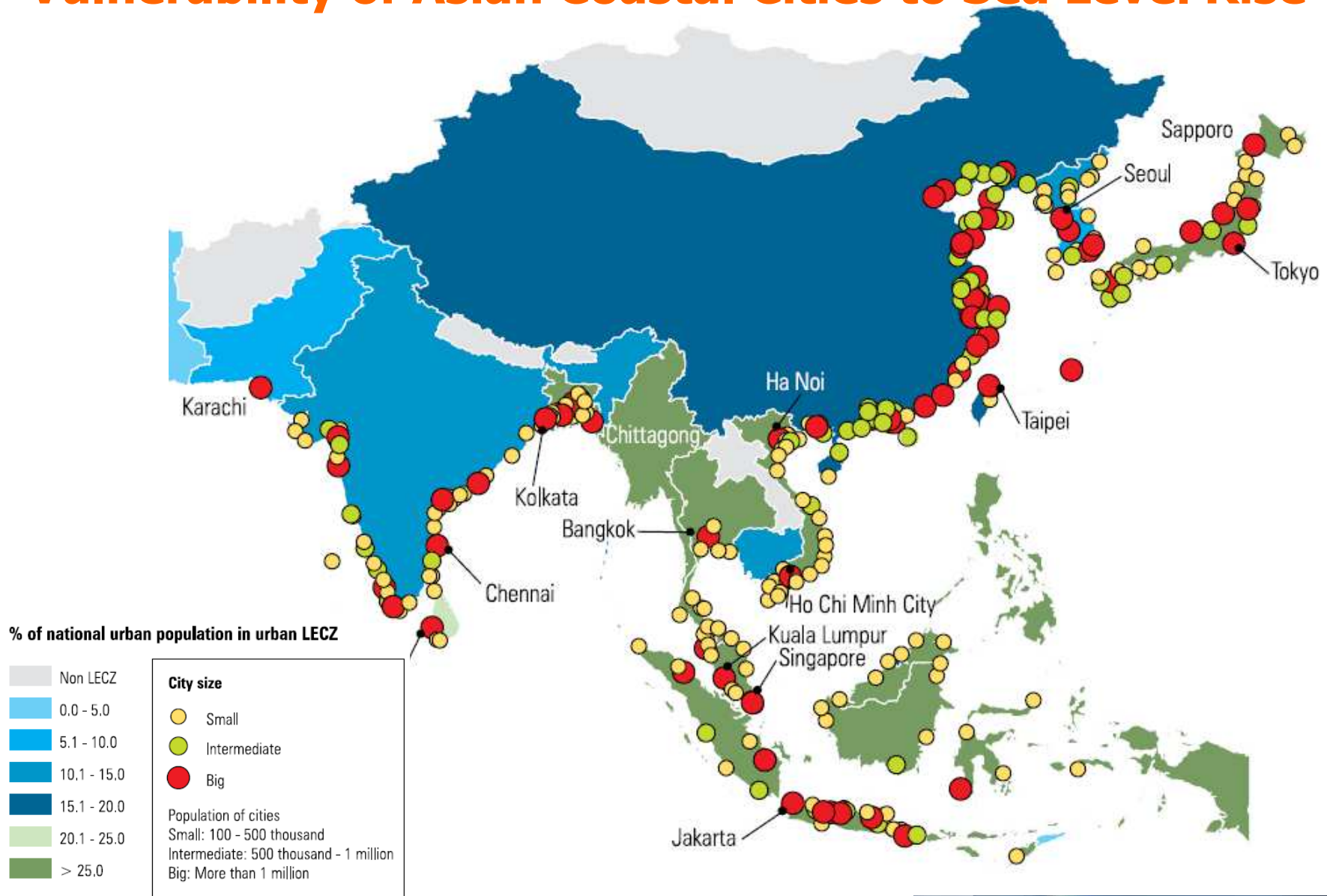


# Vulnerability of Asian River Basins to Glacial Retreat





# Vulnerability of Asian Coastal Cities to Sea Level Rise





## **2. ADB's response to Water and Climate Change Risks**



# ADB – Who We Are

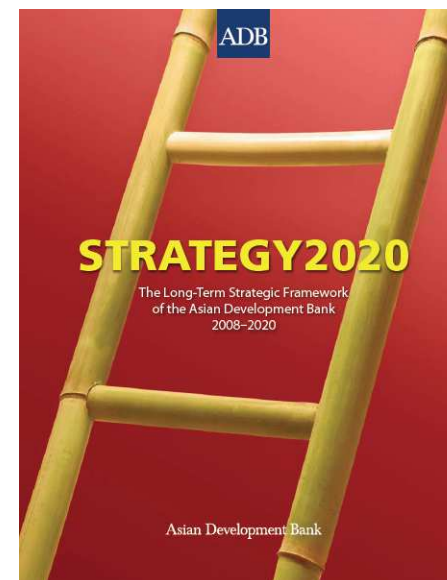
## Asian Development Bank

- Multilateral development finance institution established in 1966
- Poverty reduction is core mandate
- Provides finance (loans) and technical assistance (grants)
- 67 members – 48 of which are from Asia and Pacific region
- Financing, Co-Financing and TA: US\$ 17.5 billion in 2010



## ADB's *Strategy 2020*: Core Operations Areas

- Infrastructure
- Environment (Climate Change)
- Regional cooperation and integration
- Financial sector development
- Education



# ADB's Modalities to Address Water Security and Climate Change

## ✓ **Convening Power and Regional Dialogue:**

Asian Water Development Outlook 2012, Asia-Pacific Water Forum and Summits – Steering Group on Water and Climate Change, Greater Mekong Subregion Initiative, Regional Water Knowledge Hubs, Network of Asian River Basin Organizations (NARBO), special conferences, etc.

## ✓ **Grant Technical Assistance – Regional and Country Focused:**

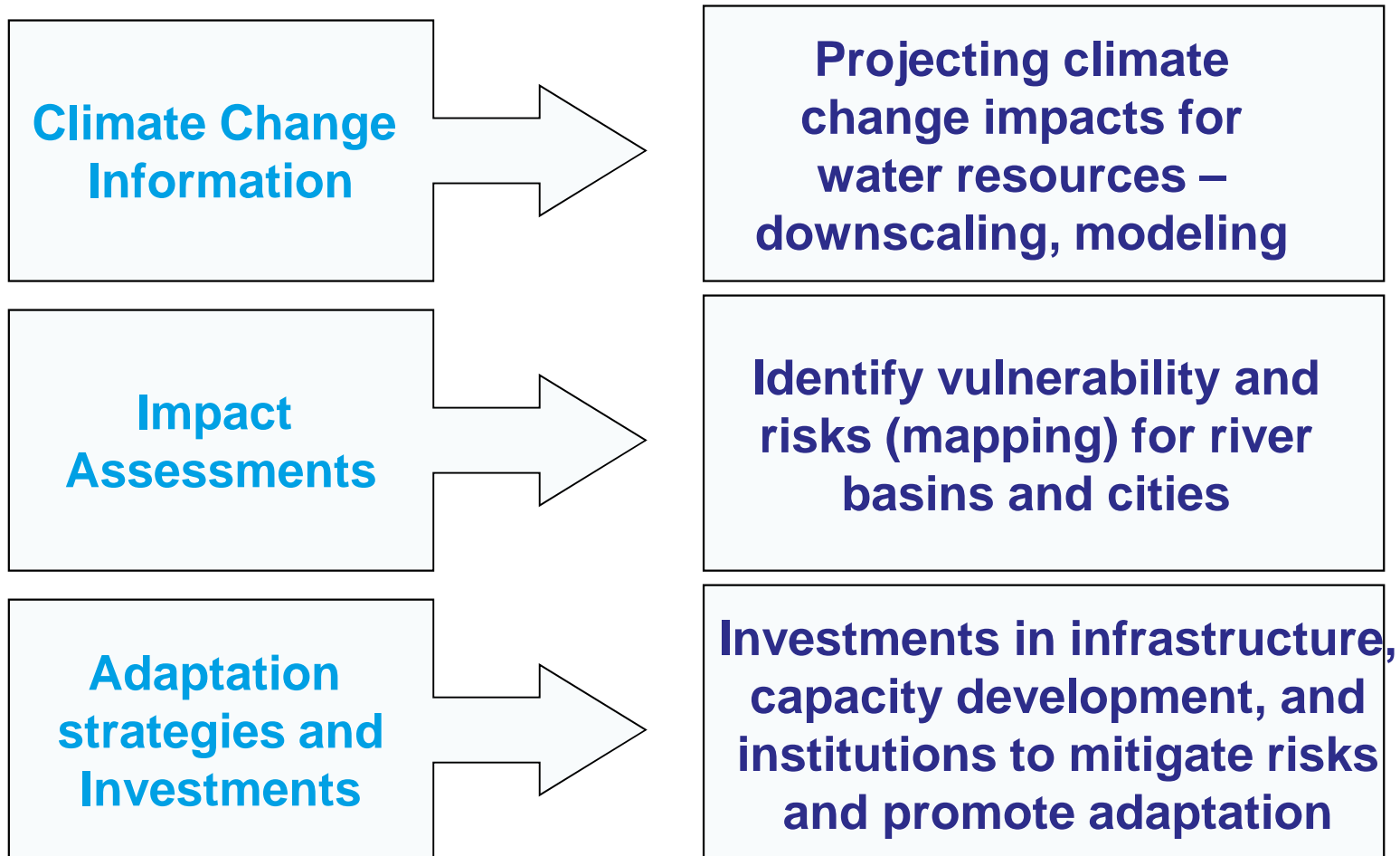
For capacity and institutional development, policy and advisory services, technical and analytical work, and project and program preparation, or blend of the above

## ✓ **Financing – Loans and Grants – Infrastructure Focused:**

Project lending for water projects, Program loans for policy reform, Climate Change Trust Fund, Clean Technology Fund, GEF, leverage bilateral grant financing, and new climate funds (*more on this in 1 October session*)



# Approach to Water Insecurity and Climate Change – 3 Is



## Project Cycle

Identification:

PPTA Fact Finding

PPTA Inception

Design:

PPTA Midterm Evaluation

PPTA Final

Appraisal (final design):

Project Implementation

## Key Activities

- Project Identification
- Establish Project Team
- Fact-Finding Missions
- Interdepartmental Review
- PPTA Approval
- PPTA Inception Mission
- In-Depth Project Analysis
- Mid-Term Workshop
- Detailed Project Costing, Design, Evaluation
- Final Tripartite Workshop
- Fact-Finding
- Management Review Mtg
- Appraisal Mission
- Staff review Committee
- Interdepartmental Review
- Loan Negotiations
- Board Consideration

## Documents

Project Concept Paper/PPTA Paper

Draft Project Design Report

Draft Final Report  
Draft RPP

RRP, PAM

## Adaptation Assessment

Preliminary Risk Screening

Adaptation Assessment Scoping

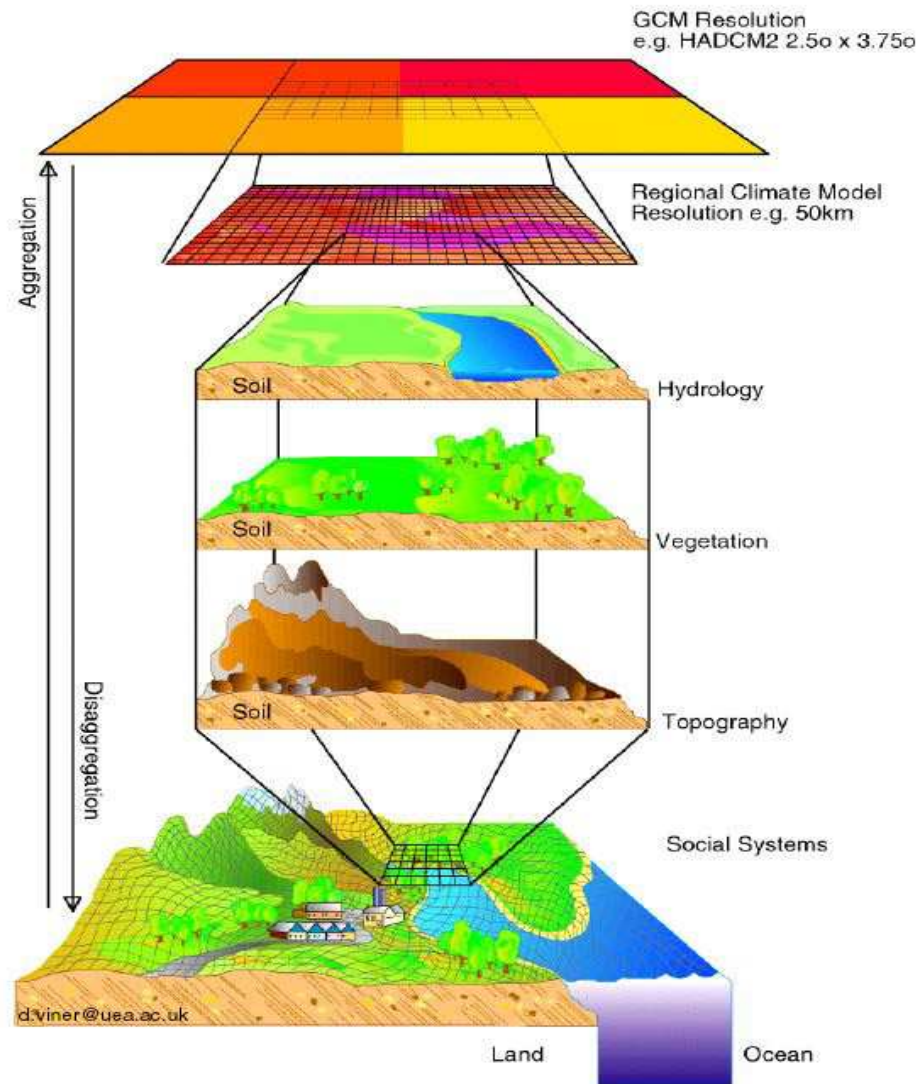
Impact, Vulnerability Assessments

Adaptation Assessment, Strategy Development

Implementation Arrangements

Monitoring & Evaluation Arrangements

# Impact assessment: top-down and bottom-up



“top-down”  
projections:

- SRES scenarios
- GCM selection
- Downscaling

“bottom-up”:

- basin characteristics
- vulnerabilities
- drivers of change
- demand side
- governance
- IWRM framework

# A Conceptual Framework for Uncertainty, Adaptation and Resilience

	Increasing Uncertainty >		
<b>Degree of Uncertainty</b>	<b>Projection:</b> High confidence in direction; reasonable bounds on magnitude	<b>Bounded Risk:</b> Changes in direction and magnitude uncertain; but within reasonable bounds	<b>System Change/Surprise:</b> Large uncertainties in magnitude, triggers, timing, impacts
<b>Examples</b>	<ul style="list-style-type: none"> <li>• Changes in temperature</li> <li>• Glacial retreat</li> <li>• Sea Level Rise</li> </ul>	<ul style="list-style-type: none"> <li>• Changes in precipitation</li> <li>• Changes in extremes</li> <li>• Changes in groundwater recharge</li> </ul>	<ul style="list-style-type: none"> <li>• State change in monsoon circulation, El Nino</li> <li>• Collapse of WA Ice Sheet (catastrophic SLR)</li> </ul>
<b>Analytic Approach</b>	<ul style="list-style-type: none"> <li>• Impact Assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Vulnerability Assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Contingency Planning</li> </ul>
<b>Adaptation Responses</b>	<ul style="list-style-type: none"> <li>• Climate-proofing</li> <li>• New infrastructure</li> <li>• Build resilience</li> </ul>	<ul style="list-style-type: none"> <li>• Build Resilience</li> <li>• Risk Management</li> <li>• No regret/Low regret</li> <li>• Adaptive (incremental) design/management</li> </ul>	<ul style="list-style-type: none"> <li>• Institutional (re)design</li> <li>• Research</li> <li>• Build resilience</li> </ul>



# Building Resilience into ADB Operations

Strategy 2020: ADB Development Policy, Objectives

Focused Action: ADB Climate Change Strategy

*Building a Climate Resilient Asia and the Pacific*

**Knowledge Inputs:**

- Climate Science
- Best Practices
- Lessons Learned
- ....

**Financing Opportunities:**

- ADB
- External (GEF, CIF, GCF, ...)
- Co-financing
- Private sector

**Regional Public Goods**

- Climate services
- Risk spreading
- Regional Security Frameworks (food, water, migration)

**Country-Led:**

- Mainstreaming: CPS, PRS, NAPA, ...
- Investment Roadmaps
- Sectoral Resilience
- Project Climate Proofing

**Social Dimensions:**

- Health
- Education
- Gender
- Governance

**Supporting Services:**

- Access to funds
- Technical guidance
- Economic analysis
- Tools and methods
- Capacity develop.

# Why Resilience?

- **Societal resilience is the goal**
- **Adaptation and Development are the means**
- **Future climate conditions are *uncertain***
- **Increased resilience will reduce vulnerability over a wide range of potential conditions (including current climate variability; natural disasters)**
- **A focus on resilience aligns ADB's climate change adaptation agenda with our development agenda to address our core mandate: poverty reduction**

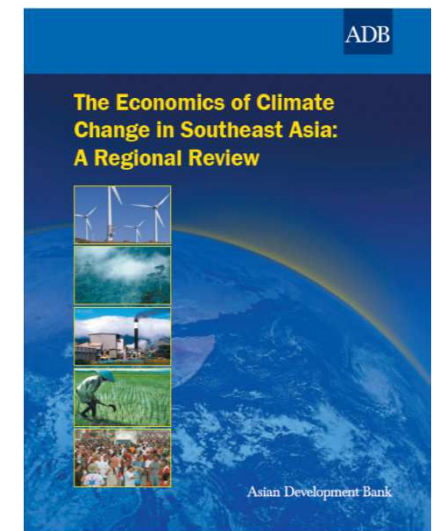
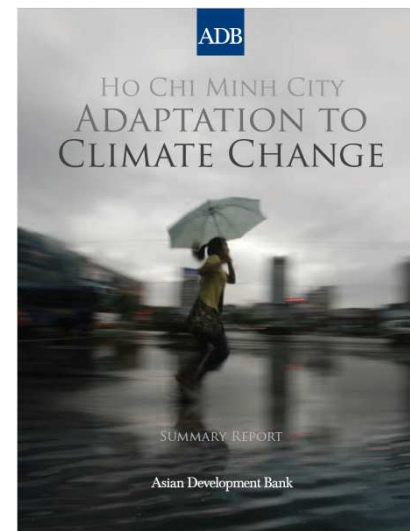
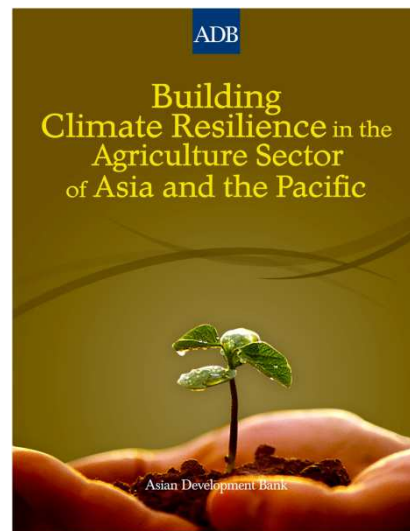
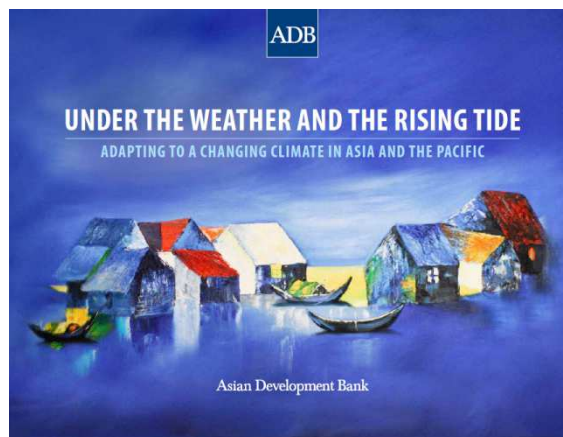
# Climate Resilience - Examples

- **Climate-proofing infrastructure**
- **Integrated water resources management**  
*in river basins*
- **Social dimensions**



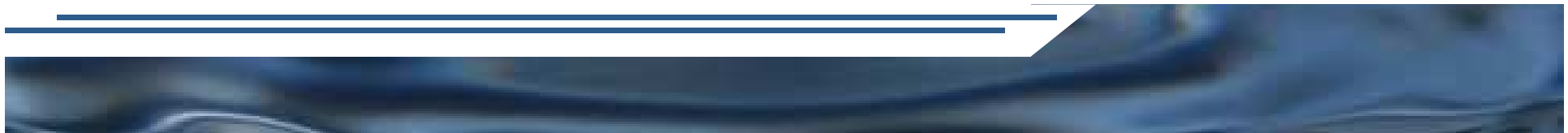
# Sharing Knowledge

- Adaptation Toolkit
- Regional Knowledge Products (agriculture, health, migration)
- Economic Analysis at Regional-to-Project-scale
- Established the Asia Pacific Adaptation Network with partners
- Proposed Establishment of regional climate projection library





### **3. Examples of Water and Climate Change Adaptation Projects**



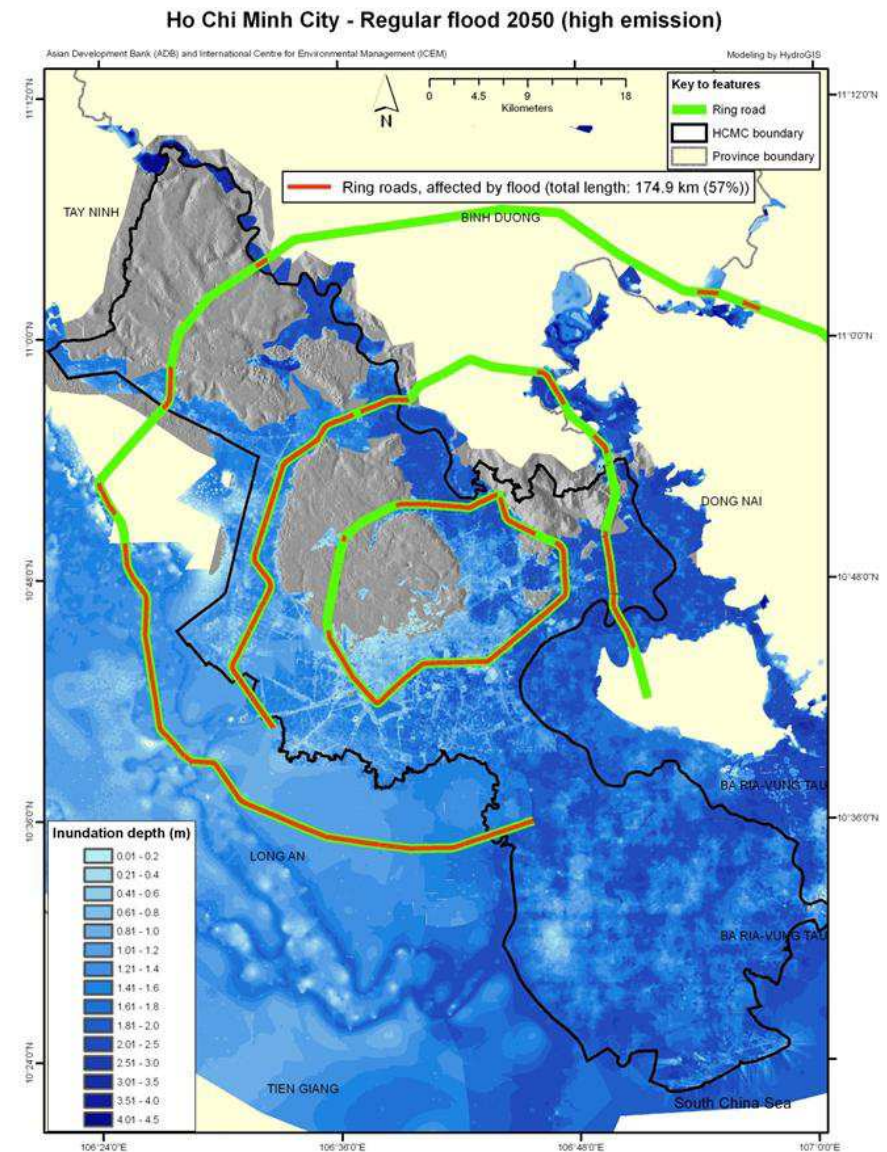
# Ho Chi Minh City (HCMC): Adaptation to Climate Change

- Objective: Assist HCMC in developing effective climate adaptation approaches
- ADB in collaboration with HCMC Peoples Committee, MONRE
- HCMC among the world's cities most likely to be severely affected by climate change
- Large, rapidly growing population (6.3 million)
- Economically important: 23% of Viet Nam's GDP
- Extremely low elevation: 40% - 45% below 1 m MSL
- Tidal flooding, storm surges
- Saline intrusion
- Periodic drought



# Ho Chi Minh City: Adaptation to Climate Change

- Climate change projection: 2050 high emissions scenario (A2)
- Inundation mapping to assess effectiveness of flood control options on:
  - exposed population
  - transportation infrastructure
  - water supply & sanitation
  - agriculture, natural ecosystems
- Examine ecosystem-based adaptation approaches:
  - mangrove, salt marsh
  - upstream natural systems



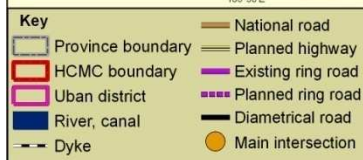
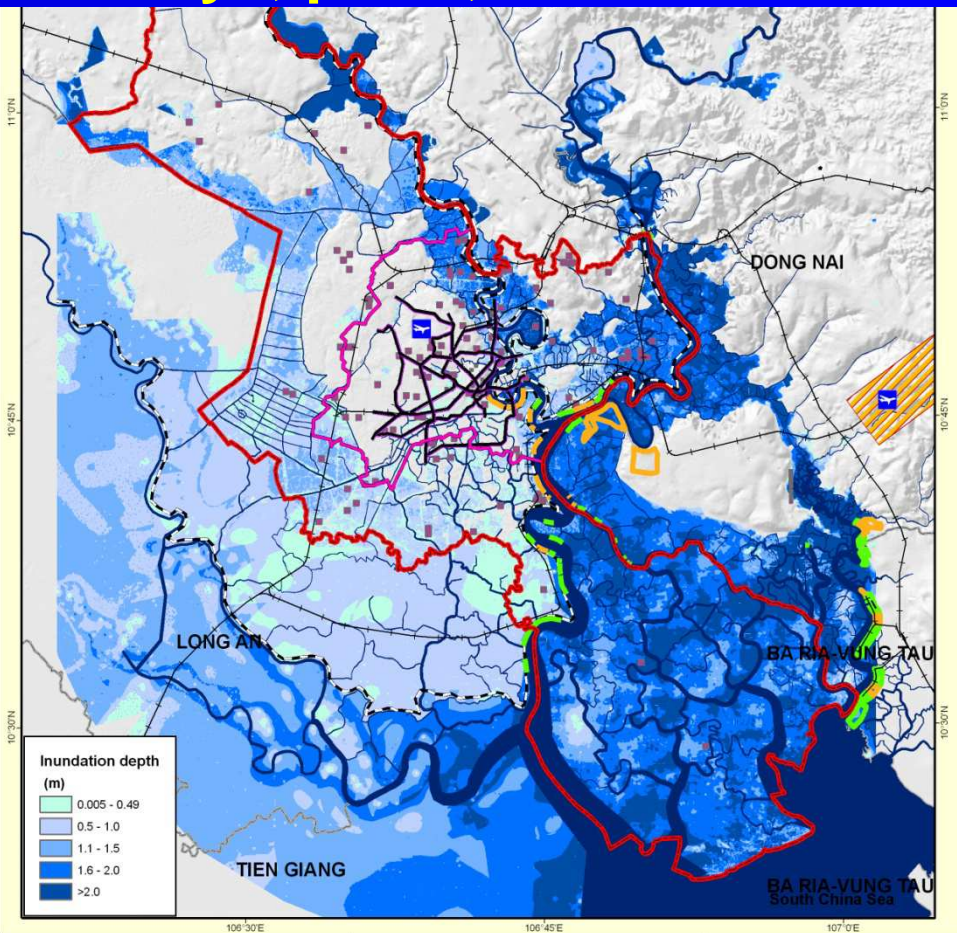
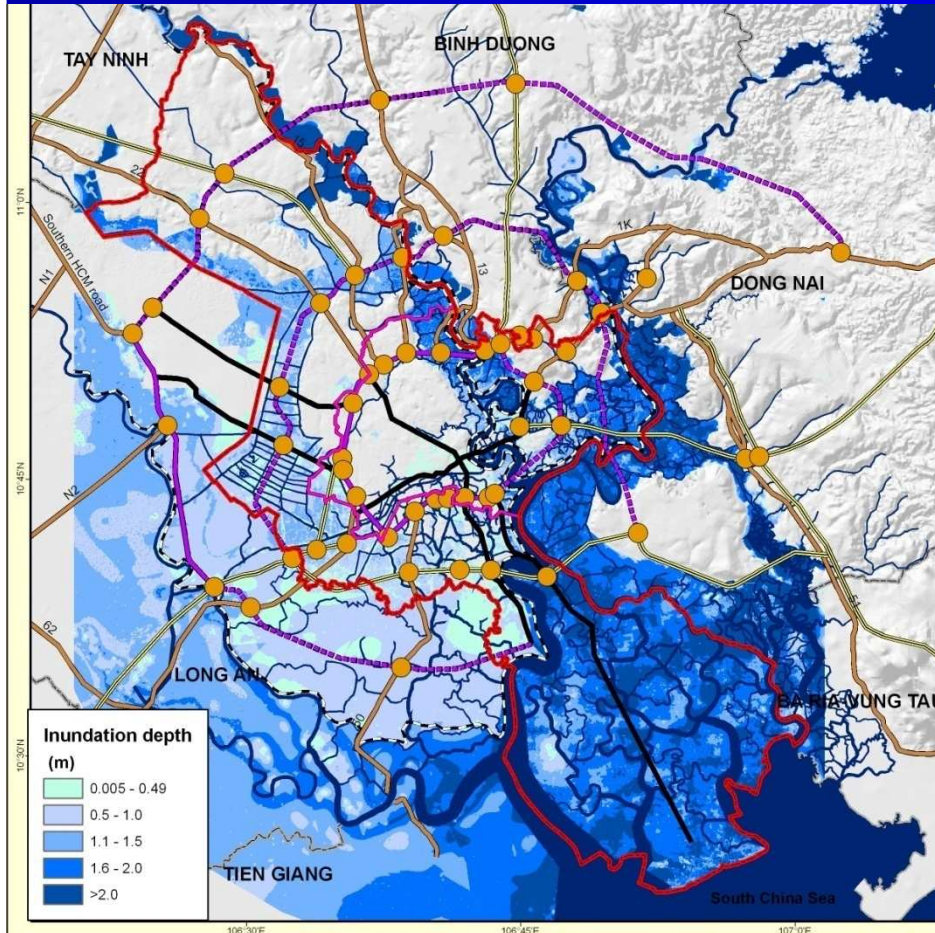
# Example: A Planning Approach to Build Climate Resilience

## Climate Change Impact and Adaptation in Asian Coastal Cities

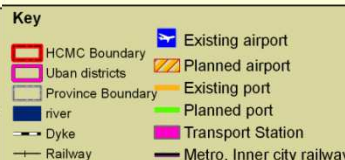
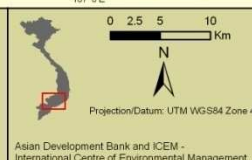
By 2050, 30-70% of new transport systems are at risk of flooding.

roadswith

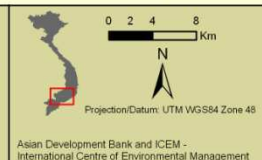
railways, ports, metrowith



**HCMC - Existing and planned transport network affected by extreme flood 2050 (high emission) with flood control system**



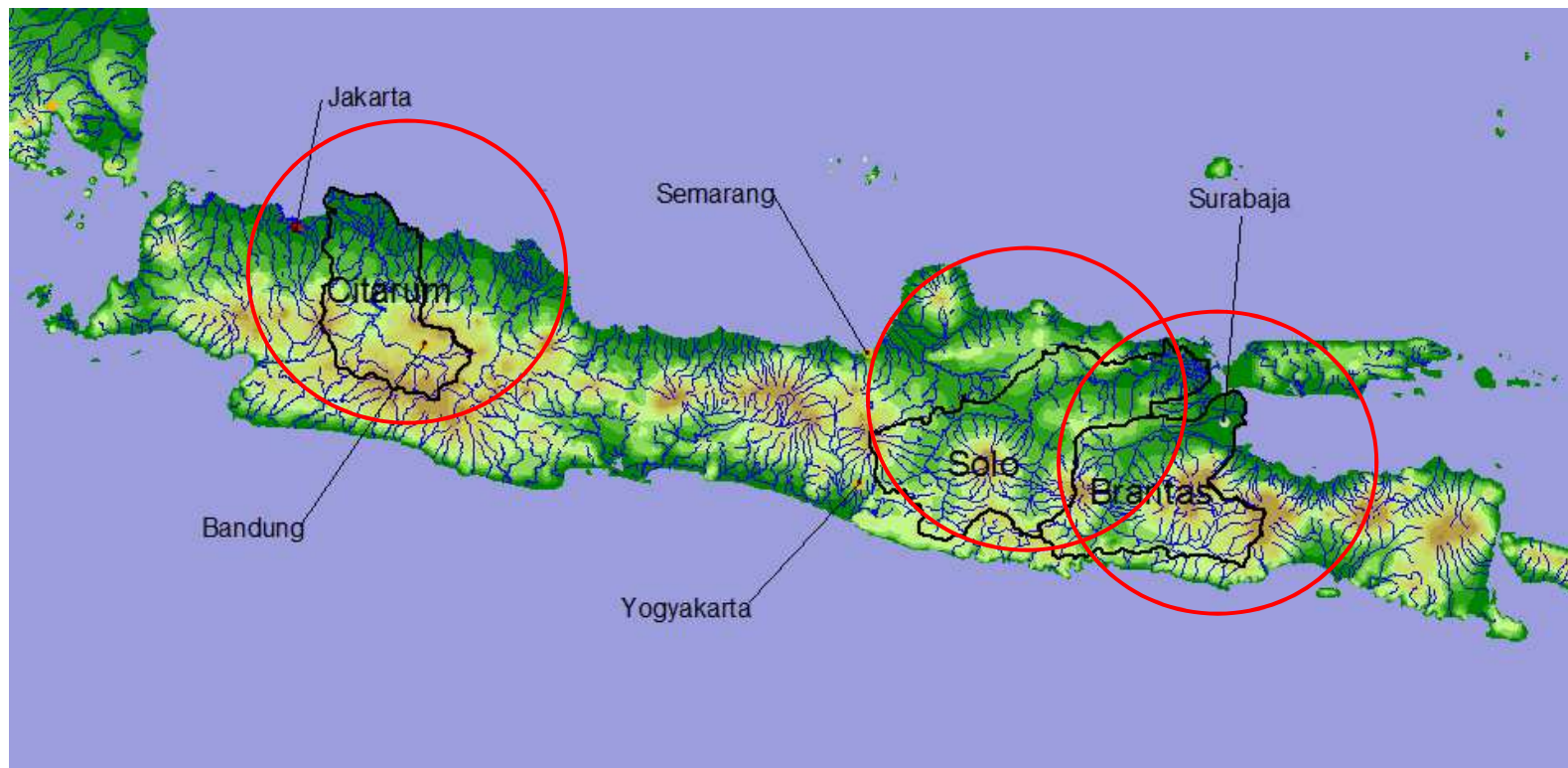
**HCMC - Existing and planned railway, metro, airport, port and transport stations affected by extreme flood 2050 (high emission) with flood control system**





# Climate Risk: Critical River Basins, Java, Indonesia

- Regionally, Nationally important basins:
  - 50 million Indonesians
  - Waters support over 25% of Indonesian GNP
  - Major irrigated rice production areas
- Representative of many Asian coastal basins



# Flood Vulnerability: Integrated Citarum Water Resources Management Investment Program (2008)

- “Most important river basin in Indonesia”
- 15-year, \$1 Bn Assistance
- Upgrade infrastructure, institutions (IWRM)
- 1,400 Mw Hydro
- 400,000 Ha irrigation
- Water supply for Jakarta, Bandung

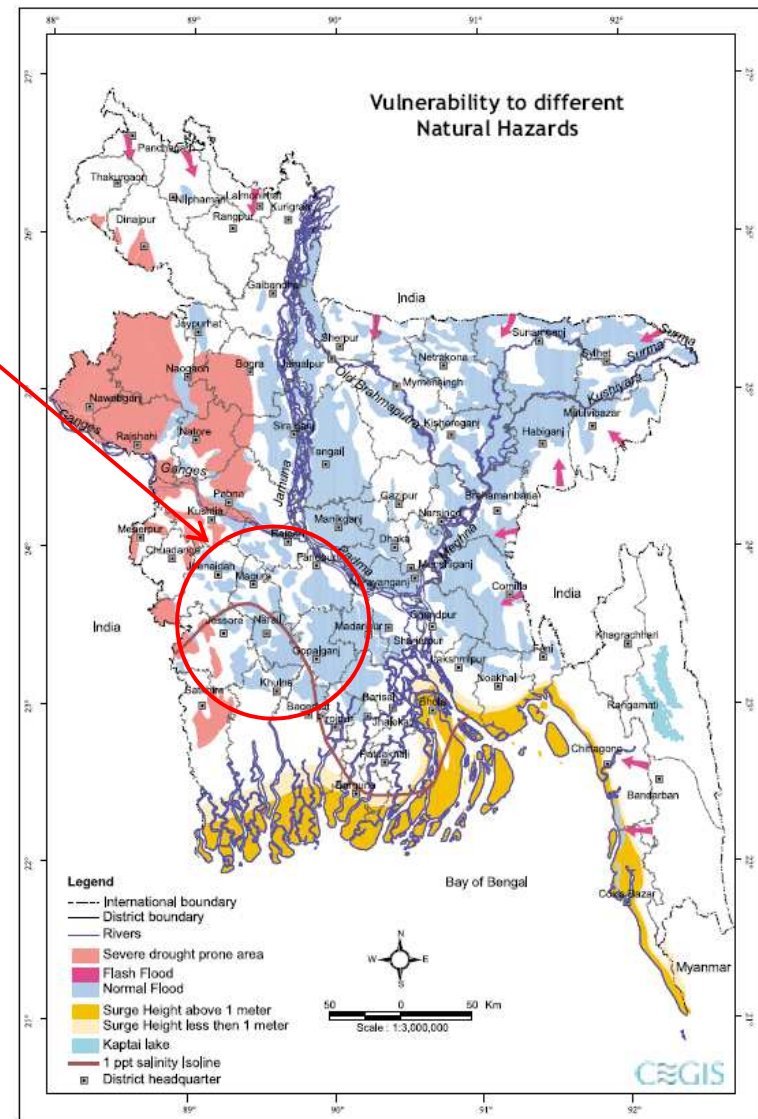
## Challenges:

- Water insecurity
- Groundwater depletion
- Water quality (severe)
- Flood risk in upper basin



# Strengthening the Resilience of Khulna (Bangladesh) Water Sector to Climate Change

- National vulnerabilities to CC:
  - Flooding
  - Drought
  - Sea Level Rise
- Third largest city in Bangladesh - population of 1.4 million (2007)
  - Shortage of water supply (currently relying on shallow groundwater aquifers)
  - Increased urban flooding
  - Drainage congestion



Source: CEGIS, Dhaka.

# Strengthening the Resilience of Khulna Water Sector to Climate Change

- ADB assistance for adaptation investment projects, with Institute for Water Modeling, Bangladesh:
  - City Region Development Project (2010): drainage, salinity control
  - Khulna Water Supply Project (2011)
  - others to follow
- Technical Assistance aligns with Bangladesh's Climate Change Strategy and Action Plan (2008)



# **India: National Action Plan for Climate Change**

## **Support for the National Water Mission**

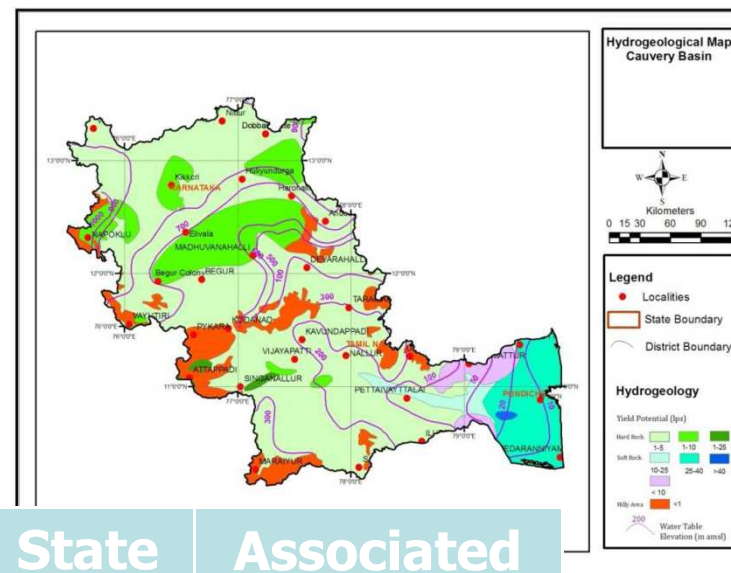
- **India MoWR requests ADB assistance in adapting water sector to climate change**
- **Desired outputs: legislative framework and capacity at the state level to enact NWM recommendations for climate change adaptation**
- **Vehicle: Policy and Advisory Technical Assistance**
- **Funding: \$750,000 (grant)**
- **Source: ADB Climate Change Fund (CCF)**



# India: National Action Plan for Climate Change

## Support for the National Water Mission

- All-India Water Systems
- 3 Pilot Sub-basins representing specific climate change risks



Category	Pilot Basin	Focal State	Associated States
Snow-fed	Sutlej	Punjab	Himachal Pradesh
Groundwater	Chambal	Madhya Pradesh	Rajasthan
Coastal	Cauvery (delta)	Tamil Nadu	Pondicherry

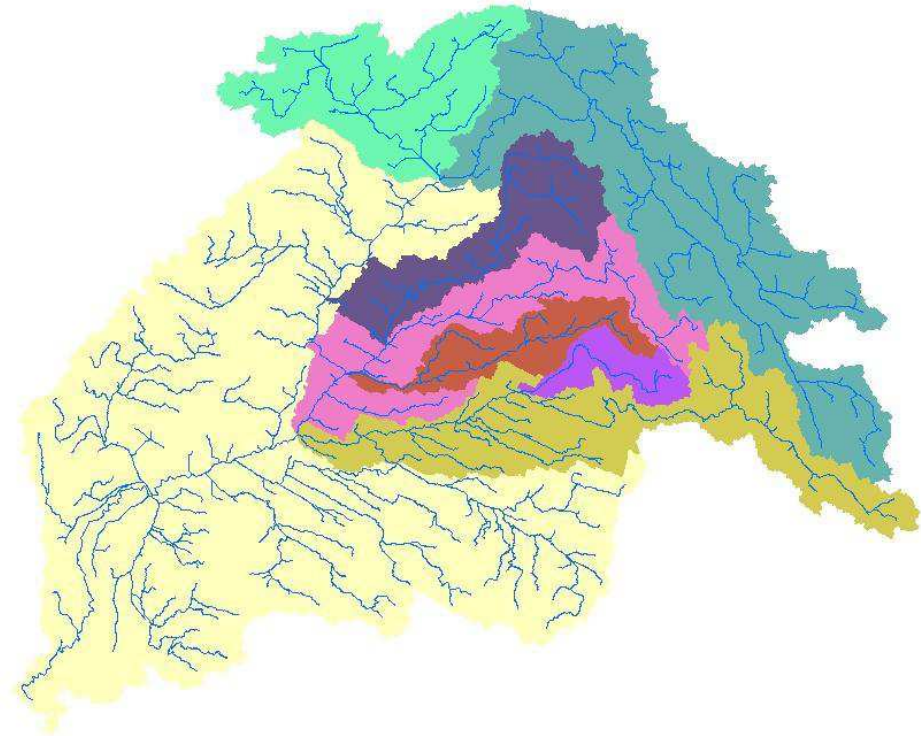
# Pakistan: Glacial Melt and Downstream Impact on Indus-Dependent Water Resources and Energy

## Gap analysis

knowledge on  
impacts of climate  
change on the  
Western Himalayas

## Adaptation Guide

*Practical Mountain  
Glacier and  
Downstream Water  
Risk Management  
Framework*



# Pakistan: Glacial Melt and Downstream Impact on Indus-Dependent Water Resources and Energy

Partners: ADB, ICIMOD, IUCN and PMD

Funding vehicle: ADB Small Grant for Adaptation (SGA)

\$ 200,000 (grant)

Source: ADB RETA 6420

Study will support ADB's water and hydro-energy projects and program area; identification priority risk management and adaptation research

activities





## Other examples of ADB projects

### ✓ **Bagmati River Basin, Nepal**

- Helping government and stakeholders to restore the river
- Developing an IWRM program led by local RBO
- Investing in water conservation, wastewater treatment, and more
- Knowledge sharing with Laos, Philippines, Indonesia, through NARBO

### ✓ **Pilot Program for Climate Resilience, Tajikistan**

- Increasing awareness and education
- Generating cross-sectoral cooperation
- Developing leadership and capacity
- Selecting priority investment projects

### ✓ **Many more...**

Enquiries: Charles Rodgers at [crodgers@adb.org](mailto:crodgers@adb.org)

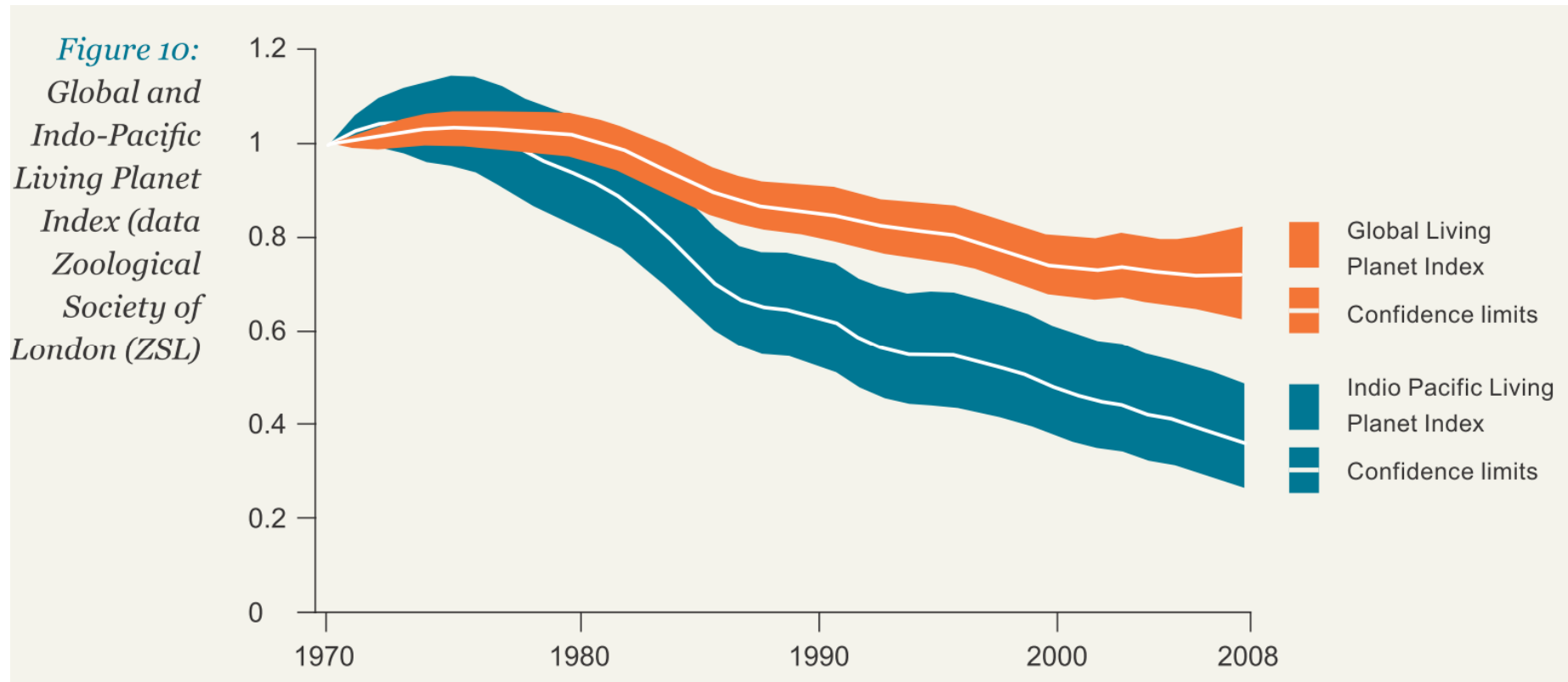


## **4. Water Security and Sustainable Asia**





# The Living Planet Index has declined 28% 64% in the Indo-Pacific Region







# Manila, August 2012

Photograph: Ted Aljibe/AFP/Getty Images



# Land degradation



# ***Anthropocene:*** **Human-dominated epoch**

**2012 Sahel:  
drought and  
famine**

***“We shall require a  
substantially new  
manner of thinking if  
mankind is to survive.” –  
Albert Einstein***

**2012 Beijing :worst rains on record**

**2012 US: worst drought on record**





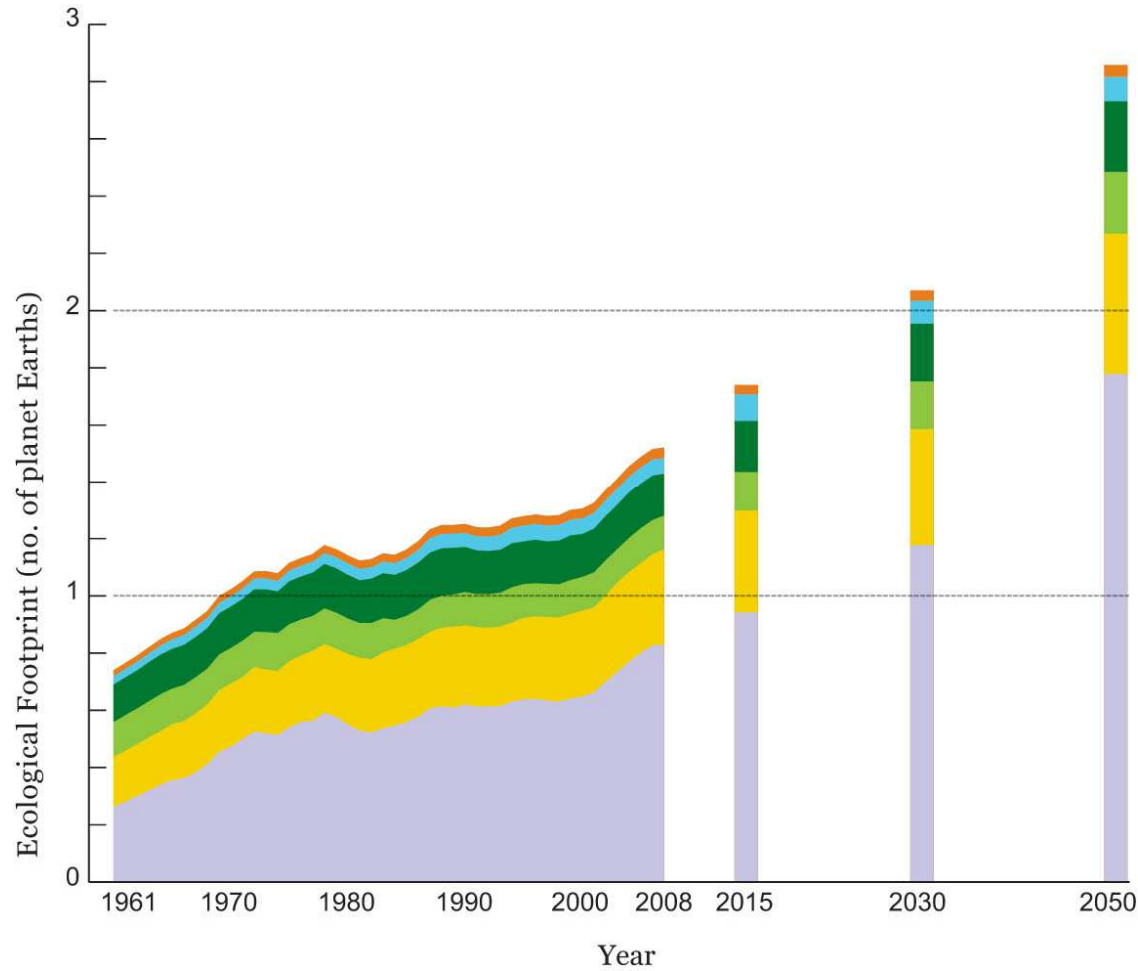
We are living as if we had two planets







# Ecological Footprint



With current trends, by 2030 we would need **2 planets**

Key

- Built-up land
- Fishing
- Forest
- Grazing
- Cropland
- Carbon

# The Trade-off in Reverse



Environmental degradation and risks to growth

Thailand: 2011 Floods

**Losses: \$45.7 billion (13.5% of GDP)**



China: Environmental Burden of Disease (2004)

**DALYs/1,000 capita: 34**

**Deaths: 2,350,000**



Global food security

**925 million hungry**

**62% are in Asia and the Pacific**



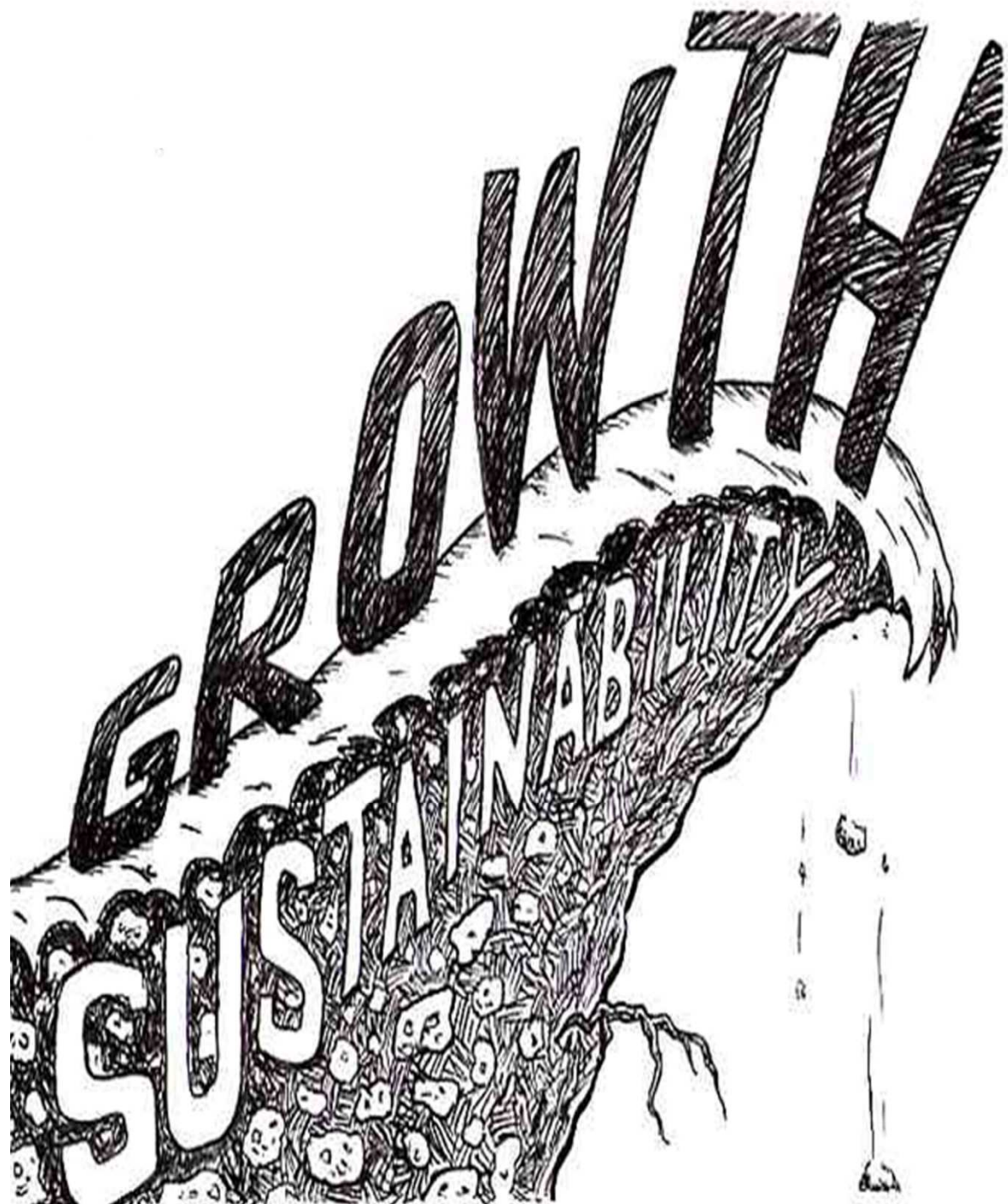
DALY - Disability Adjusted Life-Years

# ACT NOW!



'STEADY AS SHE GOES'

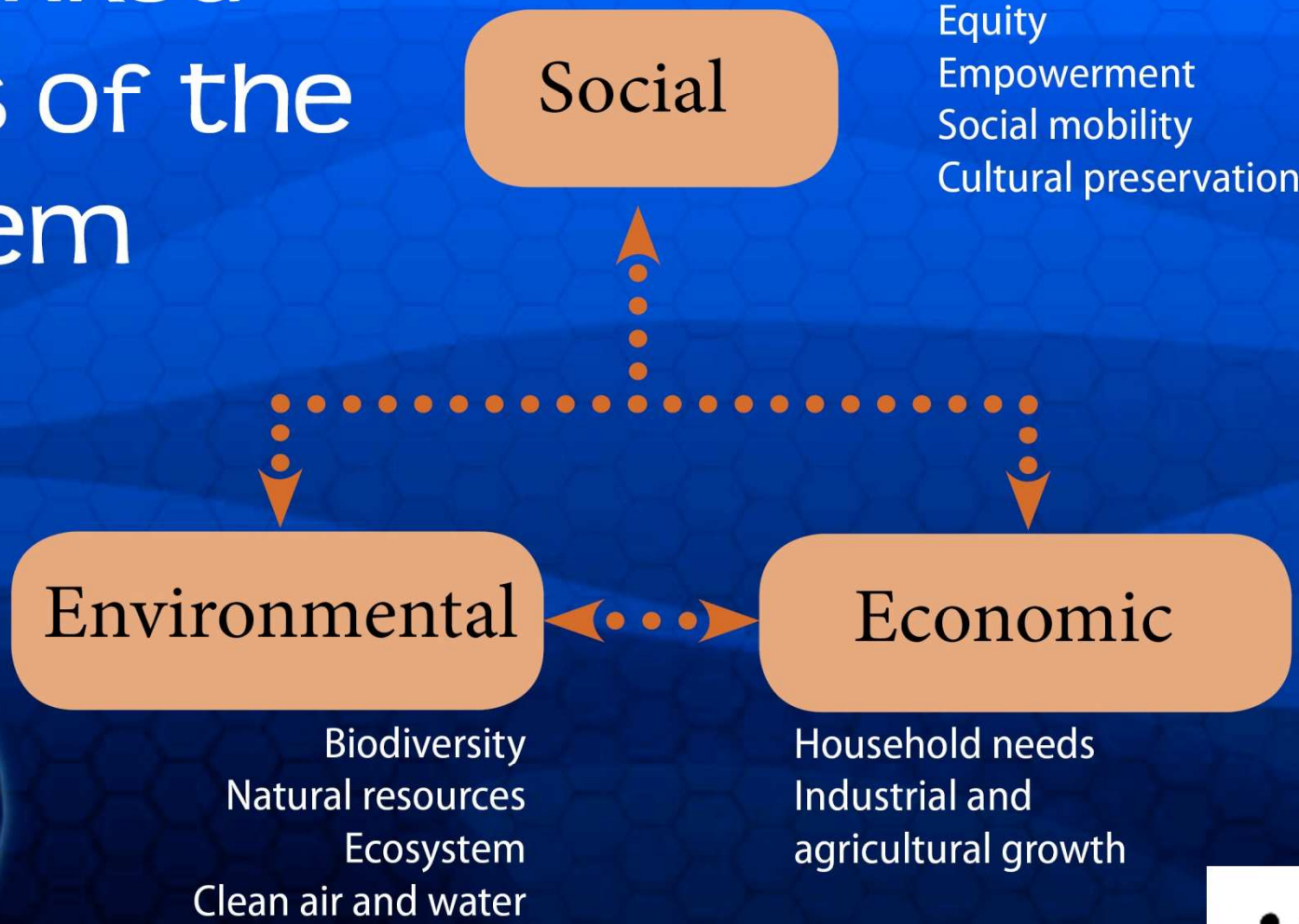
Source: [dwighttowers.wordpress.com](http://dwighttowers.wordpress.com)



*“ Climate change is not a hoax. More droughts and floods and wildfires are not a joke. They’re a threat to our children’s future. And... you can do something about it.”*

- President Barack Obama  
6 September 2012

# Interlinked Roots of the Problem



# Knowledge Development



PERSPECTIVES PAPER  Global Water Partnership

## Increasing Water Security – A Development Imperative




This Perspectives Paper argues that water security in the 21st century requires leaders, practitioners, and stakeholders to continue their joint efforts of taking an integrated approach to water resources management. It identifies key areas and points of entry for success in moving forward with the adaptive management process of WRM for sustainable development.

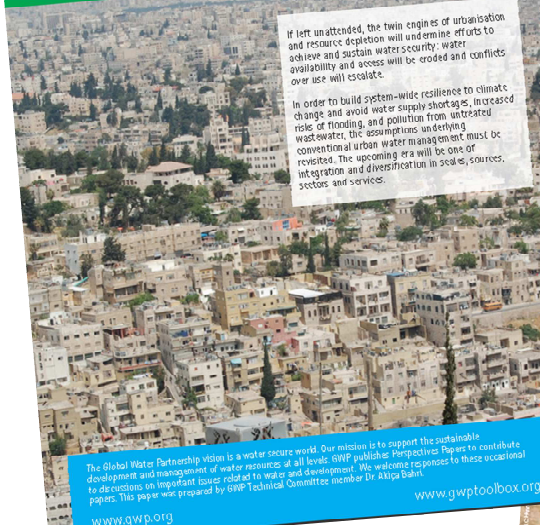
[www.gwp.org](http://www.gwp.org)

PERSPECTIVES PAPER  Global Water Partnership

## Water in the Green Economy

PERSPECTIVES PAPER  Global Water Partnership

## Towards Integrated Urban Water Management




If left unattended, the twin engines of urbanisation and resource depletion will undermine efforts to achieve and sustain water security: water availability and access will be eroded and conflicts over use will escalate.


In order to build system-wide resilience to climate change and avoid water supply shortages, increased risks of flooding, and pollution from untreated wastewater, the assumptions underlying conventional urban water management must be revisited. The upcoming era will be one of integration and diversification in scales, sources, sectors and services.

The Global Water Partnership vision is a water secure world. Our mission is to support the sustainable development and management of water resources at all levels. GWP publishes Perspectives Papers to contribute to discussions on important issues related to water and development. We welcome responses to these occasional papers. This paper was prepared by GWP Technical Committee member Dr. Akhpa Babin.

[www.gwp.org](http://www.gwp.org)

PERSPECTIVES PAPER  Global Water Partnership

## Groundwater Resources and Irrigated Agriculture – making a beneficial relation more sustainable



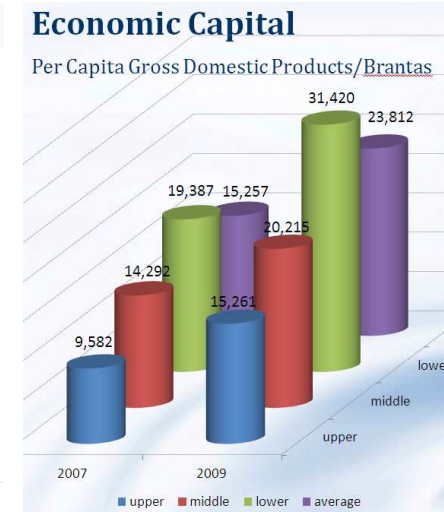
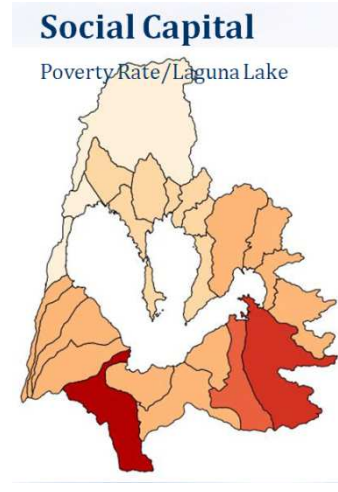
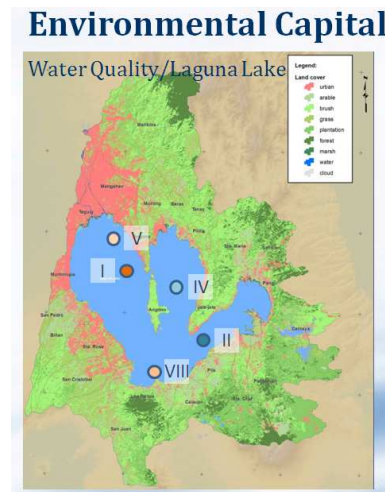
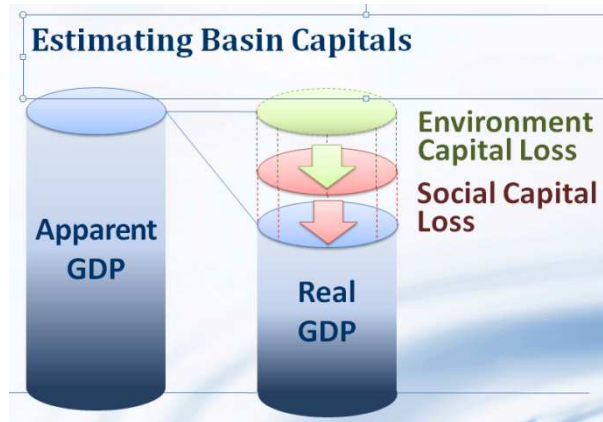
Globally, irrigated agriculture is the largest abstractor and predominant consumer of groundwater resources, with important groundwater-dependent agroecosystems having widely evolved. But in many arid and drought-prone areas, unconsolidated use is causing serious aquifer depletion and environmental degradation, and cropping practices also exert a major influence on groundwater recharge and quality. The interactions between agricultural irrigation, surface water and groundwater resources are often very close – such that active cross-sector dialogue and integrated vision are also needed to promote sustainable land and water management. Clear policy guidance and focused local action are required to make better use of groundwater reserves for drought mitigation and climate-change adaptation. To be effective policies must be tailored to local hydrogeological settings and agro-economic realities, and their implementation will require appropriate 'institutional arrangements' (with a clear focal point and statutory power for groundwater management), full involvement of the farming community and more alignment of agricultural development goals with groundwater availability.

This Perspectives Paper is intended to galvanise discussion within the network and the larger water and development community. This Paper has been written by GWP Senior Advisor Stephen Foster and GWP Technical Committee Member Jashar Shah. Feedback will contribute to future GWP Technical Committee publications on related issues.

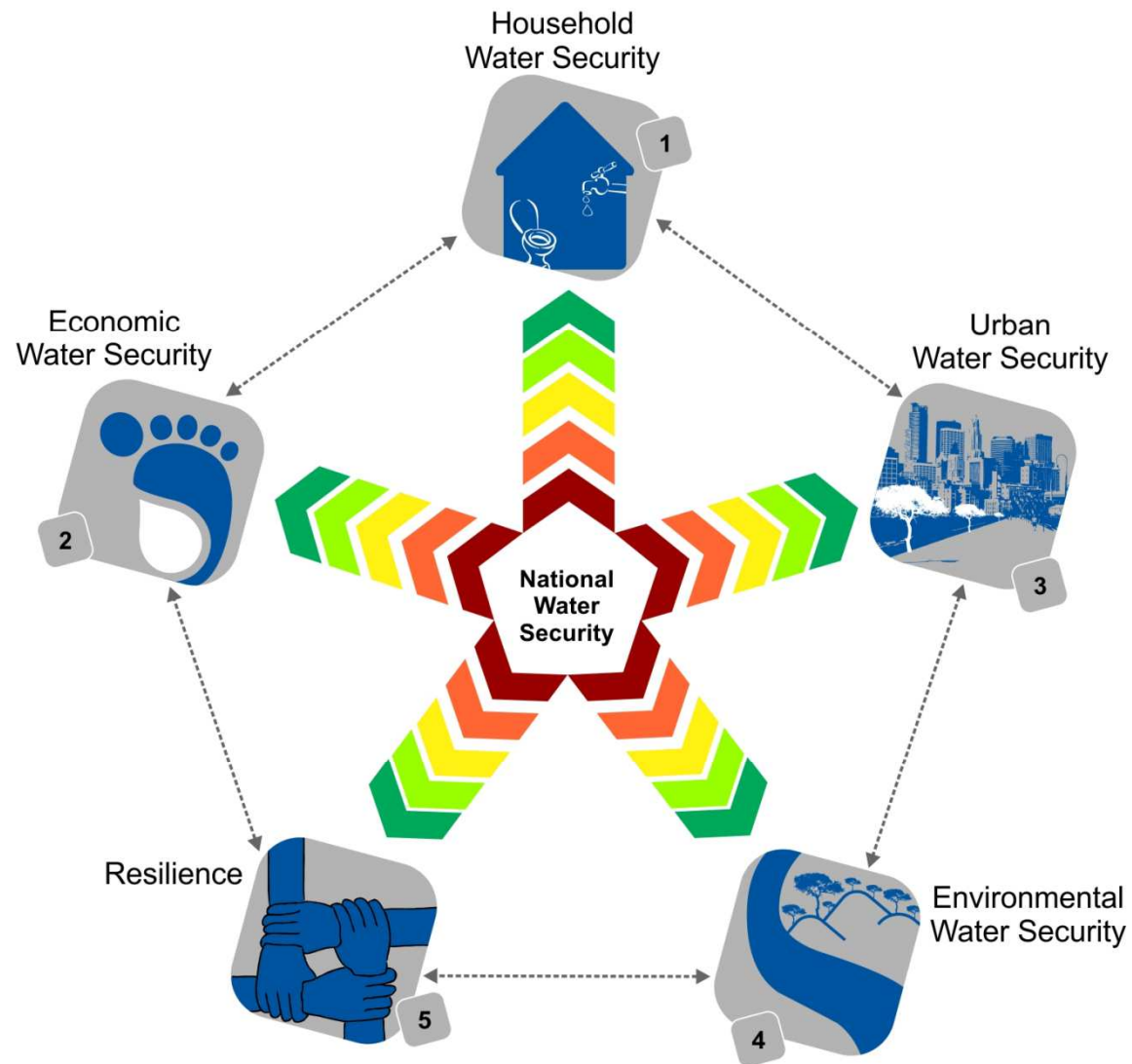
[www.gwp.org](http://www.gwp.org)

# Measuring Water Security

Assess-partner-perform  
 Scalable framework  
 Link to green economy  
 AWDO model attractive









A call for  
**Leadership**



**10-14 September 2012**  
Auditorium A-D  
ADB Headquarters



## Your Questions...



[www.adb.org/Climate-Change](http://www.adb.org/Climate-Change)

[www.adb.org/water](http://www.adb.org/water)