



USAID
FROM THE AMERICAN PEOPLE

WATER AND CLIMATE CHANGE ADAPTATION

JULY 22-24, 2013

USAID E3 OFFICES OF GLOBAL CLIMATE CHANGE AND WATER

AGENDA FOR THE WEEK

DAY 1 (Monday)	Welcome: Objectives, Agenda, Introductions
	Water and Climate Change: Overview and Basic Concepts
	The Importance of Climate Change and Water for Development
	Links Between Climate Change Adaptation and IWRM Approaches
	Digging Deeper into Vulnerability
	Using Information for Water and Climate Change Adaptation Programming
DAY 2 (Tuesday)	The USAID Institutional Framework for Water
	The USAID Institutional Framework for Climate Change Adaptation
	Vulnerability Assessment for Program Design
	Water and Climate Change Adaptation Tools and Resources “Round Robin”
	Overview of Practical Approaches to Water and Climate Change Adaptation
DAY 3 (Wednesday)	Practical Approaches to Water and Climate Change Adaptation: <i>Engineering / Technology and Ecological Approaches</i>
	Practical Approaches to Water and Climate Change Adaptation: <i>Institutional / Social and Financial Approaches</i>
	Bringing It All Together: Water-Related Climate Change Adaptation Program Design
	Action Planning

3-DAY AGENDA FOR THIS COURSE

Day 1:

- Why does water-related climate change adaptation matter for development?
- What are the links between USAID's approach to climate change and to IWRM?
- What information is available for water and climate change programming?

Day 2:

- What institutional and legal frameworks impact water and climate change adaptation?
- What is a Vulnerability Assessment and how do I use it for program design?

3-DAY AGENDA FOR THIS COURSE

Day 3:

- What are practical approaches to Water and Climate Change Adaptation...
 - ... for hard engineering principles and approaches?
 - ...for ecological/ soft engineering principles and approaches?
 - ...for institutional and social principles and approaches?
 - ... for financial principles and approaches?
- How can I select the best mix of approaches for a USAID/ USG program addressing water-related climate change adaptation?

LEARNING OBJECTIVES

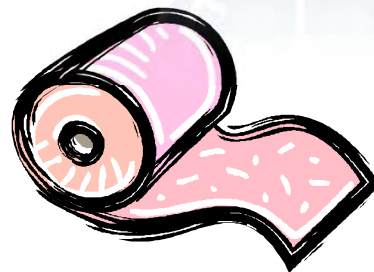
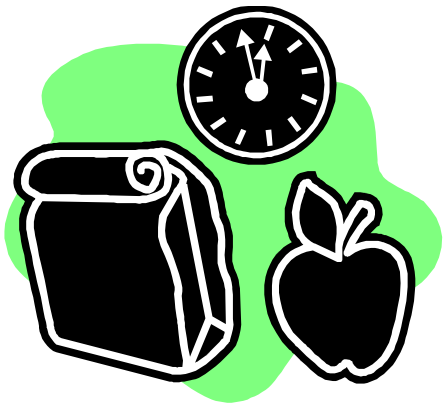
Upon completion of this course, participants should be able to:

- Understand basic concepts of the relationship between climate change and water and strategies for climate change adaptation in development
- Discuss and apply institutional and legal requirements for USAID programming on water and climate change adaptation
- Identify, access, and use information resources to assist in the development and management of water and climate change adaptation activities applicable to all development sectors

INTRODUCTIONS – YOUR TRAINING TEAM

- Richard Volk (USAID/E3 Water Office)
- Jenny Frankel-Reed (USAID/E3 GCC Office)
- Katy Beggs (USAID/E3 Water Office)
- André Mershon (USAID/E3 GCC Office)
- Samantha Wapnick (Engility/IRG)
- Yoon Kim (Engility/IRG)
- Aieysha Kayani (Engility/IRG)
- All of you!

LOGISTICS



RESOURCES/FEEDBACK

- Resource table
- Virtual flash drive
- Parking Lot
- Plus / Delta

LET US KNOW WHO YOU ARE!

- Your name
- Your job
- Your country/mission
- What is the first thing that comes to mind when you think about water and climate change?

JOURNAL GUIDELINES

- Purpose of Journal
- Individual task (5 minutes)
 - Put your name on journal / read first page
 - Complete questions on Page 2:
 - One or two expectations for the course
 - One opportunity or challenge you are currently facing in your current work related to water and/or climate change adaptation



TABLE DISCUSSION

- Share your major challenges and opportunities with each other (5 minutes)
- Select a spokesperson for your table.
- Be prepared to share a few highlights from your discussion with the rest of participants.





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WATER AND CLIMATE CHANGE: OVERVIEW AND BASIC CONCEPTS

JULY 22, 2013
ANDRE MERSHON

LET'S DIG IN

"Some of the worst impacts of climate change are going to be on water resources..."

MacArthur "Genius" Fellow and Pacific Institute President Peter Gleick in this short interview with the Environmental Change & Security Program (ECSP)

<http://www.youtube.com/watch?v=DmPckaZsXy8>

WHAT IS ADAPTATION?

- ***Adaptation***: “Adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts.” (IPCC 2001)
- Different from ***mitigation***, which is: “an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gasses.” (IPCC 2001)

Adaptation is a process by which individuals, communities and countries seek to cope with the consequences of climate change, including climate variability. It should lead to harmonization with country's more pressing development priorities such as poverty alleviation, food security and disaster management

WEATHER AND CLIMATE

Weather: fluctuating state of the atmosphere around us

- temperature
- wind
- precipitation
- clouds

Climate: average weather in terms of mean and variability over a certain time-span and area

- varies from place to place
- varies from time to time

Climate is what you expect, weather is what you get

Climate change: significant variations of the mean state or variability of the climate

CLIMATE CHANGE – WHAT DO WE KNOW?

Evidence for rapid climate change:

- Global temperature rise
- Warming oceans
- Sea level rise
- Shrinking ice sheets
- Declining Arctic sea ice
- Glacial retreat
- Extreme events
- Changes in precipitation frequency, intensity, and type
- Ocean acidification



<http://climate.nasa.gov/evidence>

CLIMATE CHANGE – WHAT DO WE KNOW?

We know...

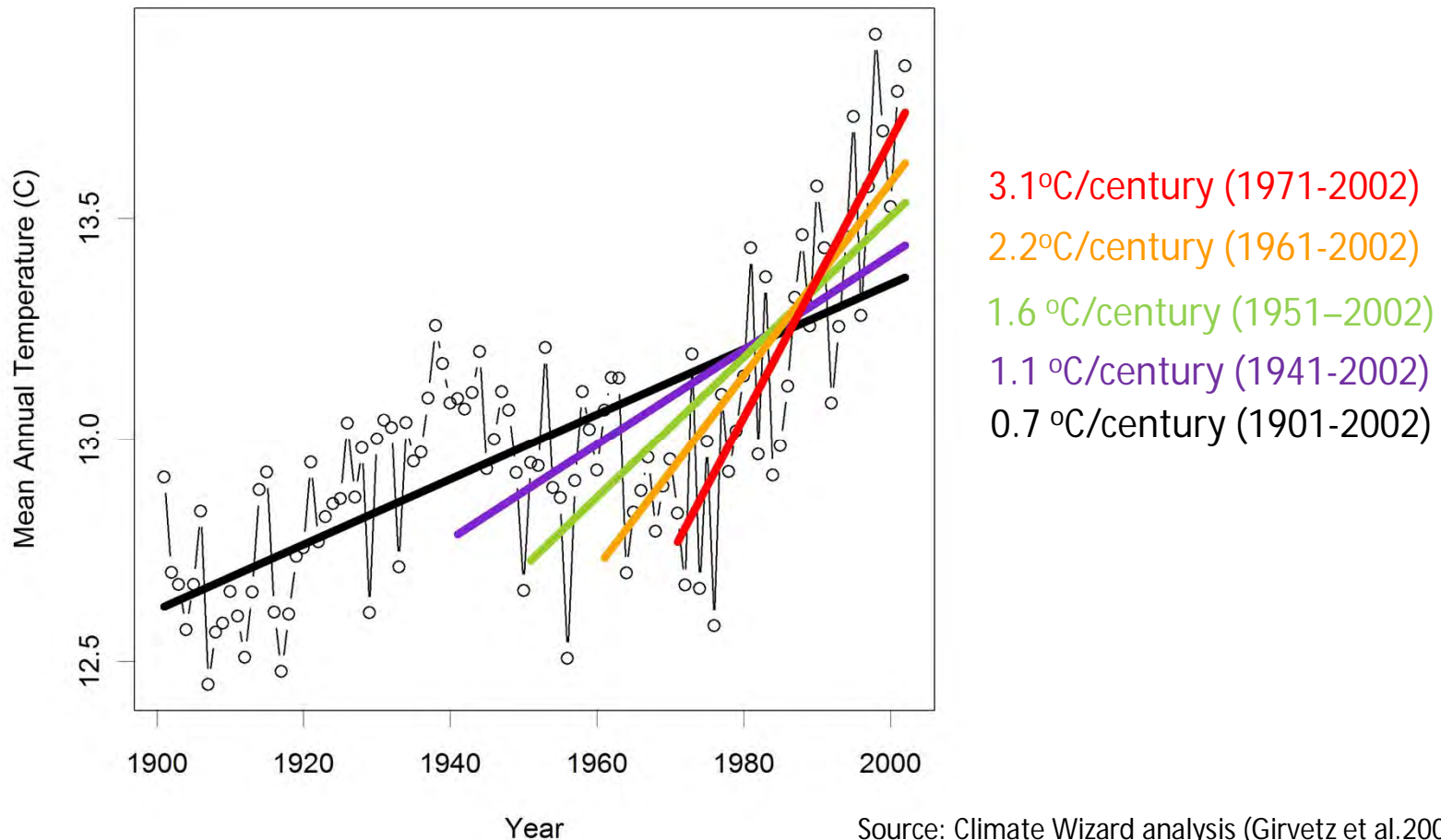
- The planet will get hotter
- Global trends for temperature
- Sea level is going to rise
- There will be more floods and droughts

We don't know...

- How much hotter it will get (2 - 4 °C)
- How temperature will change in each region
- How quickly sea level will rise
- If there will be more hurricanes, etc.
- How precipitation patterns will change in each region

WHAT'S ALREADY HAPPENING WORLDWIDE?

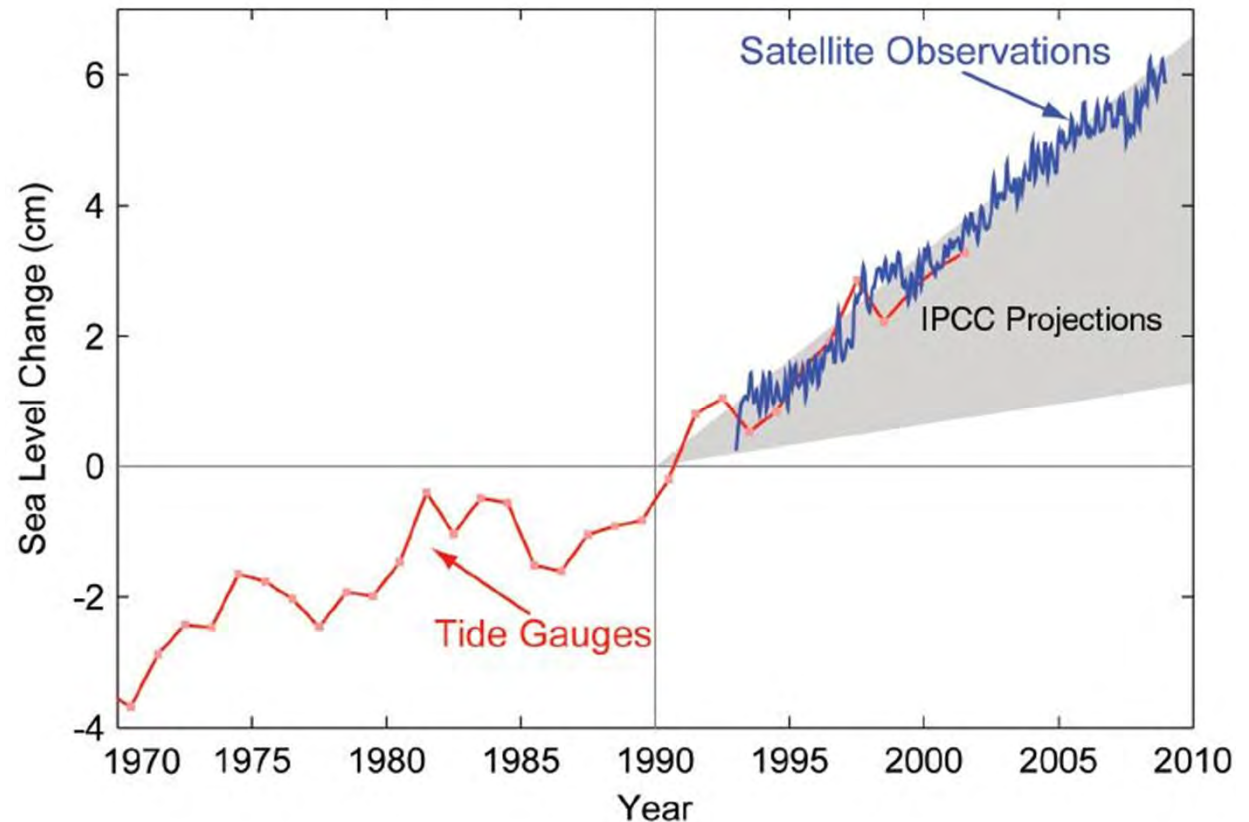
Depending on the time frame, temperature trend ranges from
0.7 to 3.1 °C/ century



Source: Climate Wizard analysis (Girvetz et al.2009), using
CRU TS 2.1 0.5 degree global climate data (Mitchell & Jones 2005)

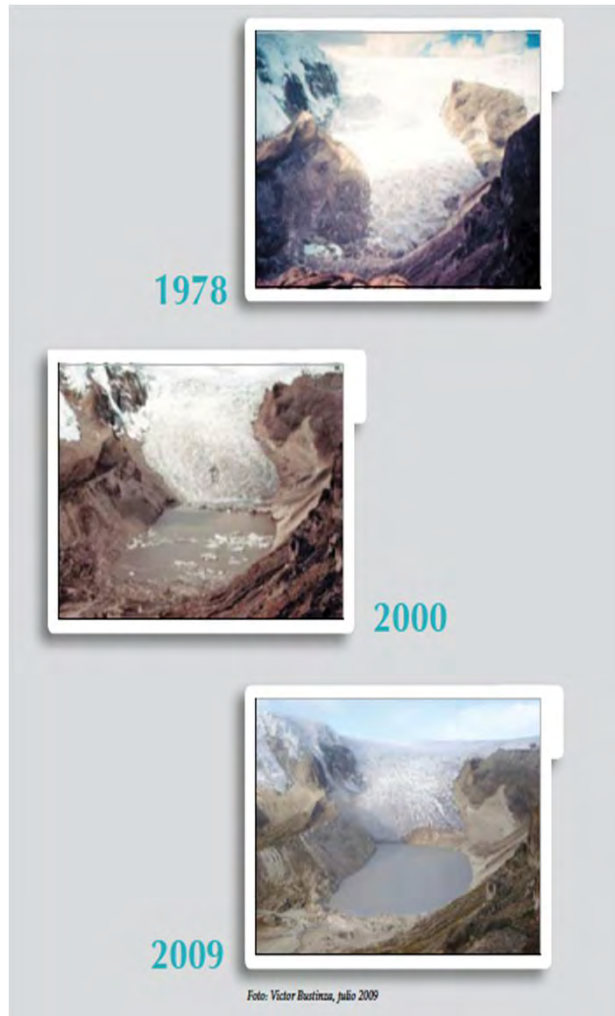
WHAT'S ALREADY HAPPENING WORLDWIDE?

Sea level is rising
... faster in some
places than others

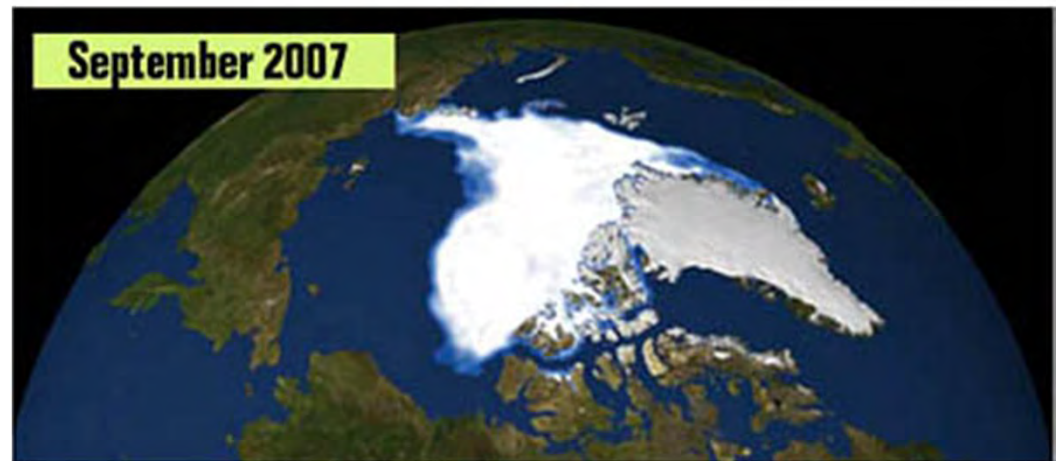


Observed sea level changes are already higher than we projected in 1990 and will continue to rise

GLACIERS AND SEA ICE



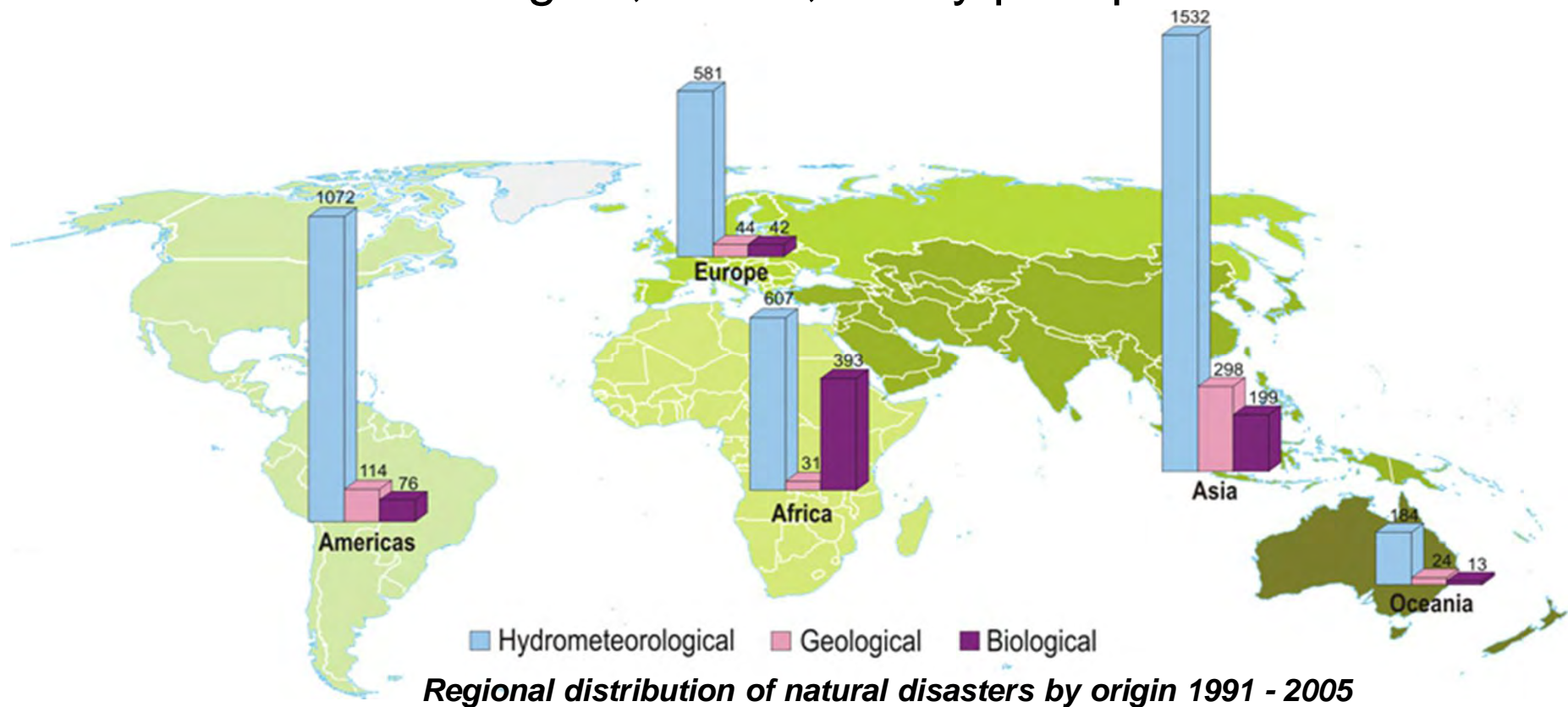
La Lengua Glacier, Cuzco Province, Peru



WHAT'S ALREADY HAPPENING WORLDWIDE?

Precipitation is changing

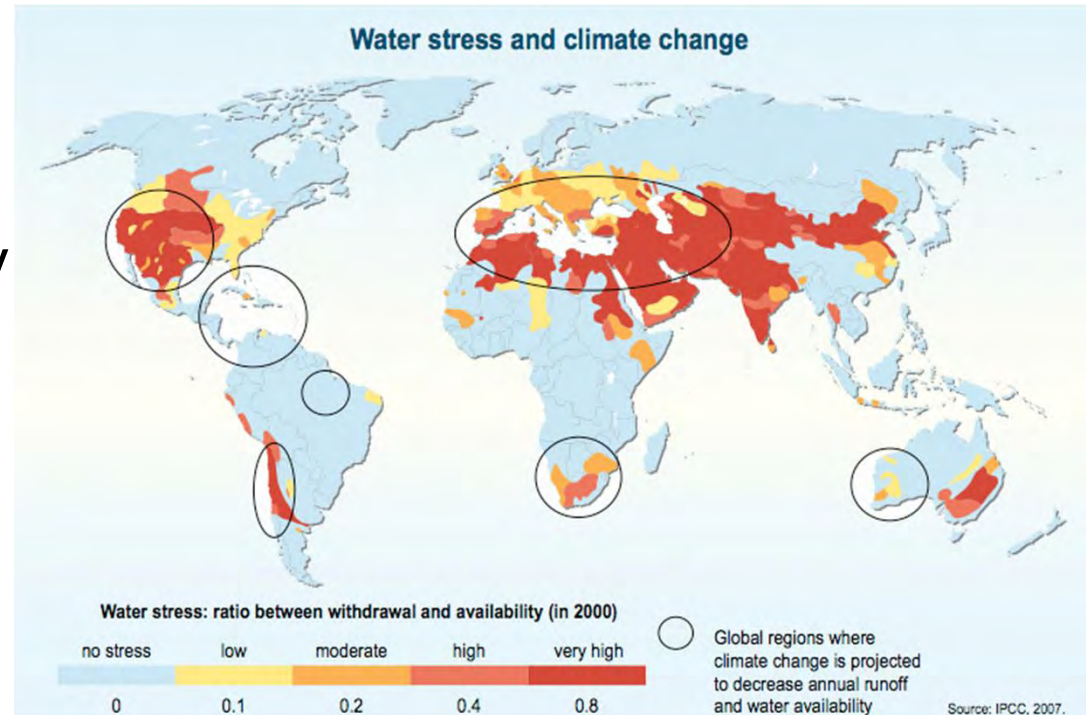
...increases in droughts, floods, heavy precipitation events



WHAT DOES THIS MEAN FOR WATER?

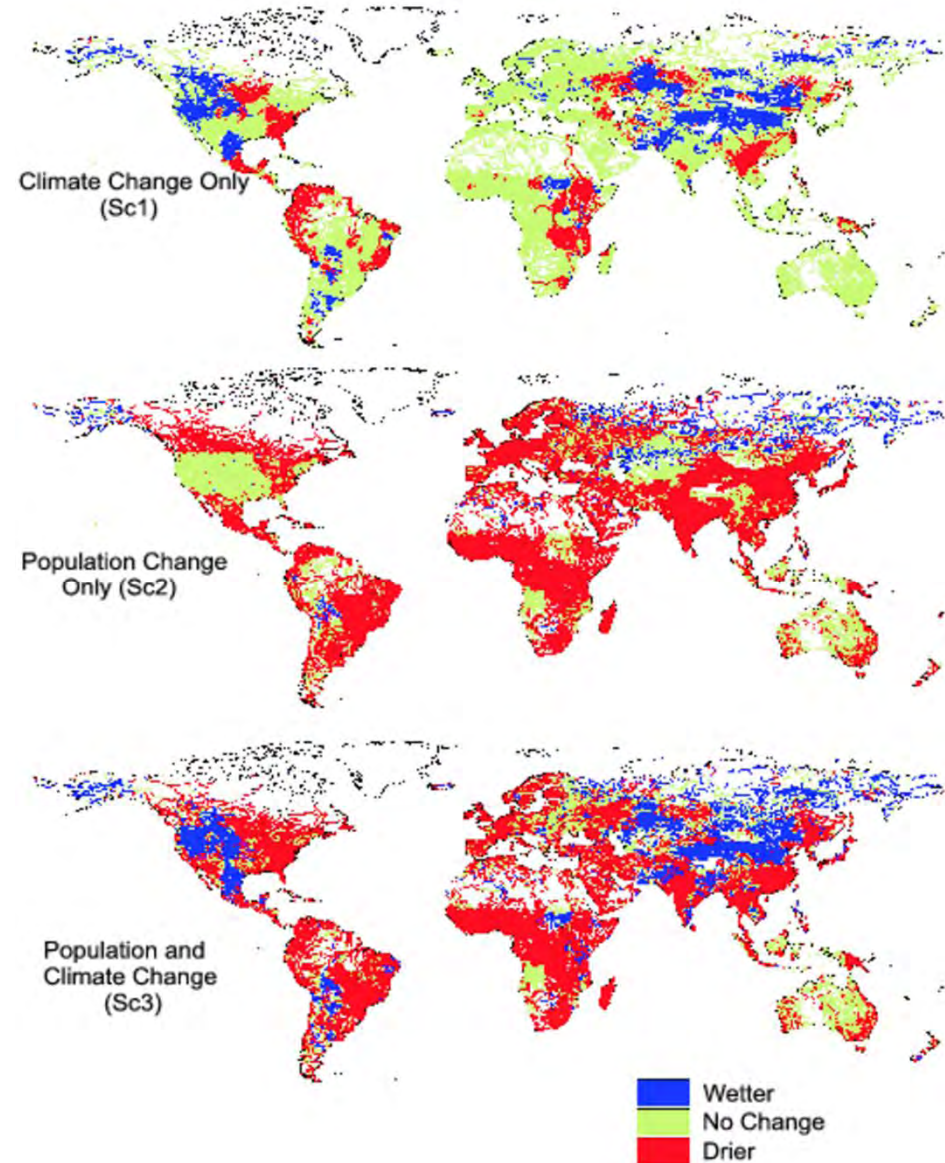
Water resources:

- Decreased water availability
- By 2025, approximately 3 billion people will be living below the water stress threshold
- Impacts vary by region and local situation



SOURCE OF STRESS?

**Next 25 years:
80% of future stress
from population and
development, not
from climate change!**



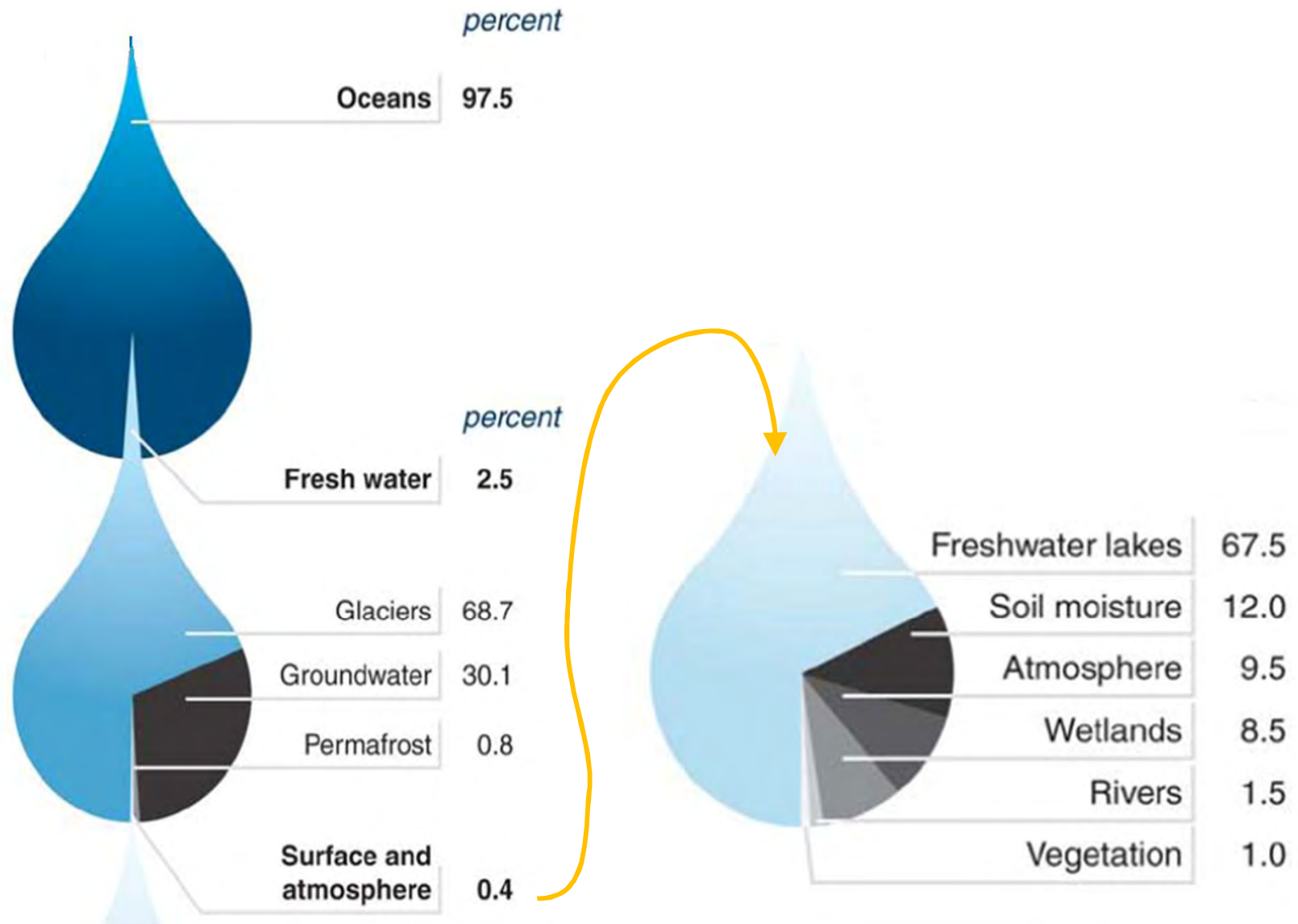
SALINIZATION

- What is salinization?
- 20% of all arable land is irrigated.
- 20% of all irrigated land suffers from salinization
- 1.6 million hectares per year lost this way
- Increased cost / complexity of water treatment



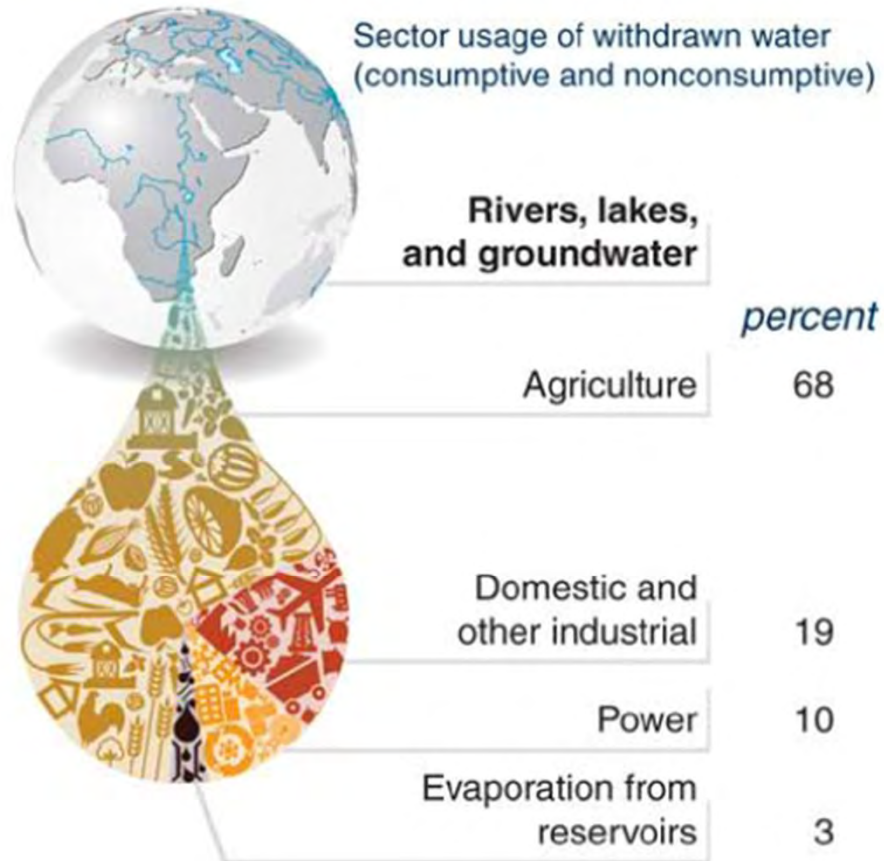
WHAT'S THE CLIMATE CHANGE ANGLE HERE?

FRESHWATER AVAILABILITY

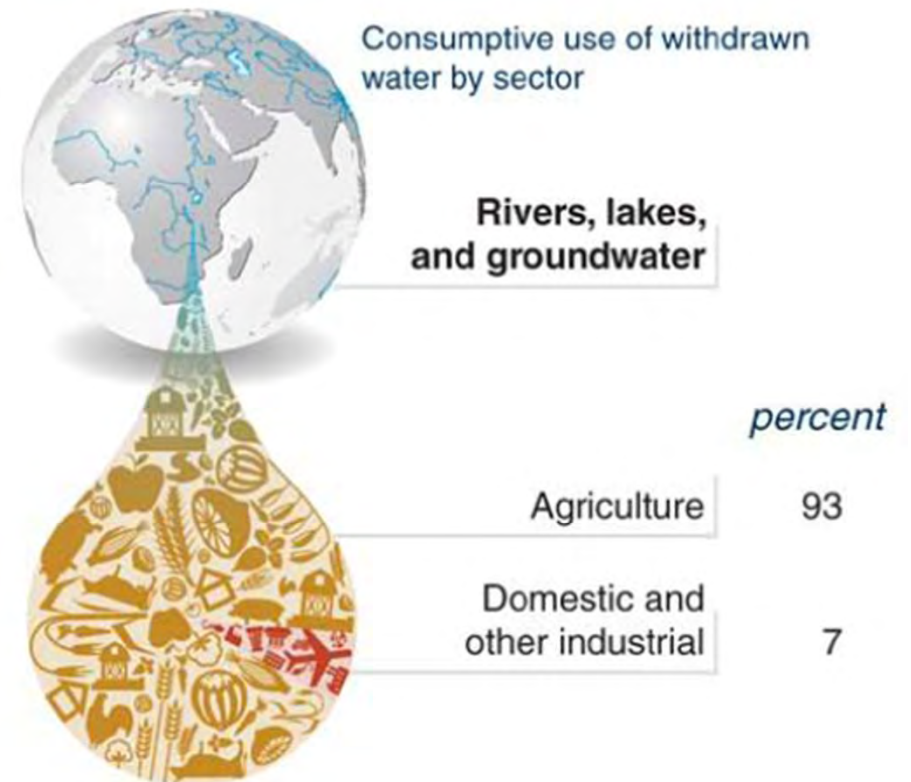


WHO USES THE FRESHWATER?

Freshwater Use



Freshwater Use



WHAT DO THE EXPERTS SAY?

World Bank Report on Water and Climate Change:

- Climate change could profoundly alter future patterns of both water availability and use, thereby increasing water stress globally
- Future water availability, use, and investments will also depend on non-climatic drivers, including economic and governance (management) conditions
- Water investments are particularly vulnerable to impacts of climate change
- Extent to which water investments are impacted by climate change will have ramifications that could extend to the economy and society at large

[Source: Water and Climate Change: Understanding the risks and making Climate-smart investment decisions](#)

EXERCISE: MYTH OR FACT?

- Break into pairs. Each person will receive a set of “cards.” Each card contains a statement about water and/or climate change trends or realities, and an indication if the statement is a “myth” or a “fact.” Do not show your partner your cards!
- The first person reads the statement on one of their cards to their partner, and asks whether it is a myth or a fact. The partner responds and explains their answer. The first person in the pair then reveals the correct answer.
- Switch roles and ask one question at a time (with a total of 7 ‘myths’ or ‘facts’ exchanged between you).

How well did you do?



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THE IMPORTANCE OF CLIMATE CHANGE AND WATER FOR DEVELOPMENT

JULY 22, 2013
JENNY FRANKEL-REED

THE DEVELOPMENT CONCERN



Thailand



Kiribati



Argentina

Source: WWF Climate Witness

http://www.panda.org/about_our_earth/aboutcc/problems/people_at_risk/personal_stories/

ECONOMIC AND SOCIAL COSTS OF CLIMATE CHANGE

Worldwide increases in net irrigation requirements ranging from 1 to 3% (2.7 – 5.1 million hectares) by the 2020s and 2 to 7% (5.2-18.9 million hectares) by the 2070s

Indian women born during a drought or a flood in the 1970s were 19% less likely to ever attend primary school

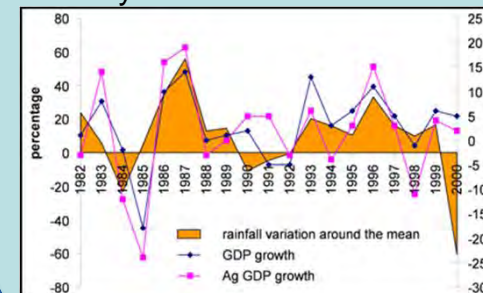
In **Bangladesh**, 1 meter of sea level rise could flood 17.5% of the country's land area

In **Niger**, children aged two or under who were born in a drought are 72% more likely to be stunted

In **Peru**, uncertainty over future hydropower capacity fed by projected glacier melt has led the government to curtail exports of natural gas

Studies project a 95% chance that production of **Southern African** maize and wheat will be harmed in the absence of adaptation

In **Ethiopia**, GDP growth closely tracks rainfall variation



BASELINE WATER CHALLENGES

- 783 million people, or 11% of the global pop, lack access to an improved source of drinking water.
- At the current pace, 605 million people will lack coverage in 2015.
- Over 40% of all people without improved drinking water live in Sub-Saharan Africa (MDG Report 2012)
- 1.7 million people die annually due to unsafe water, lack of sanitation and unhygienic practices; 90% are children under 5. (World Bank)
- Agriculture is by far the biggest user of water, accounting for almost 70% of withdrawals, up to 95% in developing countries.

WATER & CLIMATE STRESS IN A DEVELOPMENT CONTEXT

Development objectives:

Food Security, Health, Education, Tourism,
Agriculture, Poverty reduction, Gender equality



Inputs:

Labor, Financing, Energy, Governance, **Fresh water**,
Natural resources, Transport, Infrastructure



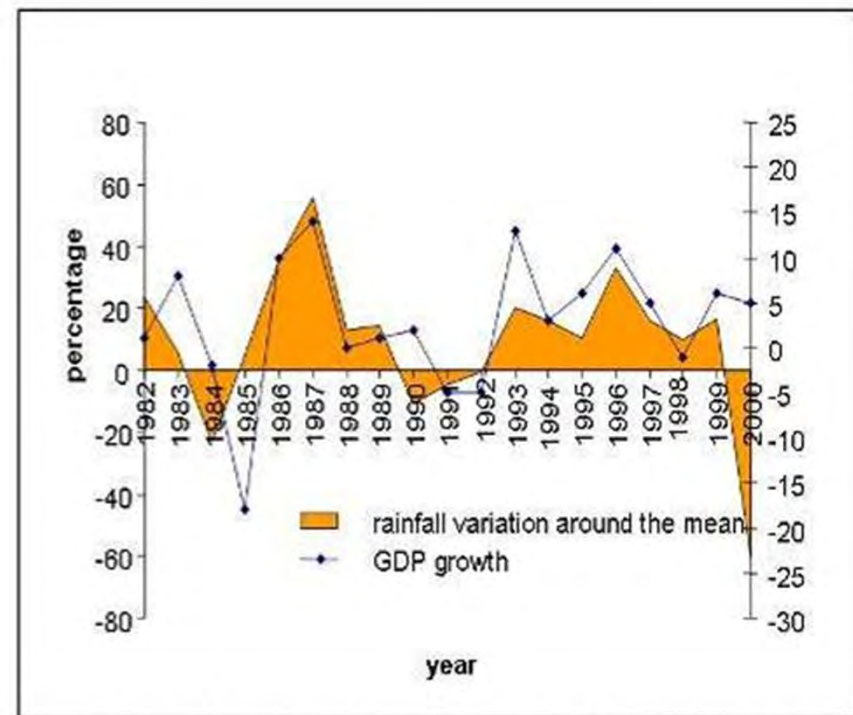
Stresses (climate and non-climate):

Changes in rainfall, temperature, sea level rise, storms,
pollution, urbanization, corruption

CLIMATE AND ECONOMIC GROWTH

- Developing country economies concentrated in climate sensitive sectors
- ~70% of developing country populations derive income from agriculture

Ethiopia: Rainfall, GDP, and Ag GDP



Source: The World Bank. "Managing Water Resources to Maximize Sustainable Growth: A Country Water Resources Assistance Strategy for Ethiopia." 2005.

WATER – ENERGY – FOOD NEXUS

- Calorie requirements rising
- Average 1 liter to grow 1 calorie
- 70% of water already allocated to agriculture
- Energy is biggest industrial water consumer
- Energy demand growing

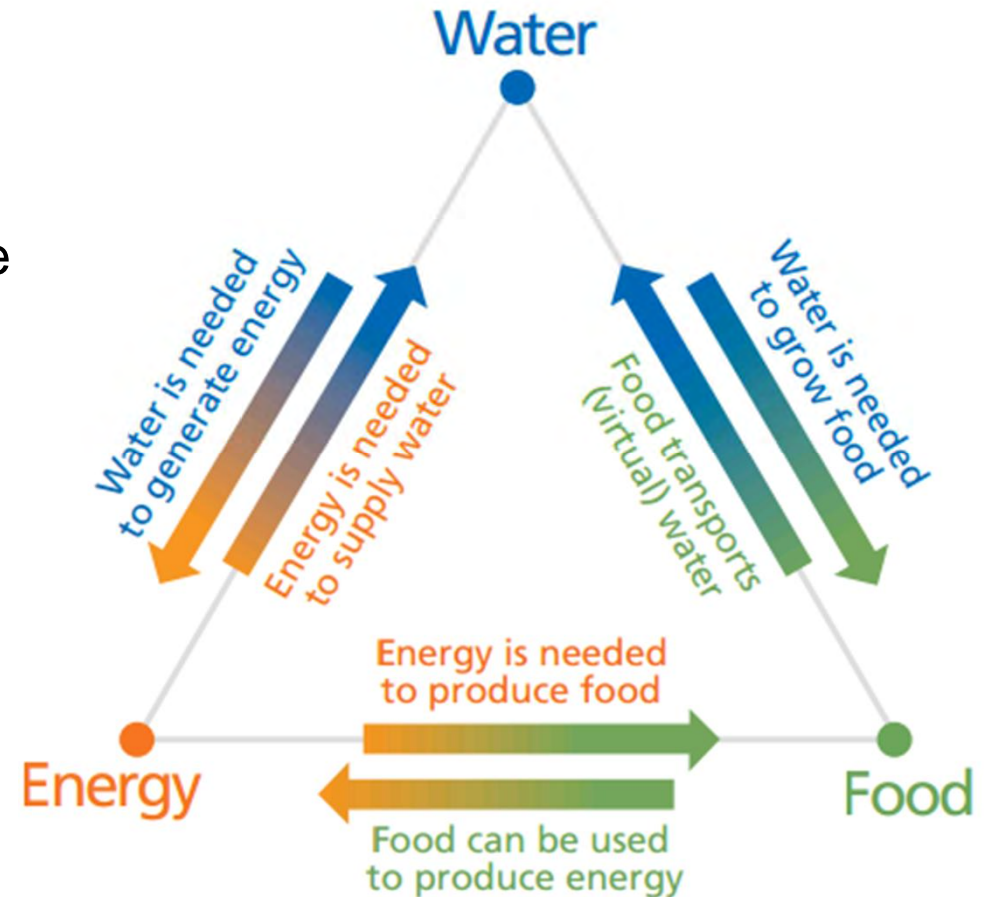
How do we...

Meet energy needs?

Double food production?

Safeguard ecosystems?

Manage floods?



Adapted from: Water – A Global Innovation Outlook Report, IBM 2009

WATER SECURITY

“The capacity of a population to safeguard sustainable **access** to adequate **quantities** of and acceptable **quality** water for sustaining **livelihoods**, **human well-being**, and **socio-economic development**, for ensuring protection against water-borne **pollution** and water-related **disasters**, and for preserving **ecosystems** in a climate of **peace and political stability**.”

Components of water security:

- *Sustainable quantity, quality, and access*
- *Sustaining multiple uses*
- *Preventing hydrological disasters and pollution*
- *Preserving ecosystems*
- *Effective governance*

★ *Climate Change Impacts*

LOOKING AHEAD

- **Increasing demand:** Urban demand for personal consumption, sanitation, industry, hydroelectric power, and water-intensive products like meat
- **Shifting supply:** Uncertain runoff changes, but 1/3 global population may live in basins where the water deficit will be larger than 50% by 2030
- **Poor water management trends:** Deforestation, leakage (30-50%), evaporation
- **Many opportunities for improvement:** Information, improved efficiency
- **Many risks:** Engineering solutions, maladaptation

GLOBAL WATER SECURITY

INTELLIGENCE COMMUNITY ASSESSMENT, Feb 2012

Conclusions

1. **Water problems**—when combined with poverty, social tensions, environmental degradation, ineffectual leadership, and weak political institutions—contribute to **social disruptions that can result in state failure**.
2. Historically, water tensions have led to more water-sharing agreements than violent conflicts. However, as water shortages become more acute beyond the next 10 years, **water in shared basins will increasingly be used as leverage**.

GLOBAL WATER SECURITY

INTELLIGENCE COMMUNITY ASSESSMENT, Feb 2012

3. Depletion of groundwater supplies in some agricultural areas—owing to poor management—will pose a risk to both national and global food markets
4. From now through 2040, water shortages and pollution probably will harm the economic performance of important trading partners (e.g., >15 developing countries generate >80% of their energy from hydropower)

GLOBAL WATER SECURITY

INTELLIGENCE COMMUNITY ASSESSMENT, Feb 2012

5. Improved water management (e.g., pricing, allocations, and “virtual water” trade) and investments will afford the best solutions for water problems
6. Because agriculture uses approximately 70% of the global fresh water supply, the greatest potential for relief from water scarcity will be through technology that reduces agricultural water use

IMPACTS ON WATER PRODUCTIVITY

Direct Climate Change Impacts	Indirect Climate Change Impacts
<ul style="list-style-type: none">• Changing precipitation cycles affecting timing, amount, and intensity of rainfall.• Changing inputs to water storage and flow due to changes in volume and timing of surface flows• Increased evaporative losses as temperature rises• Damage to infrastructure due to extreme weather events, coastal inundation• Flooding due to increasing rainfall over shorter periods of time• Contamination/salinization of coastal soils due to sea level rise and coastal flooding	<ul style="list-style-type: none">• Lost agricultural productivity due to more variable precipitation cycles (for rainfed systems) or unreliable stored water supplies (for irrigation)• Damage to crops from flooding or extreme events• Damage to irrigation infrastructure from flooding/ extreme events• Unreliable energy production from hydropower facilities due to less or more variable surface water supplies• Increased costs to manufacturers and municipalities to provide more secure water supply• Risks to industrial production due to increasing unreliability of water supplies• Disruption in fisheries productivity due to variable environmental flows and increasing competition from humans for scarce water supplies

IMPACTS ON WATER RESOURCES MANAGEMENT

Direct Climate Change Impacts	• Indirect Climate Change Impacts
<ul style="list-style-type: none"> • Changing precipitation cycles in amount, timing and location. • Changing inputs to water storage and flow due to changes in volume and timing of surface flows • Damage to infrastructure due to extreme weather events, coastal inundation • Flooding due to increasing rainfall over shorter periods of time 	<ul style="list-style-type: none"> • Increasing human conflict and strained governance over scarce and/or more variable water supplies • Potential population migrations of most vulnerable populations due to drought, natural disasters or other climate shocks. • Disruption in basic social and economic services due to extreme events and sea level rise, including damages to urban settlements, roads, ports, navigation channels, power plants, etc. • Strains on public budgets and institutional capacity to prevent, prepare for, and mitigate impacts of extreme events and sea level rise • Diminished health of aquatic / marine ecosystems (e.g., wetlands, riparian areas, coastal systems, coral reefs, etc.) due to altered timing and amounts of freshwater flows, changing temperatures, etc.

IMPACTS ON WASH

Direct Climate Change Impacts	Indirect Climate Change Impacts
<ul style="list-style-type: none"> • Damage to infrastructure due to extreme weather events, coastal inundation • Contamination of water supplies through saltwater intrusion or contaminated runoff • Flooding due to increasing rainfall over shorter periods of time • Changing inputs to water storage due to changes in volume and timing of surface flows • Increased evaporative losses as temperature rises 	<ul style="list-style-type: none"> • Lost productivity due to disruptions in piped water and sewerage services • Spread of waterborne diseases if treatment systems fail or flooding occurs • Increasing competition for water among sectors • Higher operating costs and/or shorter lifetime of water systems • Displacement of populations if water resources shift or are impaired • Increased travel distances to collect water if supplies are no longer safe and productive • Conflict over scarce water resources • Unhygienic conditions in the event of storms or flooding

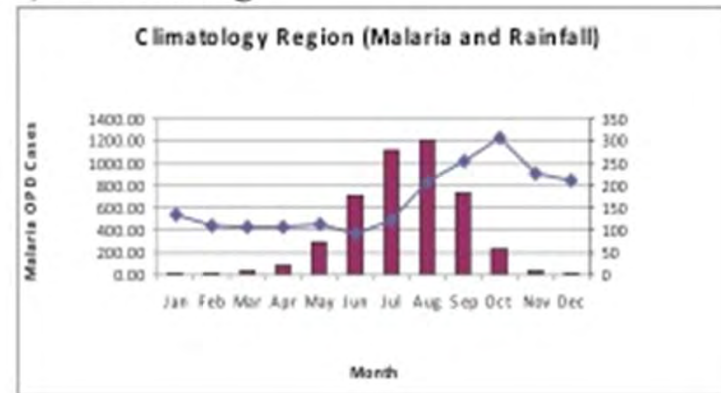
IMPACTS ON HEALTH

Climate-sensitive health outcomes or diseases are:

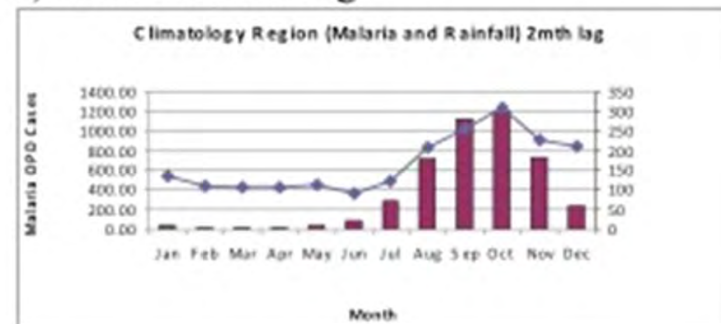
Any disease or health outcome whose geographic range, incidence, and intensity of transmission or occurrence is directly or indirectly associated with weather.

- **Waterborne:** cholera, dysentery, typhoid fever, diarrhea
- **Vector-borne:** dengue, malaria (mosquitos), onchocerciasis (flies), schistosomiasis (snails), Guinea worm (copepods)
- **Water scarcity-related:** Malnutrition

a) without lag



b) with 2 month lag



Malaria in Northern Ethiopia

IMPACTS ON HEALTH

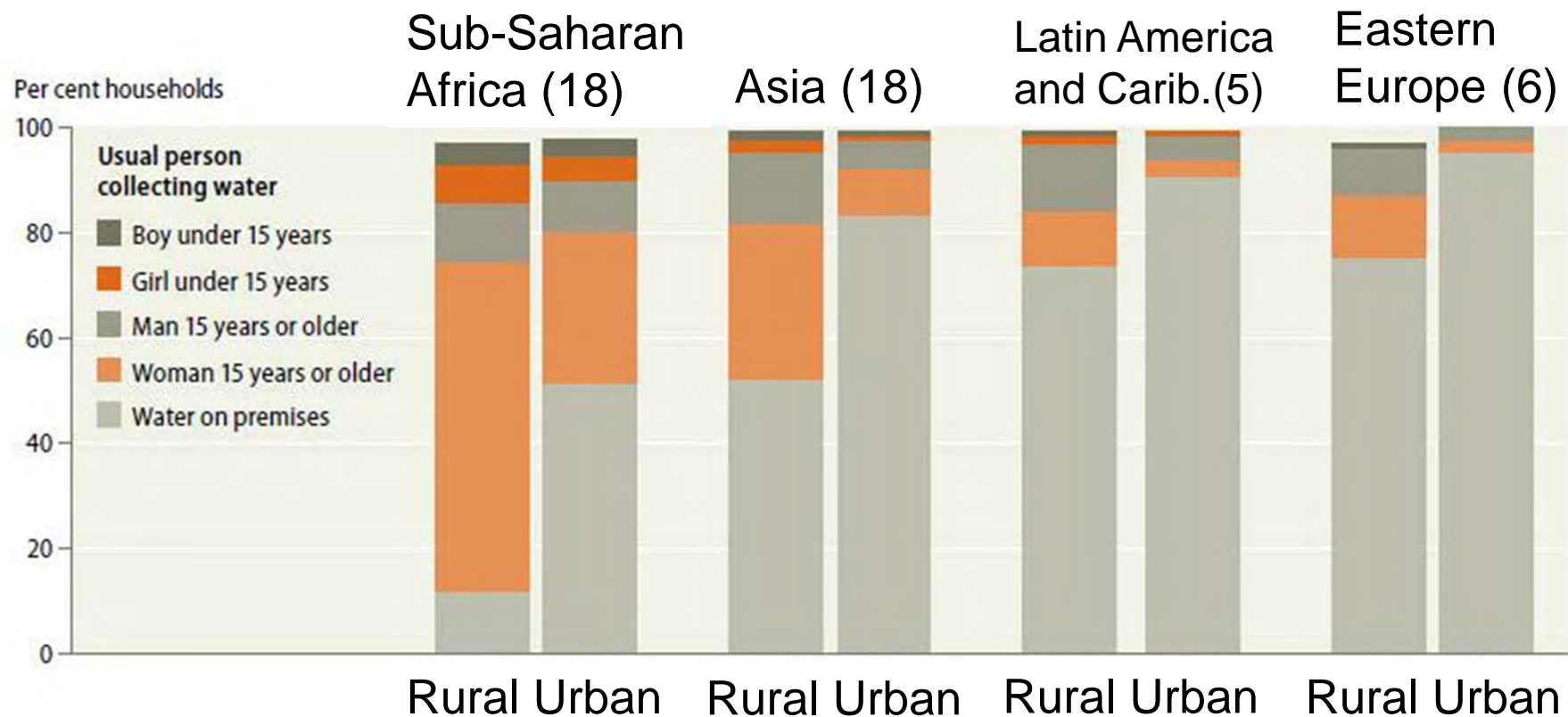
Climate change increases risks for diarrheal disease because:

- Pathogens in food and water grow faster in warmer temperatures.
- Erratic rainfall and glacial melt negatively affect water availability for drinking and hygiene.
- Extreme rainfall can damage or destroy water and sanitation infrastructure and increase the transport of pathogens into the water supply and environment.



GENDER DIMENSIONS

Distribution of households by person responsible for water collection (2005-2007)



CLIMATE IMPACTS ON WATER BY REGION

River Basin	Type of Water Issue	Impact/Expected Time	River Basin Management Capacity ^b
Indus	<ul style="list-style-type: none"> • Poor water management • Inefficient agricultural practices • Soil salinization • Inadequate infrastructure • Greater variability in water availability • Water pollution 	<ul style="list-style-type: none"> • Degraded regional food security—present to 2040 • Reduced resiliency to floods and droughts—present to 2040 	Moderate
Jordan	<ul style="list-style-type: none"> • Depleted shared groundwater resources • Greater variability in water available • Water pollution • Poor coordination between countries 	<ul style="list-style-type: none"> • Reduced resiliency to floods and drought—present to 2040 • Degraded regional food security—present to 2040 • Continuing regional tensions over water—present to 2040 	Moderate
Mekong	<ul style="list-style-type: none"> • Increased development and demands • Greater variability in water available • Changes in sediment flows 	<ul style="list-style-type: none"> • Reduced regional food security (to include fisheries) and negative impact on livelihoods—present to 2040 • Reduced resiliency to floods and droughts—present to 2040 • Increased regional tension over water development activity—present to 2040 	Limited
Nile	<ul style="list-style-type: none"> • Decreasing per capita water available • Inadequate water agreements and management structure • Greater variability in water available • Water flow impeded as new dam reservoirs are filled • Delta erosion 	<ul style="list-style-type: none"> • Degraded food security—present to 2040 • Reduced resiliency to floods and droughts—present to 2040 • Increased regional tensions over water and use of water as leverage—present to 2040 	Limited

CLIMATE IMPACTS ON WATER BY REGION

River Basin	Type of Water Issue	Impact/Expected Time	River Basin Management Capacity ^b
Tigris-Euphrates	<ul style="list-style-type: none"> • No multilateral water-sharing agreement. • Increased variability in water supply • Reduced water flow near-term • Altered sediment flows to downstream agricultural and marshlands 	<ul style="list-style-type: none"> • Reduced resiliency to floods and droughts—present to 2040 • Reduced regional food security—present to 2040 • Continued regional tensions over unilateral water development projects and management—present to 2040 	Limited
Amu Darya	<ul style="list-style-type: none"> • Inadequate water agreements • Degradation of water quality and disruption of flows some states • Poor water management 	<ul style="list-style-type: none"> • Degraded regional food security—present to 2040 • Increased regional tensions over water—present to 2040 • Decreased health of populations around dried Aral Sea 	Inadequate
Brahmaputra	<ul style="list-style-type: none"> • Uncoordinated land use and development plans • Insufficient water agreements • Reduced water flows • Saltwater intrusion into the delta 	<ul style="list-style-type: none"> • Continuing regional tensions over unilateral water development projects—present to 2040 • Reduced potential for hydropower generation in some states—2020 to 2040 • Reduced regional food security, especially fisheries—present to 2040 	Inadequate

KEY MESSAGES

- **Developing countries are particularly sensitive to changes in water cycle** due to highly-dependent economies
- **Water is a key input** to development that will be affected by climate change through changes in rainfall, temperatures, and sea level rise
- **Water-food-energy-climate are connected** and should be considered together
- **Women** are particularly sensitive to climate impacts on water resources
- Addressing climate risks is **imperative for water security and sustainable development**

EXERCISE

At your tables:

1. Read the water security or water-food-energy nexus handout
2. Consider your programs
3. Brainstorm and discuss:
 - **What are the implications for our work?**
 - **What are we already doing that is supportive of solutions?**
 - **What more do we need to do?**
4. Be prepared to share with the broader group.

You have 10 minutes for your discussion.



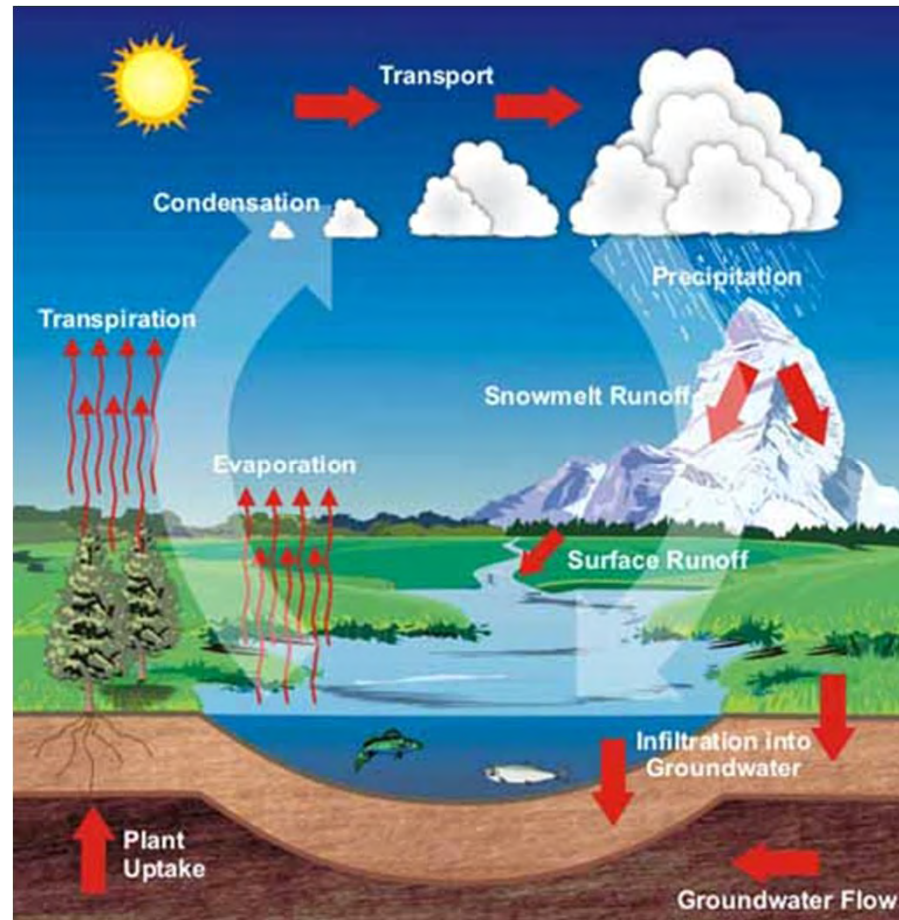
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LINKS BETWEEN CLIMATE CHANGE ADAPTATION AND INTEGRATED WATER RESOURCES MANAGEMENT

JULY 22, 2013
RICHARD VOLK

INTERCONNECTED SYSTEMS.....

Climate Cycle



Hydrologic Cycle

INTEGRATED WATER RESOURCES MANAGEMENT (IWRM)

Complex water resources challenges demand a holistic management approach



IWRM and ICM:
The strategic response to
water and coastal resource challenges

DEFINITION

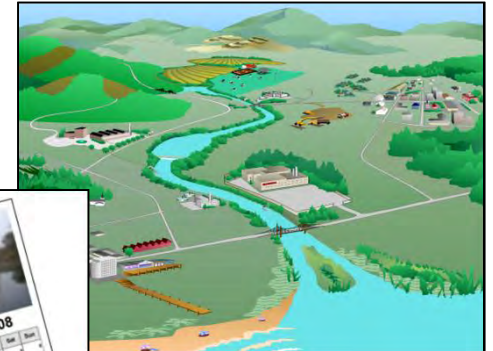
IWRM is "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems."

Global Water Partnership (2000)

ICM refers to the integration of objectives and also to the integration of relevant policies, sectors, and levels of administration to meet those objectives. It means integration of the terrestrial and marine components of the target territory, in both time and space.

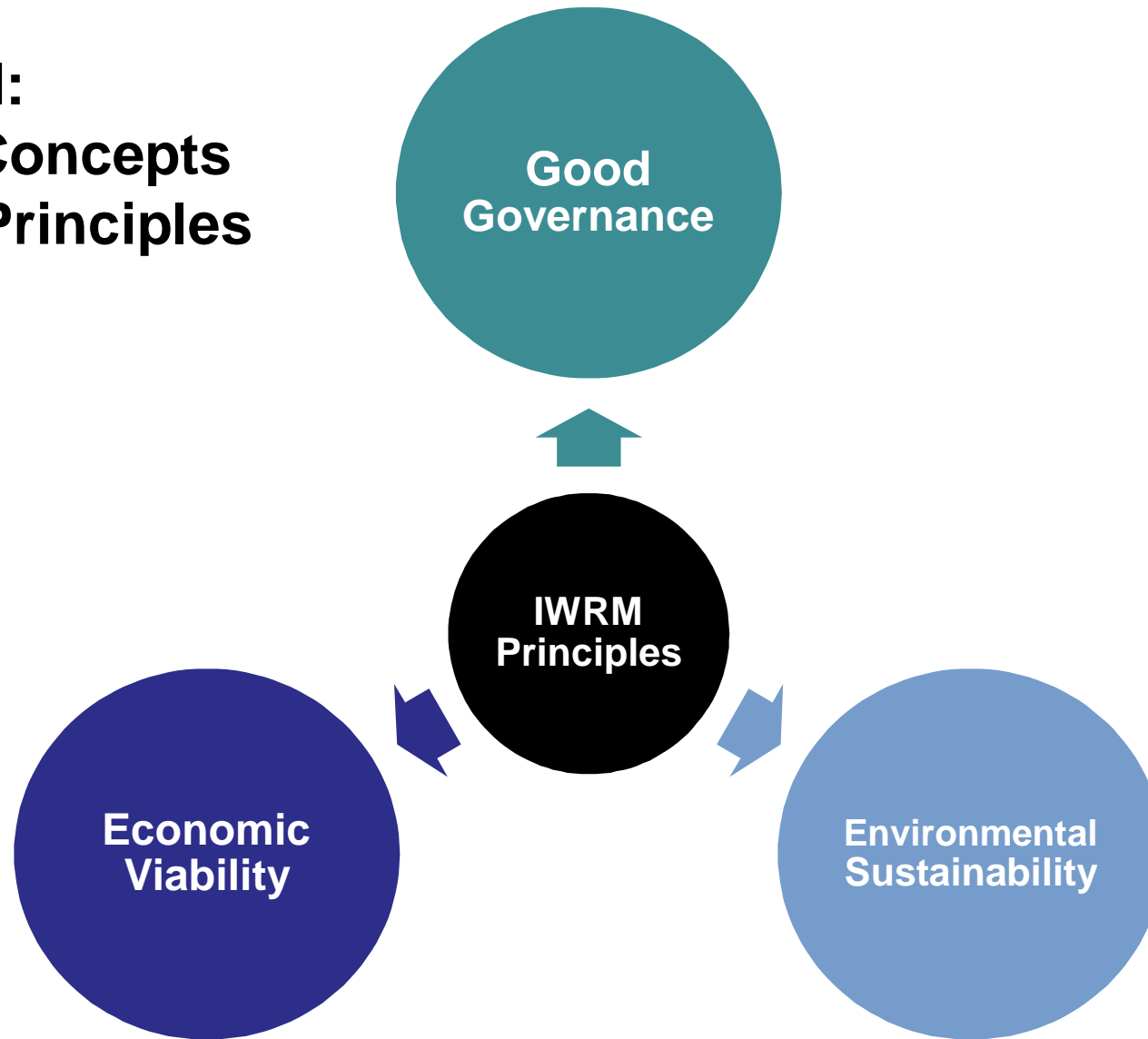
WHAT'S INTEGRATED ABOUT IWRM?

- **Geographic Scale** (basin/ecosystem, land/water, upstream/downstream, surface/groundwater, freshwater/coastal/marine)
- **Time** (long-term sustainability, intergenerational equity)
- **Resource Use Sectors** (agriculture, domestic, industry, tourism, fisheries, ecosystems)
- **Society / Institutions** (government, private sector, NGOs/civil society)

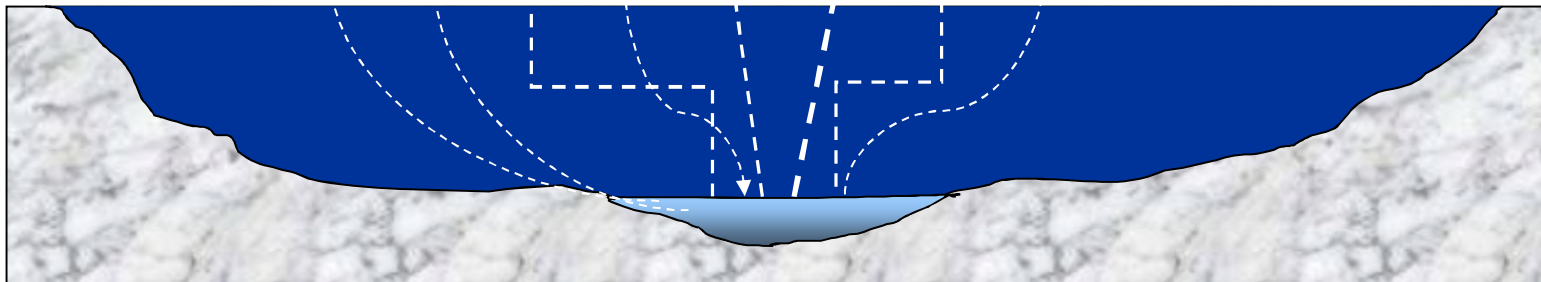
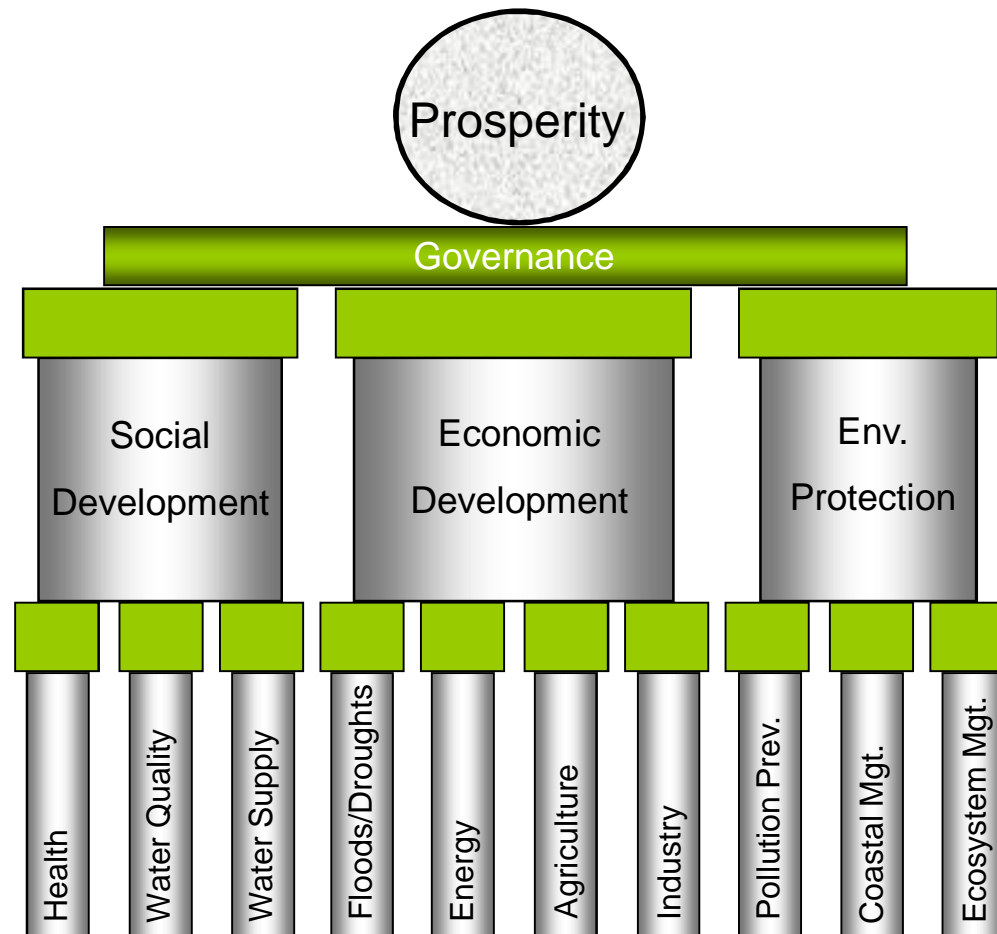


INTEGRATED WATER RESOURCES MANAGEMENT

IWRM: Key Concepts And Principles

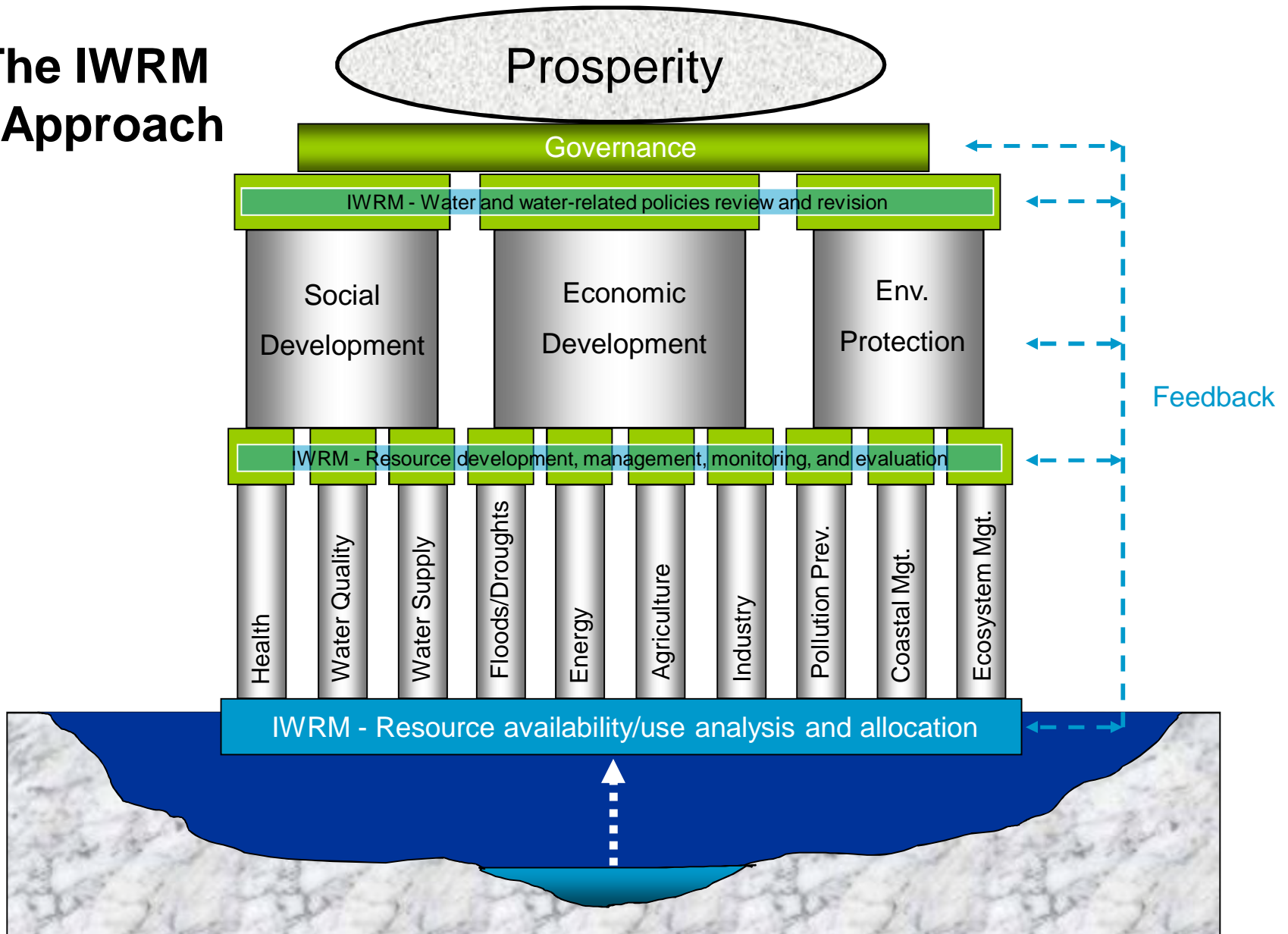


SECTOR COMPETITION FOR WATER



SCHEMATIC OF THE DEVELOPMENT PROCESS

The IWRM Approach



GOOD GOVERNANCE

- Transparent **decision-making**
- Multi-stakeholder **participation**
- **Gender** inclusive programming
- **Sound science** and information management

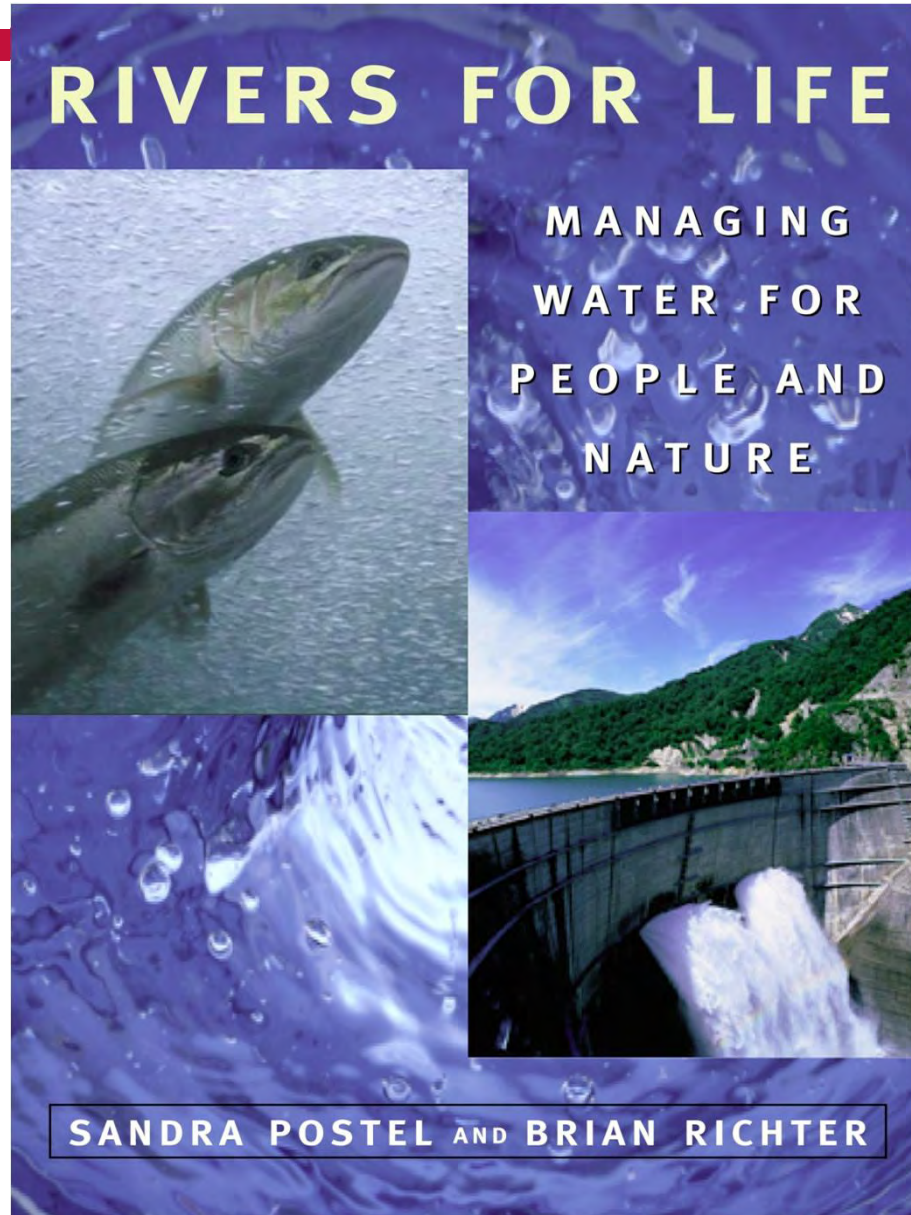


- **Decentralized, “nested” governance**
- Effective **policy and legal** frameworks
- Strong and coordinated **institutions**

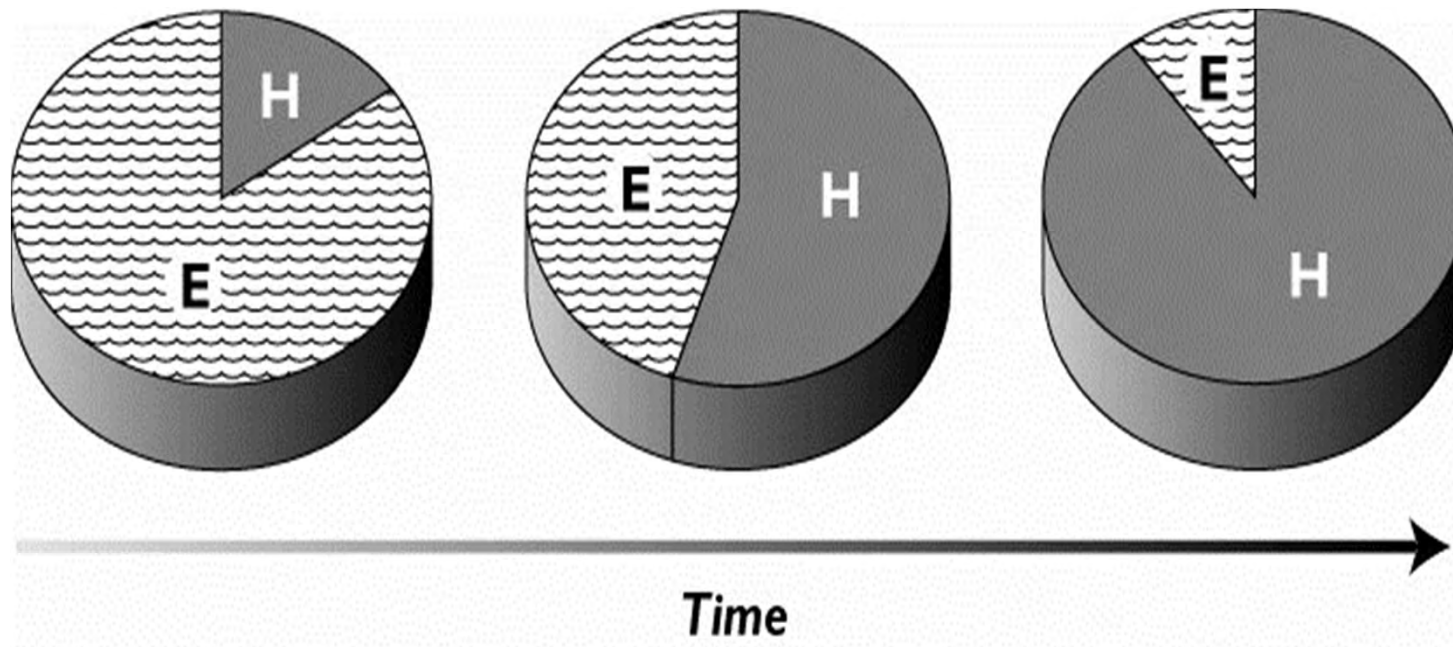
ENVIRONMENTAL SUSTAINABILITY



- Recognition of **ecosystems** as a legitimate ‘user’
- Free “**goods and services**”
- Think of ecosystems as “**critical infrastructure**”

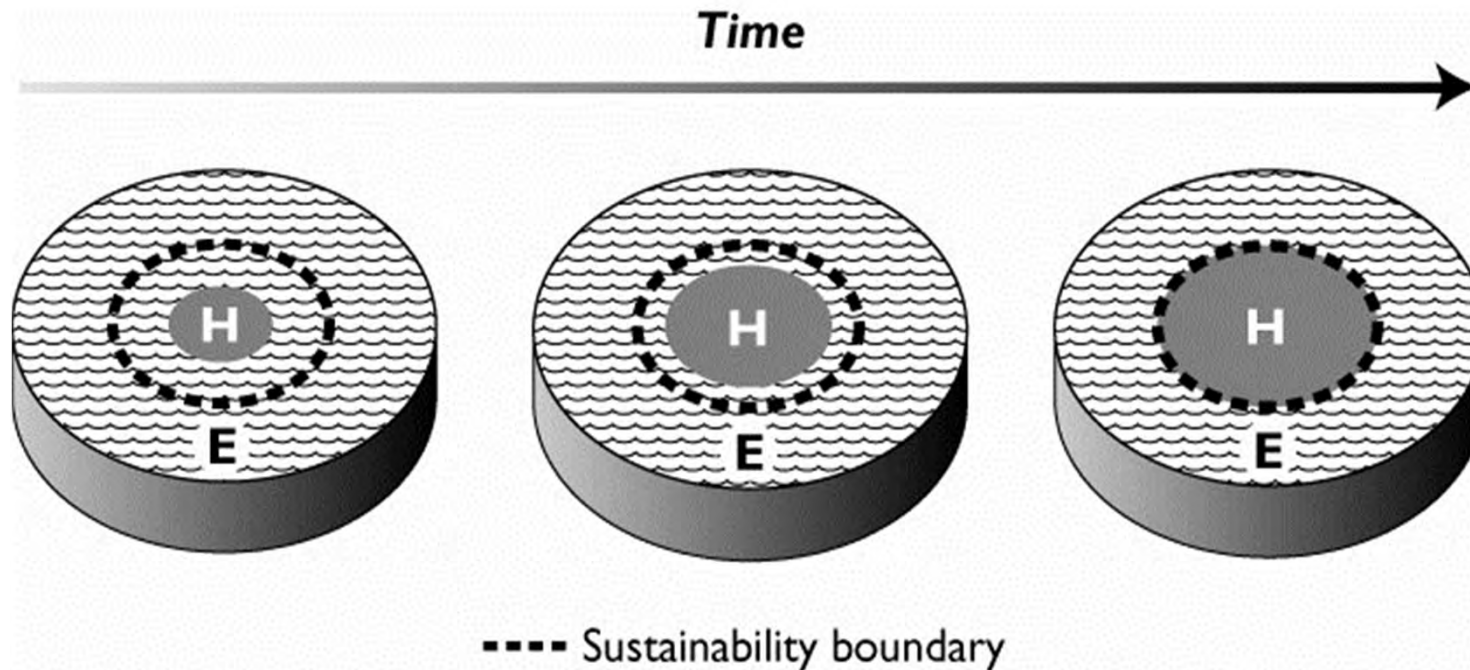


WATER ALLOCATION: 20TH CENTURY



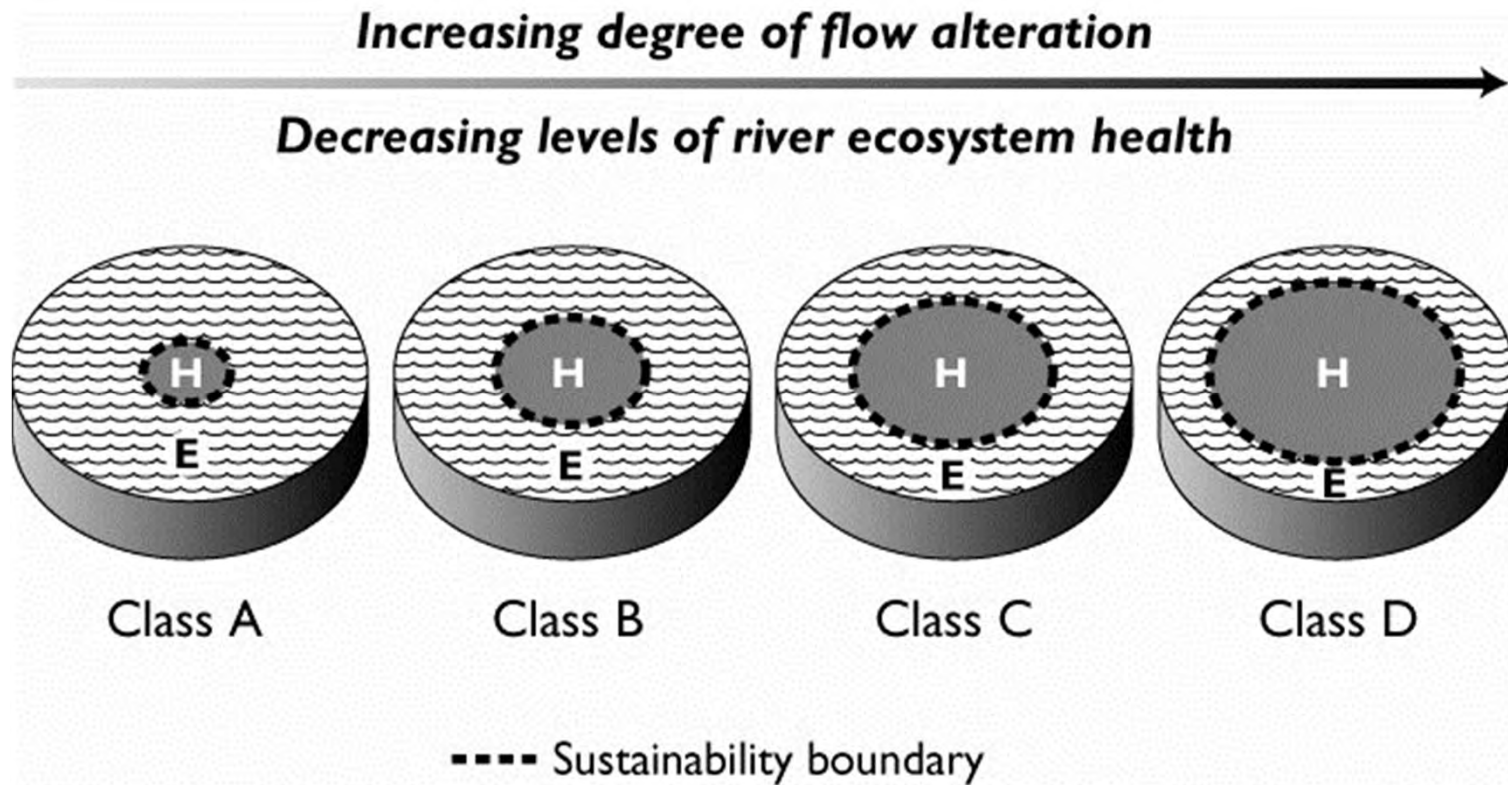
20th Century Approach to Water Allocation

WATER ALLOCATION: 21ST CENTURY (PROPOSED)



Proposed 21st Century Approach to Water Allocation

SUSTAINABILITY BOUNDARIES



Setting Sustainability Boundaries to Attain Different Categories of River Health

ECONOMIC VIABILITY

- Water is an **economic good**
- **Users** and **polluters** must pay
- Sustainable financing for:
- **Infrastructure** – capital & operations/maintenance – and
- **Water resources/ watershed / coastal resources management**
- Water sustainability considered in **value chain** analysis and planning
- Flexible models of **public-private partnership**



CLIMATE CHANGE ADAPTATION

Development advances are at risk of being undermined by climate change



CLIMATE CHANGE ADAPTATION

Adaptation is a process by which individuals, communities and countries seek to cope with the consequences of climate change, including climate variability.

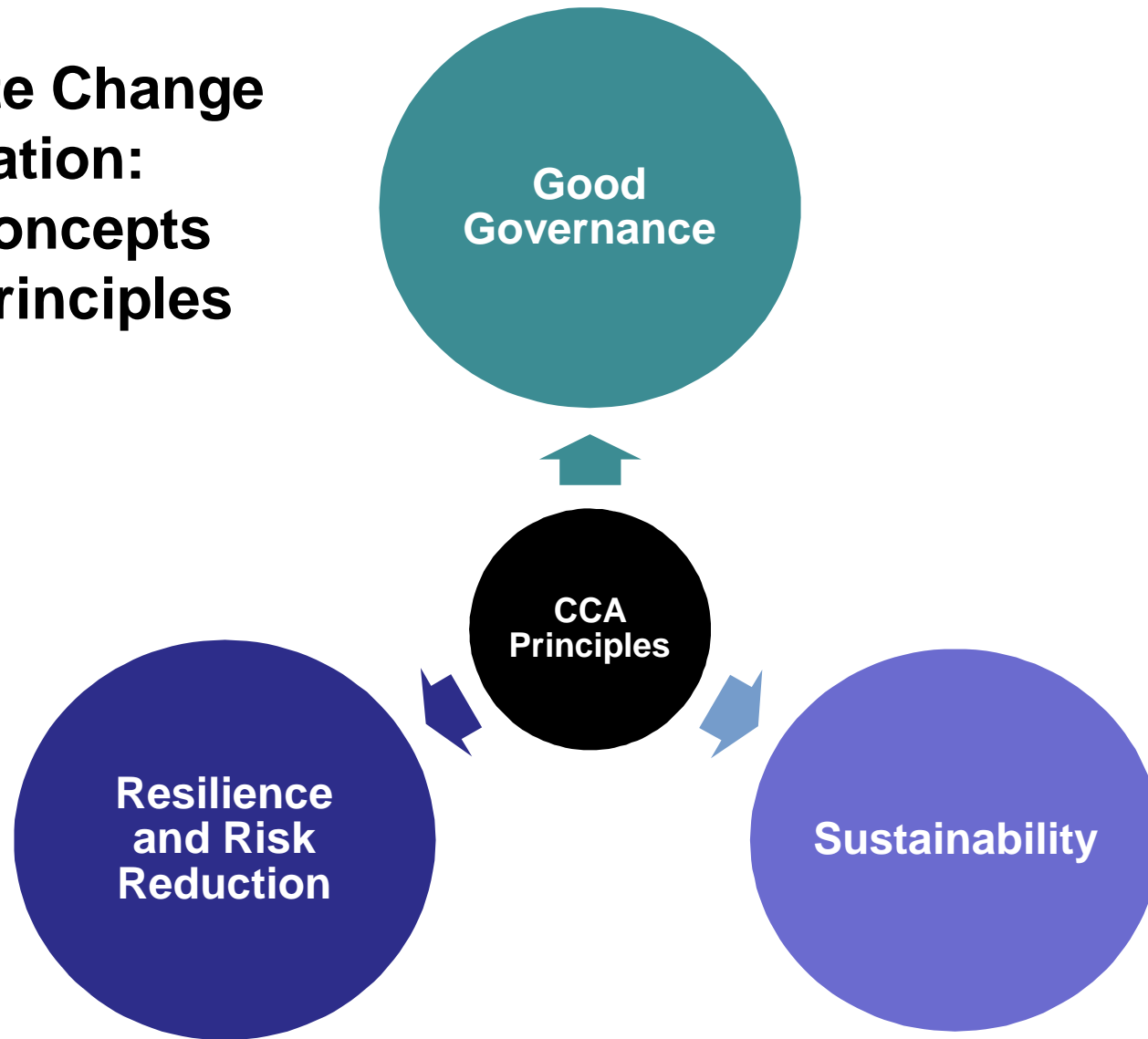
It should lead to harmonization with country's more pressing development priorities such as poverty alleviation, food security and disaster management.

Implications for our role in development assistance:

- Support partners to make these adjustments
- Design activities that help protect critical infrastructure, ecosystem function, and natural resources
- “Climate proof” our own investments
- Not something done once, but rather a process of assessing, planning, acting, monitoring, and adjusting

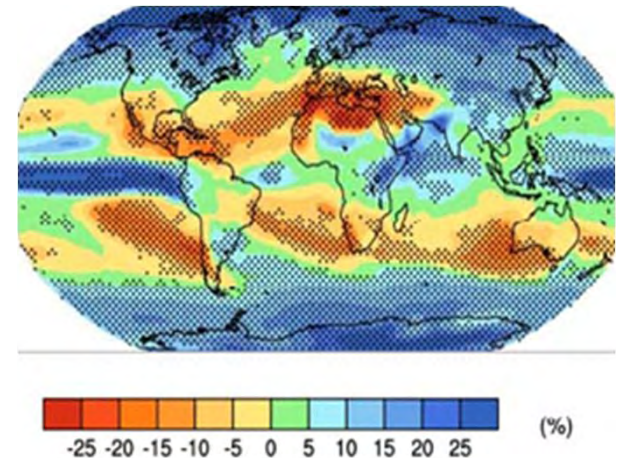
CLIMATE CHANGE ADAPTATION

Climate Change Adaptation: Key Concepts And Principles



GOOD GOVERNANCE

- **Sound science** and information based decision-making
- Management of **uncertainties**
- Capacity to **monitor/assess/report**



- **Country-led** and **community-based** processes
- Multi-stakeholder **representation**
- **Gender** inclusive programming
- **Equity** and **legitimacy** in approaches and access to benefits
- Inter-institutional **coordination**.

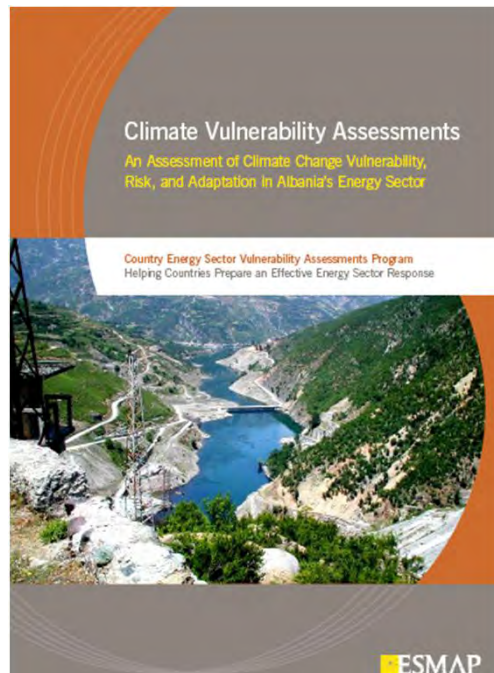
SUSTAINABILITY

- **Ecosystem-based** approaches important
- **Flexible approaches** to avoid maladaptation
- **Sustainable financing** a critical challenge
- **“Adaptive management”** is key!



- **Long-term** focus
- **“Do No Harm”**= avoid maladaptation (environmental, social, cultural, economic)

RESILIENCE AND RISK REDUCTION

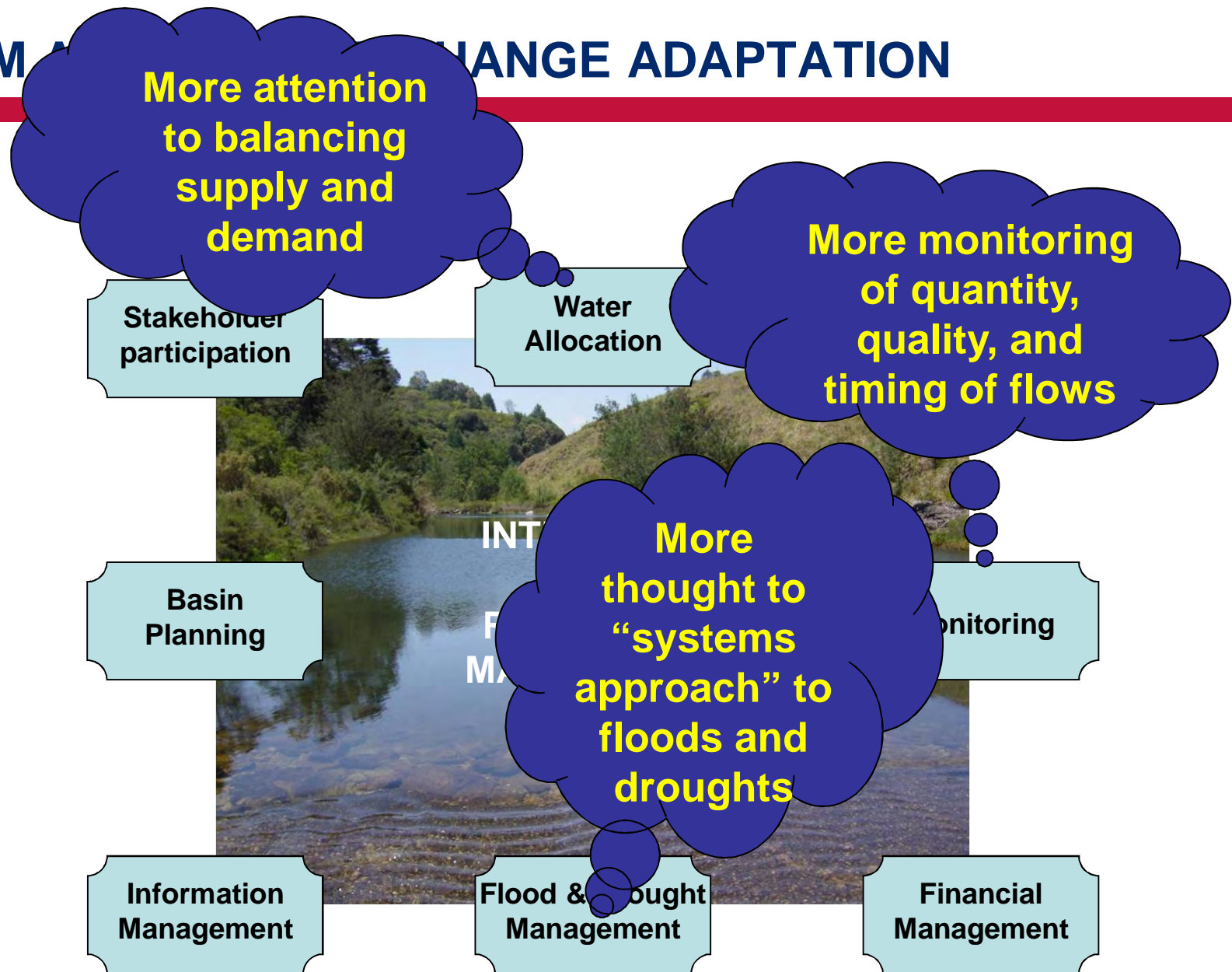


- Based on **vulnerability** assessments
- Focus on reducing vulnerability to identified **risks**
- Building **resilience** is a central approach (i.e. the capacity of a system to absorb disturbance and still retain its basic functions and structure)

- **Integrated, multi-faceted** strategies
- “**No Regrets**” approaches
- Continual **evaluation** important



IWRM AND CLIMATE CHANGE ADAPTATION



CONCLUSIONS

- Strong **parallels and synergies** exist between IWRM and climate change adaptation paradigms, concepts, and approaches
- Success and sustainability of each approach is **interdependent** with the success of the other



Questions?

TABLE EXERCISE

- Working at your tables, review the short “mini-case” about a country in Asia that is starting to work on IWRM.

- Discuss the case and ask yourselves:

What kind of climate change adaptation approaches or activities strengthen this IWRM program?

- Chart your work and be prepared to report out
- You have 15 minutes



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FROM THE AMERICAN PEOPLE

DIGGING DEEPER INTO VULNERABILITY

JULY 22, 2013
JENNY FRANKEL-REED

WHAT IS VULNERABILITY?

Vulnerability: determined by exposure, sensitivity, adaptive capacity

• **Exposure:** Is an asset out in the elements?

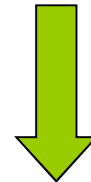
↓ – Flooding, drought, erosion, sedimentation

• **Sensitivity:** Does exposure matter?

↓ – Are crops/livestock suitable to a range of temperatures and rainfall conditions?

• **Adaptive Capacity:** Can you respond?

↑ – Irrigation, diversification, insurance
↑ – Early warning, zoning, standards



WHAT IS EXPOSURE?

Definition: *Whether an asset faces weather and climate*

Question: *Is an asset touched by a climate stress? Which? When?*

Key issues: *Location, timing*

- Are important infrastructure/settlements **exposed** to weather/climate stress due to location in a flood plain? In a coastal zone? On a hillside? What time of year?

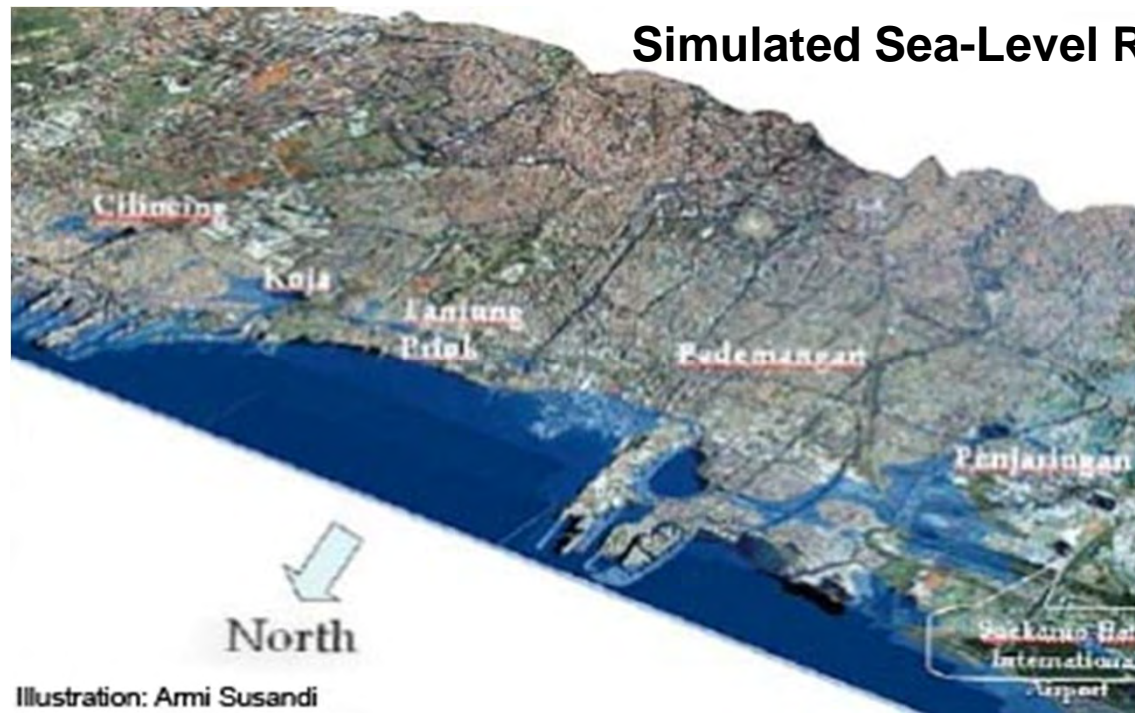


Illustration: Armi Susandi

Source: Hadi and Susandi in 2007

WHAT IS SENSITIVITY?

Definition: *The intrinsic properties of an asset that make it more or less susceptible to harm from a climate stress*

Question: *Does exposure matter to an asset? Why?*

Key issues: *Internal properties, tolerances, thresholds*

- In past events, were similar inputs affected differently?
- Why were there different impacts?



WHAT IS ADAPTIVE CAPACITY?

Definition: *The ability to adjust, prevent or moderate damages, take advantage of opportunities, or cope with the consequences*

Question: *What capabilities do people have to adjust?*

Key issues: *Flexibility, adjustment, human action*

- Components:
 - Financial
 - Institutional
 - Information
 - Ecological
 - Social



Highly relevant for people who control few other inputs

QUESTIONS TO EXPLORE

Water Supply, Sanitation, Hygiene

- *Where is water contaminated when there is a flood?*
- *Who suffers more/less and why?*
- *What do people do to prevent flooding /contamination or get clean water?*

Exposure

Sensitivity

Adaptive Capacity

Water Productivity

- *Will changing river flows affect hydropower operations?*
- *Can the turbine withstand increasing silt load?*
- *Can the reservoir be managed to buffer changes in flow?*

Exposure

Sensitivity

Adaptive Capacity

QUESTIONS TO EXPLORE

Water Resources Management

- *Can coastal vegetation withstand increasing salinity/water logging?*
- *Are water governance systems in place to mobilize ecosystem services protection?*
- *How far will salt water intrude into the coastal aquifer?*

Sensitivity

Adaptive Capacity

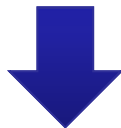
Exposure

HEALTH IMPACTS– IMPORTANCE OF VULNERABILITY

Comparison of Vulnerability to Flood-Related Disease Outbreaks



- Sparse Population
- Robust health
- Sealed sewage systems
- Cholera and typhoid absent
- High coverage of public health



**Low Vulnerability
to Disease Outbreak**



- Dense Population
- Underlying diseases/malnutrition
- Open sewage systems
- Cholera and typhoid present
- Limited coverage of public health



**High Vulnerability
to Disease Outbreak**

VULNERABILITY TERMS EXAMPLES

Stress	Reduce Exposure	Reduce Sensitivity	Increase Adaptive Capacity
Flood	Cover open wells, upgrade sanitation	Improve nutritional status	Develop back up water sources
Drought	Plant shade trees or ground cover to reduce soil moisture loss	Plant varieties that are more tolerant of heat, drought	Improve information and forecasting available to farmers
Storm surge	Move infrastructure out of storm surge zone	Unclog drainage pipes to improve drainage of heavy rainfall	Improve early warning system and municipal government response

DEFINITIONS – TWO MORE

What about **risk**?

Risk is the combination of probability and severity

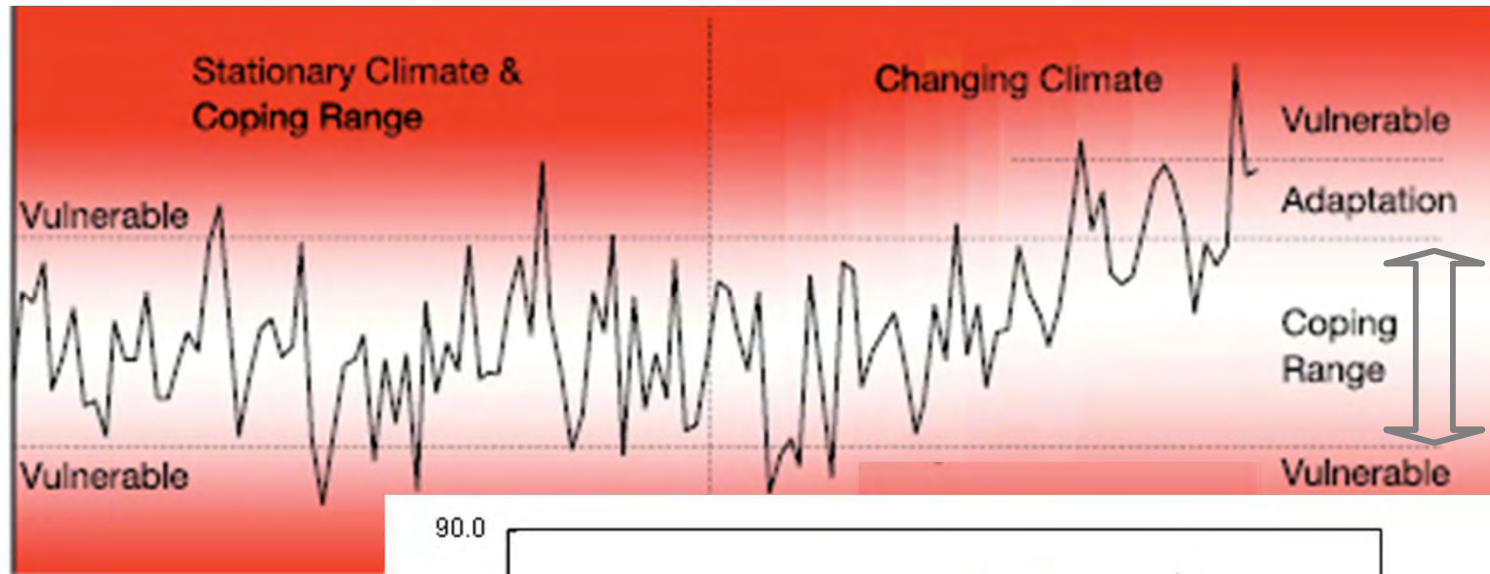
- *Low probability, low severity = low risk*
- *High probability, low severity = ?*
- *Low probability, high severity = ?*
- *High probability, high severity = high risk*

What is **resilience**?

The ability of a system to adjust to or rebound (from climate and non-climate impacts) while still maintaining its basic function and structure.

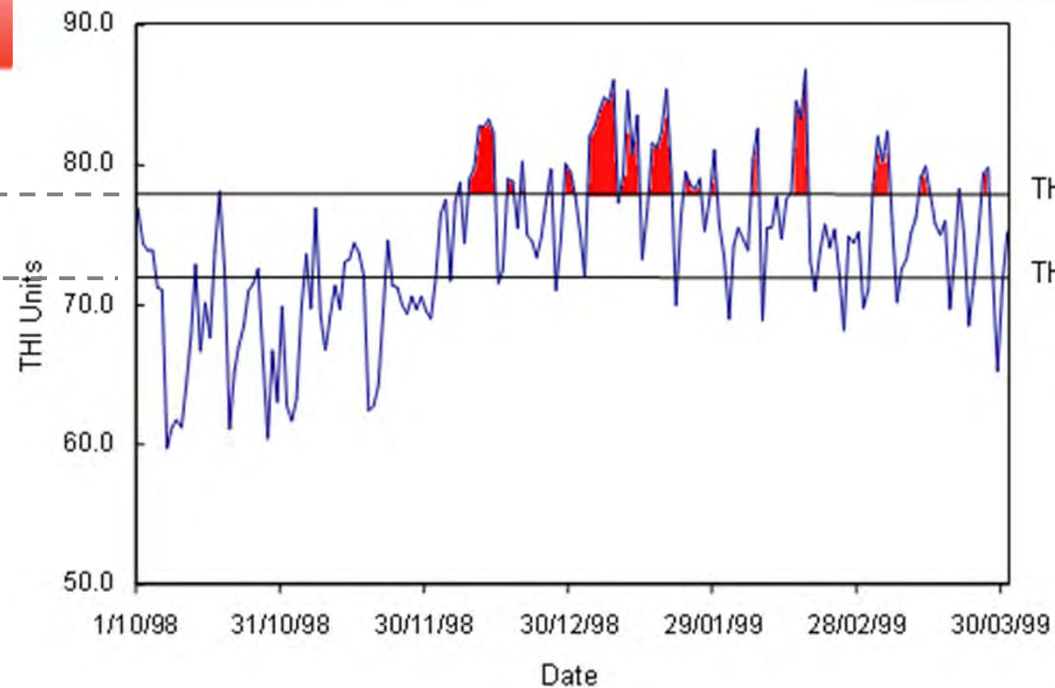
Sources: Risk - Technical Standard Risk Taxonomy Published by The Open Group, 2009
Resilience - US Forest Service

ADAPTATION AND COPING



Example: Dairy Cattle
Moderate heat stress

Mild heat stress



WHAT DO YOU SEE?



WHAT DO YOU SEE?



WHAT DO YOU SEE?



WHAT DO YOU SEE?



WHAT DO YOU SEE?



PICTORIAL EXERCISE

- A facilitator will guide you through a pictorial exercise to reinforce your understanding of the concepts of “exposure” “sensitivity” “adaptive capacity” and “vulnerability.”
- Tell a story
- Pick a card

DEFINITIONS

- **Exposure:** The extent to which something -- an input or asset -- is faced with climate stress.
- **Sensitivity:** The degree to which a system can be affected, negatively or positively, by changes in climate.
- **Adaptive Capacity:** Ability to adjust to climate change to moderate damage, take advantage of opportunities or cope with consequences. Determined by economic, technological, information, human, social and institutional resources.

Vulnerability = Exposure + Sensitivity + Adaptive Capacity



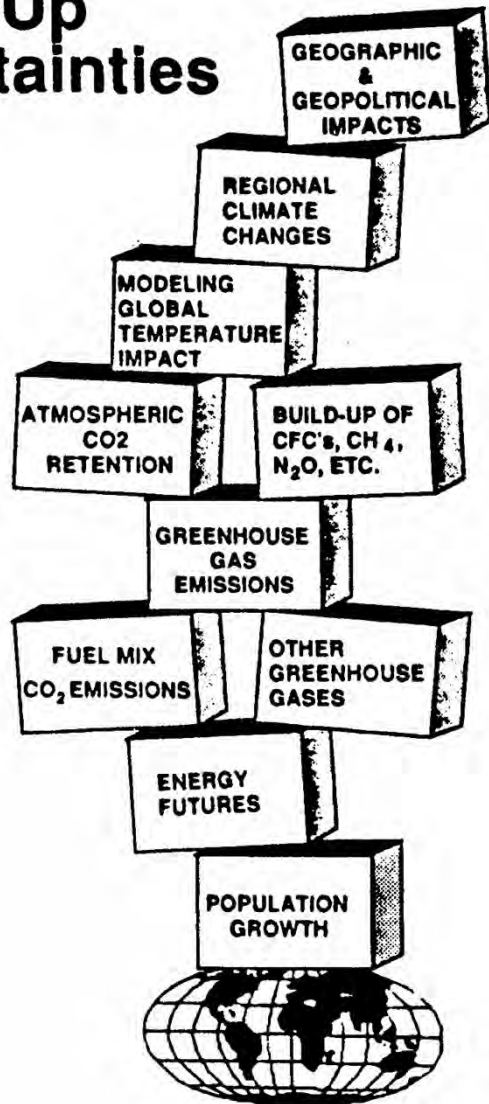
USAID
FROM THE AMERICAN PEOPLE

USING INFORMATION FOR WATER AND CLIMATE CHANGE ADAPTATION PROGRAMMING

JULY 22, 2013
KATY BEGGS

CLIMATE CHANGE – INCREASED UNCERTAINTY

Piling Up Uncertainties



Changes characterised by uncertainties regarding:

- magnitude
- timing
- spatial distribution

As well as uncertainties with respect to vulnerabilities

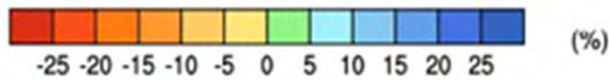
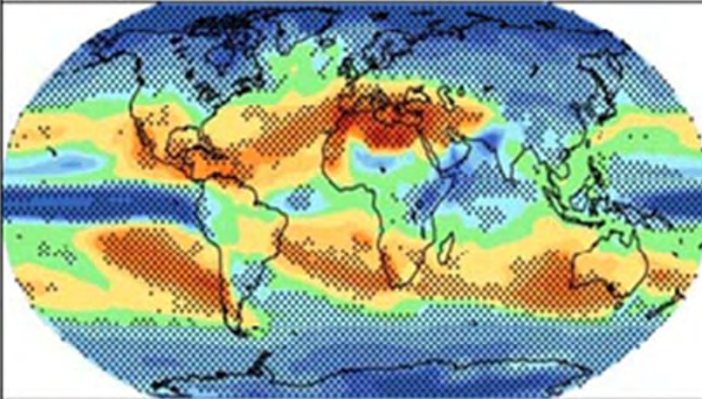
***BUT* planners have always worked amongst uncertainty**

SESSION OVERVIEW

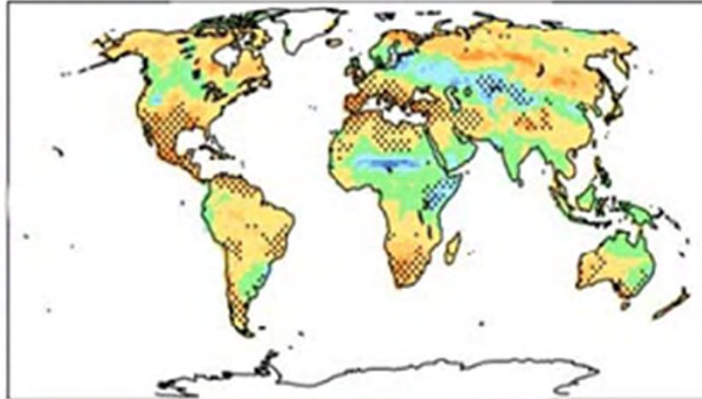
- Climate change poses a variety of challenges for water management, and there is a need to develop methods for understanding and managing risk
- Challenges in using projects based on Global Circulation Models (GCMs) for local decision making
 - Most data is for continental or regional scale
 - Downscaling is a challenge
- A number of tools and information sources are available to provide data at different scales which may be applicable for your planning needs

PROJECTED CHANGES IN HYDRO METEOROLOGICAL VARIABLES

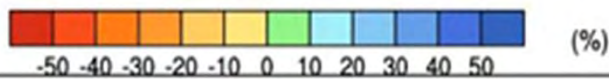
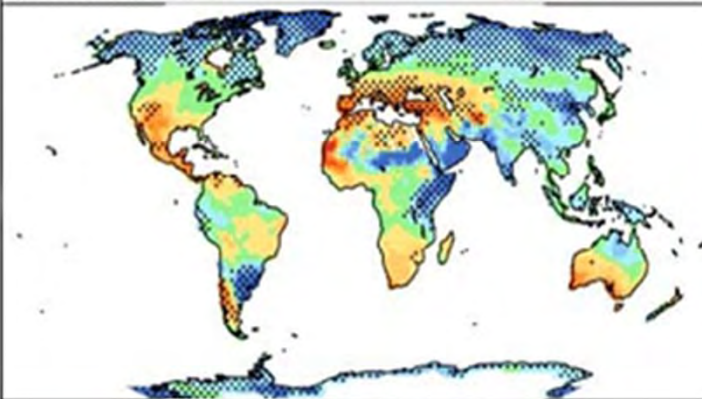
a) Precipitation



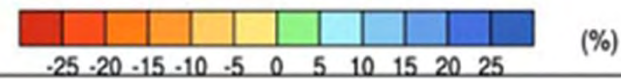
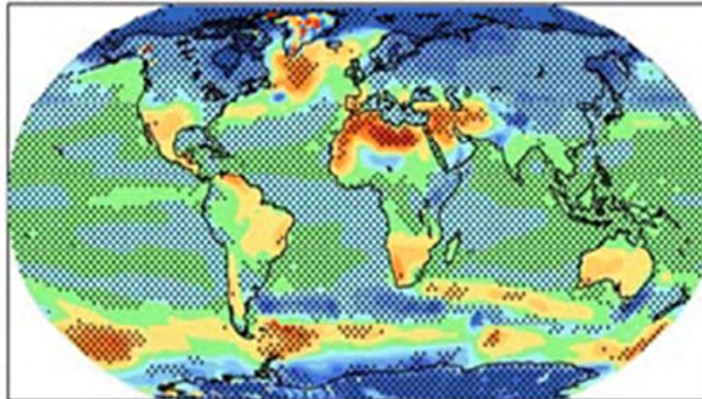
b) Soil moisture



c) Runoff



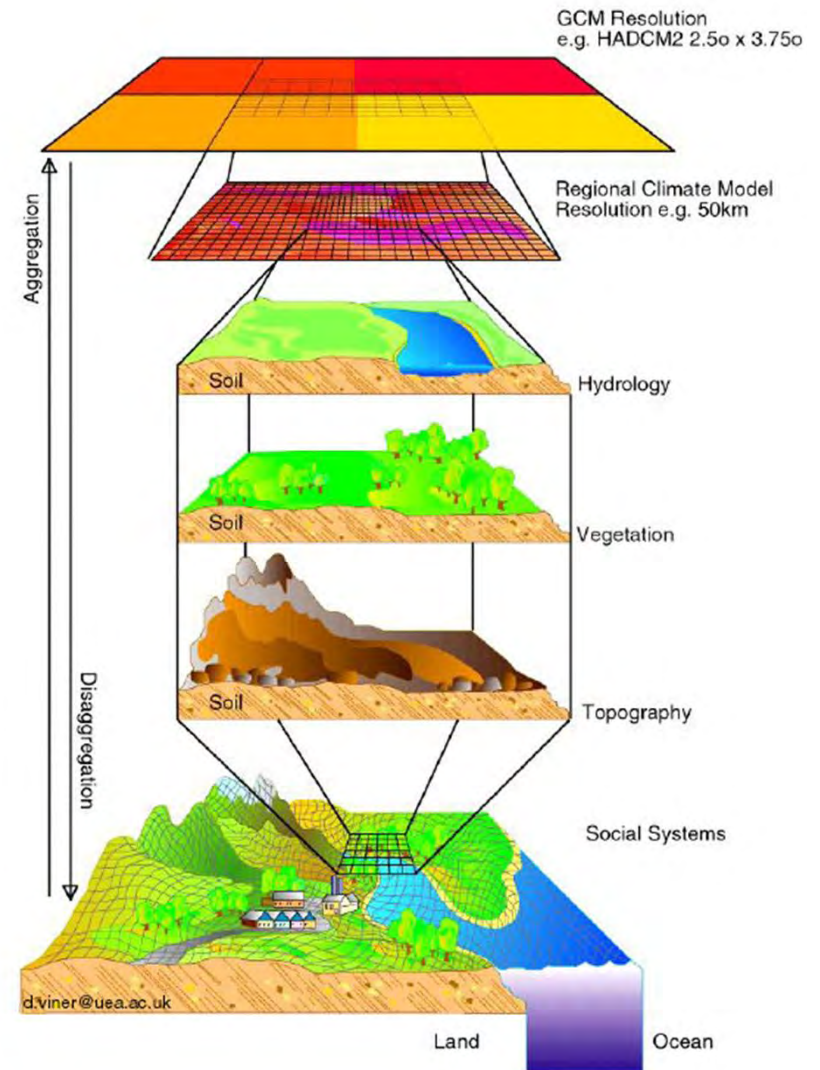
d) Evaporation



Source: Bates et al. 2008

DOWNSCALING

- Many climate change studies use data from global climate models (GCMs)
- These studies do not give the appropriate resolution to represent changes within a specific location
- Temporal and spatial downscaling techniques are used to derive finer resolution information



DETERMINING INFORMATION NEEDS

Key questions:

- How is climate related to my objective and key inputs?
- What is the timeframe of my program/project?
- What has already been done, what more do I need to know?

Question:	Select your:
What will happen?	Climate variables
Where?	Geographic extent and resolution
When?	Time frame
How sure?	Confidence level

TYPICAL INFORMATION INPUTS

FOR WATER AND CLIMATE CHANGE ADAPTATION PROGRAMMING

Climate <ul style="list-style-type: none">• Historical trends• Projections• Scenarios	Biophysical <ul style="list-style-type: none">• Environmental conditions• Status water resources• Objectives water resources• Sensitivity
Socio-economic <ul style="list-style-type: none">• Population characteristics• Development scenarios• Organization level• Income• Autonomous adaptation• Policies/legislation	Sectoral <ul style="list-style-type: none">• Technological options• Financial resources• Supply-demand

ACCESSING AND USING INFORMATION

- Locate existing assessments and studies based on need
 - What variables are important for your project?
- Combine information types - past, current and future
 - Identify trends
- Important to use all data – triangulate sources

Where do YOU start looking?

INFORMATION RESOURCES ON CLIMATE AND WATER

Many sources and tools available at all scales...

- **International / Global / Regional:**
 - IPCC
 - UN Agencies (WMO, FAO, UNDP, UNEP, etc.)
- **National Government:**
 - NAPAs and reports to the UNFCCC
 - National policies and assessments
 - Ministry strategic plans
 - EPA, NASA, USGS, NOAA (USA)
- **Donors:**
 - Project appraisal reports (e.g. GEF)
 - World Bank analyses

MORE SOURCES

- **NGOs, research institutes and universities (international and national):**
 - The Nature Conservancy (climate)
 - Water Resources Institute (water)
 - World Wildlife Fund
- **Local knowledge sources:**
 - Local reports
 - Downscaled data from national analyses
 - Local meteorological stations
 - Stakeholder interviews/consultation processes
 - Media reports

MORE SOURCES

- USAID Guidance:
 - Adapting to Coastal Climate Change: A Guidebook for Development Planners, May 2009
 - Adapting to Climate Variability and Change: A Guidance Manual for Development Planning
- USAID Tools:
 - Washington technical teams
 - SERVIR
 - FEWS NET
- Some helpful USG sites:
 - Climate.gov
 - Intelligence Community Assessment on Global Water Security

ADAPTATION PARTNERSHIP

AdaptationPartnership



- Seeks to encourage effective adaptation by catalyzing action and fostering communication
- Improve coordination of efforts to scale up action and financing
- Over 50 developed and developing countries
- Conducted **Review of Current and Planned Adaptation Action** (Stocktaking, 2010)

SOURCES

The screenshot shows the website www.adaptationpartnership.org/node. The 'Activities' menu item is circled in blue. The main content area features a large image of a hurricane and a section for the 'Climate Services Partnership (CSP)'. Below this, there is a 'What's New' section with three entries and a 'Multimedia' section with a video thumbnail and a calendar for July.

AdaptationPartnership

Register | Login

About Us **Activities** Resources Communities of Practice Contact Us Search

Climate Services Partnership (CSP)

The Climate Services Partnership (CSP) is a platform for knowledge sharing and collaboration to advance climate service capabilities worldwide.

[Goto Climate Services Partnership](#)

What's New

Mar 29th, 2013 | Resource

[Climate Change Adaptation and Peacebuilding in Africa](#)

Climate change and security have been linked in multiple ways, although some sets of linkages have garnered more attention than others.

Feb 15th, 2013 | Resource

[Climber-Scientist Small Grants Program](#)

The Climber-Scientist Small Grants program provides field-based, hands-on research opportunities to scientists and practitioners working in high mountain regions.

Dec 21st, 2012 | Resource

[Pinpoint climate studies flag trouble for Mexico, Central American farmers](#)

Reuters article reporting a new study that details the alarming impact of climate change on farmers in Mexico and Central America.

Multimedia

VIDEO

The High Mountain Glacial Watershed Program (HMGWP), with support from the

[View More](#)

July

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

[View All](#)

SOURCES

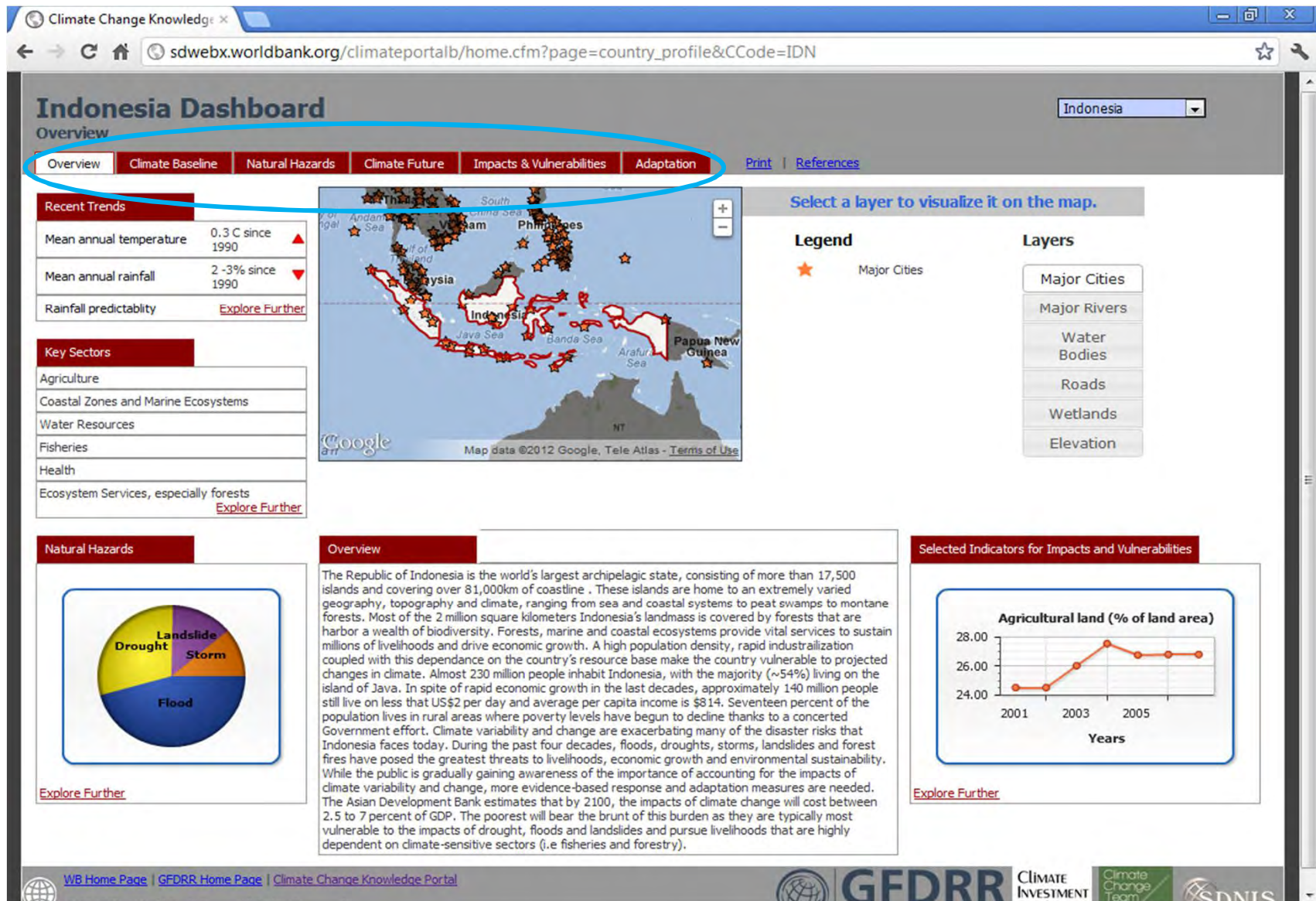
The screenshot displays the homepage of the Adaptation Learning Mechanism (ALM) website. The browser address bar shows www.adaptationlearning.net. The header includes the ALM logo, navigation links (EXPLORE, PARTICIPATE, About, Partners, News, Forum, Gallery, My Account, Thematic Pages), and logos for partner organizations (gef, UNDP, UNFCCC, UNEP, FAO). A 'SIGN UP' and 'LOGIN' link is also present.

A featured announcement box states: "Visit the new UNDP-Adaptation Learning Mechanism website: www.undp.adaptationlearning.net". Below this, it describes the ALM as UNDP's knowledge-sharing platform on country-led programmes and projects financed by the Least Developed Country Fund (LDCF), Special Climate Change Fund (SCCF), Adaptation Fund (AF), bi-lateral donors and through decentralized cooperation supported by UNDP's Down to Earth: Territorial Approach to Climate Change (TACC) project.

The 'Global Knowledge Sharing Platform' section features a blue background with a photo of a woman in a hat. It states: "The ALM is mapping good practices, providing information, sharing knowledge and building networks on climate change adaptation." and includes a "SIGN UP NOW" button.

The 'Explore' section allows users to search for climate change adaptation resources. It includes a "CHOOSE A LOCATION" dropdown menu with "Indonesia" selected. A map of Indonesia is shown, and a button labeled "View country profile for Indonesia" is highlighted with a red circle.

SOURCES



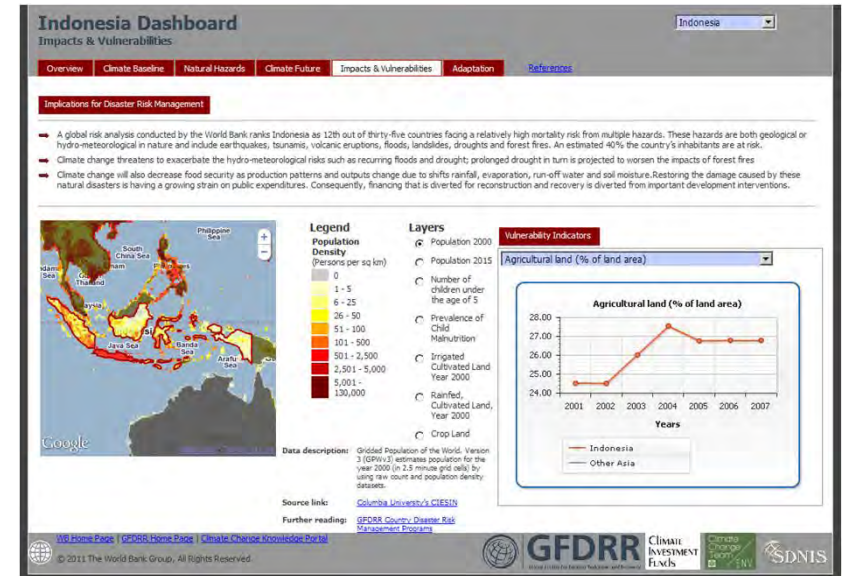
SOURCES: CLIMATE CHANGE STRESSES

Information:

- Historical variability
- Recent trends
- Projections, anticipated impacts

Key sources:

- World Bank GFDRR country profiles
- USAID country profiles
- SERVIR climate mapper
- Regional and thematic research institutes (ICRISAT, IFPRI, IRI, etc.)
- UNDP climate risk profiles
- IPCC thematic and regional chapters



CHALLENGES IN USING CLIMATE DATA

- Shifting mindsets to long-term planning
 - Not just about the immediate future
 - Determine risk tolerance
 - Engage stakeholders
- Data sharing
 - Need to incentivize data sharing so users can gain access
 - Especially for data collected locally



UNCERTAINTY A REALITY...

- Uncertainty, variability and risk most important consequences of climate change
- Climate change projections inconsistent at regional/local scales
- Caution must be used when relying on historical weather and hydrologic data for planning
- Climate change location, timing, and extent are uncertain – as are the expected impacts

Experience from the past may not be a reliable guide for the future

... BUT IT IS MANAGEABLE

- Collaboration/communication between climate and water resources management community
- Improved projections at temporal/spatial scales required by water managers
- Flexible/adaptable strategies to improve coping with uncertainty (adaptive management)
- Contingency planning
- Capturing co-benefits in near term
- Looking at historic analogues
- Monitoring for adaptive management

**All development decisions involve uncertainty –
socioeconomics, disasters, politics, costs**

EXERCISE: INFORMATION SCAVENGER HUNT

- Form your country teams:

- Ghana (1), (4)
- Nepal (2)
- The Philippines (3), (5)



- Each team will receive a list of information they must find about water and/or climate change related questions in their country
- Find as much information as you can from your list – and tell us your sources
- Your team has 40 minutes – divide the task among you
- You will be assigned points according to the amount of information you successfully gather - the best team will win!

DISCUSSION

- How easy or hard was it to find information?
- What information was most difficult to find?
- Was it easier to find water information or climate information?
- How good was the quality of the information you found? Did it seem reliable?
- What were some of the other challenges you faced regarding information collection about water and/or climate change in your assigned country?
- How useful would the information you collected be to assist in designing a program for USAID?



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DAY 1 WRAP UP

JULY 22, 2013
ANDRE MERSHON

SESSIONS TODAY

SESSIONS

Water and Climate Change: Overview and Basic Concepts

The Importance of Climate Change and Water for Development

Links Between Climate Change Adaptation and IWRM Approaches

Digging Deeper into Vulnerability

Using Information for Water and Climate Change Adaptation Programming

TODAY'S DRIVING QUESTIONS

Day 1:

- Why does water-related climate change adaptation matter for development?
- What are the links between USAID's approaches to climate change and to IWRM?
- What information is available for water and climate change programming?

DAY 1 JOURNAL: INSTRUCTIONS

1. Select a partner nearby and sit together.
2. Work independently to respond to the Day 1 questions in the journal.
3. When finished, share and discuss your answers with your partner.
4. Participate in the group discussion, drawing on responses from your journal.

DAY 1 CLOSING

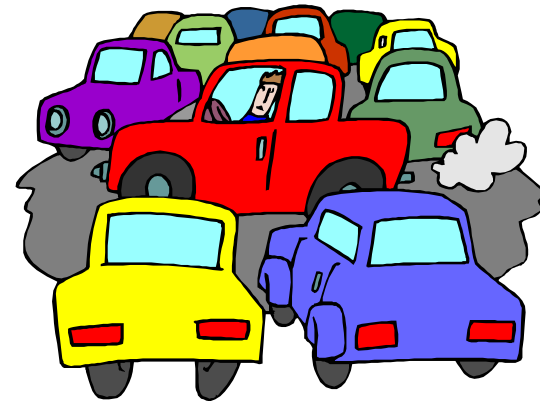
- **Thank you for your feedback**
- Day 2 starts at 8:30

Please remember to...

Be on time.

Share your own stories.

Put questions in the parking lot.





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FROM THE AMERICAN PEOPLE

DAY 2 WELCOME

JULY 23, 2013
ANDRE MERSHON

TODAY'S AGENDA

SESSIONS

The USAID Institutional Framework for Water

The USAID Institutional Framework for Climate Change Adaptation

Activity: Water and CCA Game Show “Who Wants to be a Millionaire”

Discussion: Climate Change, Water, and Health

Vulnerability Assessment for Program Design

Water and Climate Change Adaptation Tools and Resources “Round Robin”

An Overview of Practical Approaches to Water and Climate Change Adaptation

CONCEPTS TODAY

Day 2:

- What institutional and legal frameworks impact water and climate change adaptation?
- What is a Vulnerability Assessment and how do I use it for program design?
- What are some key water and climate change adaptation tools and resources I can start with?



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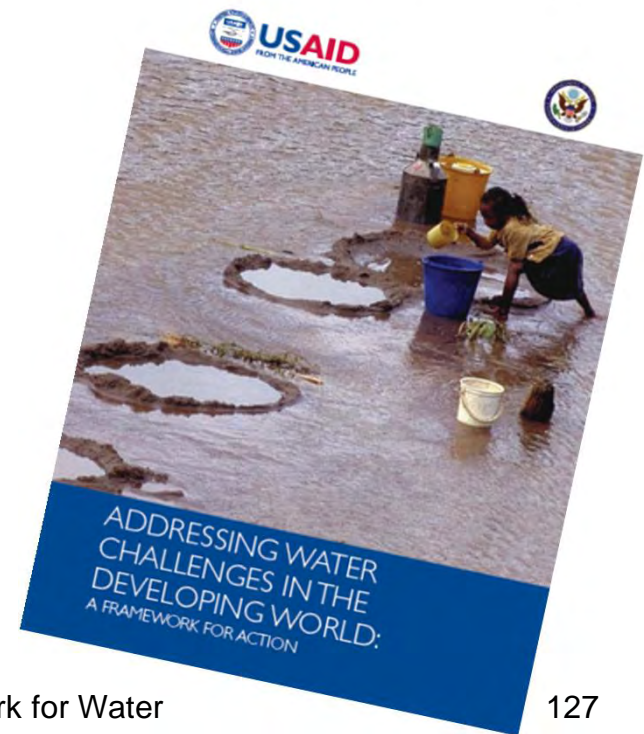
THE USAID INSTITUTIONAL FRAMEWORK FOR WATER

JULY 23, 2013

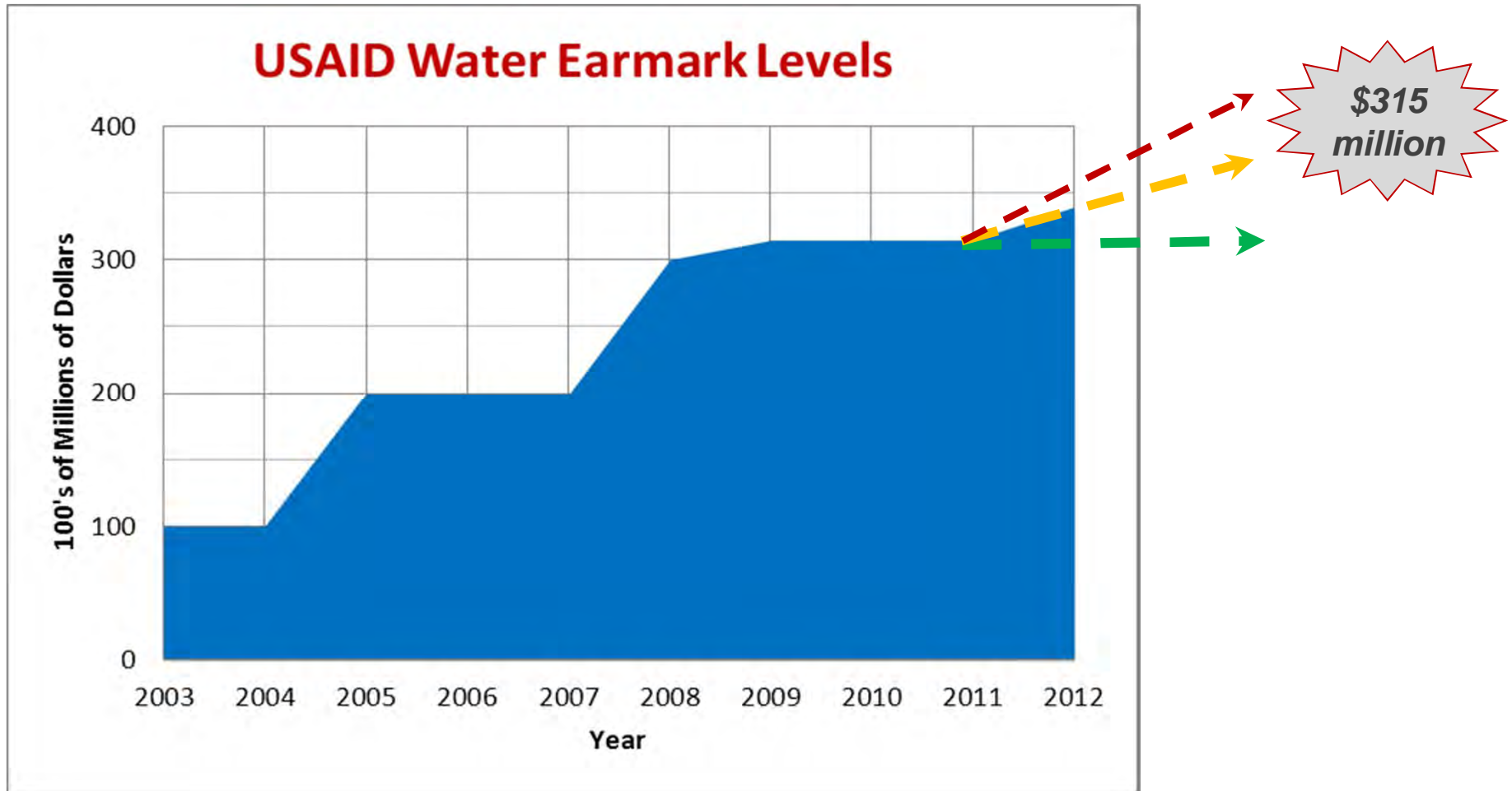
RICHARD VOLK

SOME THINGS ARE OLD...

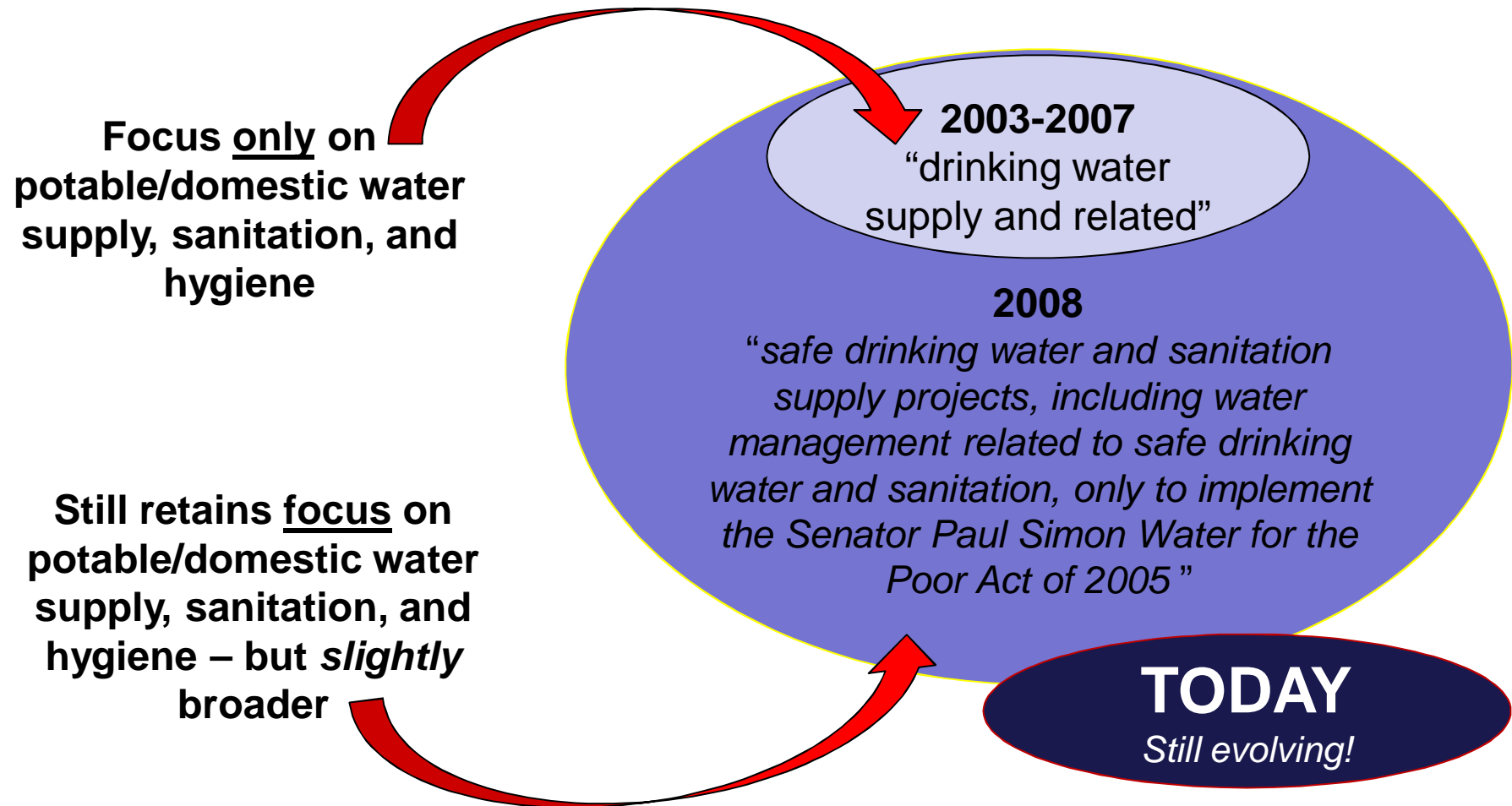
- Water Earmark (2003-present)
- Paul Simon Water for the Poor Act (2005)
- DOS/USAID Joint Strategic Framework on Water (2008)
- US Foreign Assistance Framework



USAID WATER EARMARK



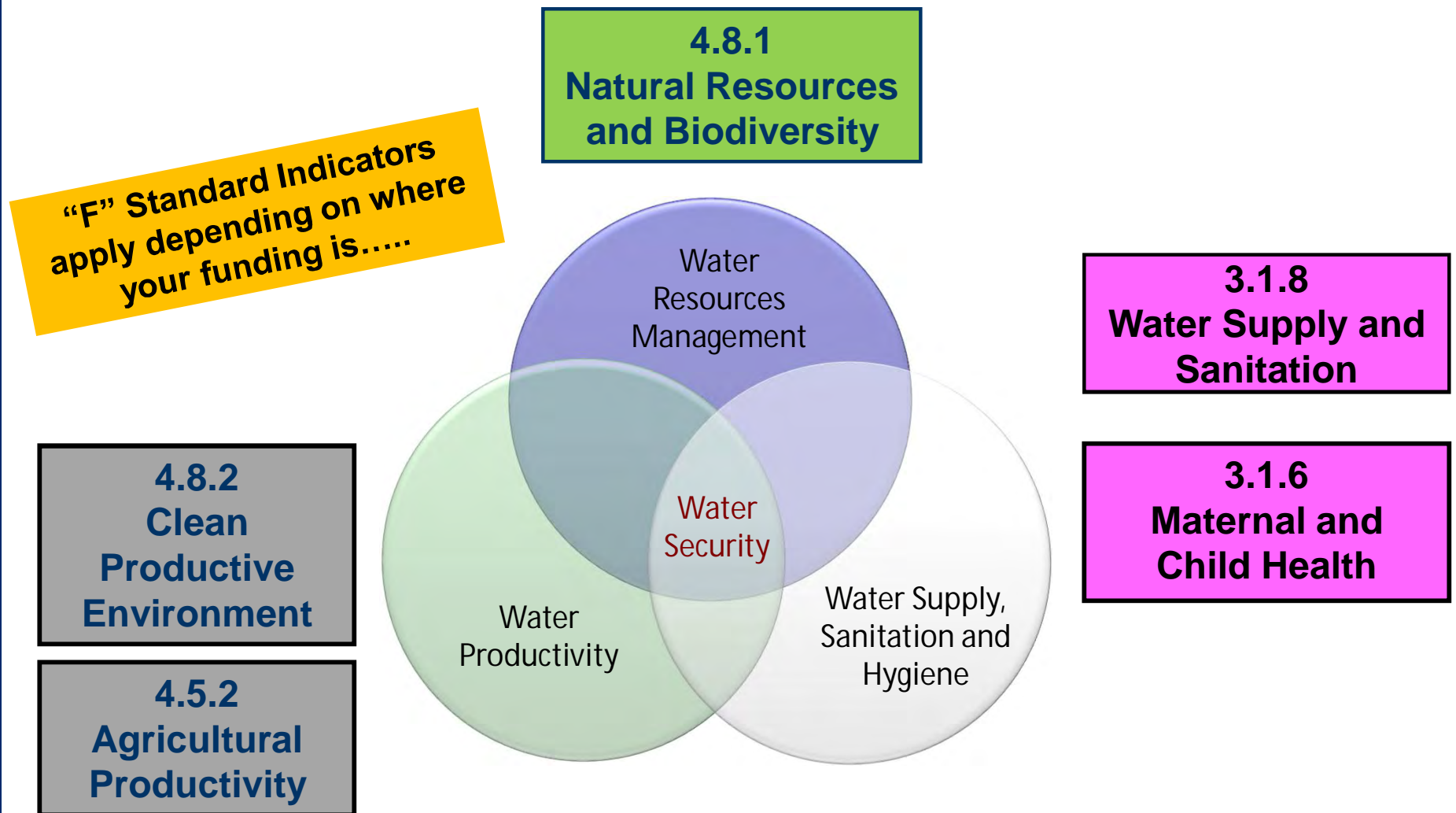
WATER EARMARK DEFINITION: AN EVOLUTION



THE WATER EARMARK: SOME QUICK FACTS...

- Requirements for meeting the earmark:
 - (a) explicit primary or secondary WASH objective*
 - (b) verifiable indicators of WASH outcomes*
 - (c) documented linkage to WASH for all partially attributed water resources management/water productivity activities*
- Accounts attributable to the earmark?
All except Title II and some IDA

WATER IN THE FOREIGN ASSISTANCE FRAMEWORK



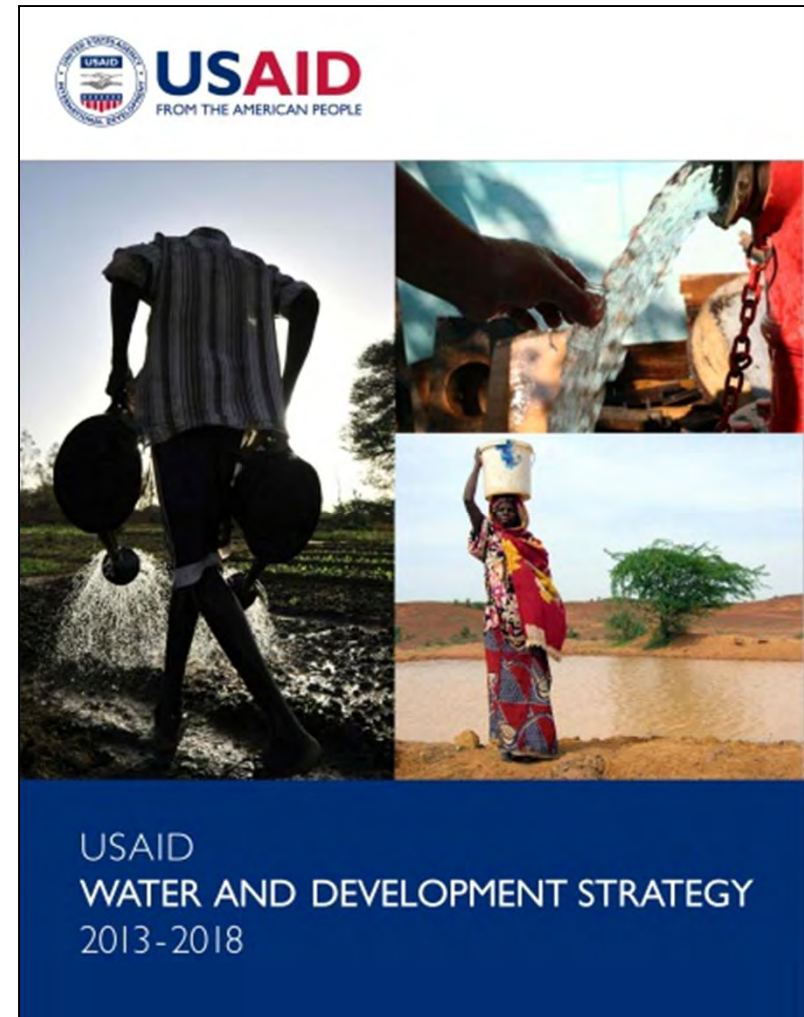
DON'T FORGET THE “WATER” KEY ISSUE

- To assist the Agency in annual required reporting for:
 - Paul Simon Water for the Poor Act
 - Attributions to the water earmark
- Does not matter under which Element/Sub-Element
- Must assign funding amounts in all Operational Plans by sub-key issue – mutually exclusive categories
- “Water” definition contains the following sub-key issue areas:
 - Drinking Water Supply and Sanitation
 - Watershed/Water Resources Management
 - Water Productivity
 - Disaster Risk Reduction



A FEW THINGS ARE NEW...

- Launch of Water and Development Strategy (May 2013)
- Implementation Guidance (under development)
- Paul Simon Water for the World Act (2013?)



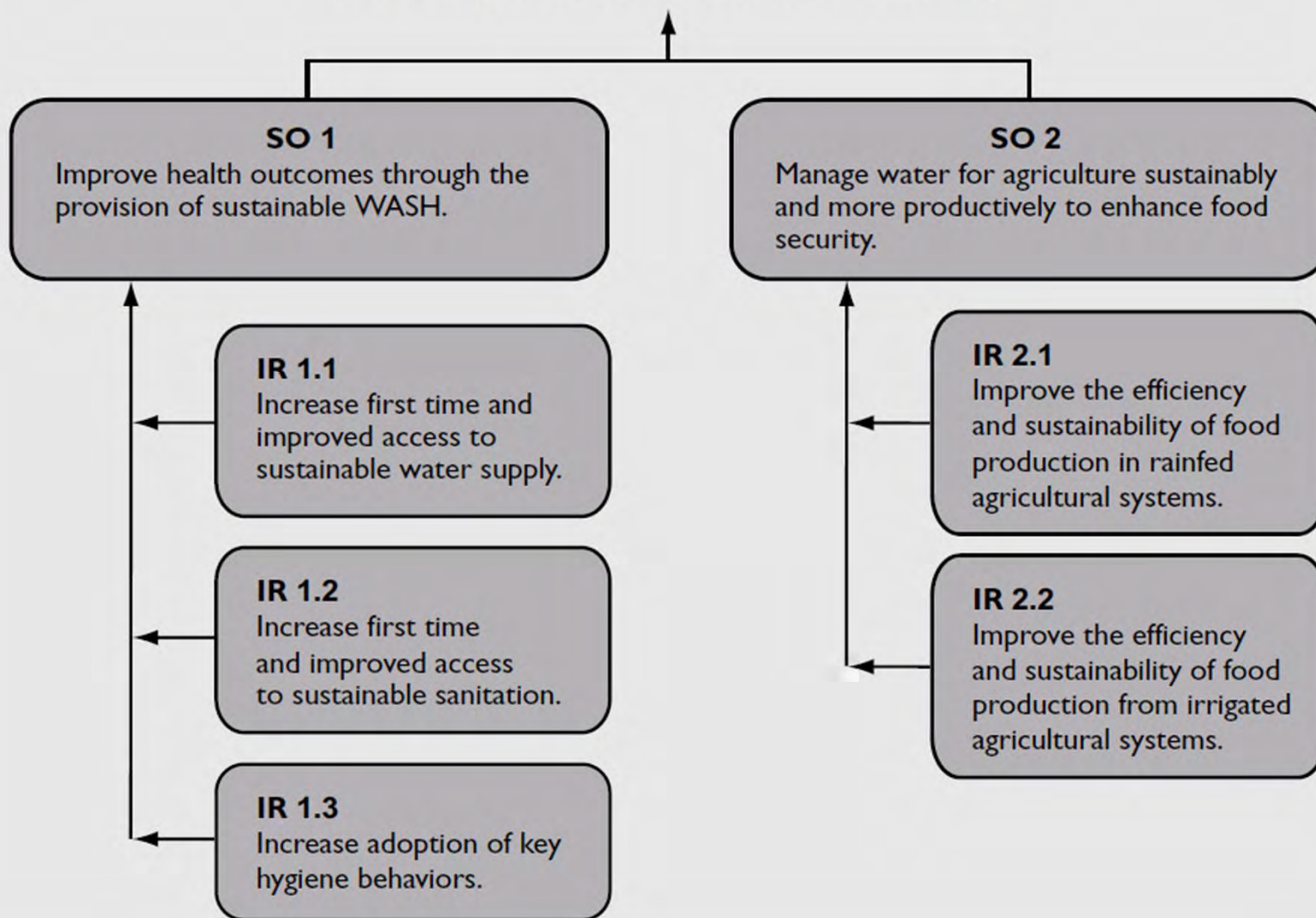
WATER AND DEVELOPMENT STRATEGY HIGHLIGHTS

- **Goal:** *To save lives and advance development through improvements in water supply, sanitation, and hygiene (WASH) programs, and through sound management and use of water for food security.*
 - **Strategic Objective 1 (SO1):** *Improve health outcomes through the provision of sustainable WASH*
 - **Strategic Objective 2 (SO2):** *Manage water for agriculture sustainably and more productively*
- **Measures of success:**
 - **Objective 1:** 10 million with new/improved water supply, 6 million with new/improved sanitation
 - **Objective 2:** To enhance food security, manage water for agriculture sustainably and more productively

USAID WATER STRATEGY FOR 2013-2018

Goal

To save lives and advance development through improvements in WASH programs, and through sound management and use of water for food security.



COUNTRY CATEGORIES – WASH

Three tiers: determined by needs and opportunity plus other programming and practicality factors

Transformative Impact Countries

- Opportunity to reach sustainable solutions at national scale
- Commitment/leadership from host country and Mission

Leveraged Impact Countries

- Significant impacts with limited investment
- Addressing one or more dimension of WASH

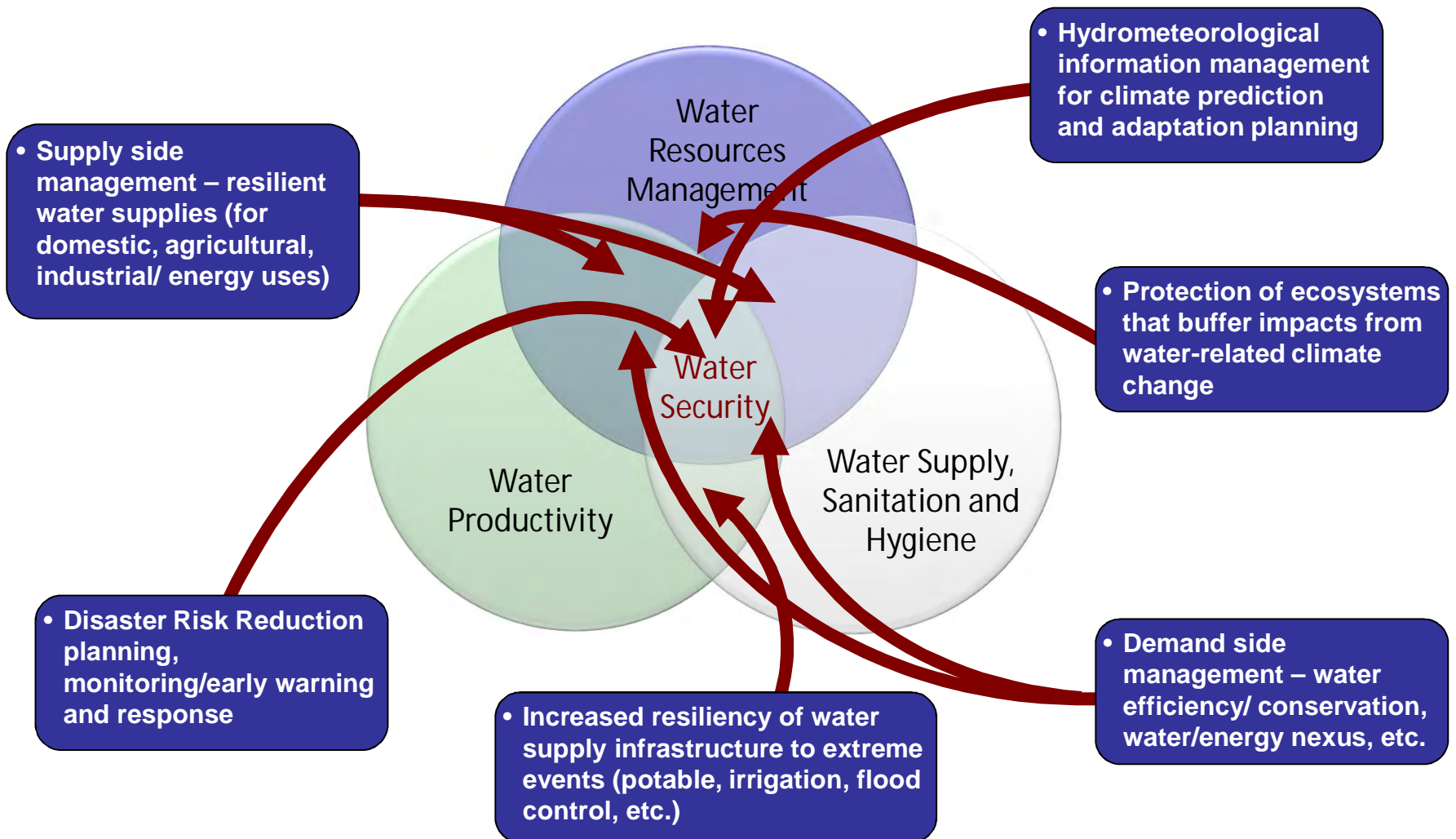
Strategic Priority Countries

COUNTRY CATEGORIES – FOOD SECURITY

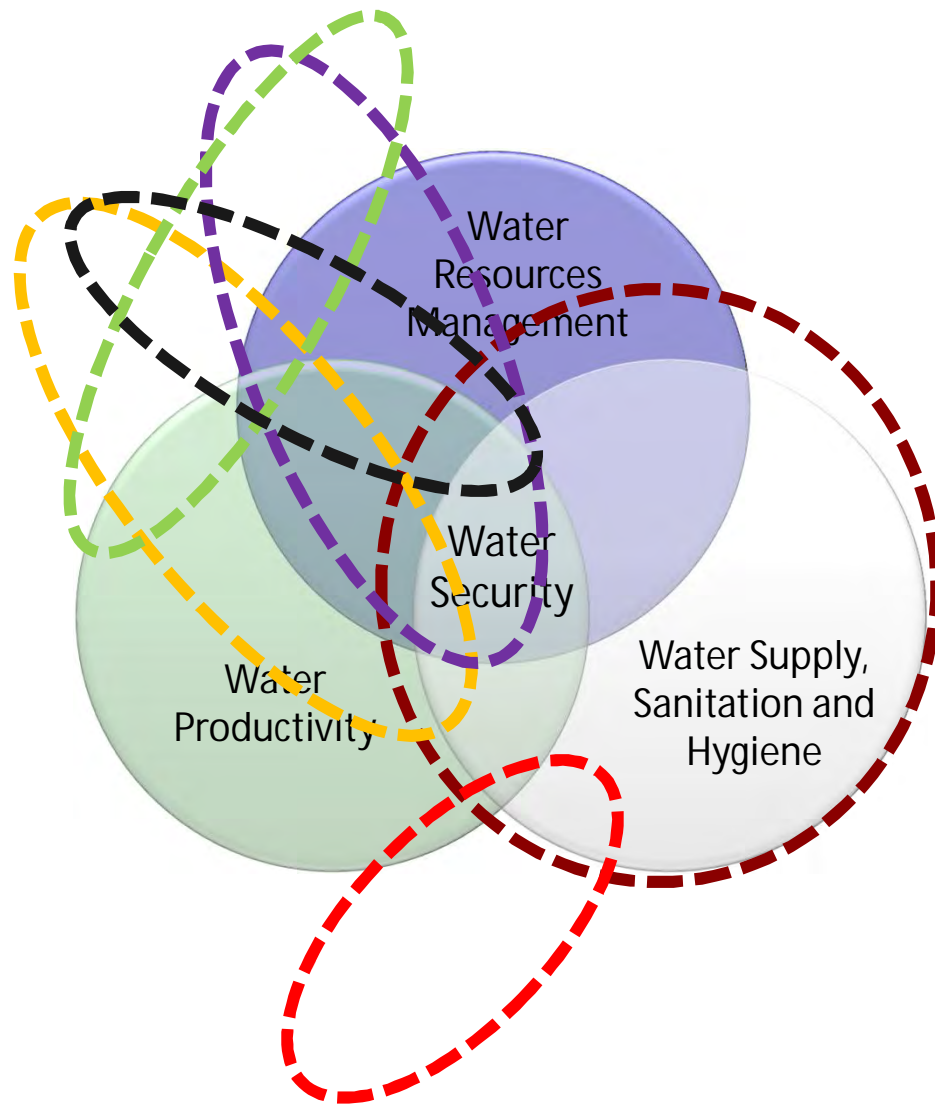
- Country selection and prioritization will align with Feed the Future Priority countries
- Countries likely to be further grouped by best practices and/or development objective
 - Poverty reduction
 - Hunger reduction
 - Sustainable intensification
 - Resiliency

LINKAGES

Although not explicit, Climate Change Adaptation is an important part of the USAID Water Strategy



FUNDING



**It's not just about
the water earmark!**

POTENTIAL WATER FUNDING:

--- = **Water Earmark**

--- = **GHI Initiative (MCH, PEPFAR – mostly water earmarked)**

--- = **FTF Initiative**

--- = **GCC Initiative – Adaptation**

--- = **GCC Initiative – Clean Energy**

--- = **Biodiversity Earmark**

KEY MESSAGES

- This is a dynamic time for ‘water’ at USAID!
- It’s not just about the water earmark (or WASH) anymore
- Increased political attention to sector, and next five years will have even greater spotlight
- USG priority emphasis on climate change adaptation highly consistent with achieving ‘water security’ goals
- GCC Initiative can provide an impetus for renewed attention to water resources management and water productivity





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THE USAID INSTITUTIONAL FRAMEWORK FOR CLIMATE CHANGE ADAPTATION

JULY 23, 2013
JENNY FRANKEL-REED

BACKGROUND AND CONTEXT

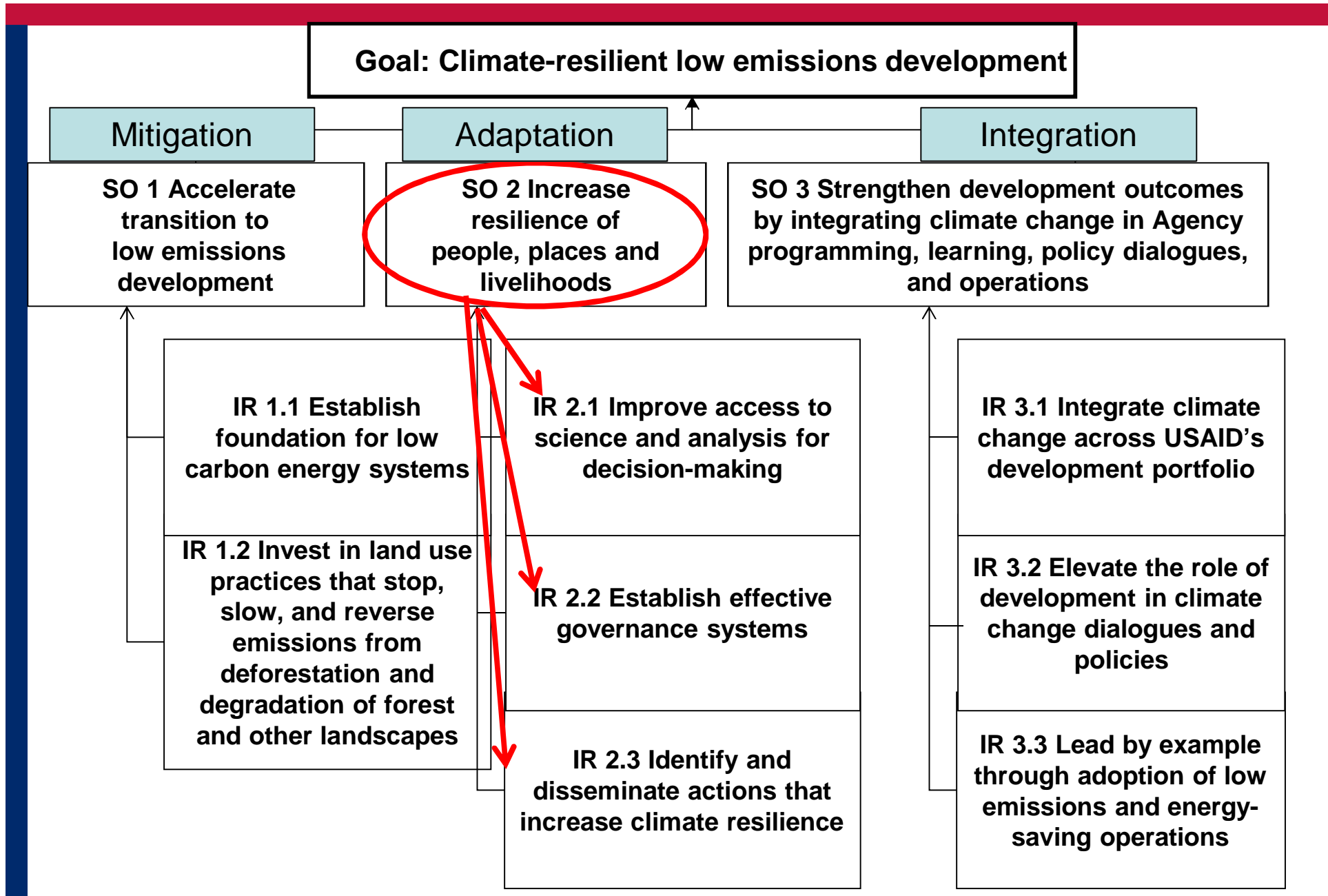
- Global Climate Change Initiative (GCCCI) among Obama Administration's top priorities
- Started in FY10, result of Copenhagen Accord Fast Start Funding pledge, reaffirmed in Cancun
- High visibility initiative, high scrutiny in international negotiations
- Significant increase in funding
- Climate change adaptation is fundamental to many USAID initiatives and priorities

USAID CLIMATE CHANGE BUDGET

	FY 2009 Estimates	FY 2010 Budget	FY 2011 Budget	FY 2012 Budget	FY 2013 Estimates
Adaptation	24	122	134.5	142	142.7
Sustainable Landscapes	90	74	139.9	114.5	107.9
Clean Energy	100	108	124	91.5	81.5
TOTAL	214	305	398.4	348	332.1

(millions of US\$)

GCC+D STRATEGY RESULTS FRAMEWORK



GCC+D STRATEGY SO 2: ADAPTATION

Anticipated outcomes

- Better and more widely available data about climate change
- Strengthened community, civil society, and private sector engagement to reduce vulnerability
- Improved public communication about climate vulnerability
- Potential conflicts over scarce resources reduced through climate-sensitive programming
- Economic growth investments protected from adverse climate impacts

GCC ADAPTATION PILLAR

- **Goal:** increase the resilience of people, places, and livelihoods to climate change by integrating effective adaptive strategies into key development sectors
- Economic, social, ecological systems – agriculture and food security, infrastructure, health, water, disaster preparedness, and conflict prevention
- **Activities that support adaptation programs should be built upon climate vulnerability and adaptation analyses (existing or new)**

ADAPTATION PRIORITY ACTIVITIES

1. Improved access to science & analysis for decision-making:

Science & analysis to inform decision-making in topics sensitive to climate, including vulnerability assessments

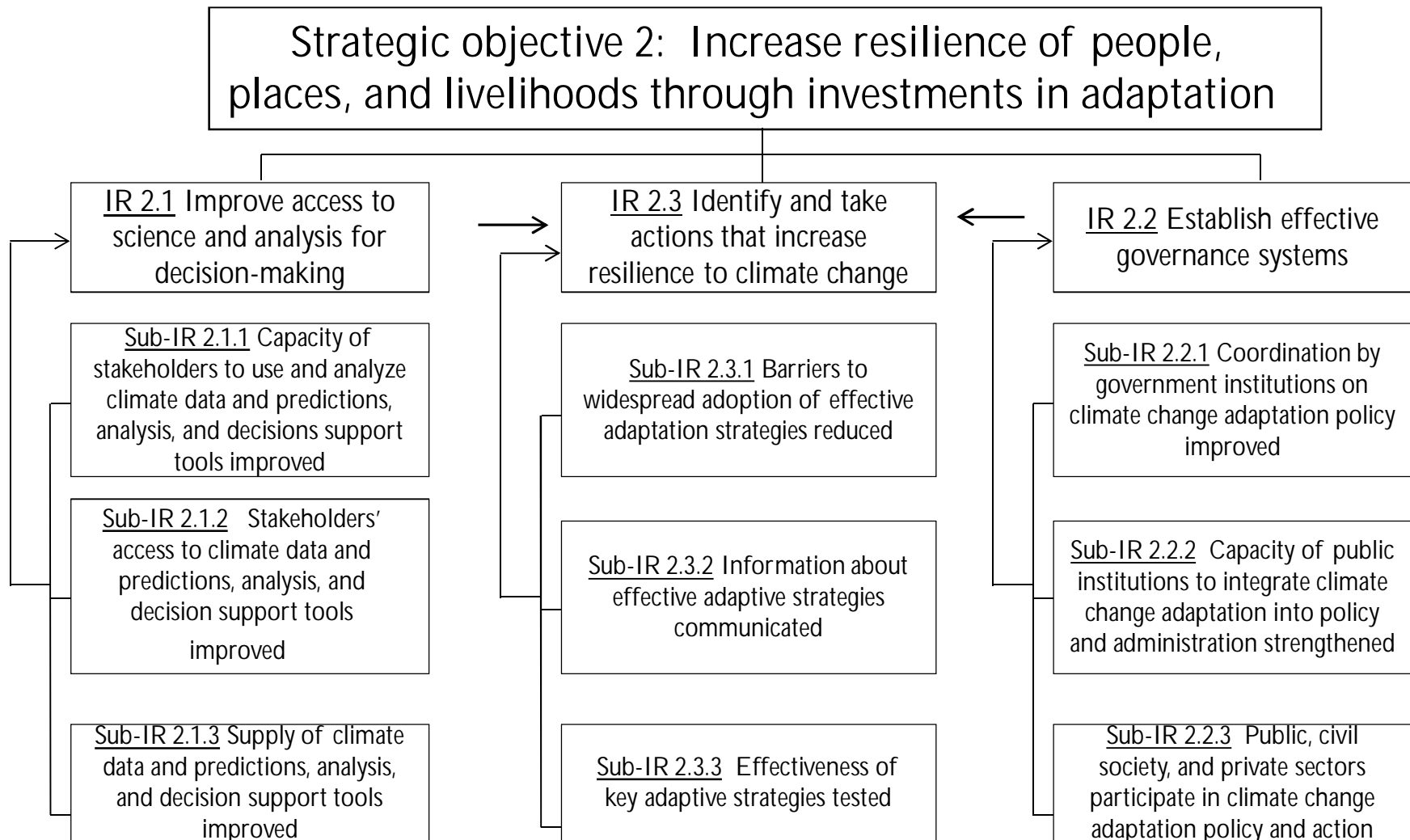
2. Establish effective governance for climate resilience:

Capacity for effective governmental coordination, planning and response, improved participation

3. Identify and take actions that increase climate resilience:

Piloting, evaluating, and implementing effective adaptation methods and systems to address climate-related risks

DRAFT ADAPTATION PILLAR RESULTS FRAMEWORK



ADAPTATION PROGRAMMING EXAMPLES

Direct

- Support for modeling, mapping, and research to better understand climate impacts in specific regions or sectors
- Strengthening government and local community response and communications capacity for climate change-related disasters, such as floods
- Supporting long-term management plans and policies to reduce vulnerability to coastal storms and sea level rise

Indirect

- Using FTF funding for conservation agriculture practices to reduce soil erosion, increase productivity, and provide adaptation benefits that counteract climate change impacts

USAID GUIDANCE ON ADAPTATION PILLAR

Adaptation Criteria Summary Table		
	Focused (Direct/Initiative)	Indirect
Funding Source	Adaptation control level	Other
Objective	Explicit goal or objective	Explicit goal or objective
Required Elements	Be informed by vulnerability and adaptation assessments	Be informed by vulnerability and adaptation assessments
Policy Priority Activities	<ul style="list-style-type: none"> • Science & analysis • Improved governance • Adaptation actions 	<ul style="list-style-type: none"> • Encouraged but not required to address priority activities
Indicators	One or more GCC indicators, including: <i>Number of stakeholders with increased capacity to adapt to the impacts of climate variability and change as a result of USG assistance</i>	

ADAPTATION INDICATORS

Required Adaptation Indicator:

Number of stakeholders with increased capacity to adapt to the impacts of climate variability and change:

- Implementing risk-reducing practices/actions to improve resilience to climate change (men/women)
- Using climate information in their decision making (men/women)

Other Standard Adaptation Indicators:

Number of laws, policies, strategies, plans, agreements, or regulations addressing climate change proposed, adopted, or implemented

Number of institutions with improved capacity to address climate change issues

Amount of investment leveraged from public and private sources for climate change

Person-hours of training in climate change (or persons trained)

EVALUATION FOR ADAPTATION

- See Jan 2011 Evaluation Policy and Nov 2012 ADS 203
- **Performance Evaluation:** whether desired results are occurring and DO and project outcomes are on track
 - Quantitative – Population living in flood zone (reduced exposure)
 - Milestones – Adoption of zoning restrictions (exposure)
 - Rating scales – Local awareness of EWS (adaptive capacity)
 - Indices – Community vulnerability index
 - Standard indicators – Number of institutions with increased capacity to adapt to climate change (adaptive capacity)
- **Impact Evaluation:** analysis of outcomes for improving effectiveness, informing current and future programming
 - Do A, B and C outputs lead to Z outcome? Why or why not?
 - Baselines, methods, and responsibility for evaluation

INDONESIA – IUWASH PROJECT

Urban WASH, \$33.7M, 2011-2016

Results:

- **Demand** for safe drinking water access and improved sanitation increased in under-served urban areas
- Capacity to sustainably **supply** mobilized demand with improved water and sanitation services built among public and private sector institutions
 - At least 20 water utilities implementing necessary climate change adaptation measures based on preliminary raw water sources vulnerability assessments
- Governance and financial **enabling environment** created that supports equitable access

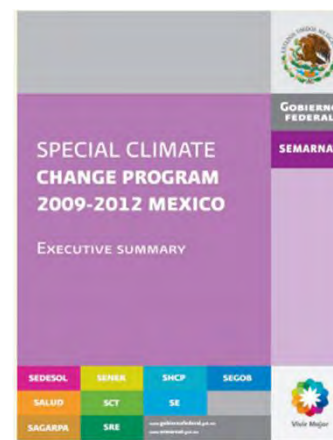
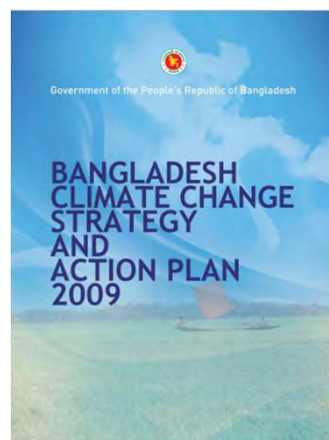
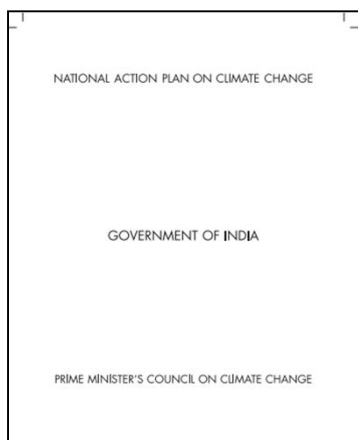


PHILIPPINES – BE SECURE PROJECT

Results and Intermediate Results:	Indicators:
IR1: Increased sustainable access to water supply services	
Sub-IR1.1 Strengthened enabling environment for sustainable water supply and wastewater treatment service delivery	<ul style="list-style-type: none"> Number of water reform policies adopted by the Government of Philippines
Sub-IR1.2 Strengthened water supply and wastewater treatment service providers for sustainable service delivery	<ul style="list-style-type: none"> Number of people in target areas with access to improved drinking water supply as a result of USG assistance (Standard WASH) Number of water supply and wastewater treatment providers receiving training in WASH
IR2: Increased resilience to climate-related water stress and hydrological extremes	
Sub-IR2.1 Strengthened water and climate data collection, analysis and communication	<ul style="list-style-type: none"> Number of people receiving training in water and adaptation (Standard AD) Number of tailored analyses conducted to inform climate-smart water management and adaptation planning Number of people with increased capacity to adapt to the impacts of climate variability and change (Standard AD) – b. Using climate information in their decision-making Stakeholder satisfaction with weather and climate information provided by PAGASA

ADAPTATION NARRATIVE ISSUES

- Not telling the development and climate change story – Why is dealing with climate stress important to supporting development objectives?
- Not referencing existing vulnerability assessments
- Integrating into existing programs without discussing–
*Why does climate stress matter? What is vulnerable?
What will be different and strategic for adaptation?*



GUIDANCE ON ADAPTATION

Principles

- Focus where development priorities and climate stress intersect
- Build on existing vulnerability assessments and adaptation plans
- Make USAID programs climate-resilient, and add value by integrating with Water, Feed the Future, Biodiversity, Sustainable Landscapes, Health, DRR, and Governance...





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And now it's time for.....

THE WATER AND CLIMATE CHANGE ADAPTATION GAME SHOW!



THE RULES

- Teams will be presented with a series of questions about the USAID institutional framework for 'water' and 'climate change'
- Each group consults internally and responds by writing the answer on one of the dry-erase paddles provided
- After one minute, the moderator asks all teams to reveal their answers
- Judges confer and assign points to each team
 - 2 points for correct answer
 - 0 points for incorrect answer
 - Note: Partial credit of 1 point may be allowed for answers that are partly correct – at discretion of judges!
- There will be eight questions total in the first round
- A 'bonus round' of more challenging questions will follow!!!

QUESTION 1

The three pillars of the USAID Global Climate Change Initiative are:

- a. Clean energy, sustainable landscapes and adaptation
- b. Adaptation, water and clean energy
- c. Adaptation, sustainable landscapes, and natural resources
- d. None of the above



QUESTION 1 – ANSWER

The three pillars of the USAID Global Climate Change Initiative are:

- a. Clean energy, sustainable landscapes and adaptation
- b. Adaptation, water and clean energy
- c. Adaptation, sustainable landscapes, and natural resources
- d. None of the above

Answer:

a. Clean energy, sustainable landscapes and adaptation

QUESTION 2

Which of the following are currently 100% eligible activities under the USAID Water Earmark (name all that apply):

- a. Watershed management
- b. Small-scale rural drinking water supply service delivery
- c. Hydropower development
- d. Development of irrigation schemes
- e. Wastewater treatment
- f. Household water treatment



QUESTION 2 – ANSWER

Which of the following are currently 100% eligible activities under the USAID Water Earmark (name all that apply):

- a. Watershed management
- b. Small-scale rural drinking water supply service delivery
- c. Hydropower development
- d. Development of irrigation schemes
- e. Wastewater treatment
- f. Household water treatment

Answer: b. Small-scale rural drinking water supply service delivery and f. Household water treatment

QUESTION 3

Which earmarks and directives can *potentially* fund some types of water-related activities?

- a. Water earmark, clean energy earmark, Feed the Future initiative
- b. Climate change adaptation directive, biodiversity earmark, Feed the Future initiative
- c. Education earmark, climate change adaptation directive, water earmark
- d. Biodiversity earmark, Global Health Initiative, Feed the Future initiative
- e. All of the above.



QUESTION 3 – ANSWER

Which earmarks and directives can *potentially* fund some types of water-related activities?

- a. Water earmark, clean energy earmark, Feed the Future initiative
- b. Climate change adaptation directive, biodiversity earmark, Feed the Future initiative
- c. Education earmark, climate change adaptation directive, water earmark
- d. Biodiversity earmark, Global Health Initiative, Feed the Future initiative
- e. All of the above.

Answer: e. All of the above

QUESTION 4

Under the USAID Climate Change Initiative, “Adaptation” activities aim to do what as their main objective?

- a. Reduce greenhouse gas emissions
- b. Build adaptive capacity in vulnerable countries
- c. Manage natural resources sustainably
- d. b and c
- e. a and b
- f. All of the above



QUESTION 4 – ANSWER

Under the USAID Climate Change Initiative, “Adaptation” activities aim to do what as their main objective?

- a. Reduce greenhouse gas emissions
- b. Build adaptive capacity in vulnerable countries
- c. Manage natural resources sustainably
- d. b and c
- e. a and b
- f. All of the above

Answer:

b. Build adaptive capacity in vulnerable countries

QUESTION 5

Climate change is best described as:

- a. A sector
- b. An objective
- c. A stressor
- d. A hobby



QUESTION 5 – ANSWER

Climate change is best described as:

- a. A sector
- b. An objective
- c. A stressor
- d. A hobby

Answer:

c. A stressor

QUESTION 6

True or False: Climate change adaptation indirect funding can be double-counted with water earmark funding.

Record your answer!



QUESTION 6 – ANSWER

True or False: Climate change adaptation indirect funding can be double-counted with water earmark funding.

Answer:

True, assuming all criteria for both earmarks/directives have been met.

QUESTION 7

What are the two fundamental required criteria for attribution of direct climate change adaptation funding, according to USAID guidance?

Record your answer!



QUESTION 7 – ANSWER

What are the two fundamental required criteria for attribution of direct climate change adaptation funding, according to USAID guidance?

Answer:

- (1) Include an adaptation objective and***
- (2) Monitor results with specific climate change adaptation indicator(s) from the required list***

QUESTION 8

What are currently the three major conditions for either total or partial attribution to the USAID water earmark?

Record your answer!



QUESTION 8 – ANSWER

What are currently the three major conditions for either total or partial attribution to the USAID water earmark?

Answer:

- (1) Have an explicit WASH objective;***
- (2) Identify indicators to measure WASH outcomes;***
- (3) For partial attribution, make sure all WRM or WP activities are directly related to positive WASH outcomes***

QUESTION 9

Under the new Water and Development Strategy, countries in the “transformational” category will be required to devote at least 20% of overall Mission budget on water for health and water for food objectives.

True or False?



QUESTION 9 – ANSWER

Under the new Water and Development Strategy, countries in the “transformational” category will be required to devote at least 20% of overall Mission budget on water for health and water for food objectives.

Answer:

- **False.** There is no such “percentage of budget” requirement specified in the Strategy.

BONUS ROUND – THERE'S STILL TIME TO WIN!!!

- A final round with 2 more challenging questions
- Each group will consult for 2-3 minutes on their answer.
- Each team writes their answers on the card provided, Judges may ask for clarification & rationale as necessary
- Judges will provide the correct answer to question after seeing all teams' responses.
- Scoring
 - 5 points for correct answer
 - [Note: Partial credit allowed – at discretion of judges]

BONUS QUESTION 1

Would a project aimed at reducing contaminated runoff into a coastal tourism zone be a good fit for direct adaptation funding? Explain your answer.

Record your answer!



BONUS QUESTION 1

Would a project aimed at reducing contaminated runoff into a coastal tourism zone be a good fit for direct adaptation funding? Explain your answer.

Answer:

No. Water pollution from either land-based (e.g. agricultural), industrial, or domestic sources is not caused by or directly related to climate – either existing patterns or expected future climate change. Increased rainfall or flooding may exacerbate the problem, but the pollution is not caused by climate, but rather by the underlying human activity causing the contamination.

BONUS QUESTION 2

A Mission would like to carry out activities to improve the climate-resiliency and overall sustainability of an urban water supply and wastewater treatment system.

- a. Can the Mission use water earmark funding? 100% or partial attribution? Explain the conditions required for your answer.
- b. Can the Mission use direct climate change adaptation funding? 100% or partial attribution? Explain the conditions required for your answer.

Record your answers!



BONUS QUESTION 2 – ANSWER

Answer:

(a) Yes – Anything to do with supporting a water supply utility is 100% eligible for water earmark attribution, including building the adaptive capacity of the utility. Even if a utility also does wastewater treatment, as long as the activity is restricted to ‘software’ investments (e.g. capacity building, institutional strengthening, financing, etc.), this activity is also 100% eligible.

(b) Yes – Those components of the activity that are strictly related to assessing and addressing climate vulnerability and building adaptive capacity would be 100% eligible for direct attribution (NOTE: Vulnerability of the utility would have to be established by a Vulnerability Assessment). However, other aspects of increasing the sustainability of the utility (e.g. utility reform, general financial management, etc. would not be eligible for climate change funding).



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CLIMATE CHANGE, WATER, AND HEALTH

EDWARD PFISTER
JENNY FRANKEL-REED, RICHARD VOLK
JULY 23, 2013

PERSPECTIVES ON CLIMATE CHANGE AND HEALTH

Edward Pfister

U.S. Department of Health and Human Services

U.S. Public Health Service

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202-619-0788

HHS POLICY

Statement on Sustainability and Climate Adaptation- June 3, 2011

- At HHS, we understand the importance of sustainable, climate-resilient communities. ...Our Department will adopt the Interagency Climate Change Adaptation Task Force guiding principles to integrate climate change adaptation and mitigation strategies into our sustainability and health programs, policies, and operations



OVERVIEW

- Brief Overview of HHS Sustainability and Climate Change Portfolio
- Quick Look at HHS Global Health Portfolio
- Glance at Climate Change and Health
- Resources

THE PRESIDENT'S CLIMATE ACTION PLAN

EXTREME WEATHER COMES AT A COST CLIMATE AND WEATHER DISASTERS IN 2012 COST THE AMERICAN ECONOMY MORE THAN \$100 BILLION



\$30 BILLION
U.S. DROUGHT/HEATWAVE
ESTIMATED ACROSS THE U.S.



\$1 BILLION
WESTERN WILDFIRES
ESTIMATED



\$65 BILLION
SUPERSTORM SANDY
ESTIMATED



\$2.3 BILLION
HURRICANE ISAAC
ESTIMATED



\$11.1 BILLION
COMBINED SEVERE WEATHER
ESTIMATED FOR INCIDENTS ACROSS THE U.S.

THERE ARE ALSO PUBLIC HEALTH THREATS ASSOCIATED WITH EXTREME WEATHER

Children, the elderly, and the poor are most vulnerable to a range of climate-related health effects, including those related to heat stress, air pollution, extreme weather events, and diseases carried by food, water, and insects.



WE CAN CHOOSE TO BELIEVE THAT SUPERSTORM SANDY, AND THE MOST SEVERE DROUGHT IN DECADES, AND THE WORST WILDFIRES SOME STATES HAVE EVER SEEN WERE ALL JUST A FREAK COINCIDENCE. OR WE CAN CHOOSE TO BELIEVE IN THE OVERWHELMING JUDGMENT OF SCIENCE — AND ACT BEFORE IT'S TOO LATE.” - PRESIDENT OBAMA

AT THE CENTER OF THESE HHS PREVENTION STRATEGIES



HHS CLIMATE CHANGE PORTFOLIO

- CDC's Climate-Ready States and Cities Initiative and the CDC BRACE Framework
- Office of the Assistant Secretary for Preparedness and Response: Health Care and Biomedical Research Infrastructure Resilience and lead for the National Response Framework (NRF)
- NIH, The National Institute of Environmental Health Sciences (NIEHS) Climate Change & Human Health Program
- The Substance Abuse and Mental Health Services Administration (SAMHSA): ensure effective response to behavioral health needs during disasters and public health emergencies.
- The Administration for Children and Families (ACF) -resilience of human services infrastructure to extreme weather events
- Inter-departmental: CDC and NIH co-chair the US Global Change Research Program's Interagency Climate Change and Human Health Working Group

CDC CLIMATE-READY STATES & CITIES INITIATIVE, BRACE

Building Resilience Against Climate Effects (BRACE) Framework

Step 1: Forecasting Climate Impacts and Assessing Vulnerabilities

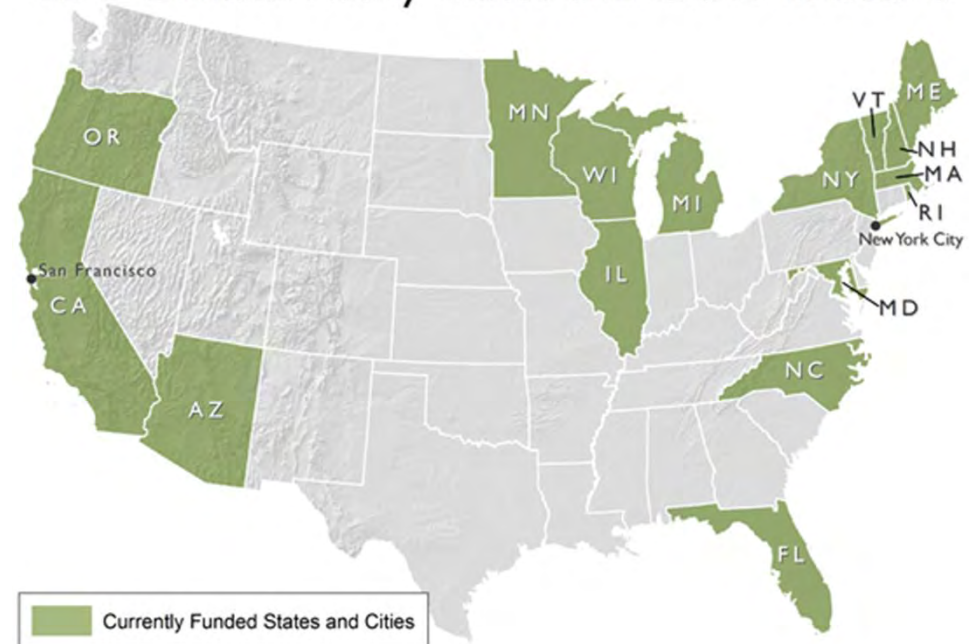
Step 2: Projecting the Disease Burden

Step 3: Assessing Public Health Interventions

Step 4: Developing and Implementing a Climate and Health Adaptation Plan

Step 5: Evaluating Impact and Improving Quality of Activities

CDC Climate Ready States and Cities Initiative



NIH population vulnerability to climate change grants: research on the health effects of air pollution and temperature, water quality and quantity, infectious disease transmission, and mitigation/adaptation actions.

Grantees

A⁺ A⁻   Share

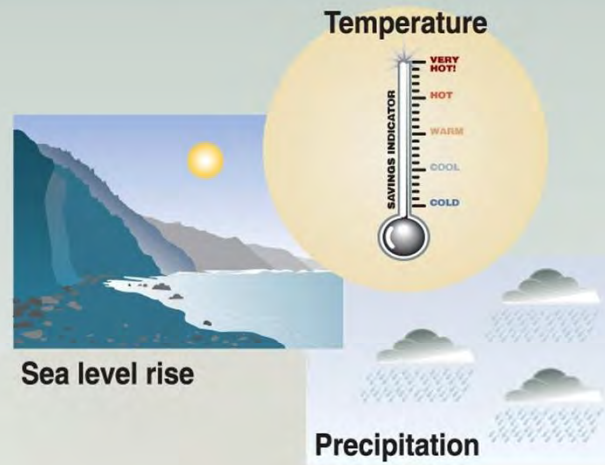
Human Health Impacts of Climate Change

PROJECT TITLE	PRINCIPAL INVESTIGATOR	INSTITUTION	LOCATION
Uncertainties in Modelling Spatially-Resolved Climate Change Health Impacts	Ying Zhou, Sc.D.	Emory University	Atlanta, Georgia
Social Vulnerability and Climatic Drivers of Enteric Disease in Rural Ecuador	Karen Levy, Ph.D.	Emory University	Atlanta, Georgia
Pediatric Asthma, Photochemical Oxidant Air Pollutants, and Climate Change Vulnerability	Ralph Delfino, M.D., Ph.D.	University of California at Irvine	Irvine, California
Extreme Heat Events- Evolving Risk Patterns in Urban and Rural Communities	Julia Gohlke, Ph.D.	University of Alabama at Birmingham	Birmingham, Alabama
Individual and Community Factors Conveying Vulnerability to Weather Extremes	Joel Schwartz, Ph.D.	Harvard University - Schwartz: Weather Extremes	Cambridge, Massachusetts
Physiologic Response to Weather Changes and Extremes in Elderly Cohort	Joel Schwartz, Ph.D.	Harvard University - Schwartz: Elderly Cohort	Cambridge, Massachusetts
Climate Change and Cardiac Vulnerability in Humans	Antonella Zanobetti, Ph.D., and Diane Gold, M.D.	Harvard University	Cambridge, Massachusetts
Extreme Heat and Human Health: Characterizing Vulnerability in a Changing Climate	Roger Peng, Ph.D.	John Hopkins University	Baltimore, Maryland
Climate Change Impacts on Power Plant Emissions, Air Quality and Health in the U.S.	Jonathan Patz, M.D., M.P.H.	University of Wisconsin at Madison	Madison, Wisconsin

HHS GLOBAL HEALTH PROGRAMS/INITIATIVES

- **CDC** – Strengthens public health systems. Improves health service delivery. Strong focus on surveillance, epidemiology, laboratory science , prevention, treatment, care, and health systems.
- **FDA** – Works in host countries and around the world to improve the drug regulatory environment. Their goal is to assure quality, life-saving drugs are affordable and available to countries in need.
- **HRSA** – Assistance in building and sustaining clinical care systems and staff training including Nursing Education Partnership Initiative (NEPI).
- **NIH** – Has an extensive research capability. Uses this capability to assist and inform countries who have health challenges due to lack of resources. NIH works very closely with other OPDIVS and partners. Fogarty International Center provides medical education for doctors through the Medical Education Partnership Initiative (MEPI). Networks present in many countries and universities.
- **SAMHSA** –Technical support targeting Most at Risk Populations (MARPs) relating to alcohol and substance abuse.

Potential climate changes impact



Impacts on...

Health



Weather-related mortality
Infectious diseases
Air-quality respiratory illnesses

Agriculture



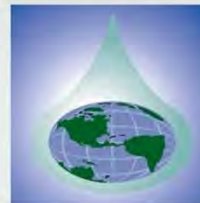
Crop yields
Irrigation demands

Forest



Forest composition
Geographic range of forest
Forest health and productivity

Water resources



Water supply
Water quality
Competition for water

coastal areas



Erosion of beaches
Inundation of coastal lands
additional costs to protect coastal communities

Species and natural areas

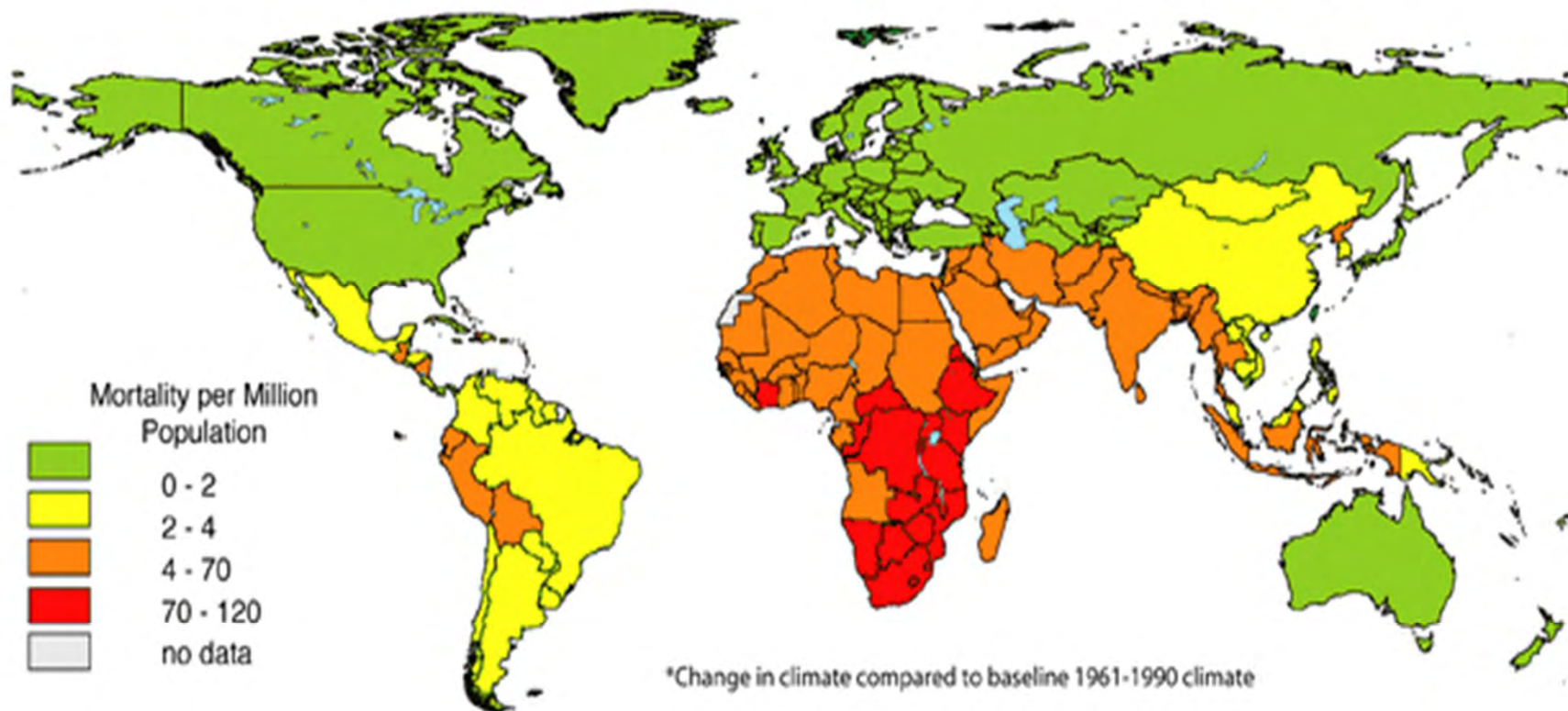


Loss of habitat and species
Cryosphere: diminishing glaciers

“Climate change will endanger public health, affecting all sectors of society, both domestically and globally”

-Executive summary, report of the interagency working group on climate change and health., Published 2010

Estimated Deaths Attributed to Climate Change in the Year 2000, by Subregion*



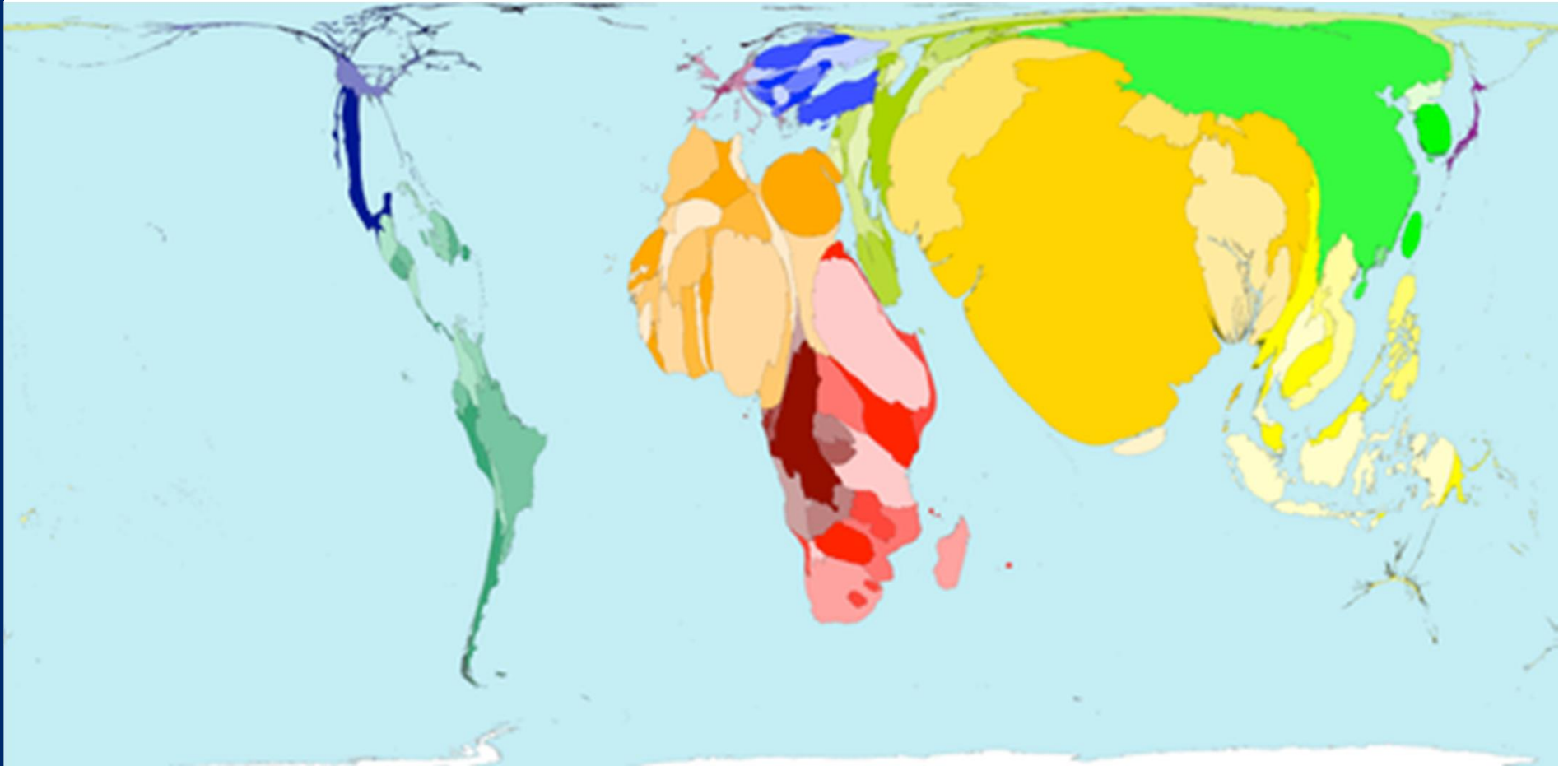
Data Source:

McMichael, JJ, Campbell-Lendrum D, Kovats RS, et al. Global Climate Change. In Comparative Quantification of Health Risks: Global and Regional Burden of Disease due to Selected Major Risk Factors. M. Ezzati, Lopez, AD, Rodgers A., Murray CJL. Geneva, World Health Organization, 2004



Maps produced by the Center for Sustainability and the Global Environment (SAGE)

WORLDMAPPER.ORG VIEW OF GLOBAL POVERTY



POTENTIAL HEALTH EFFECTS OF CLIMATE CHANGE

Climate Change:

- Temperature rise
- Sea level rise
- Hydrologic extremes



HEAT

SEVERE WEATHER

AIR POLLUTION

ALLERGIES

VECTOR-BORNE DISEASES

WATER-BORNE DISEASES

WATER AND FOOD SUPPLY

MENTAL HEALTH

ENVIRONMENTAL REFUGEES

- ➔ Heat stress, cardiovascular failure
- ➔ Injuries, fatalities
- ➔ Asthma, cardiovascular disease
- ➔ Respiratory allergies, poison ivy
- ➔ Malaria, dengue, encephalitis, hantavirus, Rift Valley fever
- ➔ Cholera, cryptosporidiosis, campylobacter, leptospirosis
- ➔ Malnutrition, diarrhea, harmful algal blooms
- ➔ Anxiety, despair, depression, post-traumatic stress
- ➔ Forced migration, civil conflict

Adapted from J. Patz

HUMAN HEALTH AFFECTED BY CLIMATE CHANGE



- Asthma, respiratory allergies, and airway diseases
- Cancer
- Cardiovascular disease and stroke
- Foodborne diseases and nutrition
- Heat-related morbidity and mortality
- Human developmental effects
- Mental health and stress-related disorders
- Neurological diseases and disorders
- Vector-borne and zoonotic diseases
- Waterborne diseases
- Weather-related morbidity and mortality

BACK UP SLIDES

- References and resource information:
- National Institute of Environmental Health Science, NIH, DHHS
<http://www.niehs.nih.gov/research/programs/geh/climatechange/>
 - Teaching aid
http://www.teachersdomain.org/asset/envh10_int_cchealth/
- GlobalChange.Gov <http://globalchange.gov/what-we-do/climate-change-health>
 - Metadata Access Tool for Health MATCH – April 2013
<http://match.globalchange.gov/geoportal/catalog/main/home.page>
 - Interagency Crosscutting Group on Climate Change and Human Health (CCHHG) [Interagency Crosscutting Group on Climate Change and Human Health \(CCHHG\)](#)

1. ASTHMA, RESPIRATORY ALLERGIES, AIRWAY DISEASES

Change in Climate	Environmental Impact	Environmental Hazard	Health Effect
Increased average temperatures	Altered growing seasons	Increased mold, pollen, allergens	Increased allergies
Increased average temperatures	Increased UV radiation	Increased ozone	Lung inflammation and scarring, chest pain, coughing, throat irritation, congestion, bronchitis, emphysema, asthma
Altered weather patterns	Drought	Increased dust and smoke/particulate matter	Respiratory symptoms, allergies, lung damage
Altered weather patterns	Weather patterns affected resulting in excess rain	Increased mold growth	Allergies, respiratory symptoms
Increased average temperatures	Increased ocean temperatures	Harmful algal blooms	Exacerbate respiratory diseases



2. CANCER

Change in Climate	Environmental Impact	Environmental Hazard	Health Effect
Increased average temperatures	Decreased cloud cover and decreased ozone layer	Increased exposure to UV radiation	Skin cancer
Increased average temperatures	Decreased cloud cover and decreased ozone layer	Increased exposure to UV radiation resulting in increased vitamin D formation	Decreased colon cancer
Increased average temperatures	Increased temperatures	Increased release of volatile compounds	Cancer
Altered weather patterns	Increased precipitation/flooding	Toxic chemical leaks from storage facilities	Various cancers



3. CARDIOVASCULAR DISEASE AND STROKE

Change in Climate	Environmental Impact	Environmental Hazard	Health Effect
Extreme temperatures	Extreme temperatures/heat and cold	Heat and cold	Chest pain, acute coronary syndrome, stroke, cardiac dysrhythmias
Increased average temperatures	Increased heat	Increase in ground-level ozone	Increased cardiac effort, impairs pulmonary gas exchange, acute myocardial infarction
Altered weather patterns	Increased incidence of drought (dust), fires from drought, longer growing seasons (from warmer temperatures)	Increased particulate matter, dust, pollen, smoke	Systemic inflammation, blood vessel dysfunction, compromised heart function, deep venous thrombosis, pulmonary embolism, increase in hospital admissions and mortality from cardiovascular disease and ischemic heart disease



4. FOODBORNE DISEASES AND NUTRITION

Change in Climate	Environmental Impact	Environmental Hazard	Health Effect
Altered weather patterns, increased average temperatures	Extreme weather events, changes in temperature and precipitation patterns	Destruction of crops and other food supplies, interruption of transport and distribution of food; reduced availability and nutritional quality of foods	Famine or malnutrition
Altered weather patterns	Drought causing an increased occurrence of crop pests	Pesticide/fungicide sprays	Some pesticides may decrease the nutritional value of foods
Altered weather patterns	Drought causing an increased occurrence of crop pests	Aspergillus mold (aflatoxin)	Liver cancer
Altered weather patterns	Flooding/extreme rain events	Physical damage, chemical contamination	Reduced nutritional intake or value
Altered weather patterns, increased average temperatures	Increased temperatures, flooding	Pathogens (e.g. <i>Vibrio cholerae</i>)	Increased illness from pathogens that cause vomiting and diarrhea, which can result in decreased nutrients in the body



5. HEAT-RELATED MORBIDITY AND MORTALITY

Change in Climate	Environmental Impact	Environmental Hazard	Health Effect
Increased average temperatures	Increased extreme temperatures	Heat	Exhaustion, heat cramps, heat stroke, death
Increased average temperatures	Increased extreme temperatures	Heat	Exacerbate existing respiratory, cerebral, or cardiovascular diseases



6. HUMAN DEVELOPMENTAL EFFECTS

Change in Climate	Environmental Impact	Environmental Hazard	Health Effect
Altered weather patterns, increased average temperatures	Increased average temperatures, droughts, extreme weather events	Food borne illness, changes in quality of food, security/availability of food	Malnutrition (which affects development/growth, particularly of fetuses, resulting in low birth weight and other developmental deficits)
Increased average temperatures	Increased occurrence of pests	Increased use of pesticides	Developmental changes, adverse changes to the immune system
Altered weather patterns, increased average temperatures	Flooding, sea-level rise	Toxic chemicals into the water and food supply	Pcbs and dioxins are linked to cognitive defects, and immunotoxicity, immunotoxicants; lead and mercury both cause brain damage in fetuses and growing children; arsenic has been shown to interfere with fetal development and increase spontaneous abortions



7. MENTAL HEALTH AND STRESS-RELATED DISORDERS

Change in Climate	Environmental Impact	Environmental Hazard	Health Effect
Altered weather patterns	Extreme weather events (hurricanes, wildfires, flooding)	Geographic displacement, damage or loss of property, death or injury of loved ones, recovery efforts	Anxiety, emotional stress, acute traumatic stress, post traumatic stress disorder, grief, depression, poor concentration, sleep disorders, etc.
Altered weather patterns, temperature changes	Extreme weather events, extreme temperatures	Prolonged heat or cold	Chronic stress



8. NEUROLOGICAL DISEASES AND DISORDERS











Change in climate	Environmental impact	Environmental hazard	Health effect
Altered weather patterns, temperature changes	Changes in ocean health (temperature, precipitation, nutrient loading from run-off)	Occurrence of toxic algal blooms (poisoning fish, shellfish)	Amnesia, diarrhea, numbness, liver damage, skin and eye irritation, respiratory paralysis, Parkinson's and Alzheimer's disease-like symptoms, epilepsy, death
Increased average temperatures	Increased occurrence of pests	Increased use of pesticides and herbicides to control pests	Parkinson's disease and other neurological diseases
Altered weather patterns, temperature changes	Flooding, increased temperatures/rise in ocean levels	Exposure to heavy metals such as lead and mercury	Neurological deficits in children/learning disabilities, Parkinson's and Alzheimer's disease



9. VECTOR-BORNE AND ZOOONOTIC DISEASES

Change in climate	Environmental impact	Environmental hazard	Health effect
Increased average temperature	Increase in range of disease vectors	Increased vector-borne and zoonotic diseases	Spread of vector-borne and zoonotic diseases (e.g. Lyme disease expected to spread north as the range of the deer tick increases);
Increased average temperature and changes in precipitation patterns	Increase in vector populations	Increased vector-borne and zoonotic diseases	Hantavirus and plague may increase if rainfall increases in the southwest united states
Altered weather patterns	Increase in rainfall	Increase in some vector populations (e.g. Mosquitoes require water)	Increase in vector-borne diseases like malaria, dengue
Increased average temperature	Increased occurrence of pests/ vectors	Increased use of pesticides	Neurological diseases, cancer, developmental effects



Disease	Vector	Population at risk (million) ¹	Number of people currently infected or new cases per year	Present distribution	Likelihood of altered distribution
Malaria	Mosquito	2,400 ²	300-500 million	Tropics and Subtropics	
Schistosomiasis	Water snail	600	200 million	Tropics and Subtropics	
Lymphatic Filariasis	Mosquito	1 094 ³	117 million	Tropics and Subtropics	
African Trypanosomiasis (Sleeping sickness)	Tsetse fly	55 ⁴	250 000 to 300 000 cases per year	Tropical Africa	
Dracunculiasis (Guinea worm)	Crustacean (Copepod)	100 ⁵	100 000 per year	South Asia, Arabian Peninsula, Central-West Africa	
Leishmaniasis	Phlebotomine sand fly	350	12 million infected, 500 000 new cases per year ⁶	Asia, Southern Europe, Africa, Americas	
Onchocerciasis (River blindness)	Black fly	123	17.5 million	Africa, Latin America	
American Trypanosomiasis (Chagas disease)	Triatomine bug	100 ⁷	18 million	Central and South America	
Dengue	Mosquito	1,800	10-30 million per year	All Tropical countries	
Yellow Fever	Mosquito	450	more than 5 000 cases per year	Tropical South America, Africa	

1. Top three entries are population-prorated projections, based on 1989 estimates.

2. WHO, 1994.

3. Michael and Bundy, 1995.

4. WHO, 1994.

5. Ranque, personal communication.

6. Annual incidence of visceral leishmaniasis; annual incidence of cutaneous leishmaniasis is 1-1.5 million cases/yr (PAHO, 1994).

7. WHO, 1995.

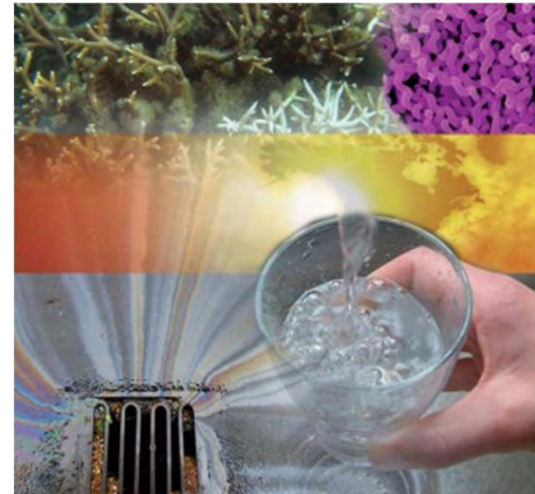
 Highly likely  Very likely  Likely  Unknown

 
 GRID Arendal
 GRAPHIC DESIGN: PHILIPPE REKACEWICZ

Source: Climate change 1995, Impacts, adaptations and mitigation of climate change: scientific-technical analyses, contribution of working group 2 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996.

10. WATERBORNE DISEASES

Change in climate	Environmental impact	Environmental hazard	Health effect
Altered weather patterns	Drought	Increased concentration of effluent pathogens in wastewater treatment plants	Waterborne pathogens
Altered weather patterns	Flooding	Pathogens carried into water and food supplies	Vomiting, diarrhea, wound/skin infections
Increased average temperature	Increase in ocean temperature	Increase in pathogenic organisms such as diarrhea-causing vibrio bacteria, increased growth of harmful algal blooms, which are toxic	Diarrhea, neurotoxic or respiratory effects from toxic algae

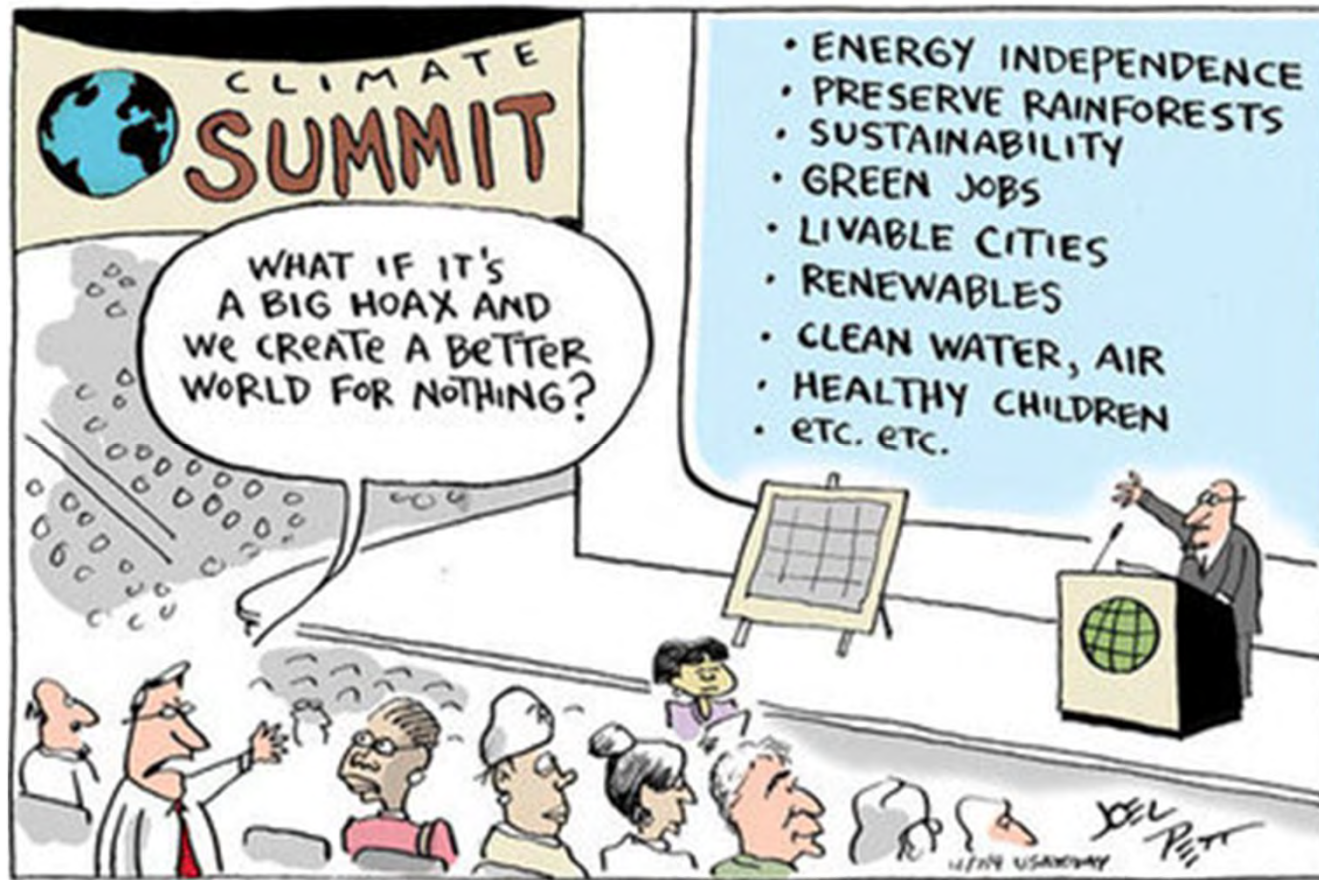


11. WEATHER-RELATED MORBIDITY AND MORTALITY

Change in climate	Environmental impact	Environmental hazard	Health effect
Altered weather patterns	Extreme precipitation	Flooding	Drowning, mudslides
Altered weather patterns	Extreme weather	Hurricanes, tornadoes, wind damage to structures	Damaged structures can injure or kills people
Altered weather patterns	Drought	Forest fires, decrease in potable water supplies, decrease in water supplies for agriculture	Smoke inhalation, being burned by fire, dehydration, illness from poor quality water, famine



CO-BENEFITS



Contact Info: Edward.Pfister@hhs.gov 202-619-0788



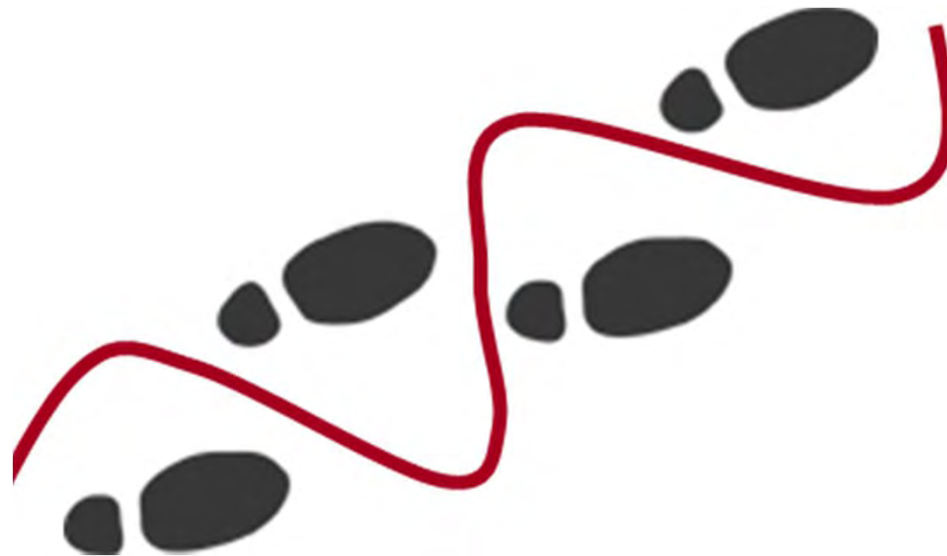
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WATER AND CLIMATE VULNERABILITY ASSESSMENT FOR PROGRAM DESIGN

JULY 23, 2013
JENNY FRANKEL-REED

OUTLINE

1. About vulnerability assessments
2. Asking the right questions
3. Selecting methods
4. Understanding the water context
5. Examples



VULNERABILITY ASSESSMENT (VA) BASICS

- Standard concept - understanding Exposure, Sensitivity, Adaptive capacity – but **no one-size-fits-all** approach
- Must be precise about **vulnerability of WHAT to WHAT**
 - Vulnerability of farmers to prolonged drought
 - of fish to increasing ocean temperatures
 - of crops to increasing salinity, etc.
- Scope **driven by what you need to know** to act
- Methods vary based on the **desired output**
- Either **Comparative** (who/what/where is most vulnerable), or **Explanatory** (why are people vulnerable?)

CONSIDERATIONS

- **What decisions do we want to influence with this assessment?**
- **Timing** – What timescale is relevant? 2020? 2050? 2100?
- **Precision, certainty** – How precise and certain does the information need to be to inform decisions at hand?
- **Sources** – What are the trusted sources?
- **Practical constraints** – Time, funds, politics
- **What information will inform action** – How much is enough information for a CDCS, project concept, local response measures, etc.?

FRAMING: WHAT DO YOU NEED TO KNOW?

For a country strategy?

- What are water-related risks to national development objectives?
- What regions and sectors have greatest climate risk?

For a sector policy or plan?

- What are the water dependencies in the sector?
- What are the climate risks to water or sector objectives?

For a project or project activities?

- What are the project's water uses and impacts on water?
- What are the climate risks to project objectives?
- What sites and activities should be targeted?

FORMULATING VA QUESTIONS

Country strategy:

- Is water security in the Philippines vulnerable to climate change?
- What areas in Ghana are vulnerable to flooding and drought?

Sector policy or plan:

- Is water supply infrastructure vulnerable to flooding?
- Is agriculture productivity vulnerable to shifting rainfall?

Project or project activities:

- Is a surface intake vulnerable to low flow conditions?
- Is a freshwater lake vulnerable to climate change?
- Are wells in this community vulnerable to contamination?

DRILLING DOWN TO SELECT METHODS

Is water security in the Philippines vulnerable to CC?

Exposure:

- Will water supplies decline due to more erratic rain?
- Will water consumption increase due to higher temps?

Sensitivity:

- Will increased sedimentation damage infrastructure?
- Is reservoir capacity sufficient to deal with increasing rainfall?

Adaptive Capacity:

- Are alternative water sources available?
- Are incentives in place for water conservation?

VULNERABILITY ASSESSMENT METHODS

1. Desk studies

- + : Low cost, flexible level of effort, as initial stocktaking
- : Not participatory, may be thin in places with little info

2. Consultations

- + : Participatory, helps coordinate, increases buy-in, can identify future plans not yet be public
- : Need to ensure a variety of perspectives is represented

3. Workshops

- + : Participatory, transparent, builds capacity
- : Requires outreach, planning, to manage expectations

4. Further studies, modeling

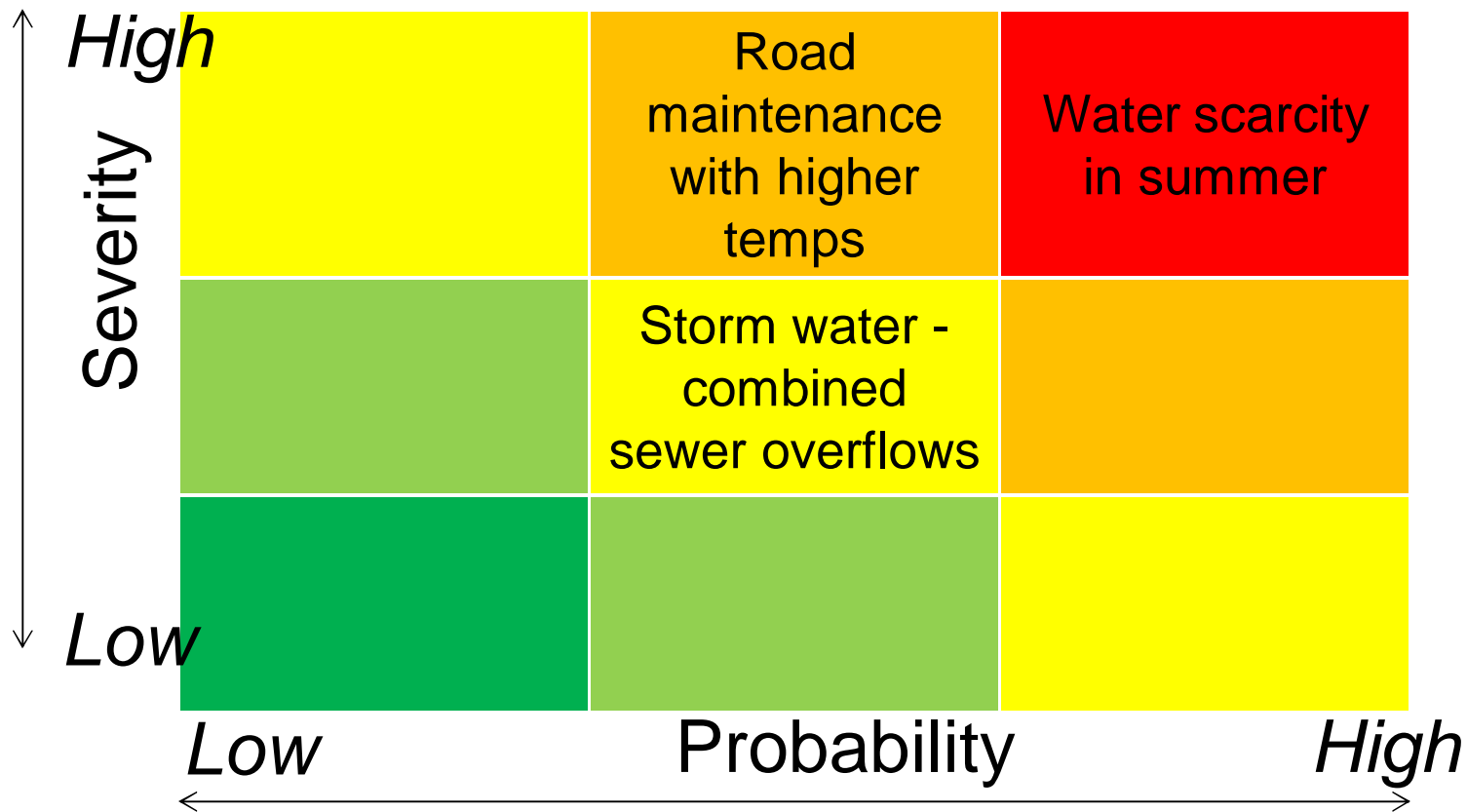
- + : Targeted, action-oriented, publishable
- : Can be costly, time-consuming, high data requirements

TYPES OF VA OUTPUTS: NARRATIVE SUMMARY

Planning area	Current and expected stresses to systems in planning area	Projected climate change impacts to systems in area	Vulnerability assessment		
			Degree of sensitivity of systems in planning area	Adaptive capacity of systems in planning area	Vulnerability of systems in planning area
Water supply	Summer drought (both current and expected)	More drought & summer water stress likely due to lower snowpack and warmer, drier summers. Population growth compounds problem.	High - water supply is very sensitive to changes in snowpack	Low - numerous regulatory constraints to reallocating water, options for expanding supply limited, summer demand already greater than supply	High

Source: University of Washington Climate Impacts Group, 2007

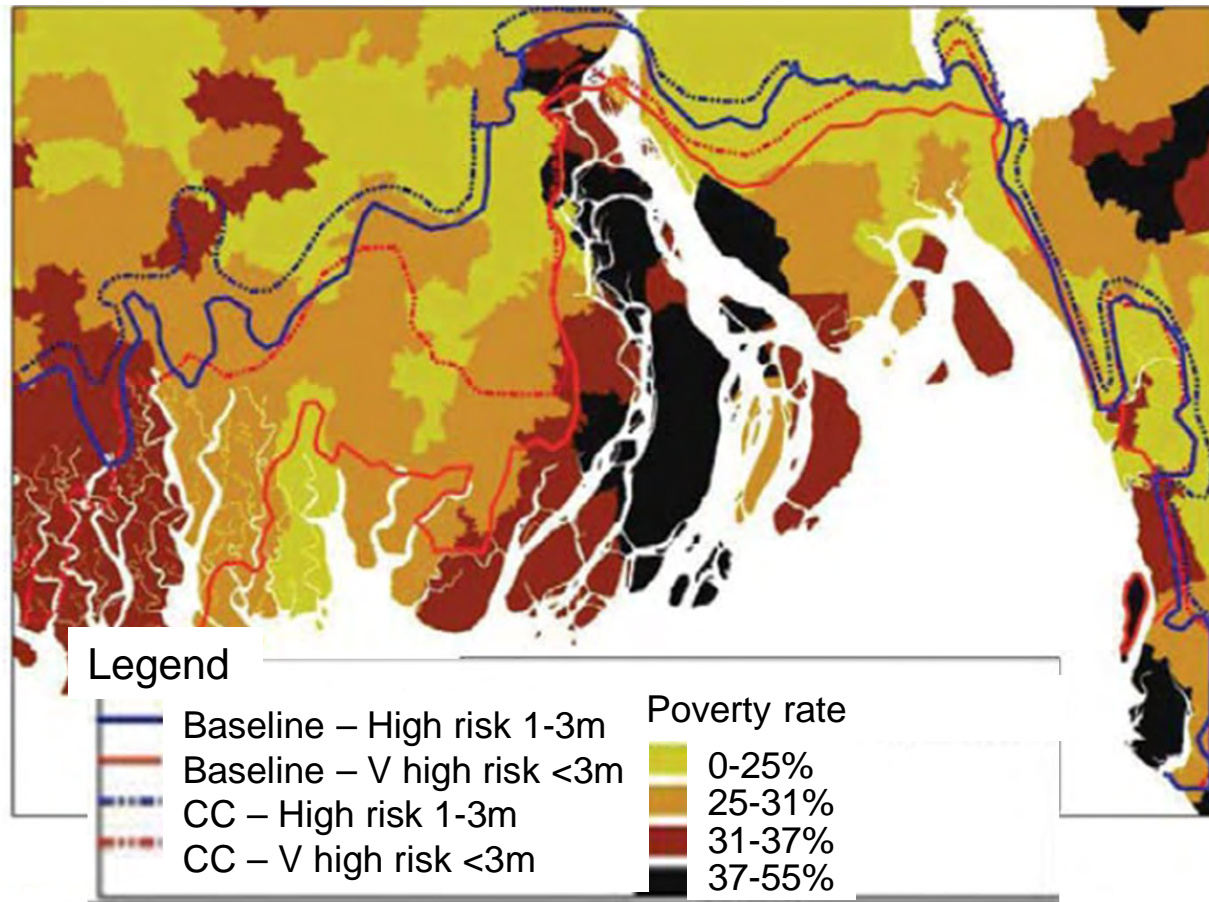
Higher Risk



Source: University of Washington Climate Impacts Group, 2007

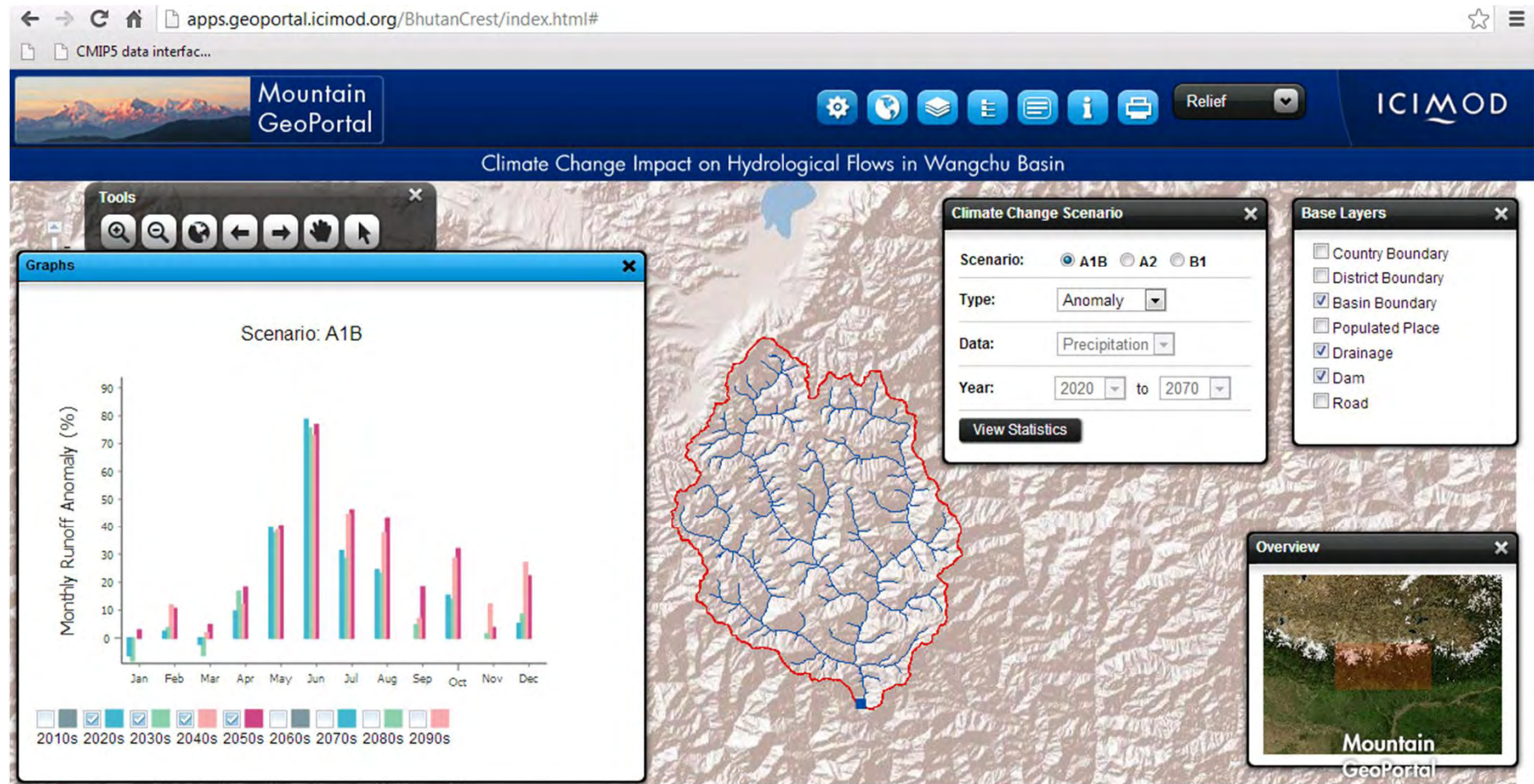
TYPES OF VA OUTPUTS: MAPS

Population under poverty in relation to flood risk



Source: World Bank Economics of Adaptation, 2009

TYPES OF VA OUTPUTS: BASIN MODELING



FIRST, UNDERSTANDING THE WATER CONTEXT

Water resource: Ground, surface, transfers

Water infrastructure: Wells, impoundments, canals, transmission, metering, financing, desalination, recycling

Water demands: Irrigation, industry, drinking, ecological flows, transport, flood control, and recreation

Water governance: Water sharing agreements, water rights, policy to control pollution/quality, incentivize rainwater capture, manage soil moisture, manage demand, capacity for monitoring



What are the baseline water challenges?

UNDERSTANDING THE WATER CONTEXT + CLIMATE

Water resource: Saline intrusion in coastal areas, shifted timing of surface water flows due to changes in snow melt, rainfall, monsoon timing, increased evaporation rates

Water infrastructure: Risk of water supply damage and contamination due to flooding, drought or storms, siltation due to increased rainfall intensity, flood control failure

Water demands: Increased demand for irrigation, industrial, and domestic use

Water governance: Need for updated supply and demand scenarios, negotiated water agreements, transboundary dialogue

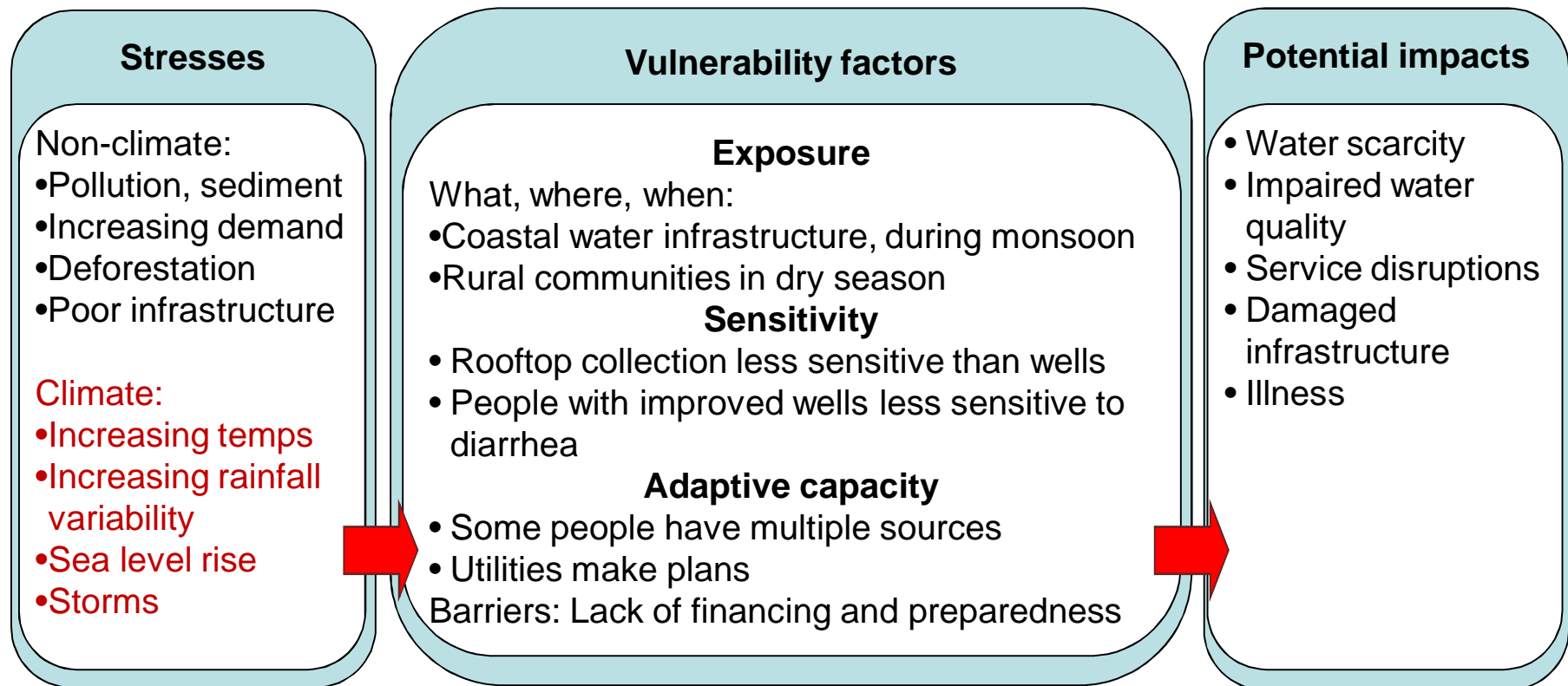


How does climate change complicate water challenges?

VULNERABILITY ASSESSMENT

Goal: Maintaining reliable, clean water despite changes in rainfall for tourism

Inputs: Supply, treatment, and distribution infrastructure; surface, rain and groundwater; functioning utilities; trained staff; communities, businesses



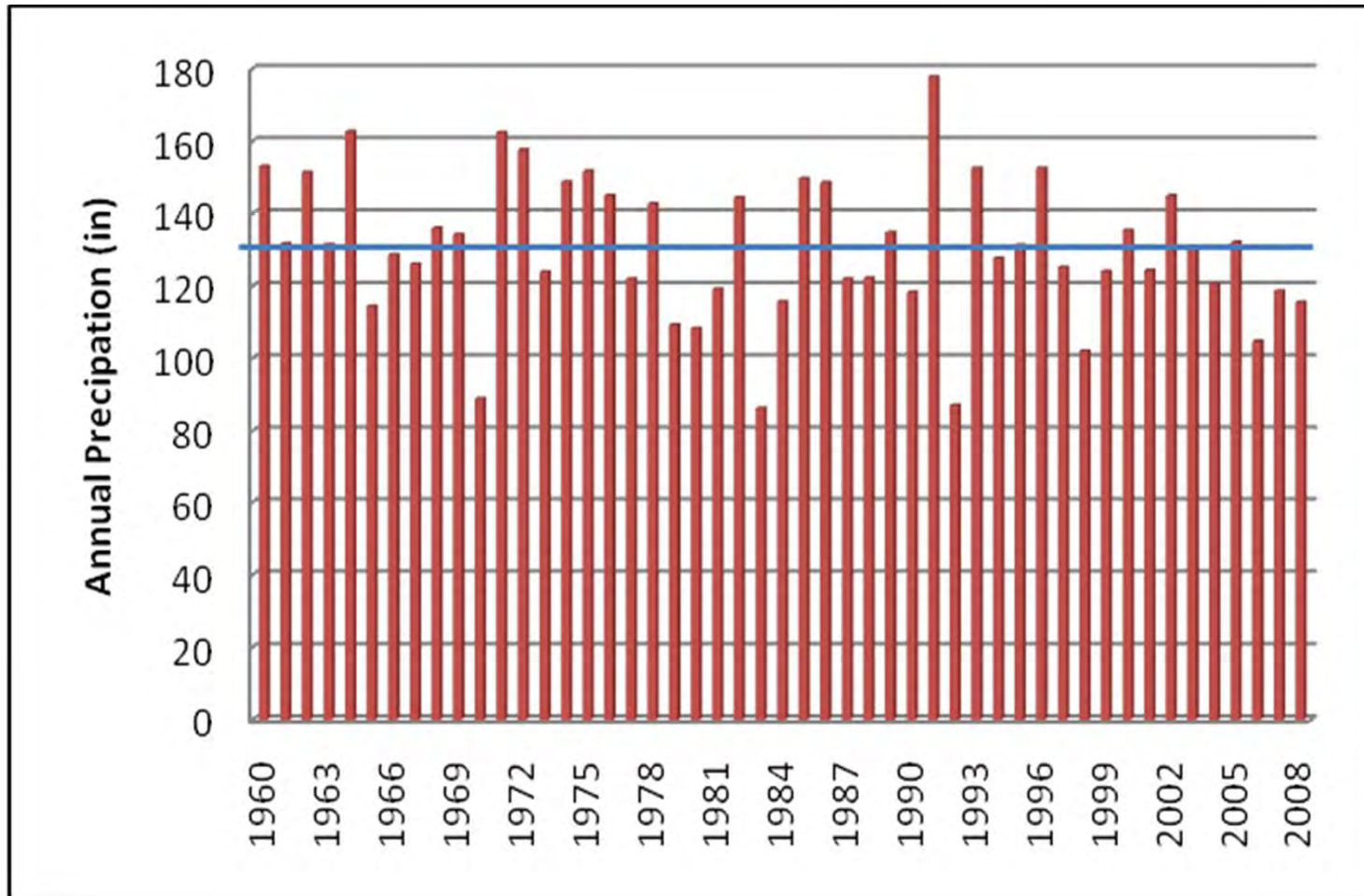
REPUBLIC OF THE MARSHALL ISLANDS ASSESSMENT

Step 1. Stakeholder workshop to agree on:

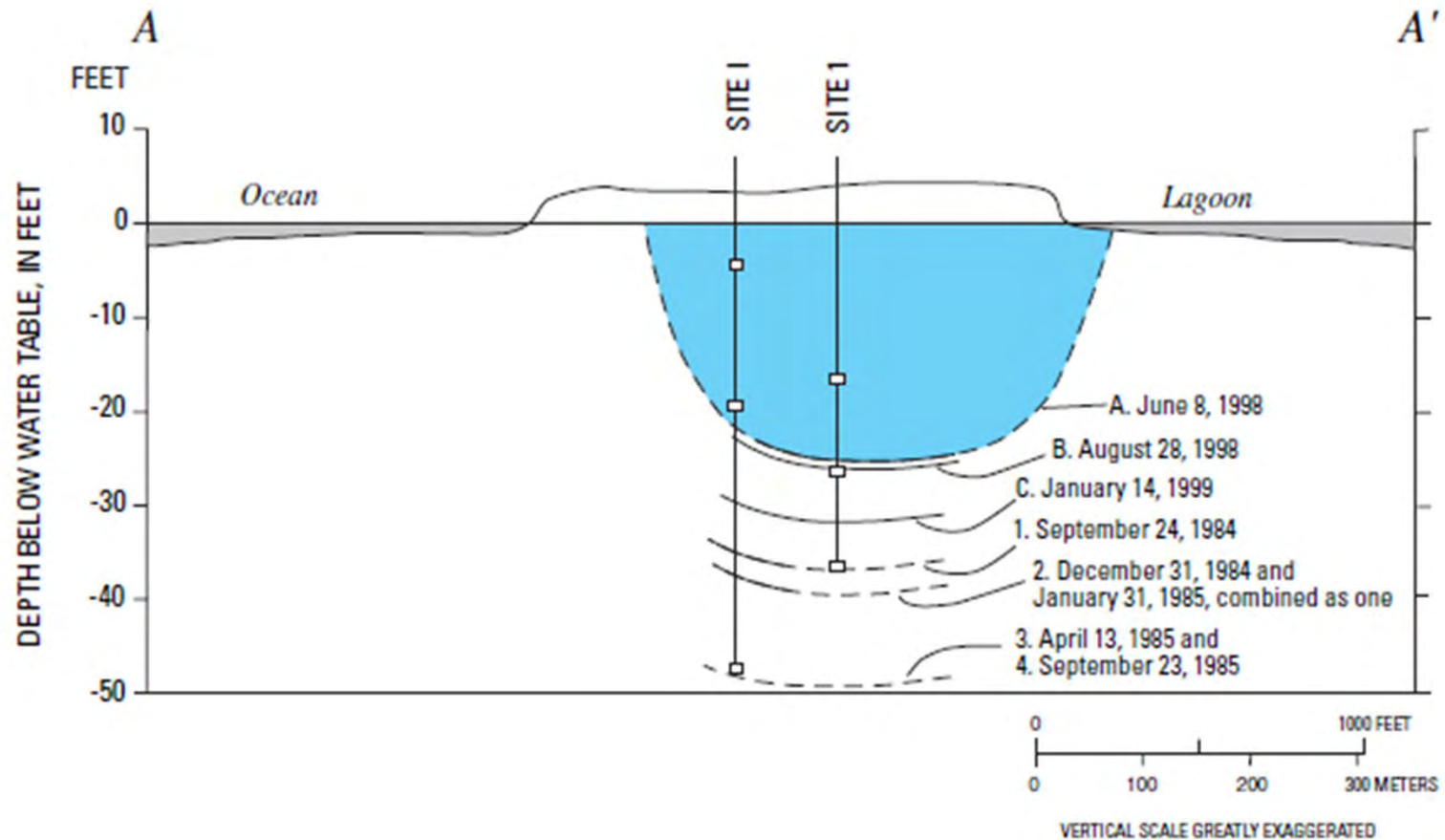
- **Objective:** Reliable freshwater for human health, agriculture and other uses
- **Critical inputs, enabling factors:** Groundwater, rainwater, infrastructure, energy, pollution regulations, DRM, resource management
- **Stresses:** More persistent drought, weak water management, limited financing for capital improvements, unenforced building codes, El Nino-related droughts, rising temps, SLR

Step 2. Deeper assessment of water resources, climate trends, barriers, options

CLIMATE STRESS: ANNUAL RAINFALL IN MAJURO



BASELINE: DEPLETION OF FRESHWATER LENS



EXPOSURE

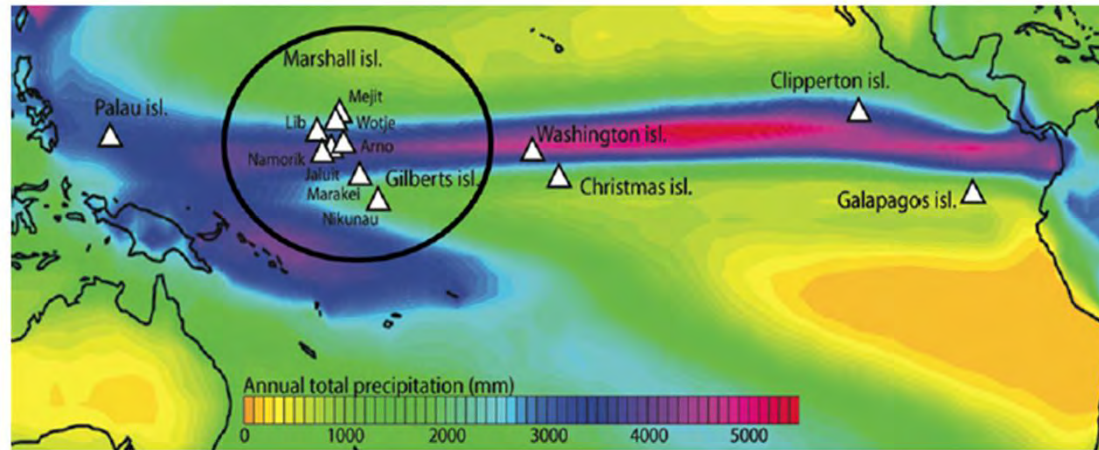


Figure 3-8: ITCZ Rain Band



SENSITIVITY



Figure 3-2: Pooling of Rainwater –
Airport Collection System

ADAPTIVE CAPACITY

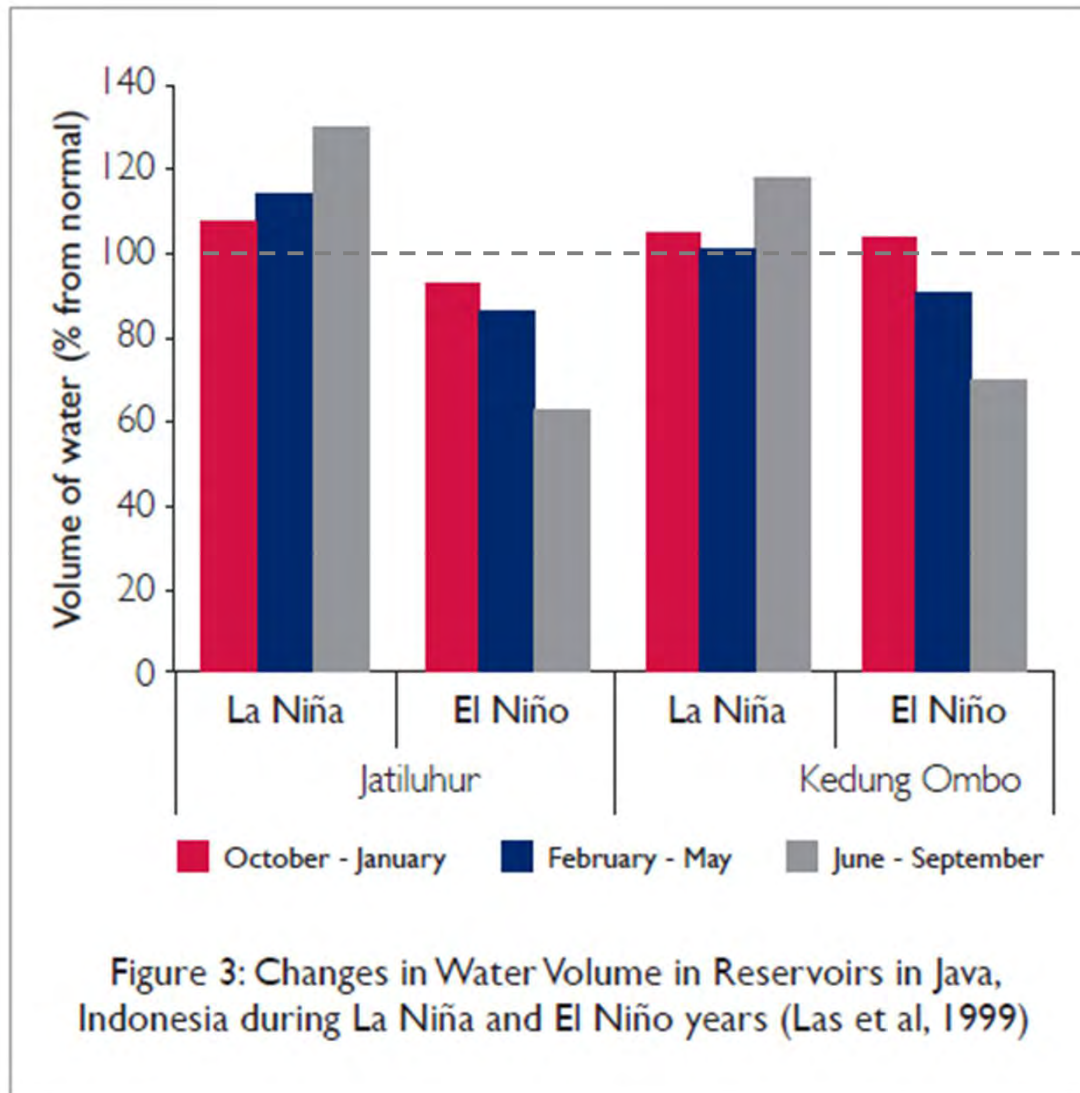
Challenges

- Governance: Ministry of Resource Development constrained to champion National Water Policy and Action Plan
- Financing: Financial crisis in RMI government

Lessons Learned

- Non-climate stressors present urgent challenges
- Promising options should not require major financing
- Need to build human technical capacity of government staff

EXAMPLE: INDONESIA IUWASH



- Strong El Nino – La Nina influence on water reservoirs
- Particularly pronounced in summer (June-Sept)

IUWASH VULNERABILITY ASSESSMENT METHODS

Phases	Steps	Tools/ Methodologies
1. Evaluation of the Current Situation: The Baseline Scenario	a. Stakeholder Engagement: Understanding the objectives and perspectives of the PDAM and Local Gov't; b. Data Collection and Analysis: Description of current system, types of water resources, historical hydro-met data, customer data, and supply/demand projections; c. Baseline Scenario Vulnerability Assessment: Identification of existing hazards and evaluation of associated risks.	Stakeholder Kickoff Meeting Key Informant Interviews Geospatial Analysis PDAM Asset Risk Matrix
2. Climate Change Vulnerability Assessment: The Climate Change-Driven Scenario	a. Analysis and synthesis of localized climate change data using existing research, interviews, and models; b. Development of Climate Change-Driven Scenario: Using quantitative and qualitative information to envision future impacts; c. Climate Change-Driven Scenario Vulnerability Assessment: Considering how the PDAM's risk profile may change.	Geospatial Analysis General Circulation Models PDAM Asset Risk Matrix Stakeholder Workshop
3. Adaptation Planning: A Portfolio of Prioritized Responses	a. Develop Long-List of Adaptation Options for Natural and Constructed Assets; b. Develop a Short-List of Adaptation Options; c. Prioritize Actions within Portfolio	Multi-Criteria Analysis Cost-benefit analysis Decision-Maker Workshop
4. Implementation, Integration, and Learning	a. Implementation of balance portfolio of adaptation options b. Integrate prioritized adaptation responses into PDAM planning documents; c. Begin implementation and monitoring, emphasizing an iterative approach to regularly incorporate new knowledge and experiences (learning).	PDAM Corporate Plan Project Feasibility Studies M&E systems

PHILIPPINES: ADAPTATION OPTIONS ASSESSMENT

Option	Vulnerability addressed			Effective- ness	Feasibil- -ity	Cost
	Water quality	Water supply	Flooding			
1.A Develop long-term monitoring program	✓	✓	✓	Medium	Medium	Medium
1.B Evaluate and enhance groundwater		✓		Medium	High	Low
2.A Enhance monitoring network for supply, quality, and flooding	✓	✓	✓	Medium	Medium	High
2.B Develop an information clearinghouse	✓	✓	✓	Medium	Low	Medium
2.C Develop capacity for information-based management decisions		✓		Low	High	Low
3.A.1 Rainwater harvesting		✓		High	High	Low
3.A.2 Community-based water supply		✓		High	High	Low
3.A.3 Demand side management		✓		High	Medium	Low
3.B.1 Reduce MIWD non-revenue water		✓		High	Medium	High
3.B.2 Feasibility study of MIWD treatment of Jalaur water	✓	✓		High	High	Medium
4.Evaluate point of use source water treatment	✓			Medium	Medium	Medium
4.B Improving compliance and enforcement capacity to achieve water quality goals	✓			Medium	High	Low
4.C Develop a sanitation information and education campaign	✓			High	High	Low

IN SUMMARY

Vulnerability assessments:

- Assess exposure, sensitivity, adaptive capacity, +
- Can be done at different scales – country, sector, project

...Must ask the right questions:

- To inform action, get specific

...Should select appropriate methods:

- Based on information and resources available, desk studies, consultations, workshops, modeling

Start by understanding baseline water context

ARCC PROGRAM

African and Latin American Resilience to Climate Change (ARCC) (ARD/TetraTech)

Task Areas:

- Development of Vulnerability Assessments Methodologies;
- Outreach, Training and Support;
- Knowledge Development and Management; and
- Technical Support to USAID Missions and Operating Units

Geographic focus on regional and bilateral Missions in Africa and LAC

Contacts: Africa Bureau, Tegan Blaine, Alex Apotsos
LAC Bureau, Christine Pendzich

E3 ADAPTATION TASK ORDER

CLIMATE CHANGE RESILIENT DEVELOPMENT (CCRD) (IRG, IRG, ICF, Stratus, TMI)

Main tasks:

- Adaptation guidance for USAID and partners
- Information and tools for adaptation planning
- Mission support*
- Piloting
- Adaptation Partnership workshops & communities of practice

*Mission support: Assessments, workshops, training

Contact: John Furlow, E3/GCC

EXERCISE

- Gather in the same country case study teams that worked on the Information Scavenger Hunt exercise.
- With information gathered during the Scavenger Hunt and new information provided, complete the “Vulnerability Assessment Template” provided.
- On the form, identify:
 - What inputs are **exposed to climate stress**, where and when?
 - What makes certain inputs **sensitive to climate stresses**?
 - What current **adaptive capacity** exists? What are the barriers?
- You have 30 minutes for this exercise.
- Each team will have 5 minutes to summarize results.

VULNERABILITY ASSESSMENT

Goal: Maintaining reliable, clean water despite changes in rainfall for tourism

Inputs: Supply, treatment, and distribution infrastructure; surface, rain and groundwater; functioning utilities; trained staff; communities, businesses

Stresses

Non-climate:

- Pollution, sediment
- Increasing demand
- Deforestation
- Poor infrastructure

Climate:

- Increasing temps
- Increasing rainfall variability
- Sea level rise
- Storms

Vulnerability factors

Exposure

What, where, when:

- Coastal water infrastructure, during monsoon
- Rural communities in dry season

Sensitivity

- Rooftop collection less sensitive than wells
- People with improved wells less sensitive to diarrhea

Adaptive capacity

- Some people have multiple sources
- Utilities make plans

Barriers: Lack of financing and preparedness

Potential impacts

- Water scarcity
- Impaired water quality
- Service disruptions
- Damaged infrastructure
- Illness



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WATER AND CLIMATE CHANGE ADAPTATION TOOLS AND RESOURCES “ROUND-ROBIN”

JULY 23, 2013

JENNY FRANKEL-REED, RICHARD VOLK, KATY BEGGS

EXERCISE

- Count off by threes and split into groups.
- Each group goes to one 'station' where a trainer will present a tool or resource on water / climate change adaptation.
- After 15 minutes of presentation and Q&A, a bell will ring and the groups rotate together to the next station.
- Each group will visit all three stations.

FEATURED RESOURCES



- **SERVIR:** Jenny
- **Water Point:** Richard

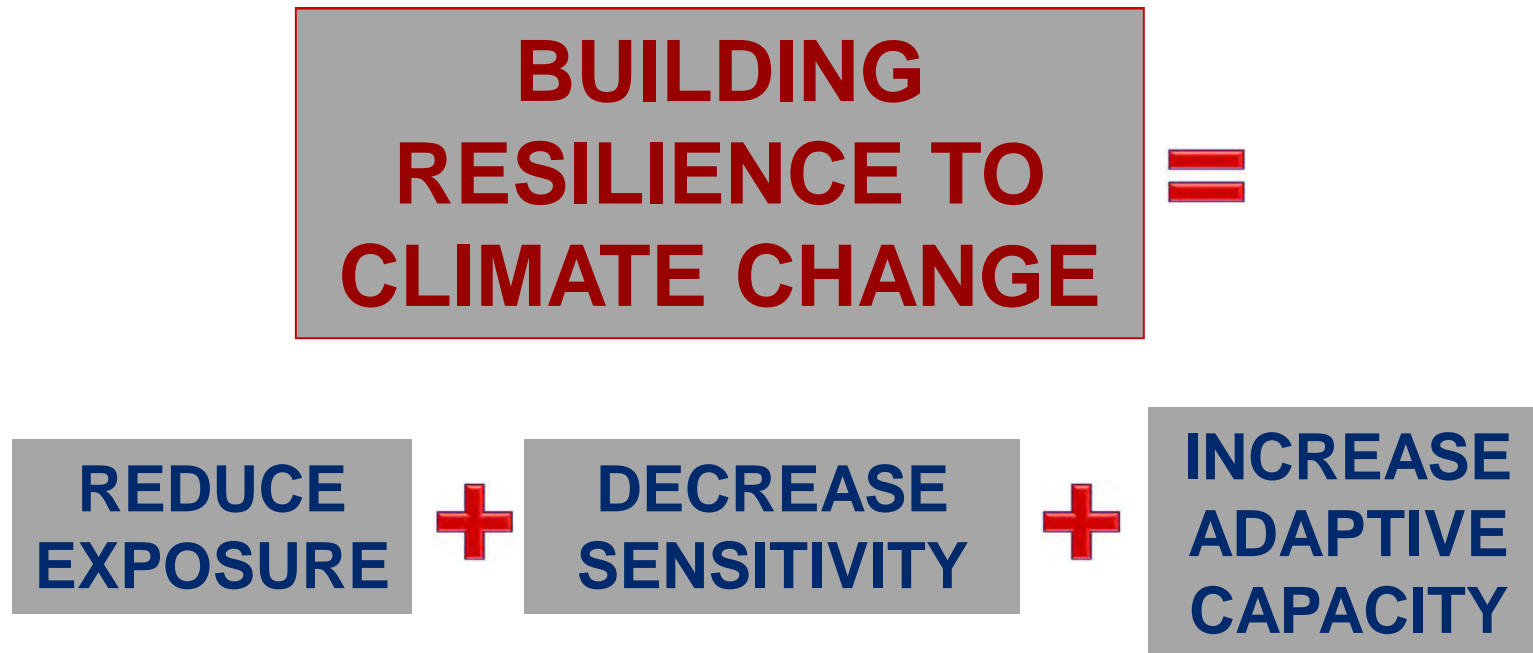


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PRACTICAL APPROACHES TO WATER-RELATED CLIMATE CHANGE ADAPTATION: AN OVERVIEW

JULY 23, 2013
RICHARD VOLK

JUST TO RECALL...







A variety of approaches exist to address each of these components...

ADAPTATION STRATEGIES

Many ways to approach adaptation.....

- **Change location** – relocation
- **Armor or elevate** – protect key assets
- **Modify the threat** – minimize stresses to other areas
- **Prevent effects** – proactive management
- **Change use** – alternative options
- **Share losses** – spreading risk/vulnerability
- **Research** – develop new strategies/technologies
- **Behavioral/rule change** – changing behaviors and rules to reduce risk

Four Major Categories

- Engineering/ Technological  TECHNOLOGY
- Environmental  NATURE
- Institutional/Social  PEOPLE
- Financial  MONEY

Engineering/ Technological



TECHNOLOGY

Includes:

- Modification of infrastructure / technologies to make them more resilient to climate change
- “Hard”, constructed interventions to prevent, resist, or shift climate change risk / exposure
- Innovative science and technology to increase adaptive capacity



Engineering/ Technological



TECHNOLOGY

Strengths:

- Can provide permanent protection
- Encourages innovation

Weaknesses:

- High environmental / social impacts
- More expensive than other options
- Requires a long time for design, financing, procurement, etc.
- May not be sustainable in absence of strong management institutions

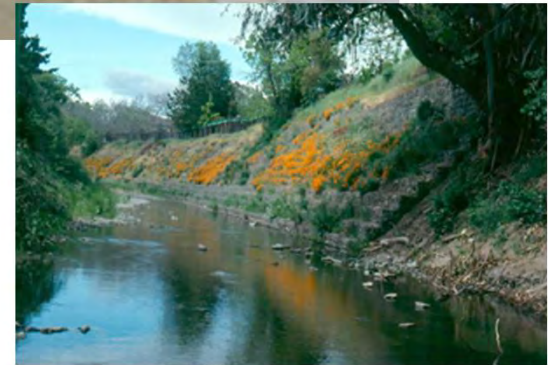
Environmental



NATURE

Includes:

- Protecting intact natural ecosystems to mitigate the impacts of climate change
- Using 'green' engineering and technology to increase resilience



Environmental



NATURE

Strengths:

- Ensures sustainability of essential ecosystem goods and services
- Generally low / no-cost approaches, with high cost-benefit ratios

Weaknesses:

- Bias towards “hard” engineering makes this a difficult sell
- Value of intact ecosystems to climate change resilience not always understood or economically valued

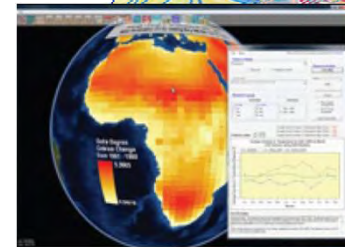
Institutional/Social



PEOPLE

Includes:

- Policy, legal and regulatory mechanisms
- Data and information management for decision-making
- Participatory governance approaches
- Capacity building
- Behavior change approaches
- Social networks and familial support



Institutional/Social



PEOPLE

Strengths:

- Ensures stakeholder/government 'ownership' of proposed solutions
- Builds on existing cultural, social and familial networks / assets
- Addresses root causes of problems

Weaknesses:

- Capacity is limited, especially in developing countries
- Policy reform, institutional strengthening, and behavior change are slow and challenging to achieve short-term results

Financial



MONEY

Includes:

- Sharing or spreading risk and losses associated with climate change
- Financial incentives and penalties to change behaviors, influence investment, etc.
- Mechanisms to finance climate change adaptation



Financial MONEY

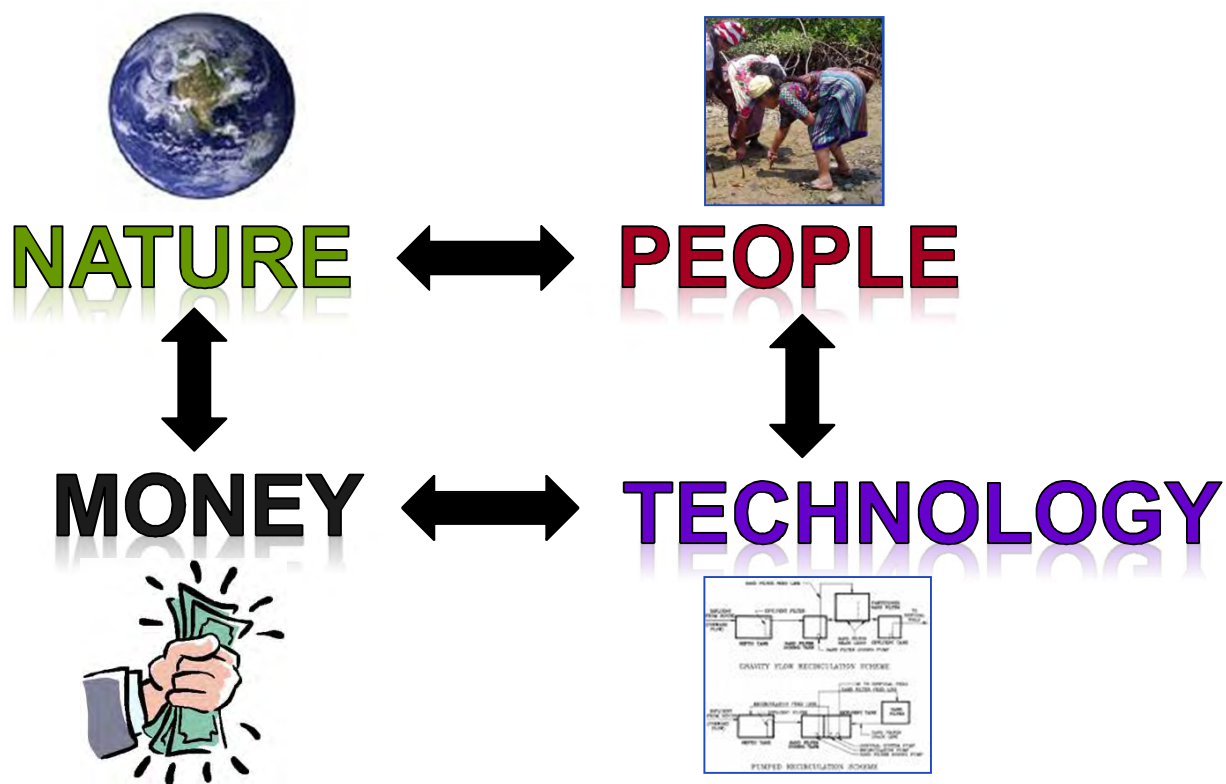
Strengths:

- Aligns with market forces
- Enhances sustainability of investments
- Engages private sector

Weaknesses:

- Models for financial instruments still nascent, especially in developing countries
- Challenge to find adaptation financing
- Some private sector actors not willing or able to invest in long-term adaptation measures

All four approaches have an important role to play.....



***More details on each of these categories...
coming tomorrow!***





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FROM THE AMERICAN PEOPLE

DAY 2 WRAP UP

JULY 23, 2013
ANDRE MERSHON

SESSIONS TODAY

SESSIONS

The USAID Institutional Framework for Water

The USAID Institutional Framework for Climate Change Adaptation

Activity: Water and CCA Game Show “Who Wants to be a Millionaire”

Discussion: Climate Change, Water, and Health

Vulnerability Assessment for Program Design

Water and Climate Change Adaptation Tools and Resources “Round Robin”

An Overview of Practical Approaches to Water and Climate Change Adaptation

TODAY'S DRIVING QUESTIONS

Day 2:

- What institutional and legal frameworks impact water and climate change adaptation?
- What is a Vulnerability Assessment and how do I use it for program design?
- What are some key water and climate change adaptation tools and resources I can turn to as I begin?

DAY 2 JOURNAL: INSTRUCTIONS

1. Select a partner nearby and sit together.
2. Work independently to respond to the Day 2 questions in the journal.
3. When finished, share and discuss your answers with your table.
4. Be prepared to give an example of an insight / learning from today.

DAY 2 CLOSING

- Thank you for your feedback
- Day 3 starts at 8:30

Please remember to...

Be on time.

Share your own stories.

Put questions in the parking lot.





USAID
FROM THE AMERICAN PEOPLE

DAY 3

WELCOME

JULY 24, 2013
ANDRE MERSHON

TODAY'S AGENDA

SESSIONS

Practical Approaches to Resiliency and Adaptation:
Engineering / Technology and Ecological Approaches

Practical Approaches to Resiliency and Adaptation:
Institutional / Social and Financial Approaches

Bringing It All Together: Water-Related Climate Change Adaptation
Program Design

CONCEPTS TODAY

Day 3:

- What are practical approaches to Water and Climate Change Adaptation...
 - ... for hard engineering principles and approaches?
 - ...for ecological/ soft engineering principles and approaches?
 - ...for institutional and social principles and approaches?
 - ... for financial principles and approaches?
- How can I select the best mix of approaches for a USAID/ USG program addressing water-related climate change adaptation?

DAY 3 – START UP ACTIVITY

Create large groups.

As you toss the ball around:

- **Thrower** calls out the name of the person they are throwing to
- **Receiver** shares their most significant “takeaways” from yesterday’s sessions that s/he thinks will be useful once back in his/her Mission or office.





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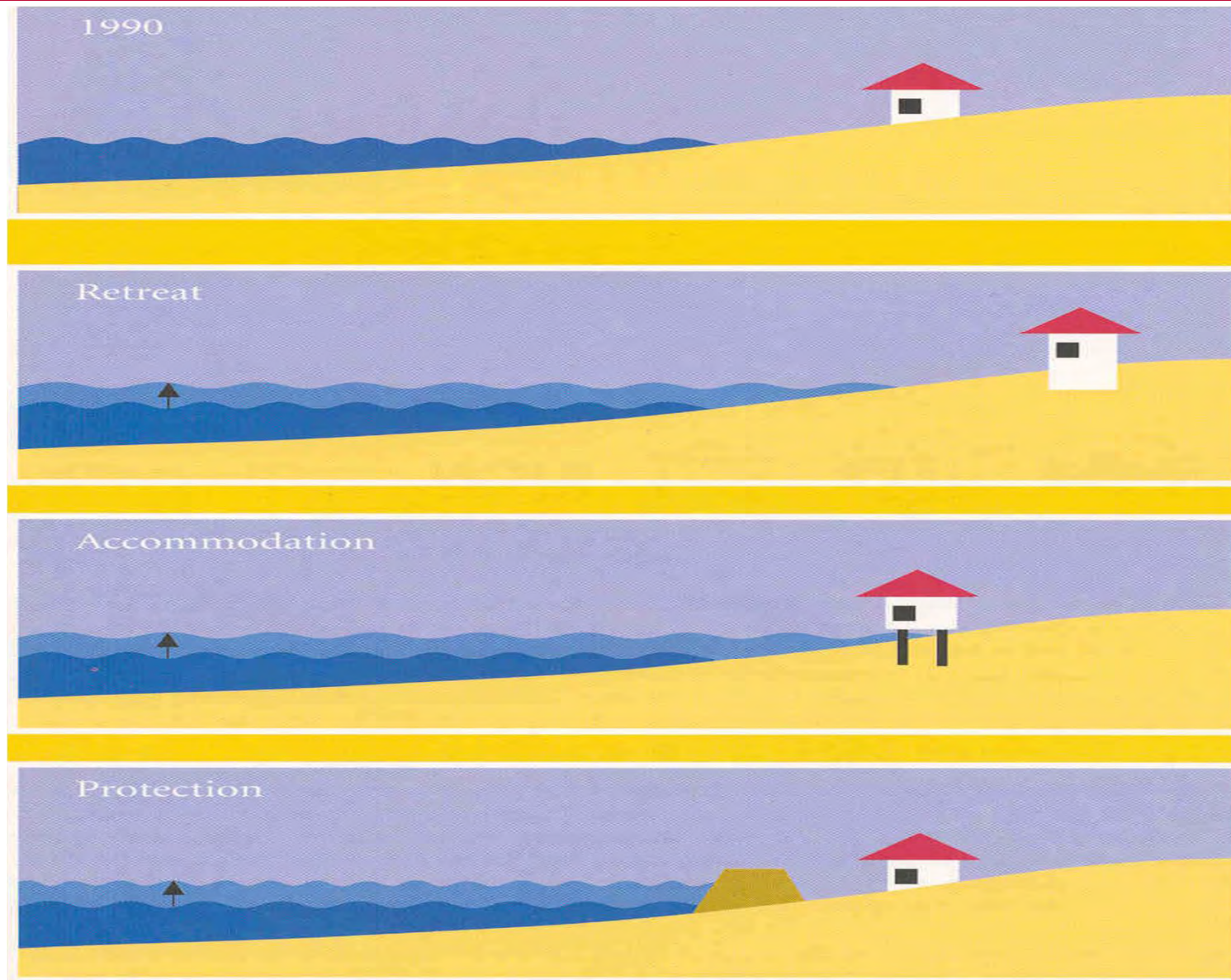
PRACTICAL APPROACHES TO WATER-RELATED CLIMATE CHANGE ADAPTATION: ENGINEERING/ TECHNOLOGICAL APPROACHES

JULY 24, 2013
RICHARD VOLK

WATER-RELATED ADAPTATION RESPONSES

Water objective	Engineering	Environmental	Institutional/Social	Financial
Supply	Surface, ground, RWH, desalination Leak detection, Low-flow technologies, Metering	Watershed mgmt., Environmental flow allocation, green roofs	Information mgmt., Modeling, Climate forecasting, Compulsory water restriction / rationing, Illegal connections	Tariff setting, Taxes and fees,
Storage	Reservoirs, Sand dams, impoundments, tanks	Reoptimize dams, Restoration of wetlands, Restoration of forests		
Reuse/recycling	Grey water, brackish water			
Irrigation Large-scale Micro-irrigation	Flood irrigation (flow measures and automated lift gates), drip irrigation, sprinkler irrigation, various lifting technologies, Various sensor technologies	Rainfed irrigation, conservation agriculture, Crop selection, Clay pots		Volumetric pricing of irrigation water
Risk reduction: Sea level rise Storm surge Flood Drought Stormwater runoff	<u>Protect</u> <u>Accommodate</u> <u>Retreat</u> Dikes, levees, seawalls, Retention ponds, hydro-met service	Floodplain mgmt., Watershed mgmt., Wetlands, riparian buffers, Dune/beach restoration, Green roof, biofiltration strips	Building codes, EWS, Planning/zoning/permitting Disaster response plan, Drought contingency plan,	Insurance

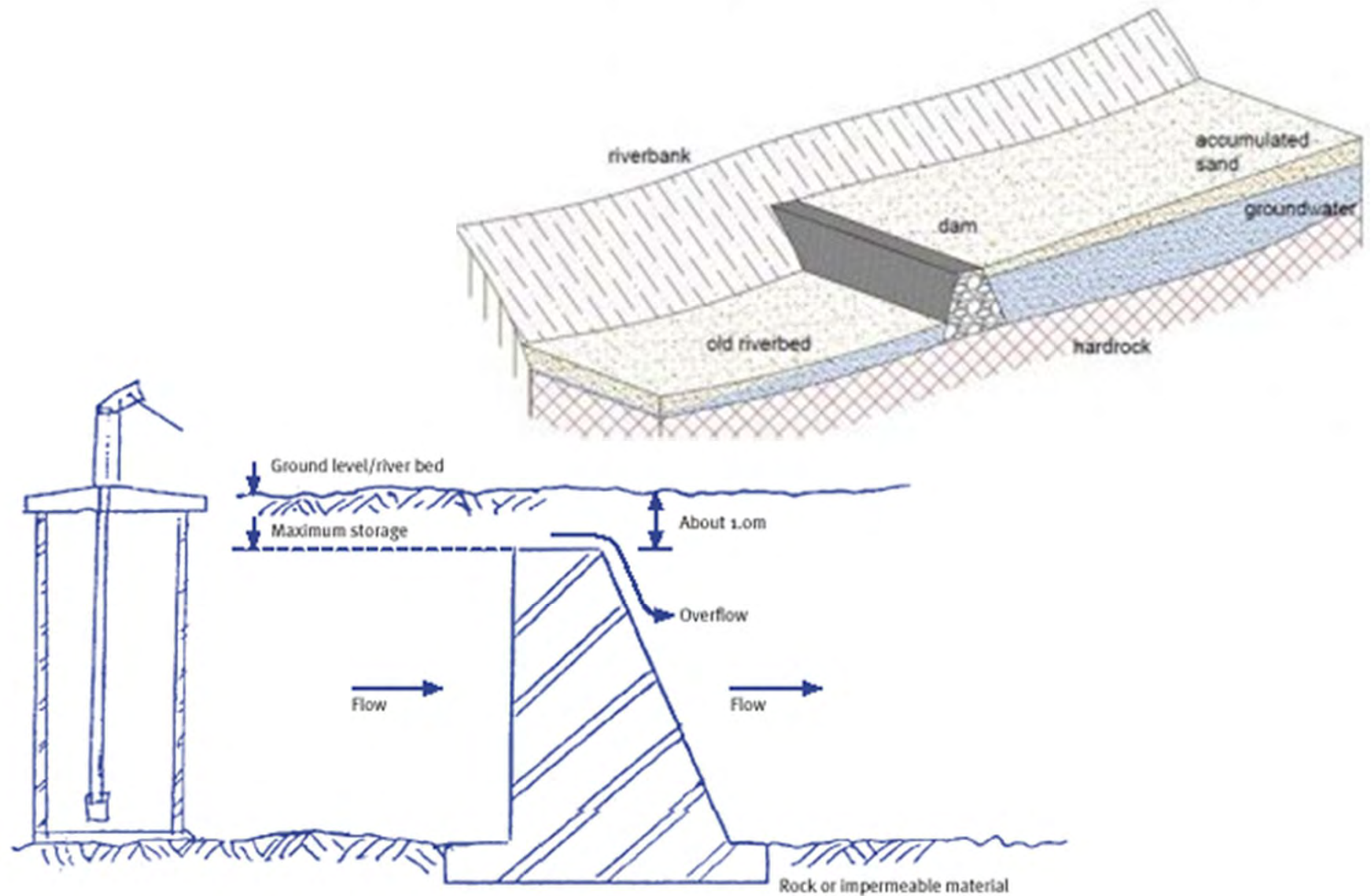
ADAPTATION TO SEA LEVEL RISE: RANGE OF OPTIONS



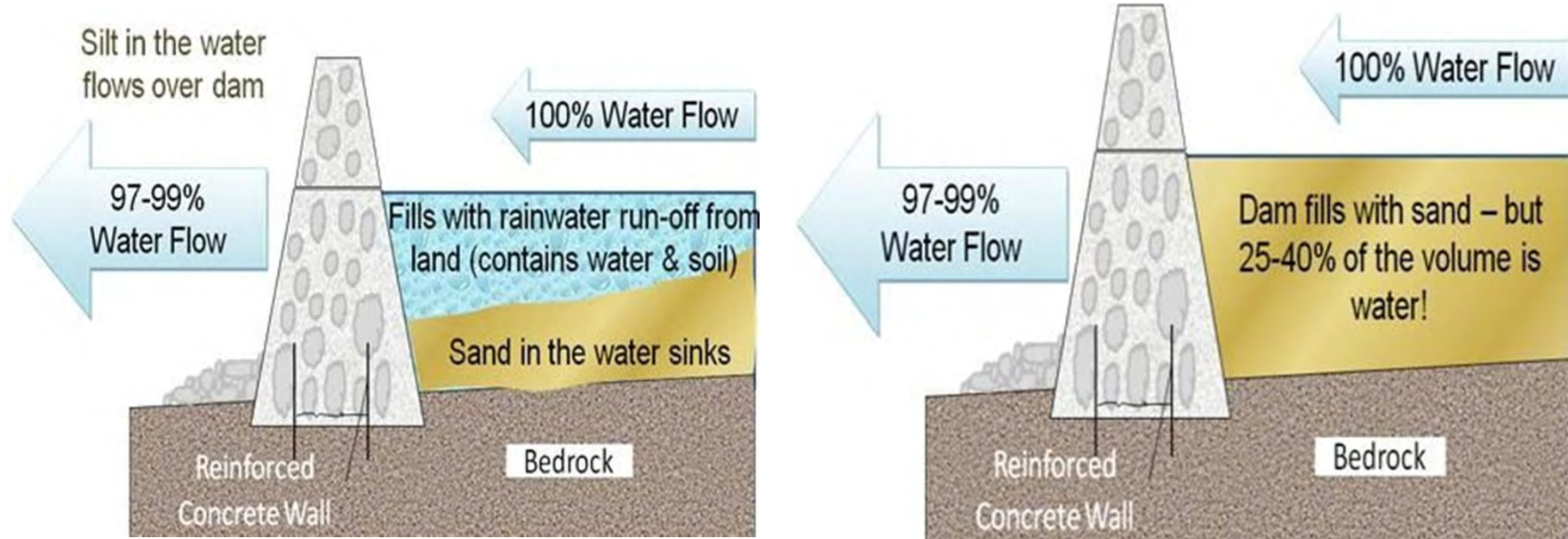
RESERVOIRS



SUBSURFACE AND SAND DAMS

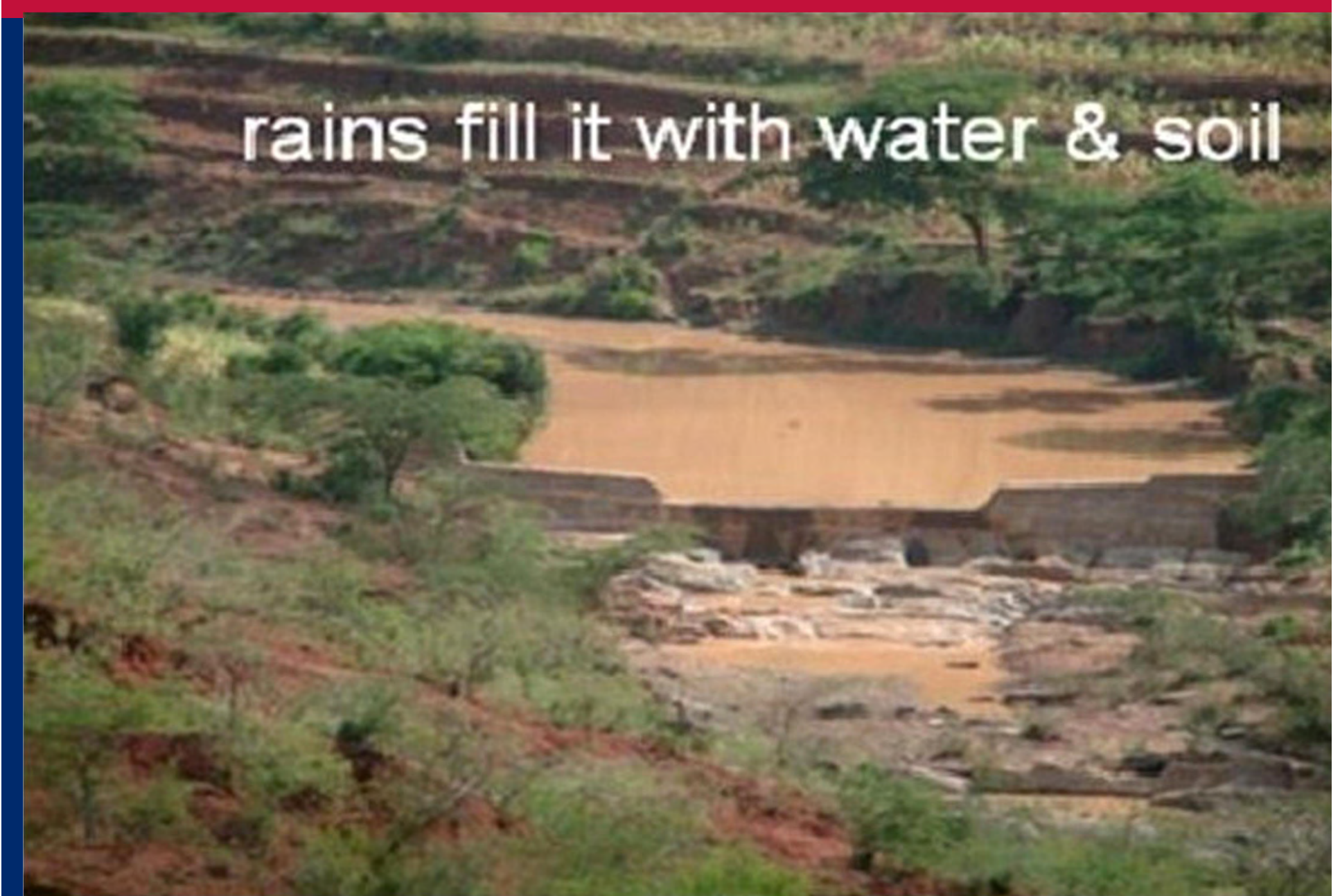


SUBSURFACE AND SAND DAMS



SUBSURFACE AND SAND DAMS

rains fill it with water & soil

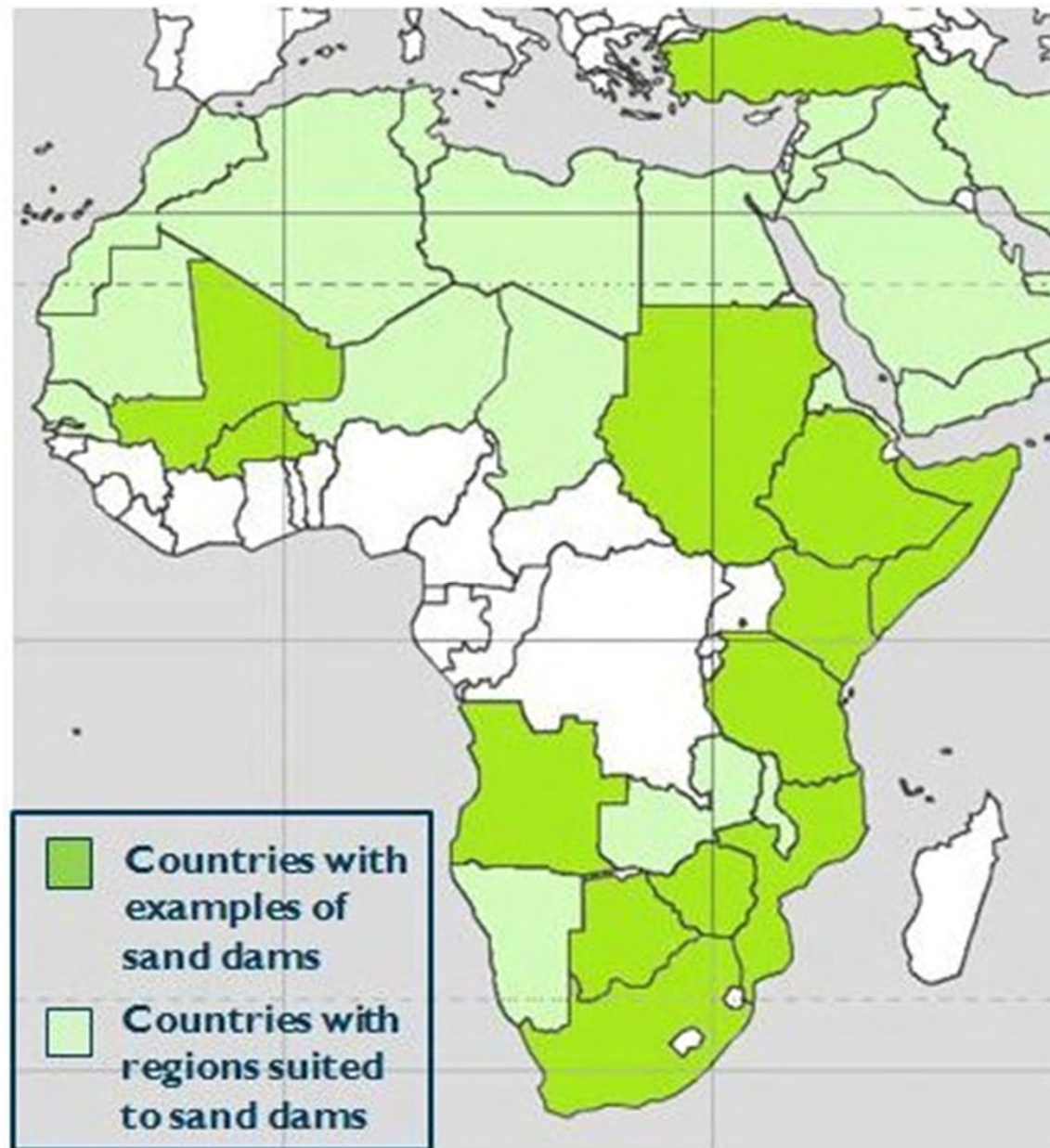


SUBSURFACE AND SAND DAMS

the sand sinks holding 25-45%
water



SUBSURFACE AND SAND DAMS



RAINWATER HARVESTING



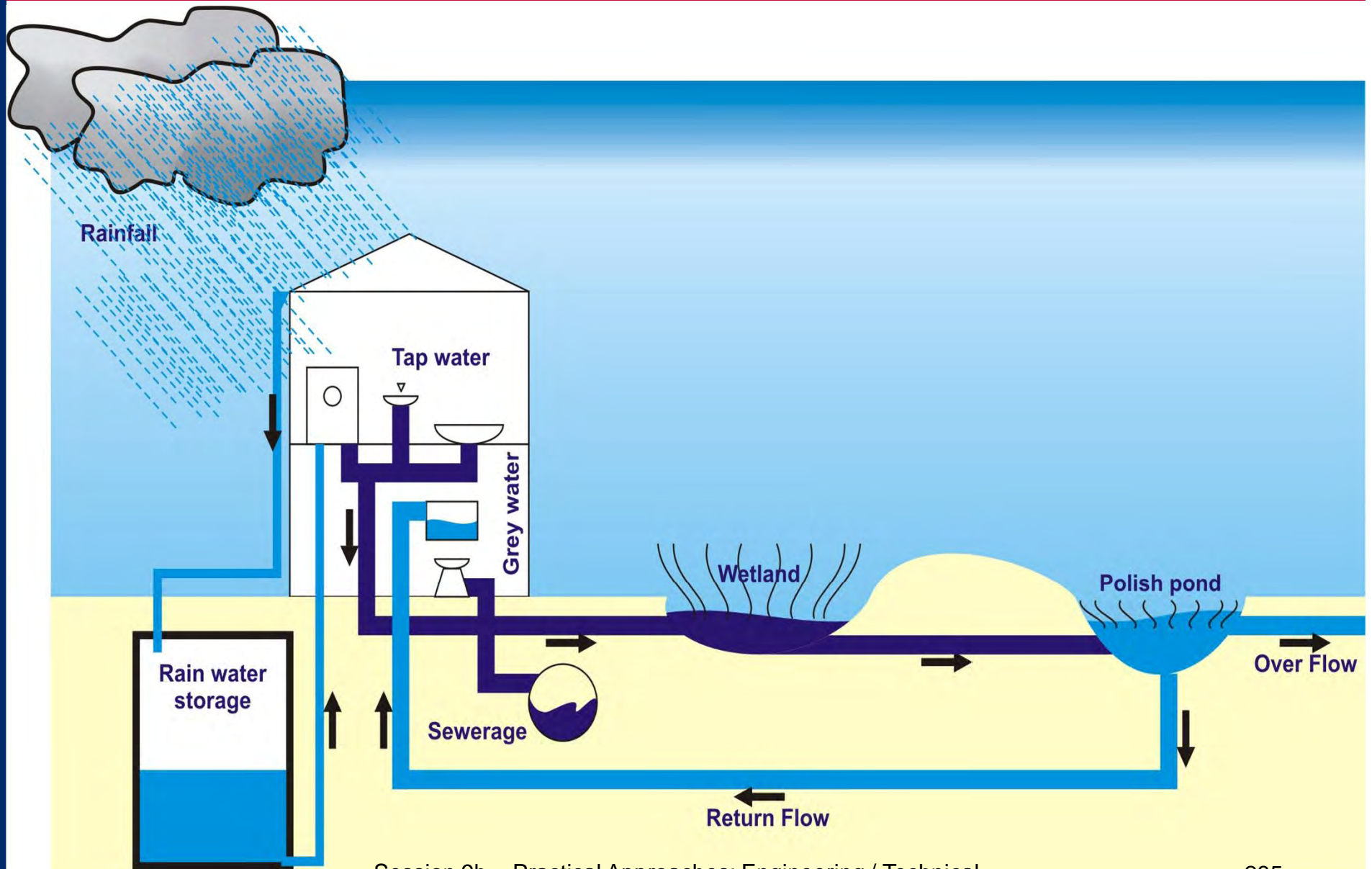
RAINWATER HARVESTING



RE-USE / RECYCLING



USE OF GREY WATER



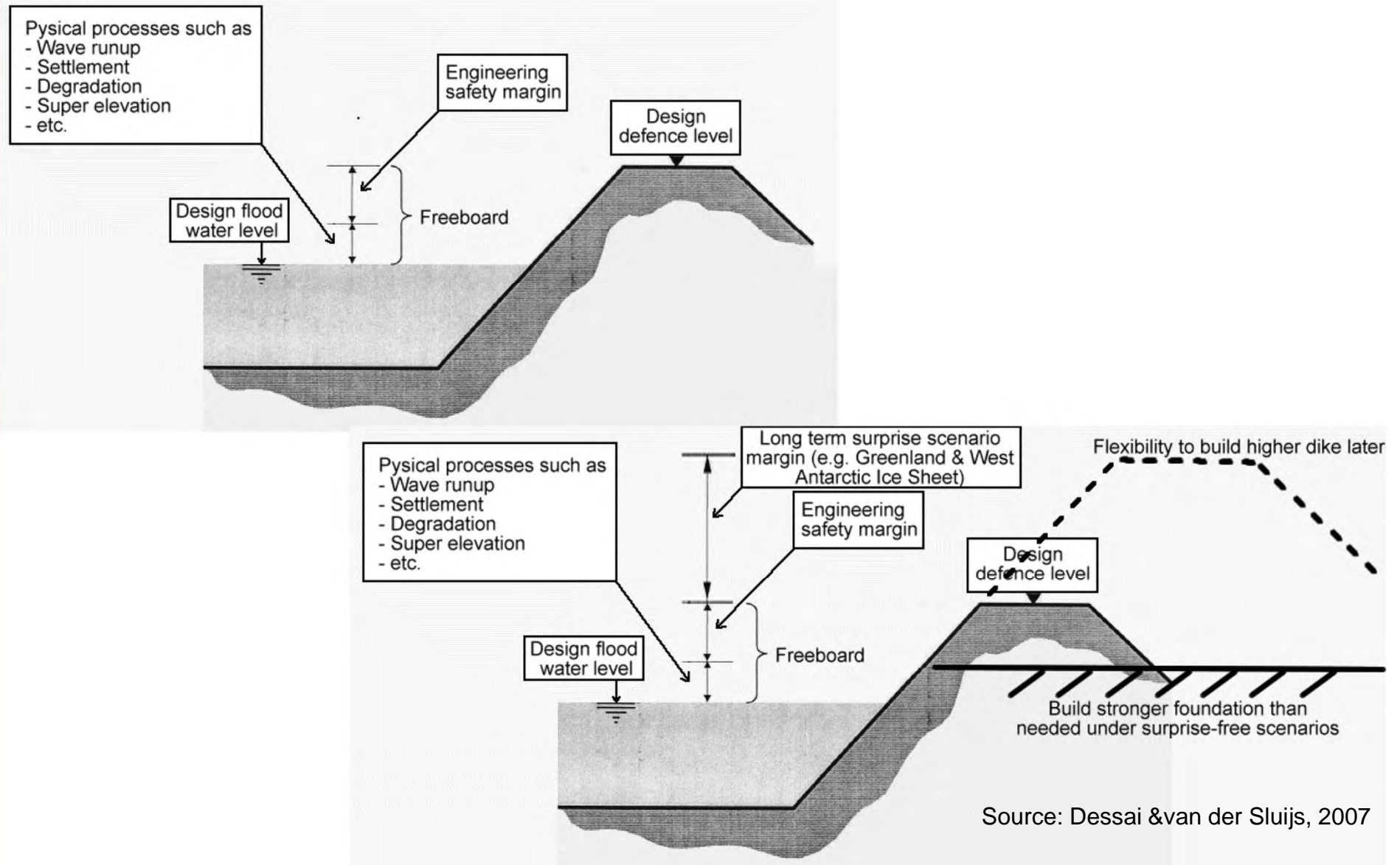
DRY SANITATION / ECOSAN



EXAMPLE: FLOOD MANAGEMENT

<i>Strategy</i>	<i>Options</i>
Reducing Flooding	Dams and reservoirs Dikes, levees, and flood embankments High flow diversions Catchment management Channel improvements
Reducing Susceptibility to Damage	Flood plain regulation Development and redevelopment policies Design and location of facilities Housing and building codes Flood-proofing Flood forecasting and warning
Mitigating the Impacts of Flooding	Information and education Disaster preparedness Post flood recovery Flood insurance
Preserving the Natural Resources of Flood Plains	Flood plain zoning and regulation

RESILIENCE-ORIENTED APPROACHES



CONCLUSION

- A variety of engineering and technological solutions exists to support adaptation
- These range from large-scale structures to low-cost, local solutions

But how effective are they alone?

The next presentations will go into more details on:

- Ecological/soft engineering solutions
- Institutional, social and financial approaches



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PRACTICAL APPROACHES TO WATER-RELATED CLIMATE CHANGE ADAPTATION: ECOLOGICAL APPROACHES

JULY 24, 2013
RICHARD VOLK

NATURAL ASSETS ARE IMPORTANT FOR ADAPTATION!

- Ecosystems provide a natural protection against climate extremes
- Prevention and conservation of intact ecosystem services is a low-cost climate change adaptation measure
- Strategic combination of 'classic' engineering know-how with site specific natural components and inherent natural dynamics
- Restoration of degraded natural buffers may be required for maximum adaptation benefits



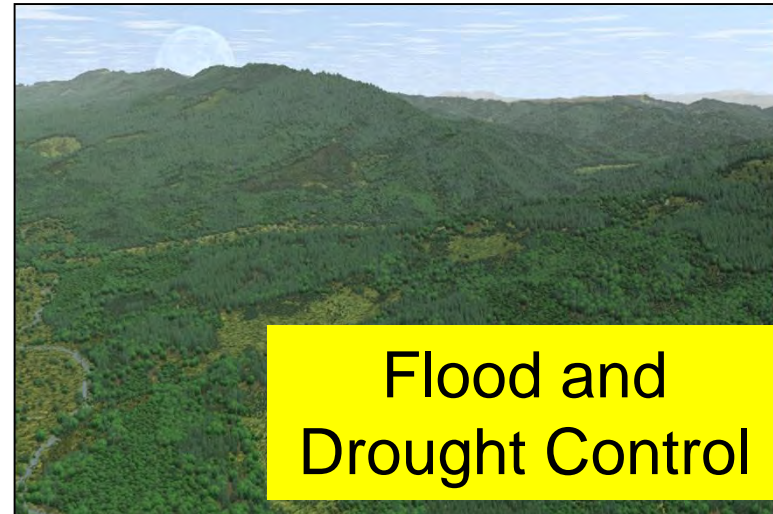
ECOLOGICAL MANAGEMENT APPROACHES

- Protection of Intact Ecosystem Services:
 - Wetlands and flood plain protection
 - Coastal Zone management (including dunes, coastal erosion)
 - Vegetative cover / soil stabilization (watershed management)
 - ‘Environmental Flows’ protection
- “Green Infrastructure” / Green Engineering:
 - Flood control
 - Water storage
 - Onsite storm water infiltration
 - Water purification systems

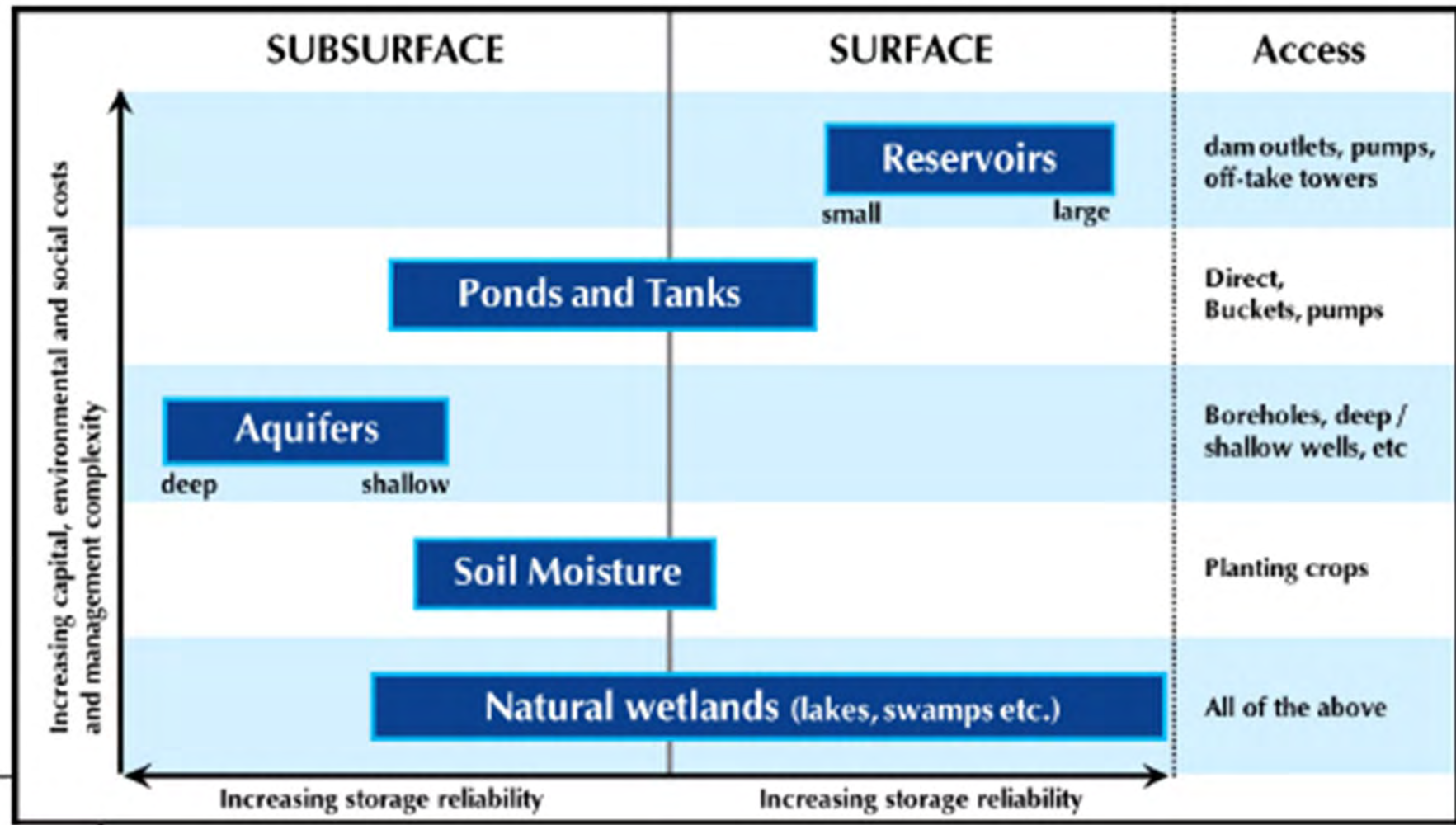


PROTECTION OF INTACT ECOSYSTEM SERVICES

What climate change adaptation “infrastructure” do you see?



PROTECTION OF INTACT ECOSYSTEM SERVICES



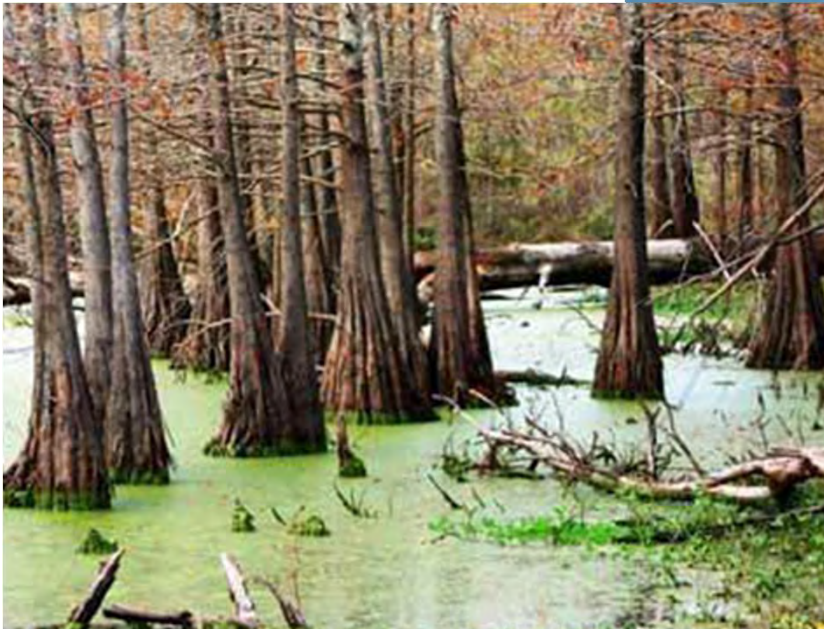
EXAMPLES

**Vegetation maintains
elevation of coastal
dunes**



EXAMPLES

Mangroves and marshlands protect against coastal flooding



EXAMPLES

**Urban greening
reduces heat island
effect**



EXAMPLES

**Land depressions
help store water
and encourage
infiltration**



A HOLISTIC APPROACH

A holistic approach integrates gray and green infrastructure



ON-FARM WATER PRODUCTIVITY

Conservation agriculture

- crop selection
- crop frequency & timing
- soil management
- low tillage / mulching

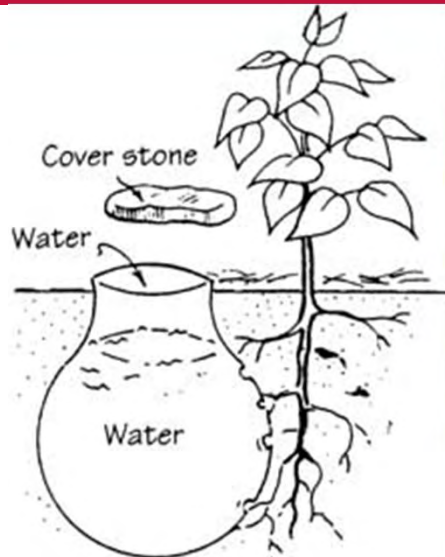
Land tenure

- Irrigation efficiencies
- rain-fed
- clay pots
- drip / sprinkler
- meters/tariffs

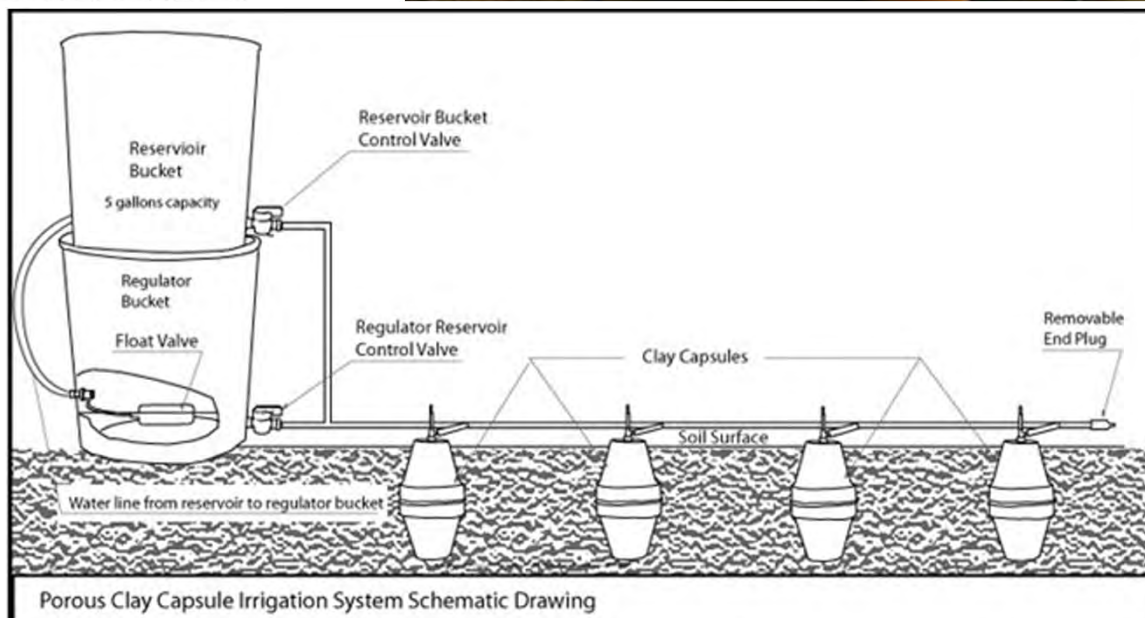
Water User Associations



CLAY POT IRRIGATION



UNGLAZED CLAY POT



Porous Clay Capsule Irrigation System Schematic Drawing

KEY MESSAGES

- Ecological approaches to water and climate change adaptation have potential for application in the development context:
 - Maintain ecosystem services
 - Apply green engineering principles and approaches
- Technical innovation may be needed to modify green and gray infrastructure practices originally designed for temperate climates
- Integration of natural and human-built infrastructure will optimize resiliency to climate change impacts
- Scale Matters! Plan at basin and landscape scale for most effective and sustainable results

VIDEO

A thick red horizontal bar spans the width of the slide, starting from the left edge. A thick blue vertical bar starts from the top-left corner and extends down to the bottom edge of the slide.

Global Dam Reoptimization Initiative



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PRACTICAL APPROACHES TO WATER-RELATED CLIMATE CHANGE ADAPTATION: INSTITUTIONAL/SOCIAL APPROACHES

JULY 24, 2013
JENNY FRANKEL-REED

INSTITUTIONAL APPROACHES

No-regrets:

1. Reduce non-revenue water
2. Manage demand
3. Reduce energy intensity of water supply

Integrating climate change impacts and adaptation into:

1. Watershed management
2. Disaster preparedness
3. Managed retreat from flood zones
4. Improve information and climate services
5. Integrate adaptation into water policy reform

1. REDUCING NON-REVENUE WATER (NO REGRETS)

- Obtain needed data
- Tackle governance and tariffs
- Leak detection equipment comes last, not first
- Repair visible leaks
- Train staff
- Make utility staff responsible for small zones (caretakers)
- Properly meter all production and consumption
- Provide good performance incentives for utility staff
- Explore links to water vendors

Source: Frauendorfer and Liemberger, 2010.

2. WATER DEMAND MANAGEMENT (NO REGRETS)

Virtual water

- Policies that support the importation of water-intensive food and products in arid areas can help address water scarcity and reduce demand
- Egypt and Turkey, Malaysia and Singapore

Water trading

- Owners of water rights can trade with other users. Requires well-defined, enforceable, and transferable water rights, authorized separately from the land.
- Governance is best when formalized
- S. Africa, Chile, India, Mexico, Pakistan

WATER DEMAND MANAGEMENT

Design standards

- Water conserving plumbing for buildings or communities
- US Green Business Council's Leadership in Energy and Environmental Design (LEED) certification requires a 20% reduction in internal building water use
- Amman, Jordan building code achieved 40% reduction in water usage for high-rise developments (Global Water Intelligence, 2012).

Product labeling

- To promote fixtures that increase water savings
- US EPA WaterSense label guarantees a minimum of 20% water savings over traditional fixtures



WATER DEMAND MANAGEMENT

Incentive programs

- Utilities or governments provide rebates on purchases of devices that reduce water demand
- Grants for lower-income communities to implement WDM measures.

WATER DEMAND MANAGEMENT

Pricing and Metering

- Charging consumers for their water usage provides an economic incentive for people to use less water.
- Metering systems provide essential data needed to measure consumption, detect water leakage, and charge fees based on actual usage rates
 - **Flat rate fees**
 - **Volumetric or tiered fees** proportional to consumption, or fees that are increased as a block system.
 - **Water surcharge pricing** imposes a higher rate on excessive water usage
 - **Fees** scaled by time-of day, in which charges are relatively higher during peak use periods

WATER DEMAND MANAGEMENT

Education and Awareness Raising

- School, hotel, and community use
- Maintaining pipes, fixtures, and appliances
- Watering at specific times of day or using specific techniques to reduce evaporative loss
- Using dry cleaning methods to clean indoor and outdoor surfaces
- Reducing the duration of faucet use



Dallas Hospitality Industry Program

WATER DEMAND MANAGEMENT

Mandatory use restrictions:

- On total quantity of water that can be used or particular water uses

Hotel water conservation campaigns

- Financial benefits most compelling
- Conserving water in hotels reduces expenditures on water supply from local utilities and tankers.
- Also reduces costs associated with treating raw water, wastewater treatment systems, water storage tanks, pumps and pressure tanks, septic tanks

3. REDUCING ENERGY INTENSITY OF WATER SECTOR

Water Extraction, Treatment, and Distribution require energy:

Energy generation methods	Water consumption (kg/kWh)
Wind	1
Solar photovoltaic	10
Geothermal	12–300
Hydroelectric	36
Coal	78
Gas	78

1. WATERSHED MANAGEMENT POLICIES AND REGS

Based on watershed scale perspective of climate risks:

Improve common understanding and information

- Projected water supply and demand, climate impacts

Develop a water allocation system

- And processes for dialogue for flexible allocation decisions in context of variability

Establish eco-markets

- Account for environmental values by providing a payment mechanism for ecosystem services that reduces risk to water supplies

2. DISASTER PREPARATION, RESPONSE, RECOVERY

Informed by climate impacts on risk and vulnerability:

- ***Strengthen advance-warning systems.*** Improve equipment and technology; train staff to utilize information; and develop, test, and deploy communication strategies
- ***Improve preparedness and response.*** Designate evacuation routes and emergency gathering areas, plans for maintaining communication systems and services.
- ***Expand access to insurance.*** Insurance can help with recovery from flood or storm events.
- ***Facilitate post-disaster recovery.*** Prior planning and strong institutions can restore critical services like potable water after a disaster.

3. MANAGED RETREAT FROM FLOOD ZONE

Informed by climate impacts on flood zone:

- ***Ban or limit new development.*** Land use policies like density restriction; restricting additional development; restricting the size of built structures; modifying building codes; or outright bans of new development.
- ***Establish triggers for demolition or abandonment.*** Based on frequency of intense precipitation or level of sea rise, require abandonment of threatened areas.
- ***Relocation.*** Costs of relocation can be less than costs of frequent rebuilding, but many cultural, political, and logistical barriers

4. IMPROVED INFORMATION & CLIMATE SERVICES

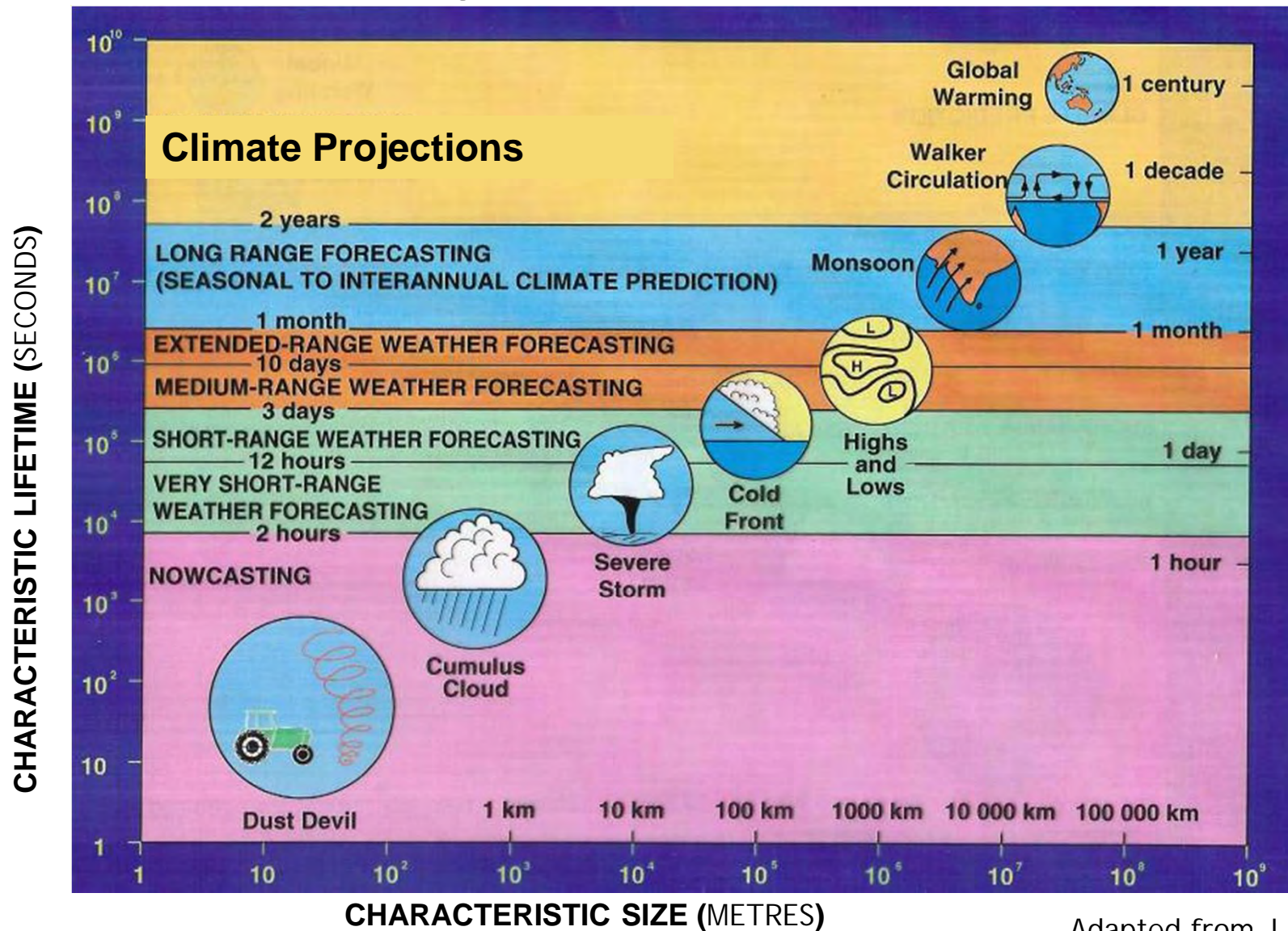
Strengthen hydro-meteorological capacity

- Data collection, analysis, sharing, integration
- Decision support tools, communication, training, evaluation
- Climate-informed supply and demand scenarios
- Hydrological modeling
- Regional climate outlook forum



4. IMPROVED INFORMATION & CLIMATE SERVICES

From now-casting to climate projections



Adapted from J. Zillman

5. CLIMATE-RESILIENT CITY, LAND USE PLANNING

Mozambique Coastal City Adaptation Program (CCAP):

USAID GCC Adaptation, \$10M, 2013-2018

- 1) Improve the provision of climate-resilient urban services by municipalities;
- 2) Increase adoption of climate resilience measures by communities, civic, and community organizations, including civil society, nongovernmental, and faith-based organizations;
- 3) Increase local awareness of economic risk-management tools, such as insurance plans and contingency funds, for at-risk urban infrastructure and livelihoods.

5. CLIMATE-RESILIENT CITY, LAND USE PLANNING

Pacific Islands Coastal Community Adaptation Program (CCAP):

USAID GCC Adaptation \$15M 2013-2018

1. Rehabilitating and constructing new, small-scale community infrastructure (\$50k/community)
2. Building capacity for community engagement for disaster prevention and preparedness
3. Integrating climate resilient policies and practices into long-term land use plans and building standards

12 Pacific Islands, with up to 90 communities

6. INTEGRATING ADAPTATION INTO WATER POLICY

Conducting vulnerability assessments, and integrating adaptation measures into:

- Poverty reduction strategies
- National Adaptation Plans, National IWRM plans and water policies
- Spatial plans and urban master plans
- Disaster management plans
- Flood or drought action plans
- Rural employment schemes

6. INTEGRATING ADAPTATION INTO WATER POLICY

India's Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA)

- 100 days of minimum wage, unskilled employment
- 50% of MNREGA works relate to water conservation
- Benefits for incomes of rural poor and water resources:
 - Flood control and protection
 - Water conservation and water harvesting
 - Micro irrigation works
 - Drought proofing
 - Renovation of traditional water bodies
 - Desilting, repair of tanks, canals, check dams, tanks/ponds

6. INTEGRATING ADAPTATION INTO WATER POLICY

NREGA WORKS



6. INTEGRATING ADAPTATION INTO WATER POLICY

NREGA WORKS



Field Channel at Mednipur, E.C. Rs.1.50 lakhs (NREGA)

INSTITUTIONAL APPROACHES

No-regrets:

1. Reduce non-revenue water
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Integrating climate change impacts and adaptation into:

1. Watershed management
2. Disaster preparedness
3. Managed retreat from flood zones
4. Improve information and climate services
5. Integrate adaptation into water policy reform



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PRACTICAL APPROACHES TO WATER-RELATED CLIMATE CHANGE ADAPTATION: FINANCIAL APPROACHES

JULY 24, 2013
JENNY FRANKEL-REED

KEY APPROACHES

1. Remove barriers to WASH investment (no regrets)
2. Facilitate credit and savings for water security
3. Insurance to spread water-related risks

1. REMOVE BARRIERS TO WASH INVESTMENT

Utility Financing and Business Planning

- Improving utility income and expense data and transparent reporting to attract public and private financing
- Improving utility business plans
- Reform tariffs toward progressive tariff system
- Explore development credit guarantees to incentivize private sector WASH financing

2. FACILITATE CREDIT AND SAVINGS

Credit and Savings Strategies

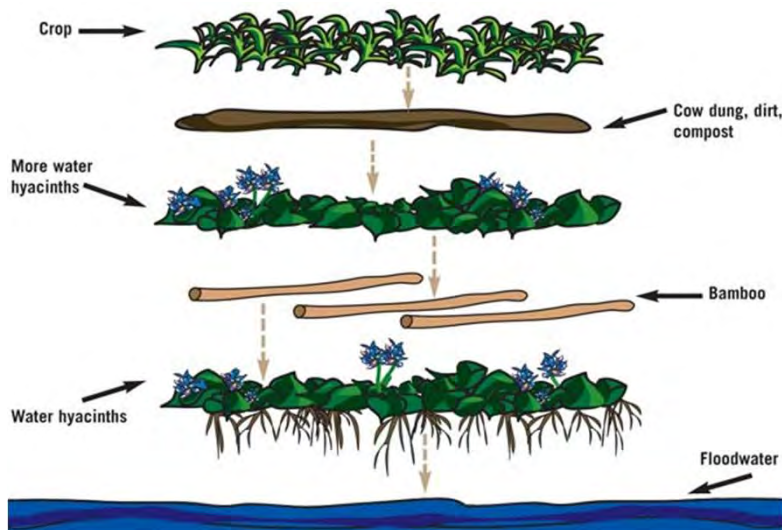
- **Housing loan conditions:** resilient construction, stilt design, or lower-risk siting to reduce flood damage
- **Tube well loan conditions:** raised to protect against contamination by floodwater
- **Farm loan conditions:** less water-intensive crops in drought-prone areas
- **Flexible repayment terms** – rescheduling repayment in times of flood
- **Bundling services** – combining insurance, savings, and loan packages, and/or different types of insurance

Enables risk-taking to help move people out of poverty traps

2. FACILITATE CREDIT AND SAVINGS

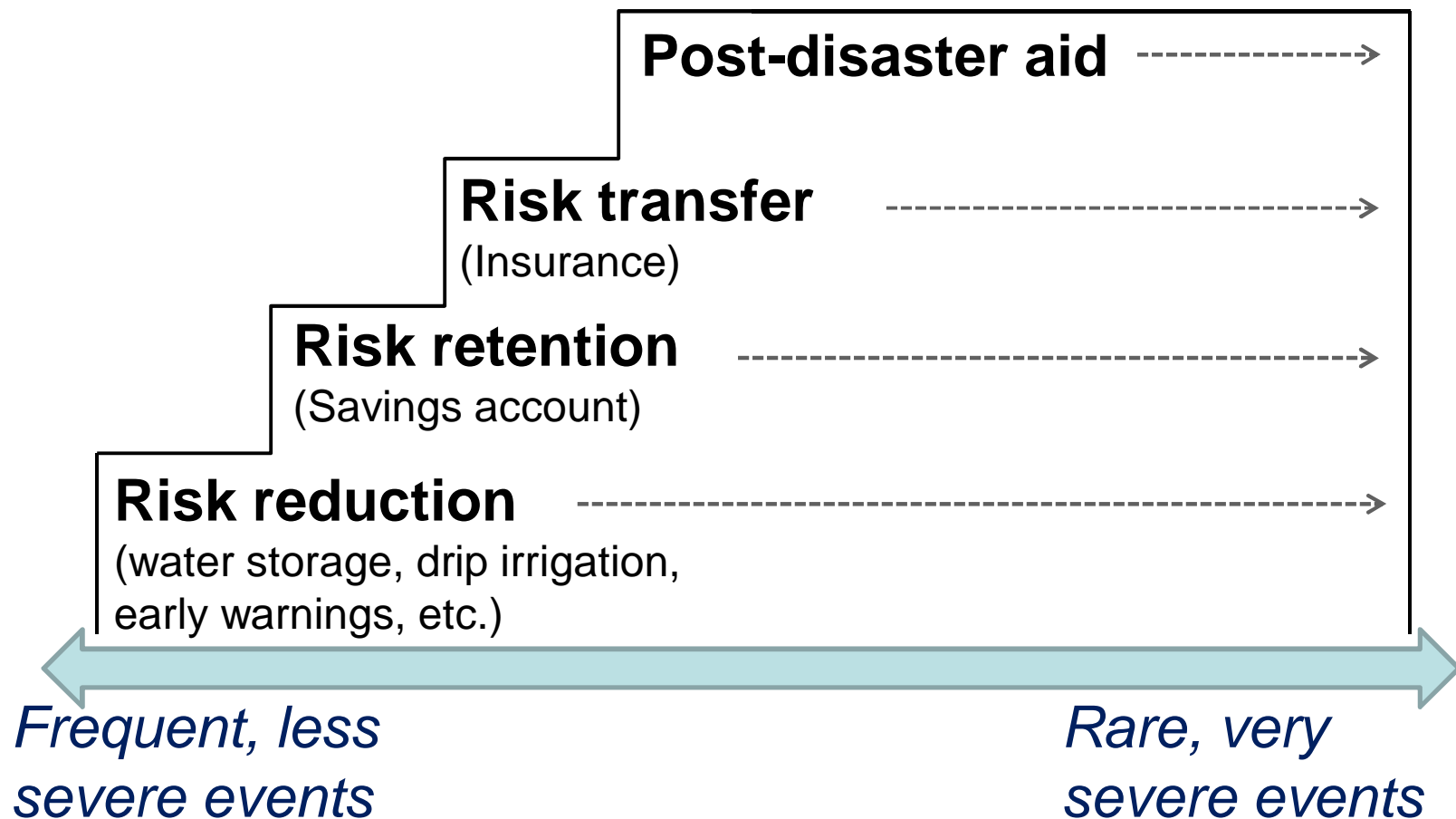
Microfinancing climate-adapted strategies

- **Floating gardens** – for hydroponics in seasonally-flooded areas (e.g., Bangladesh)
- **Aquaculture** – loan condition to grow fish in mangrove forest. MFIs could lease land from the government and re-lease it to clients.



3. INSURANCE: 4 “BUCKETS” FOR CLIMATE RISK MGMT

- Insurance is not the best way to deal with all risks
- If something happens too frequently (e.g., seasonal drought), it is not insurable (too expensive)



3. WEATHER INDEX INSURANCE

- Applicable at multiple scales
- Protection against financial loss with payouts determined by a specified set of **weather conditions**
- No damage assessment



*Wind Footprint of Tropical Cyclone Tomas, 2010.
Payouts made to Barbados, Saint Lucia and St.
Vincent & the Grenadines. CCRIF*



The phone confirms the insurance policy.

CONSIDERATIONS FOR INTERESTED MISSIONS

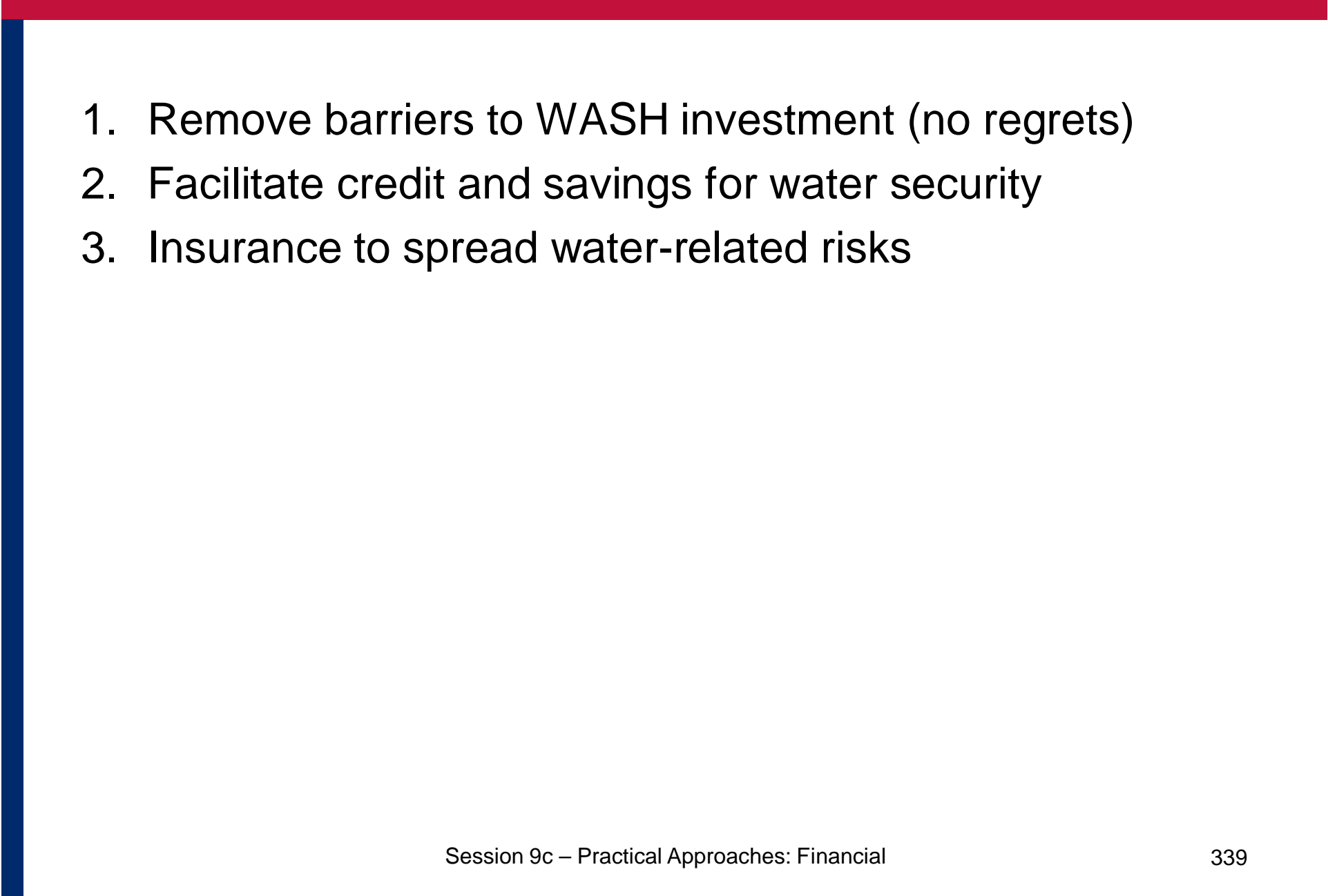
- Allow for a 4 year project
- Each product needs to be designed for a specific crop.
Consider:
 - Is weather the primary problem?
 - Is it feasible to design an accurate index for that risk?
 - Do farmers have other coping options? access to insurance?
are they interested in the insurance being proposed?
 - Would insurance help address other barriers, e.g., to credit?
- FTF or AD funds for complementary risk reduction
- Seek private sector partners; e.g., Swiss Re MOU

MISSION PROJECT: DOMINICAN REPUBLIC

- Rural Economic Diversification project worked with 17 agriculture producer clusters
- Climate change is an important threat

Crop	Rationale
Coffee	Complicated to design; difficult to establish relationship between climate and production
Pineapple	Too few growers to do an impact evaluation or have a large enough market
Vegetable	Vulnerable to complicated risks; diversity in vegetables grown in the field. Vegetables in greenhouses = traditional insurance (easy to assess damages).
Dairy	Drought is relatively easy to index and is the primary risk facing dairy farmers; farmers have expressed desire for insurance



- 
1. Remove barriers to WASH investment (no regrets)
 2. Facilitate credit and savings for water security
 3. Insurance to spread water-related risks



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BRINGING IT ALL TOGETHER: WATER-RELATED CLIMATE CHANGE ADAPTATION PROGRAM DESIGN

JULY 24, 2013

JENNY FRANKEL-REED, RICHARD VOLK, AND ANDRE MERSHON

BRINGING IT ALL TOGETHER: CASE STUDY EXERCISE

- Regroup with your country case study team.
- You are tasked with developing a preliminary activity/project concept addressing water-related climate change adaptation.
- Use the information they produced in earlier exercises, as well as additional information provided by the trainers.

INSTRUCTIONS

In your teams, record the following on flip charts and prepare to report out in plenary:

- Activity/project objective – What objective will you pursue and what climate stress(es) will you address?
- Activity/project geographic scale(s) and sites, include a focus on both national and local issues, as needed
- Illustrative activities that use all four categories – engineering, environmental, institutional, financial
- Funding strategy – with justifications for attributions
- Additional assessment(s) – Key questions you need to answer and methods you would use to design the program
- **Optional:** Draft a results framework to organize your thoughts

BRINGING IT ALL TOGETHER (CONTINUED)

- Please appoint two people to present your concept
- Others will serve as the 'peer review panel' for another Team
- Presenters stay, with your flip charts
- Review panels, move to your assigned countries

Ghana 1 → reviews **Philippines**

Philippines → reviews **Ghana 2**

Ghana 2 → reviews **Nepal**

Nepal → reviews **Ghana 1**

INSTRUCTIONS

Take notes and be prepared to provide feedback on the following:

- How well do you think the proposal will meet its stated objective? Does it have a sound theory of change?
- Has the program fully articulated the key climate and water stresses and vulnerabilities? Does it effectively address them?
- Did they meet the requirements associated with the types of funding they used? Did they capture integration opportunities?
- What potentially negative impacts (environmental, social, economic, maladaptation) does the proposed program need to address?



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GOOGLE DRIVE AND ADDITIONAL RESOURCES

JULY 10, 2013

ANDRE MERSHON AND RICHARD VOLK

REVIEW OF GOOGLE DRIVE

Google drive folders contains:

- GCC Resources
- Water Office Resources
- Course Presentations



GCC RESOURCES

- Bi-monthly USAID GCC Bulletin (internal USG)



- Monthly USAID Extended GCC meeting (internal USG)
- DC and Mission email Listservs (internal USG)

GCC INTRANET WEBSITE

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Monday, March 14, 2011

Search 

EGAT



GLOBAL CLIMATE CHANGE
Office of Environment and Science Policy

 [USAID Climate Change Pillars](#)

 **[Overview](#)**
Why climate change matters, our approach, climate change pillars, climate science, capacity building, US policy

 **[Tools & Resources](#)**
Learn how to program, develop, design, procure, staff, and report on climate change

 **[Country & Regional Programs](#)**
Profiles of USAID's climate change programs

 **[Training & Events](#)**
Calendar of events, training and materials, E-Learning

 **[Publications & References](#)**
Newsletters, reports, glossary, reference materials

 **[Staff](#)**
Global Climate Change Team, contacts

What's New

 Feb 2011: [GCC Bulletin: Issue 41](#)

 [ENRM 201 DL Course GCC E-Books](#)

 [New FY11 GCC Training Opportunities](#)

 [Letter from the USAID Administrator](#)

 [What are LEDs?](#)

 [Gender and Climate Change](#)

 [U.S. Climate Change Talking Points](#)

 [Climate Science](#)

 [Capacity Building](#)

 [Updated FY10 Guidance for SL Pillar](#)

 [Climate Change Results Framework, DRAFT Dec 2010 \(PDF 41K\)](#)

We welcome your suggestions for improving this site. Please contact [EGAT/ESP/GCC](#) with your comments, questions, or concerns.
Learn more about Global Climate Change at [USAID.gov](#).

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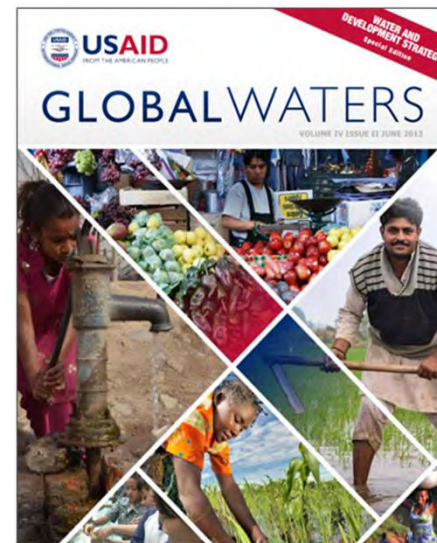
[INSIDE.USAID.GOV/CLIMATE/](https://inside.usaid.gov/climate/)

GCC KNOWLEDGE MANAGEMENT

- GCC Office uses data, stories, and photos from the field, but needs sharing of best practices, success stories, and lessons learned
- GCC Office can provide information/clarification and field support, but goal is to build field capacity
- Contact:
 - Becky Chacko: rchacko@usaid.gov
 - Jenny Kane: jkane@usaid.gov
 - Andrea Welsh: awelsh@usaid.gov

WATER RESOURCES

- Bi-monthly USAID Water Update (USG only)
- Quarterly Global Waters publication



IN THIS ISSUE ~

INSIDE THE WATER STRATEGY
Senator Durbin, Administrator Shah & more on the U.S. Government's New Approach


WATER FOR HEALTH
Battling Disease from Gaza to Cambodia

FROM SEEDS TO SATELLITES
Technologies Revolutionizing Agriculture



And More...

- DC and Mission email Listservs
 - Contact Richard to join

WATER INTRANET WEBSITE

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Tuesday, July 23, 2013



Office of
WATER
Addressing Water Challenges in the Developing World

Water Team
Names, locations, contact information and team member profiles

Themes & Working Groups
Our approach to integrated water resource management (IWRM), cross-sectoral issues, and Presidential Initiatives

Programs & Partnerships
Information on implemented programs and partnerships with external organizations

Programming Tools
Procurement mechanism details, sample documents, tools, and programming guides

Training & Events
Dates, times, places, and registration details

Publications & Resources
Country profiles, USAID publications, case studies, newsletter archives, multimedia and more

Of Special Note...
Ask the Expert
▶ Have a question for the Office of Water? We can help! [Contact us](#)
Agency Leadership
▶ [Executive messages](#)
▶ [Congressional news](#)
▶ [Water Results Framework](#)
Press Releases
▶ **Aug 16** [Water for the Poor Report Released, State Department](#)
▶ **July 22** [International Law Failing Coral Reefs, Experts Arque, Science Daily](#)
Annual Report
▶ [USAID's 2009 Water Sector Report](#)

WATER PROGRAMMING SUPPORT

WATER POINT (BETA)

YOUR WATER PROGRAMMING RESOURCE



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WATER AT USAID ▾

FOCUS AREA ▾

TOOLKIT ▾

SAMPLE DOCUMENTS ▾

PROGRAM CYCLE ▾

RESOURCES ▾

Projects in the Field

Region: Fiscal Year Focus Area



GETTING STARTED WITH THE WATER POINT

HIGHLIGHTS

1 2 3

CHECK OUT THE
LATEST ISSUE

WATER UPDATE

June 2013

Beta Test Feedback

Contact

Jenny Dattoo jdatoo@usaid.gov

Richard Volk rvolk@usaid.gov

Katy Beggs kbeggs@usaid.gov



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DAY 3

ACTION PLANNING

AND WRAP UP

JULY 24, 2013
ANDRE MERSHON

CONCEPTS TODAY

Day 3:

- What are practical approaches to Water and Climate Change Adaptation...
 - ... for hard engineering principles and approaches?
 - ...for ecological/ soft engineering principles and approaches?
 - ...for institutional and social principles and approaches?
 - ... for financial principles and approaches?
- How can I select the best mix of approaches for a USAID/ USG program addressing water-related climate change adaptation?

COURSE LEARNING OBJECTIVES

Upon completion of this course, participants should be able to:

- Understand basic concepts of the relationship between climate change and water and strategies for climate change adaptation in development
- Discuss and apply institutional and legal requirements for USAID programming on water and climate change adaptation
- Identify, access, and use information resources to assist in the development and management of water and climate change adaptation activities applicable to all development sectors

JOURNAL – DAY 3

- Go to pages 5-6 of your journal and complete the questions for day 3 (individual task)
- Share your ideas with your tablemates
- Be prepared to give an example of an insight / learning from today
- Take 15 min

