

# International Water Resources Perspectives

## UCOWR / NIWR 2011 Conference, 3<sup>rd</sup> Plenary Session Boulder, CO

**Bob Pietrowsky, Director**  
USACE Institute for Water Resources  
& the International Center for Integrated  
Water Resources Management, *under*  
*the auspices of UNESCO*

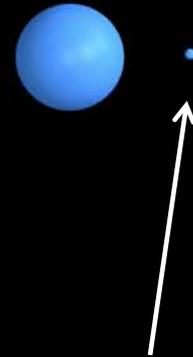
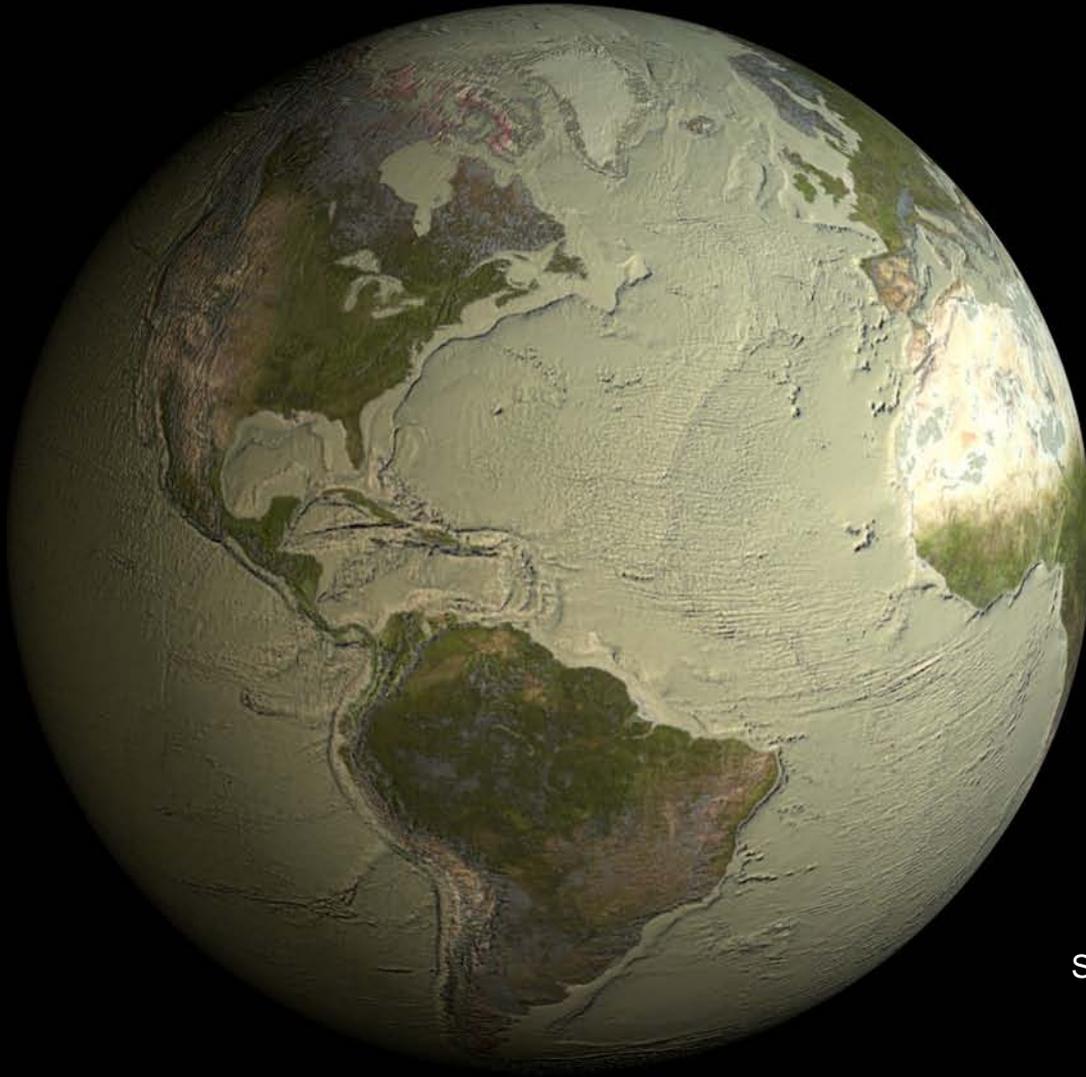
14 July 2011



US Army Corps of Engineers  
**BUILDING STRONG**<sup>®</sup>



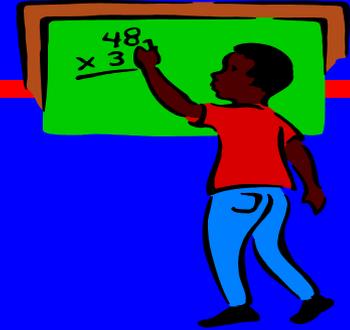
Blue Sphere – all water on earth expressed volumetrically



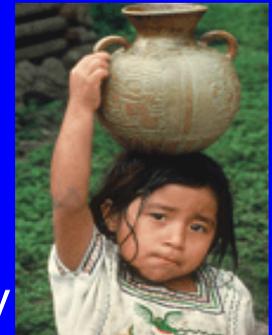
Small blue dot = relative volume of fresh water on earth

Only ~ 2.75 % of earth's water is fresh water, including ~ 2.05 % frozen in glaciers, ~ 0.68 percent as groundwater & ~ 0.011 % of it as surface water in lakes and rivers!

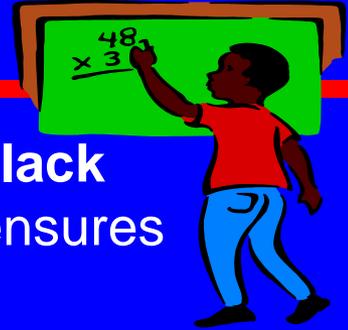
# *Gloomy Arithmetic of Global Water Resources*



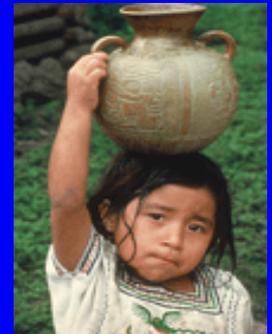
- **About one out of six, ~ 1 billion people, lack access to safe water**
  - > 80% of diseases carried by water:
  - Over 90% of deaths from diarrheal diseases in developing world are children under 5 yrs old
  - A child dies every 20 seconds from waterborne disease;
  - 3-5 million people dying annually, with \$125 billion in workday losses/yr.
  - Millions of women and children spend several hours a day collecting water from distant, often polluted sources
  - In just one day, more than 200 million hours of women's time is consumed collecting water for domestic use
  - 443 million school days are lost each year due to water-related illness.



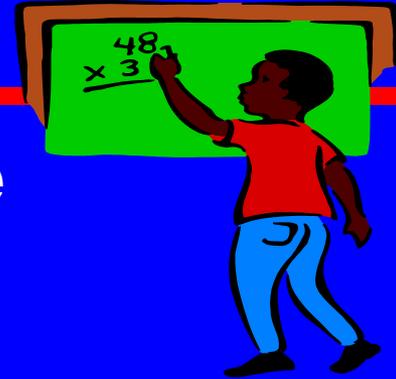
# *More Gloomy Arithmetic of Global Water Resources*



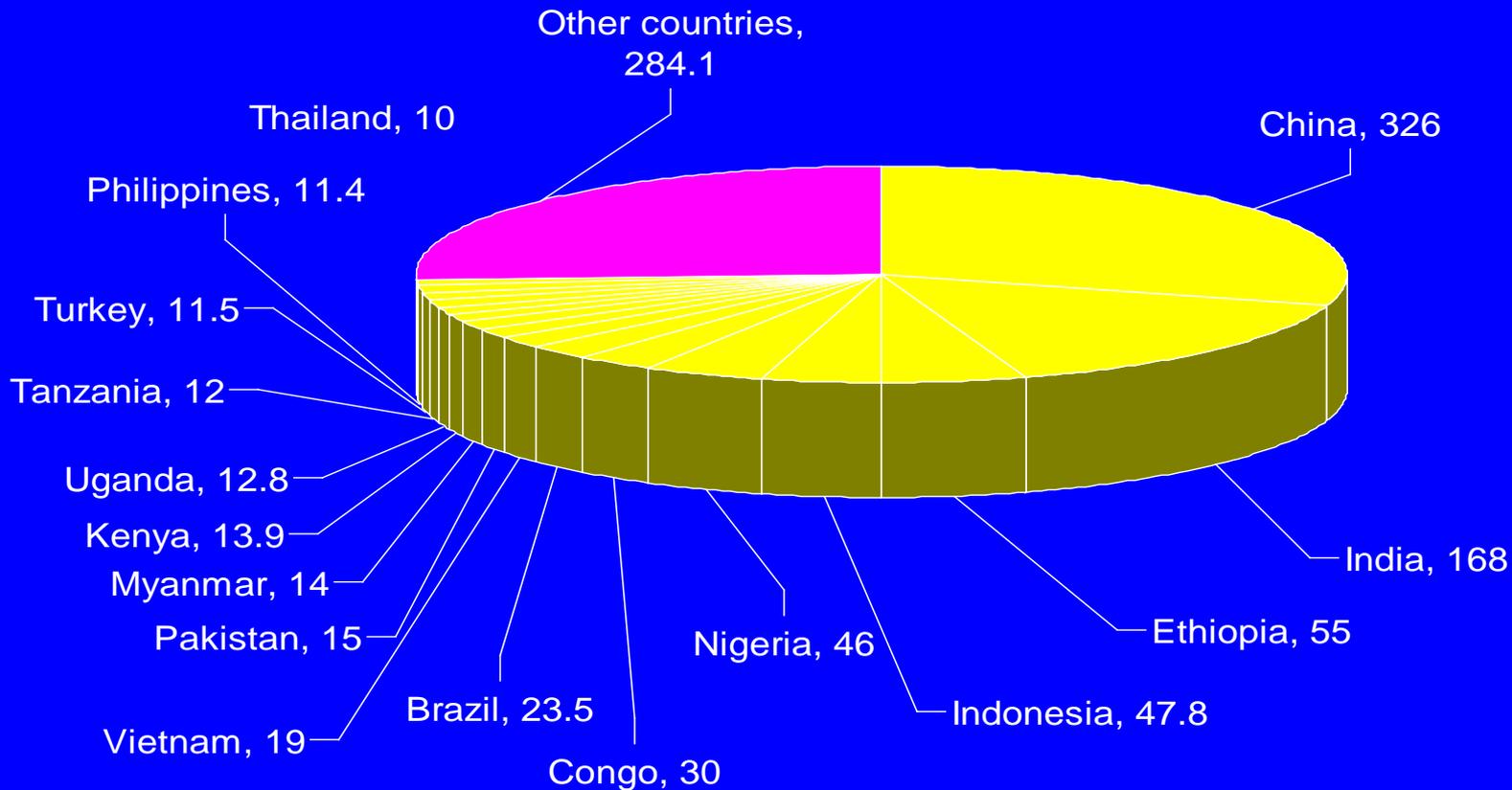
- **About two out of every six people, ~ 2.5 billion people, lack adequate sanitation** - defined as a sanitation facility that ensures hygienic separation of human excreta from human contact
  - This represents almost 50% of the developing world's population
  - With 1.2 billion people with no facilities at all
  - More people in world have cell phones than access to a toilet
- **World population projected to increase by ~ 3 billion people by 2030**
- > 75% people live in water stressed areas (less than 1000 mm/yr.), most in politically unstable regions
- > 25% of world live in high risk of drought and floods: Average annual losses now over \$40 billion/yr
- Asia & Sub-Saharan Africa : > 2/3's population live in areas where 80% of rainfall occurs in < 20% of the year
- Urbanization - 50% of people will depend on world markets for food



# More Gloomy Arithmetic of Global Water Resources



## 75% of People Without Access to Safe Water Reside in 16 Countries



*In Parts of the World  
this Qualifies as “Adequate”*



# *Sustainable Water Resources? - Drinking water vending machines in Thailand.*



Drinking water vending machines in Pattaya, Thailand. A liter of water (in a customer's own bottle) costs 1 baht.

# UN Millennium Development Goals (MDG)

By the year 2015, all 191 United Nations Member States have pledged to meet these goals



## Goal 1 Eradicate extreme poverty and hunger

- Water Security essential for improving quality of life, health & economic development

## Goal 2 Achieve universal primary education

- Water Security keeps children fit & underpins healthy school environment.

## Goal 3 Promote gender equality & empower women

- Water Security saves women's time & provides opportunities for women to lead.

## Goal 4 Reduce child mortality

- Water Security reduces morbidity/mortality.

## Goal 5 Improve maternal health

- Water Security reduces miscarriages, deaths, & impacts on fetuses/newborns.

## Goal 6 Combat HIV/AIDS, malaria, & other diseases

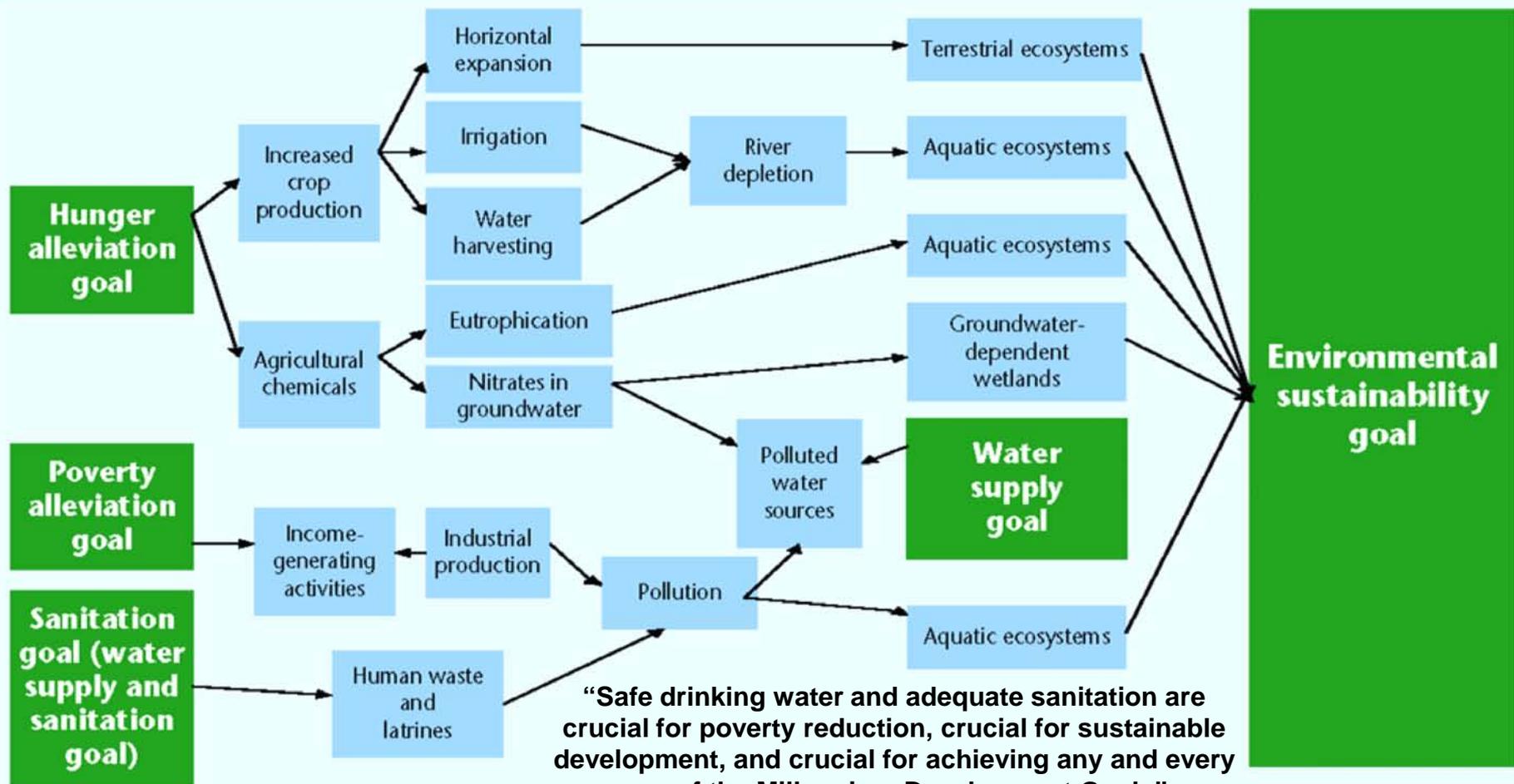
- Water Security prevents vector born & water/hygiene-related diseases.

## Goal 7 Ensure environmental sustainability

- ✓ 2000-2015: Halve proportion of people without sustainable access to safe drinking water
- ✓ 2020: Have achieved a significant improvement in the lives of at least 100 million thru access to improved sanitation.

# Water is Key to Fulfilling Multiple Millennium Development Goals (MDGs)

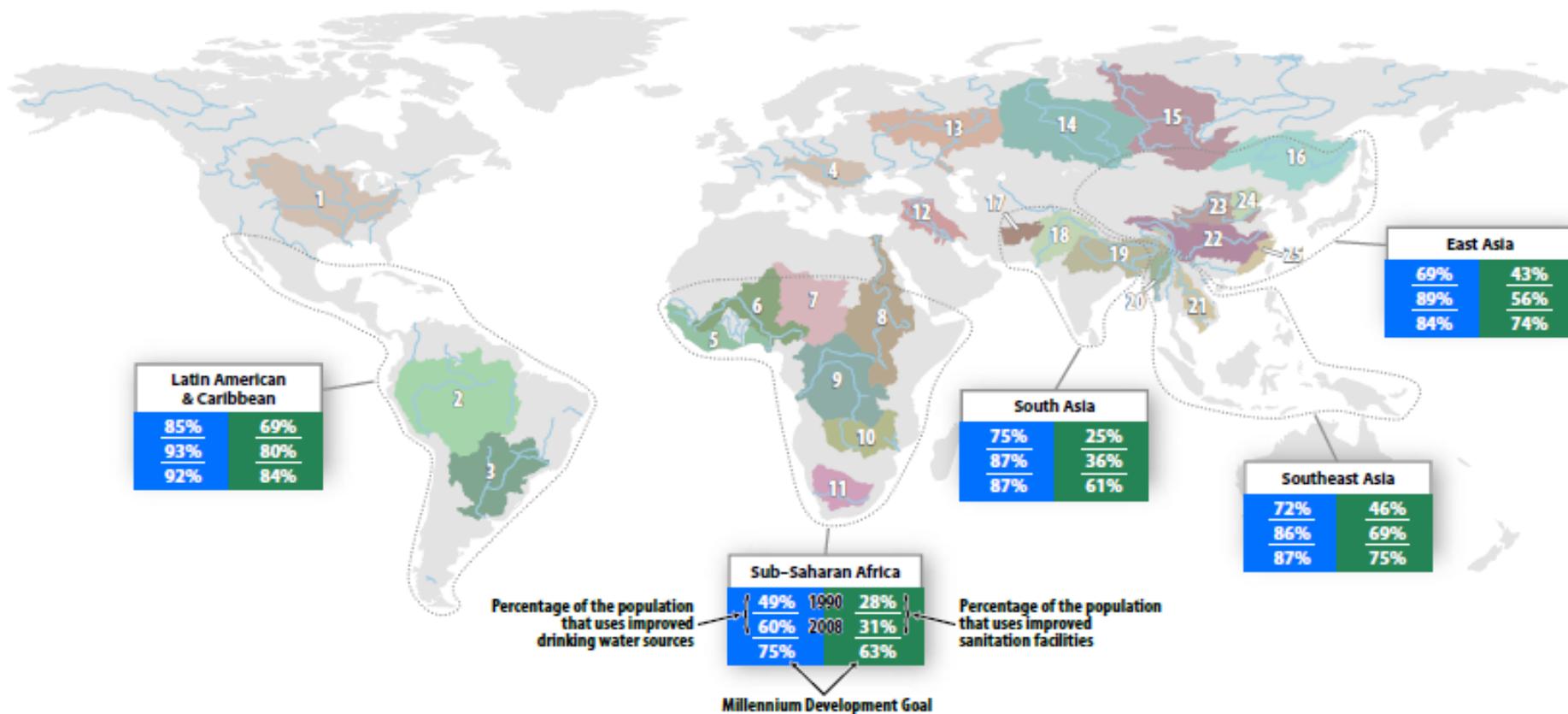
Figure 1.7 Cause-effect chains and links between water and the Millennium Development Goals



“Safe drinking water and adequate sanitation are crucial for poverty reduction, crucial for sustainable development, and crucial for achieving any and every one of the Millennium Development Goals”

- UN Secretary-General, Ban Ki-moon

# Water Demand Across Borders: Status of Millennium Development Goals for Improved Drinking Water and Sanitation, by Region



Number	Water Basin (# countries)	Estimated Pop. Served (mil.)	Number	Water Basin (# countries)	Estimated Pop. Served (mil.)	Number	Water Basin (# countries)	Estimated Pop. Served (mil.)
1	Mississippi - Missouri (2)	76	9	Congo (6)	83	18	Indus (5)	233
2	Amazon (9)	27	10	Zambezi (6)	33	19	Ganges - Brahmaputra (5)	687
3	Parana (5)	68	11	Orange (4)	15	20	Irrawaddy (3)	29
4	Danube (11)	81	12	Tigris - Euphrates (4)	55	21	Mekong (6)	71
5	Guinean Coast (11)	108	13	Volga (1)	61	22	Yangtze (1)	402
6	Niger (10)	98	14	Ob (4)	282	23	Huang He (1)	153
7	Lake Chad (7)	43	15	Yenisey (2)	8	24	Ziya He (1)	135
8	Nile (9)	221	16	Amur (3)	69	25	China Coast (1)	154
			17	Helmand (3)	9			

The United Nations established the **Millennium Development Goals (MDG)** in 1990. MDG Target 7c aims to reduce by 50% the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015.

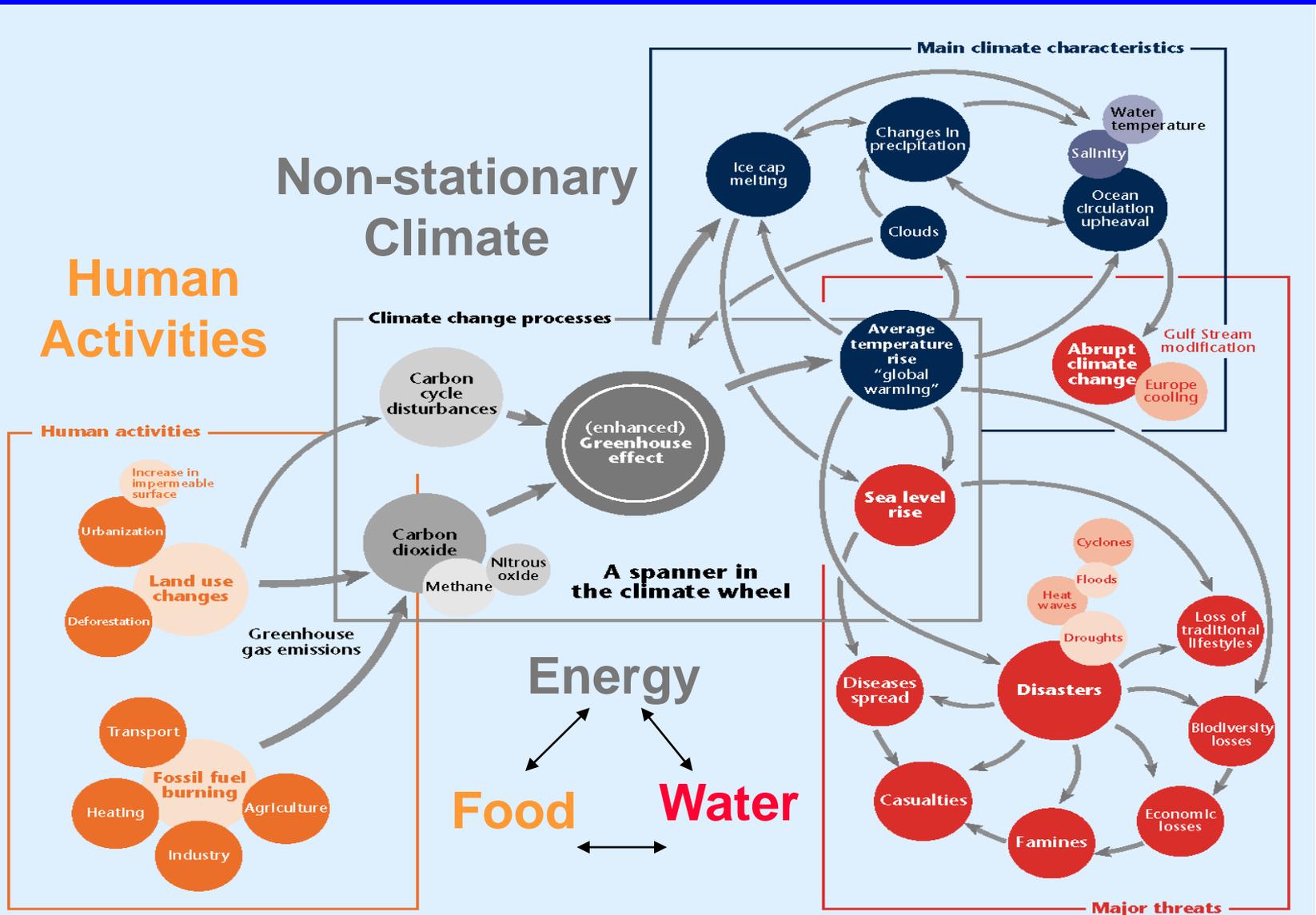
A **water basin** is defined as the area of land drained by a river and its tributaries.

**Improved drinking water sources** are delivery points that are likely to protect the water source from outside contamination.

**Improved sanitation facility** separates human excreta from human contact. Sanitation facilities are not considered improved when shared with other households, or open for public use.

Names and boundary representation are not necessarily authoritative.

# 21<sup>st</sup> Century Challenge to Sustainable Development

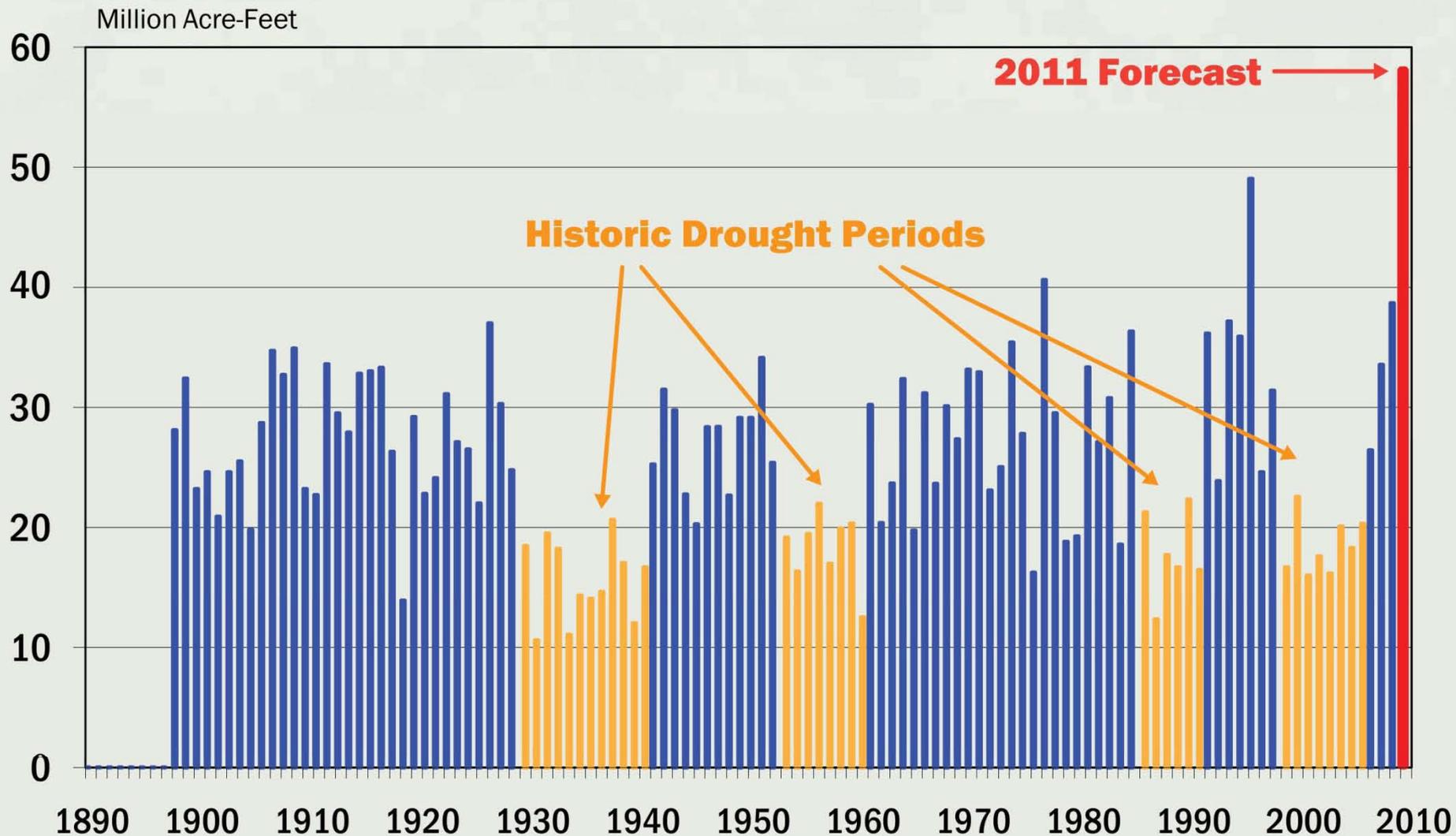




US Army Corps of Engineers  
BUILDING STRONG

# Missouri River Mainstem Reservoir System

Annual Runoff 1898 - 2011\*



\*Above Sioux City, IA

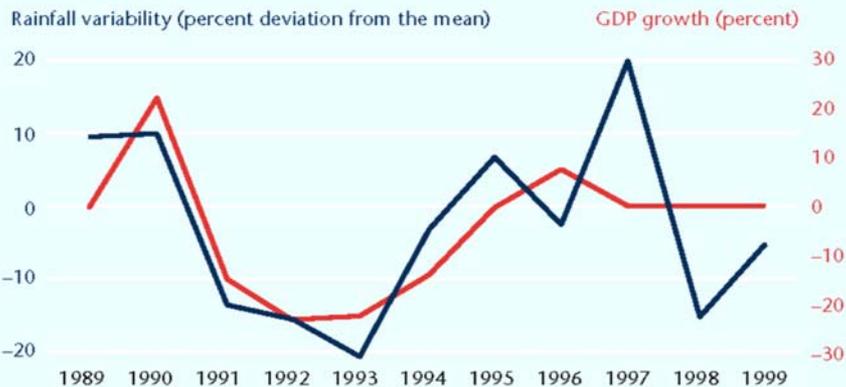
# Climate Variability Manifests Economy-Wide Impacts to Vulnerable Nations

## GDP Growth Tracks Rainfall Variability -- Inadequate Storage & Distribution

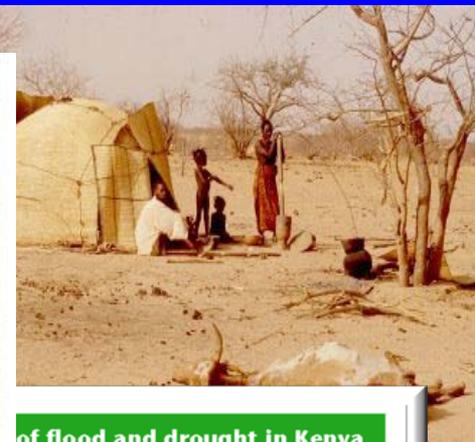
### Ethiopia



### Tanzania



Source: Based on van Aalst, Hellmuth, and Ponzi 2007.



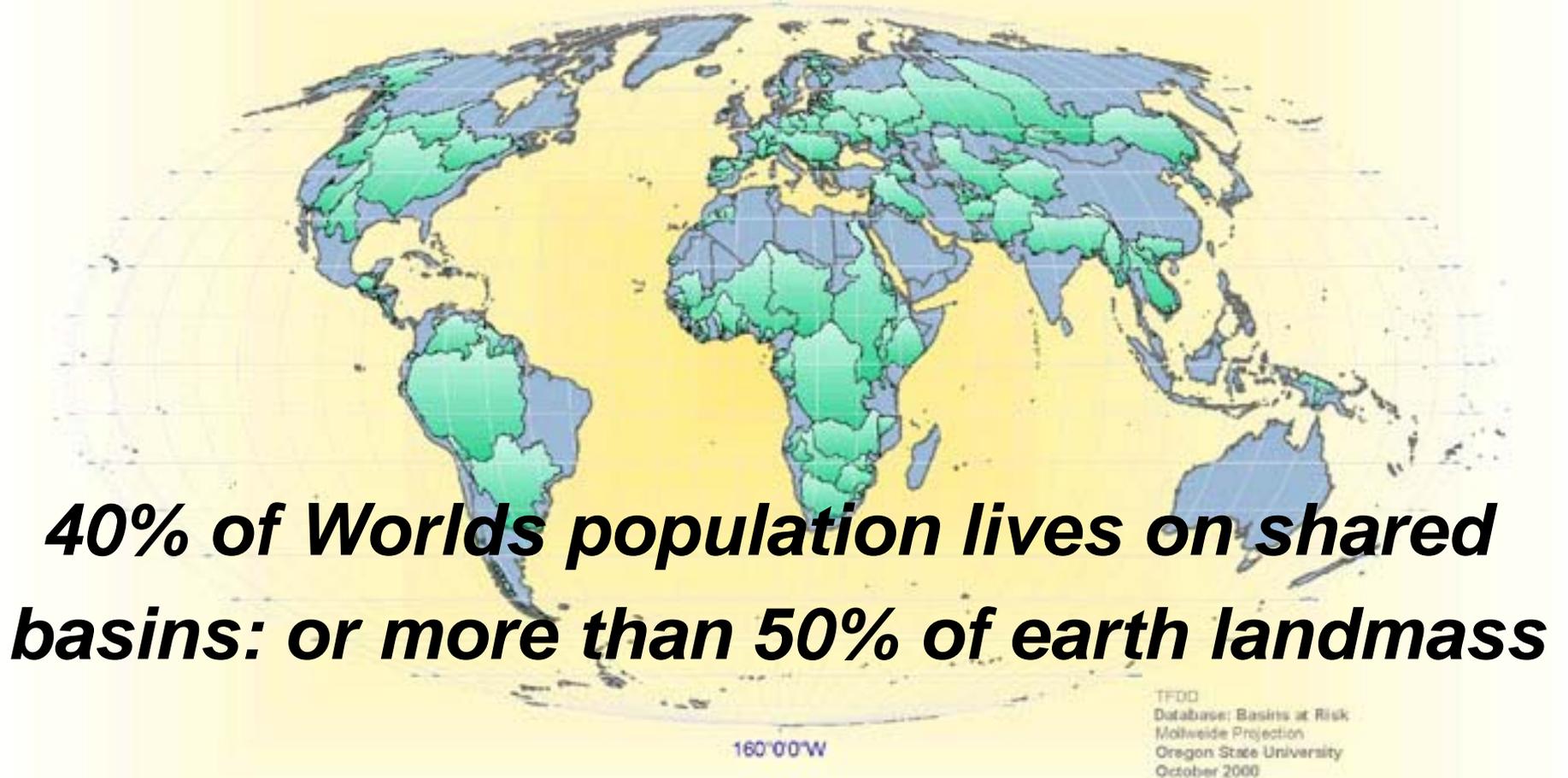
### Costs of flood and drought in Kenya,

	Costs (\$ millions)	Share of total (percent)
Water supply infrastructure	777	89
Total flood impact	56	6
Share of GDP 1997-98 (percent)	45	5
<b>1998-2000 La Niña drought impacts</b>		
Industrial production	1,400	58
Hydropower	640	26
Agricultural production	240	10
Livestock	137	6
Total drought impact	2,417	
Share of GDP 1998-2000 (percent)		16

Source: World Bank 2004.

**Emergency Management & Rebuilding Costs  
Divert Potential Adaptation Investment**

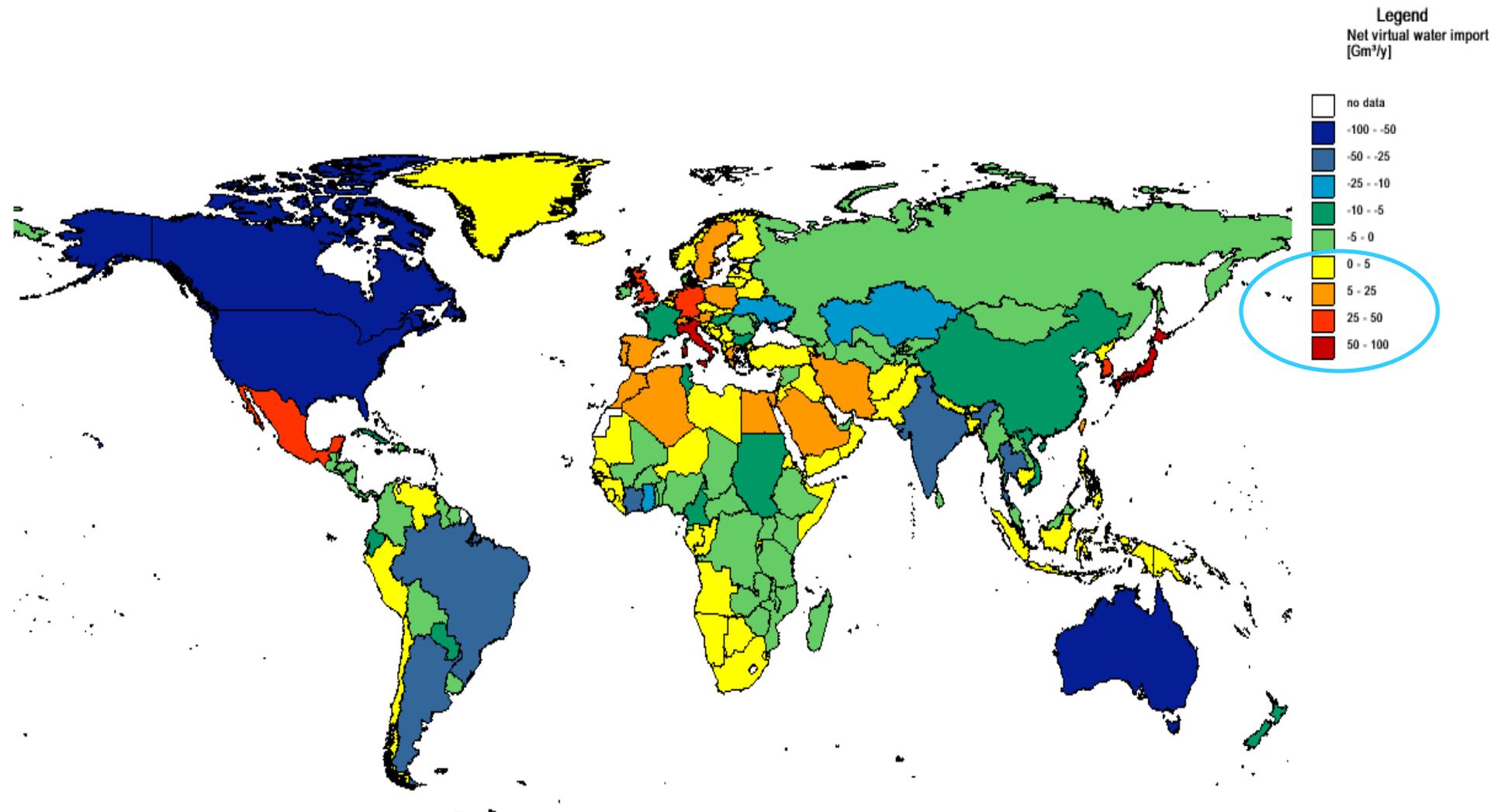
## International Basins of the World

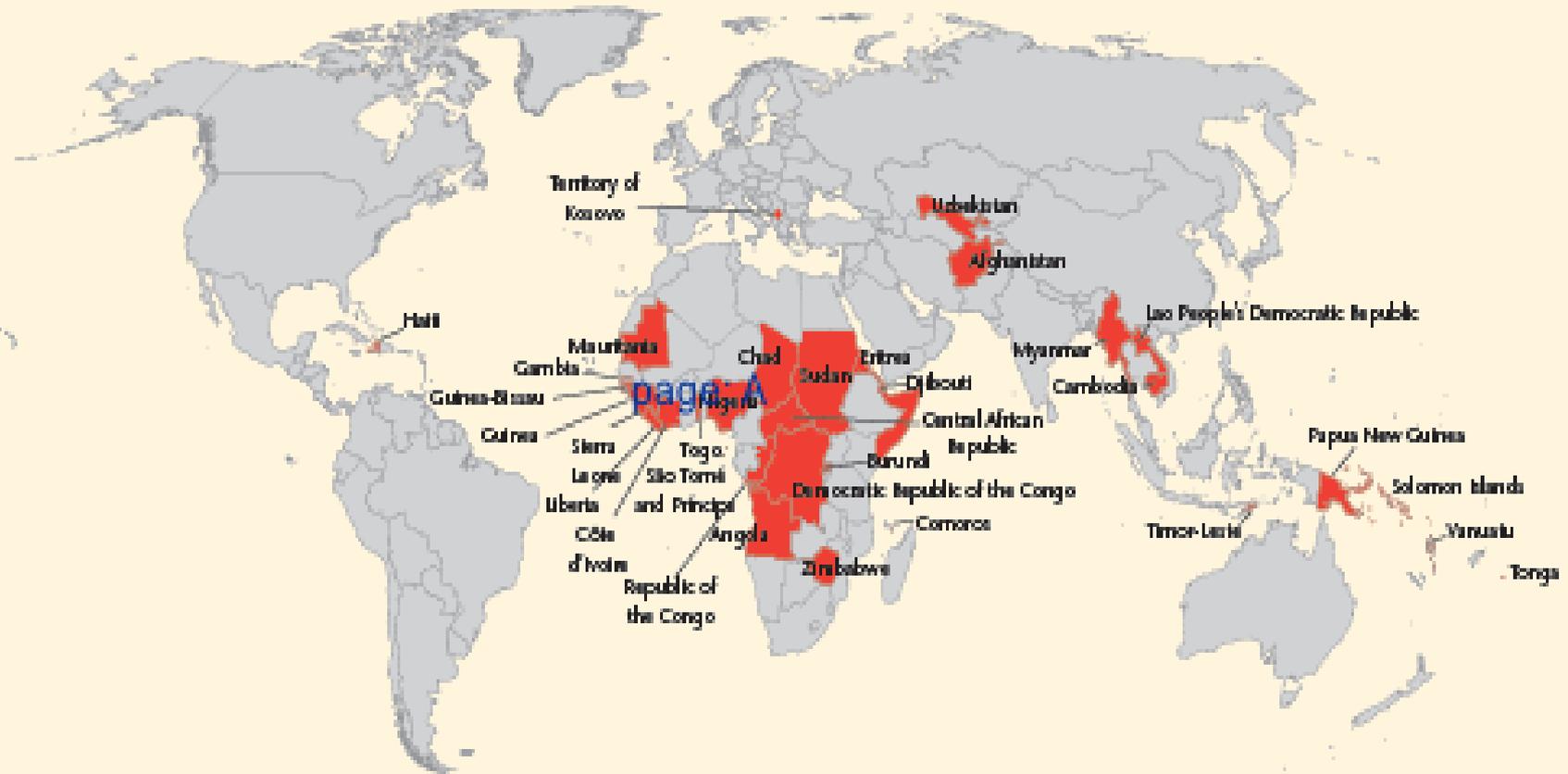


***40% of Worlds population lives on shared basins: or more than 50% of earth landmass***

TFDD  
Database: Basins at Risk  
Mollweide Projection  
Oregon State University  
October 2000

# Less-Developed Countries Becoming Water Importers





Note: Fragile states are low-income countries that score below a threshold on the International Development Association's Country Policy and Institutional Assessment, a tool used to assess the quality of country policies. The list is prepared annually.

Source: Based on IDA 2007.



# *Water Actions as Key Societal Adaptation Tools*

**Investment in Water Infrastructure, IWRM,  
Water Supply, Water Quality, Flood & Drought Mgt**



**Water Security (small s)  
Minimum Platform for Growth**



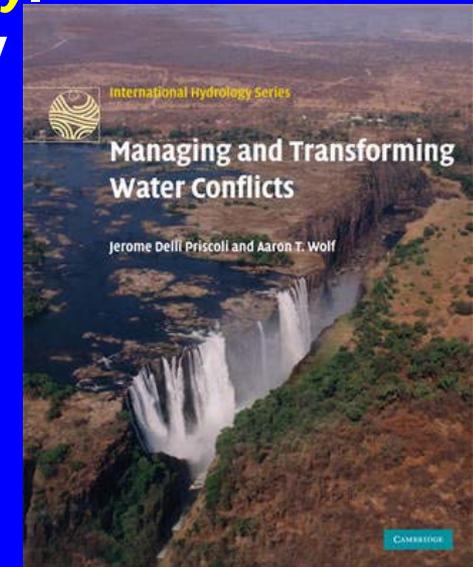
**Internal Stability  
and Security (large S)**



**Strategic  
Security**

# WATER AND SECURITY: the small "S"

1. The water crisis (s) is mainly one of **distribution** of water, knowledge and resources **not one of absolute scarcity**. However, water and security debate is often driven by notions of scarcity.
2. Water is **rarely the cause of war** and large scale social violence. However, such focus dominates the security and water debates.
3. The most salient aspects of water are passed over in the debate. They are water's powerful role in:
  - Building social community; **generating wealth** through provision of preconditions of economic activities;
  - **Convening adversaries** and providing common language for joint and creative dialogue, and; integrating, in a practical way, diverse interests and values.
  - Providing a principle **tool for preventive diplomacy** and for building cultures of cooperation, if not peace.



# ***Investment in Water Infrastructure Is Critically Important***

## **Water: Productive & Destructive**

An essential input to life – to  
food production, the health  
of humans and the natural  
environment, economic  
growth & cooperation  
AND...

A source of destruction,  
poverty and dispute

## **‘Water Security’**

Sustainable availability of a  
reliable quantity & acceptable  
quality of water for production,  
livelihoods & health  
AND...

Acceptable level of risk  
to society of  
unpredictable water-related  
impacts

## *...but... so is Water Education and Institutional Capacity Development*

- While it is generally recognized that the world is facing a global water and sanitation crisis, there is less awareness of the global “water education crisis”.
- The international agenda is focused on the MDG’s, with the water and sanitation goals linked to virtually all of the other MDG’s
- However, many water investments are at risk if countries continue to lack sufficient numbers of competent water professionals to manage those investments & ensure their long-term sustainability.
- In order to achieve the MDG’s for water and sanitation, its estimated that the number of water professionals in Africa would need to increase by 300%, in Asia, by 200%, and in Latin America by 50%.

“ One year ago, I reaffirmed the United States commitment to water security, to ensuring that people have the water they need, when and where they need it, in a sustainable manner, while reducing the risk and impact of extreme water events like droughts and floods. So water security for us is a matter of economic security, human security, and national security, because we see potential for increasing unrest, conflicts, and instability over water.....



....But there is another side to this issue. The water crisis can bring people together. In fact, on water issues, cooperation, not conflict, is and can be the rule. We have seen this in the success of local water groups, neighbors combining their resources to build wells and install pipes, then paying for water together. We have seen how water projects, done right, can unite engineers, health experts, educators, and political leaders. And we have seen countries come together to settle disputes and arrive at joint solutions to their water problems. So we want to enhance collaboration and commitment to bring more clean water and sanitation to more people.





# *The 2011 Senator Paul Simon Water for the Poor Act of 2005 Report to Congress*

- **USG Strategy – USAID is preparing new water strategy focused on themes expressed by Secretary Clinton on World Water Day**

**Overarching: 3-D's - Water security for Diplomacy, capacity Development & Defense**

- ▶ **Strengthening institutional and human capacity;**
- ▶ **Mobilizing financial support;**
- ▶ **Advancing science and technology & sharing U.S. expertise;**
- ▶ **Building partnerships that deliver meaningful results on the ground; and**
- ▶ **Identify priority countries and key approaches for achieving USG objectives.**

Senator Paul Simon  
Water for the Poor Act of 2005



Report to Congress

## **➤ USG Objectives for International Water Resources**

**➤ Increase access to, and effective use of, safe water and sanitation to improve human health;**

**➤ Improve water resources management and increase water productivity;**

**➤ Reducing risks to life safety;**

**➤ Enhancing resiliency against economic shocks from extreme events; and**

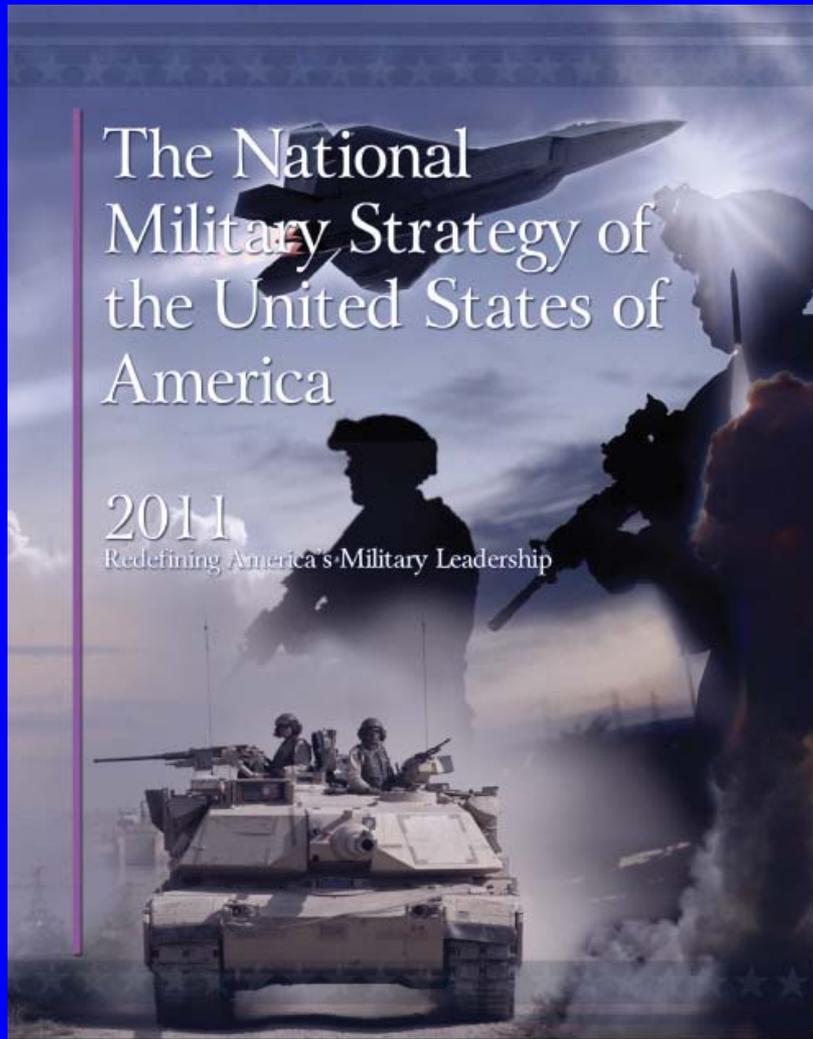
**➤ Reducing conflict and promoting stability within civil society.**

**Senator Paul Simon  
Water for the Poor Act of 2005**



**Report to Congress**

# *Water Security and the National Military Strategy*

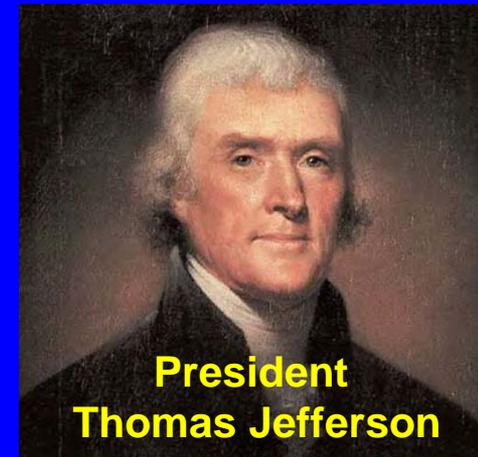


## *Strategic Environment.....*

*Population growth and urbanization in the Middle East, Africa, and South Central Asia will contribute to **increased water scarcity** and may present governance challenges. The uncertain impact of **global climate change** combined with increased population centers in or near coastal environments may challenge the ability of weak or developing states to **respond to natural disasters**.*

# Return to "Nation-Building "Paradigm?"

**BACK  
TO  
THE FUTURE**



- Secretary Clinton's World Water Day Speech – foreign policy emphasis on
  - Diplomacy
  - Defense &
  - Development
- President' Obama's UN Speech on "development " as a pillar in U.S foreign policy
- Historical context with founders aim to create a "multi-purpose nation building" engineering capability within U.S.



United Nations  
Educational, Scientific and  
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# International Hydrological Programme

UNESCO » Natural Sciences » Environment » Water » IHP

Share A- A+

## Water

### IHP

- About IHP
- IHP-VII Themes
- IHP Programmes

### WWAP

### UNESCO-IHE

### Water Centres

### Water Chairs

## UNESCO's Intergovernmental Scientific Cooperative Programme in Hydrology and Water Resources



The International Hydrological Programme (IHP) is the only intergovernmental programme of the UN system devoted to water research, water resources management, and education and capacity building. The programme, tailored to Member States' needs, is implemented in six-year phases – allowing it to adapt to a rapidly changing world.

### IHP-VII: Water Dependencies: Systems under Stress and Societal Responses

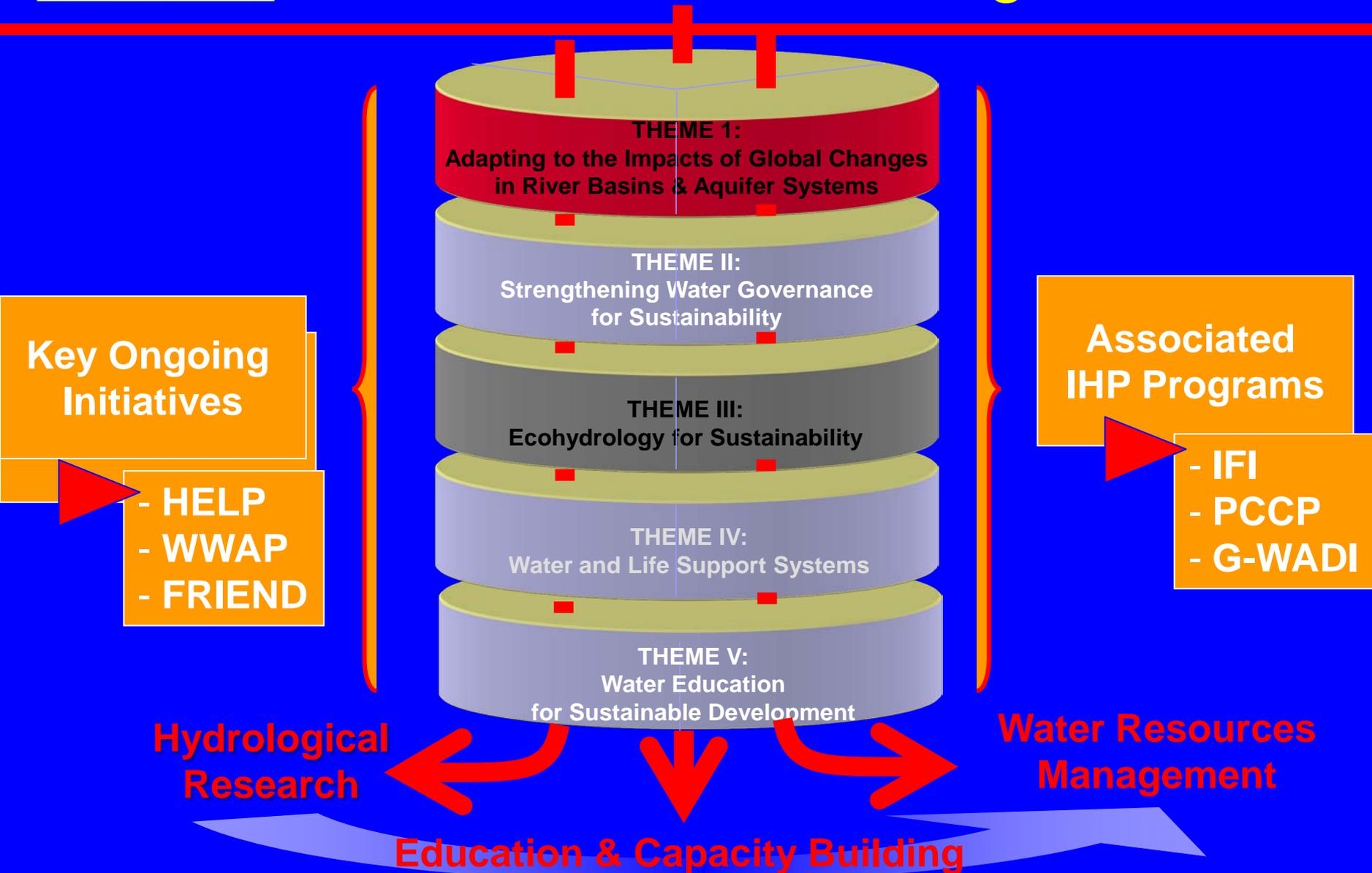
This phase of IHP (2008-2013) will continue to promote and lead international hydrological research, facilitate education and capacity development and enhance governance in water resources management. The aim of these efforts is to help meet the UN Millennium Development Goals (MDGs) on environmental sustainability, water supply, sanitation, food security and poverty alleviation.

▲ Back to top

## IHP PROGRAMMES

- FRIEND
- GRAPHIC
- G-WADI
- HELP
- IFI
- ISARM
- ISI
- JIHP
- PCCP
- UWMP
- WHYMAP

# *IHP-VII Core Themes & Cross-Cutting and Associated Programs*





# UNESCO “Category 2” Water Centers

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International Center for Integrated  
Water Resources Management  
under the auspices of UNESCO





Under the auspices of  
**UNESCO**

United Nations  
Educational, Scientific and  
Cultural Organization

# Water-Related “Category 2” U.N. Centers *- under the auspices of UNESCO*

- 1) International Research & Training Centre on Erosion & Sedimentation (IRTCES) (1984) Beijing, China
- 2) International Research & Training Centre on Urban Drainage (IRTCUD) (1987) Belgrade, Serbia
- 3) Regional Humid Tropics Hydrology & Water Centre for SE Asia & Pacific (1999) Kuala Lumpur, Malaysia
- 4) Regional Centre for Training and Water Studies of Arid and Semi-Arid Zones (RCTWS) (2002) Egypt
- 5) Regional Centre on Urban Water Management (RCUWM) (2002) Tehran, IR of Iran
- 6) International Centre on Qanats & Historic Hydraulic Structures (ICQHS) (2003) Yazd, IR of Iran
- 7) IHP-HELP Centre for Water, Law, Policy & Science (2006) University of Dundee, Dundee Scotland, UK
- 8) International Centre for Water Hazards & Risk Management (ICHARM) (2006) Tsukuba, Japan
- 9) European Regional Centre for Ecohydrology (ERCE) (2006) Lodz, Poland



Under the auspices of  
**UNESCO**

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# Water-Related “Category 2” U.N. Centers - *under the auspices of UNESCO*

- 10) Water Centre for Arid & Semi-Arid Zones of Latin America & the Caribbean (2006) La Serena, Chile
- 11) Regional Centre on Urban Water Management for Latin America and the Caribbean (2007) Colombia
- 12) Regional Centre for Shared Aquifer Resources Management (RCSARM) (2008) Tripoli, Libya
- 13) International Centre for Integrated Water Resources Management (ICIWaRM) (2009), USA
- 14)** International Centre for Education, Capacity Building & Applied Research in Water (HidroEx) (2009) Minas Gerais, Brazil
- 15) International Centre for Coastal Ecohydrology (ICCE) (2009) Faro, Portugal
- 16) Centre for the Sustainable Management of Water Resources in the Caribbean Island States (2010) Dominican Republic



# Confluence of USG Objectives & IHP-VII Themes



## President's Priorities

Reflected in addressing Senator Paul Simon Water for the Poor Act, CSD, UN MDG's, etc. to improve access to clean water & sanitation

- 1 – Mitigation & Adaptation to GCC
- 2 – Agriculture and Food Security
- 3 – Health
- 4- Education
- 5- Gender Equity

## Secretary Clinton's Focus Areas

(World Water Day 2010 & 2011)

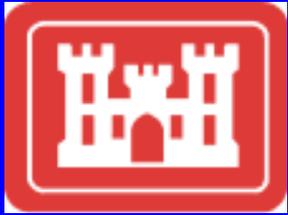
- 1 – Capacity Building
- 2 –Leveraged Financing
- 3 – US Science & Technology Cooperation & Innovation
- 4 - Partnerships
- 5 – USG to Identify Priority Countries

## USG Water Strategy Objectives

- 1 - Promoting better hygiene & reduced incidence of waterborne disease
- 2 - Improving productivity of water for food, clean energy, etc.
- 3 – Reducing risks to life safety
- 4 - Enhancing resiliency against economic shocks from extreme events
- 5 – Reducing conflict and promoting stability within civil society

## IHP Program VII Themes

- 1 - Adaptive Mgt/Climate Change
- 2 - Strengthening Water Governance
- 3 – Ecohydrology for Sustainability
- 4 – Water & Life Systems (IWRM)
- 5 - Water Education & Capacity Building



# International Center for Integrated Water Resources Management



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Cultural Organization



International Center for Integrated  
Water Resources Management  
under the auspices of UNESCO



## AGREEMENT BETWEEN THE GOVERNMENT OF THE UNITED STATES OF AMERICA AND THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO)

### CONCERNING THE ESTABLISHMENT OF THE INTERNATIONAL CENTRE FOR INTEGRATED WATER RESOURCES MANAGEMENT

AT THE  
U.S. ARMY CORPS OF ENGINEERS INSTITUTE FOR WATER RESOURCES,  
ALEXANDRIA, VIRGINIA, USA,  
AS A CATEGORY 2 CENTRE UNDER THE AUSPICES OF UNESCO

Whereas at the 18<sup>th</sup> session of the  
Hydrological Programme (IHP) of the U



ational  
Cultural  
adopted

For the United States of America  
U.S. Army Corps of Engineers

Major General Don T. Riley

Deputy Commanding General

For the United Nations Educational,  
Scientific and Cultural Organization

Koïchiro Matsuura

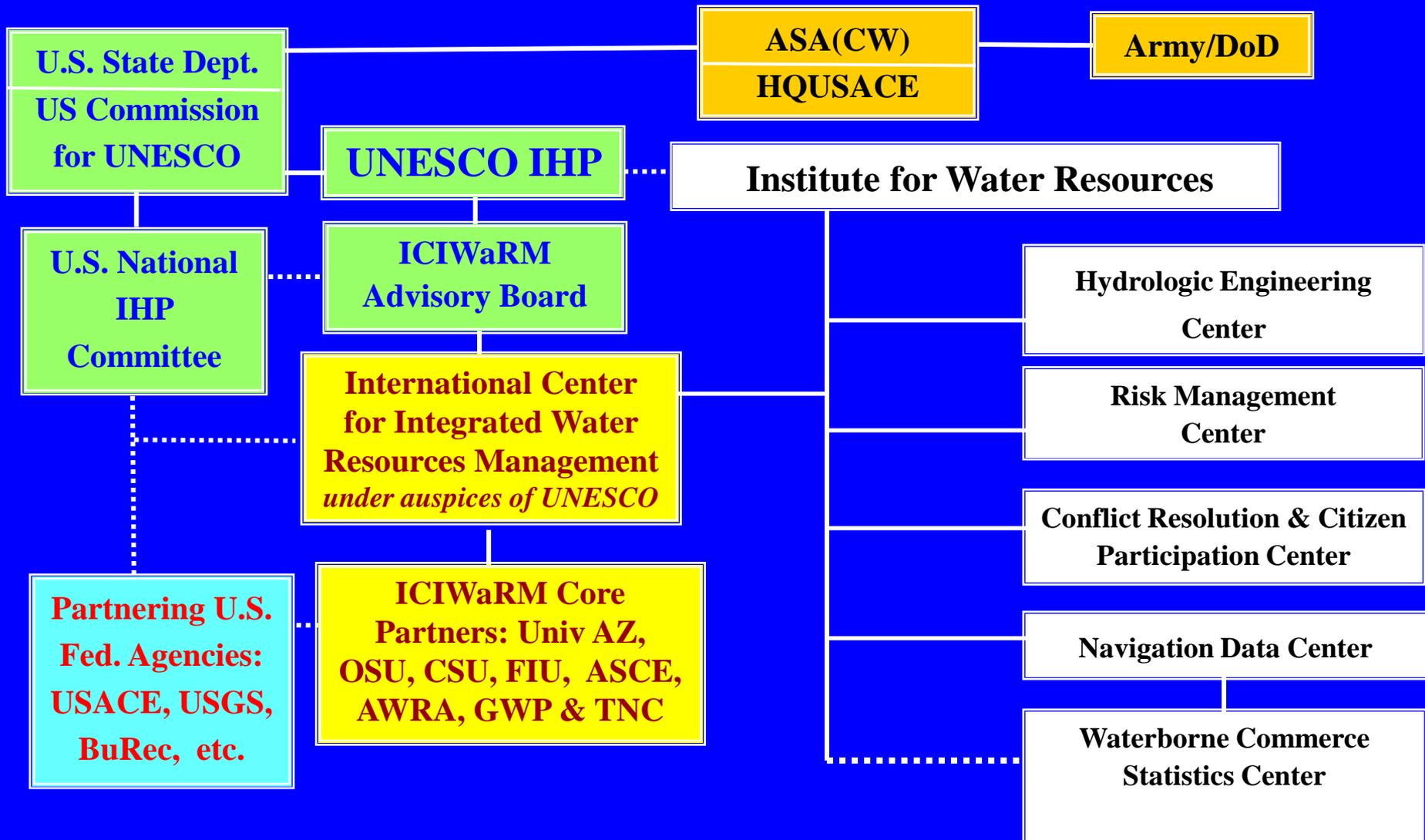
Director-General



# Organizational Structure

## International Center for Integrated Water Resources Management (ICIWaRM)

Host Institution - USA Institute For Water Resources





United Nations  
Educational, Scientific and  
Cultural Organization



International Center for Integrated  
Water Resources Management  
under the auspices of UNESCO

# *ICIWaRM Mission*

*“Advancement of the science and practice of integrated water resources management (IWRM) to address water security and other water-related challenges by regional and global action, through new knowledge, innovative technologies, collaborative interdisciplinary scientific research, networking, training and capacity development, within the framework of UNESCO’s International Hydrological Programme (IHP).”*

**Research**

**Best Practices**

**Education**



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Water Resources Management  
under the auspices of UNESCO

# *Program Focus*

- **Focus on practical science and technology** development which can be readily transferred to improve integrated water resources management (IWRM) in developing nations and contribute towards meeting Millennium Development Goals.
- Partner and **support existing UNESCO-IHP programs** which serve to **implement IHP programmatic objectives** related to IWRM.
- **Seek collaborations for joint applied research, capacity-building and training programs through existing UNESCO Centers** and established programs, with particular emphasis on Latin America and the Caribbean, and Africa.



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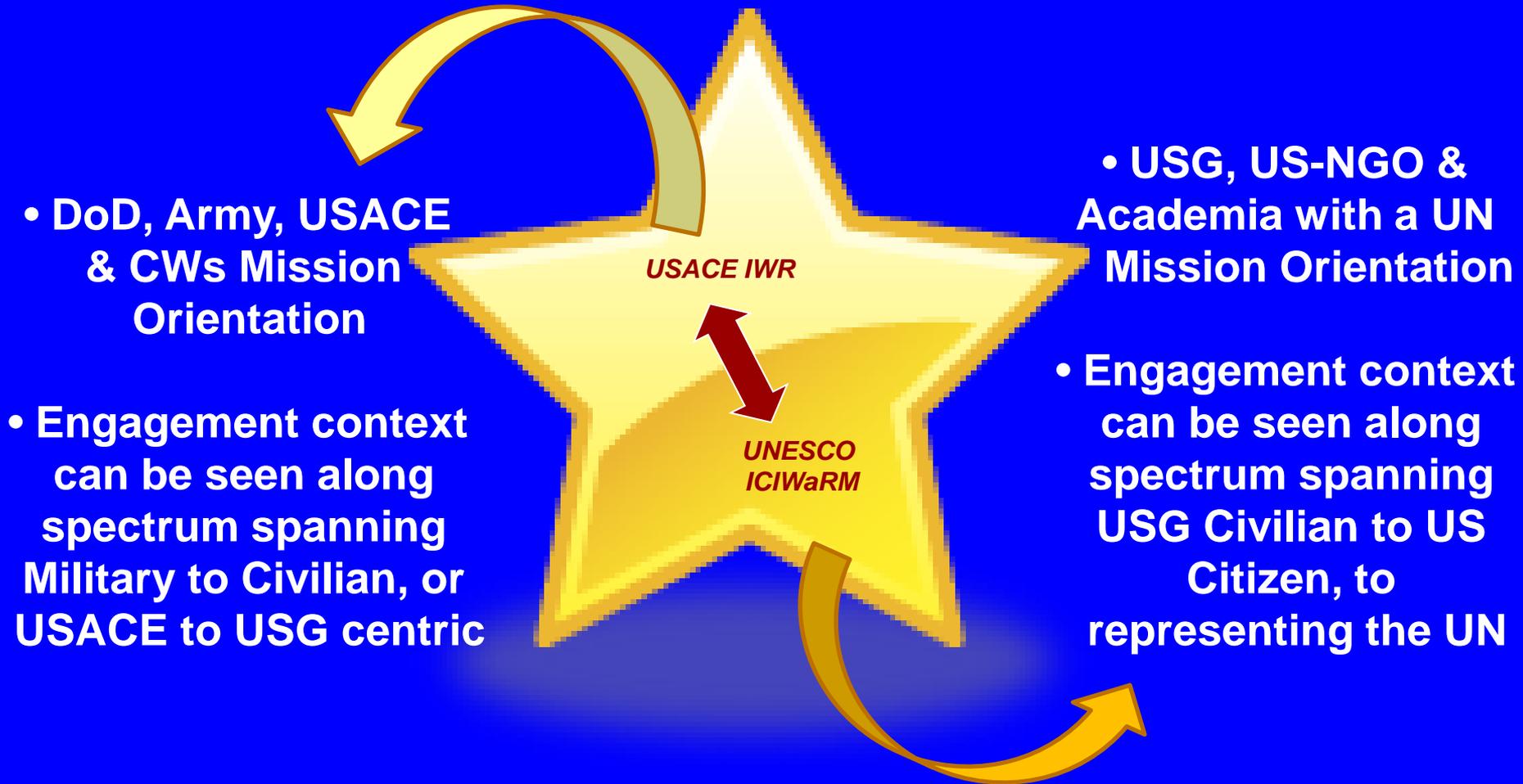


International Center for Integrated  
Water Resources Management  
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# ICIWaRM Operating Context



# *USACE IWR – ICIWaRM Engagement Context*





# Global Water Security – Objective: A Water Secure World



DoD /Army /USACE

USACE Civil Works  
Program



Global NGO's &  
Monetary  
Institutions

United Nations

USG – Department of State



- MSC & COCOM Support
- CMEP / EMI Programs
- Iraq, Afghanistan Reachback & Capacity Development
- Haiti, Pakistan Tech Assistance

## DoD /Army /USACE

- Stability & Reconstruction Ops
- Disaster & Humanitarian Assistance
- Gen Petraeus' Strategy, COIN
- Support via USAID, MCC
- USAID Water Strategy

## USACE Civil Works

- IJC – Canada
- CRT – Canada
- UNAM – Mexico
- CONAGUA – Mexico
- RWS – Netherlands
- MLIT – Japan
- K-Water, South Korea
- Mekong & Miss RC's



## Global NGO's & Monetary Institutions

- World Water Council
  - WWF's
  - Water Policy Journal
- Global Water Partnership
- The Nature Conservancy
- WB, IDB, IBRD, ADB, etc.

## USG – Department of State

- Interagency Water Group
- USAID, MCC, NSF
- Middle East Water Network
- AMCOW Engagement Strategy

## United Nations

- **UNESCO - IHP Program**
  - **US Mission to UNESCO**
  - **US National IHP Committee**
- **UN High Level Panel on Water & Disasters**



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# *Whole of Government - Intergovernmental Approach*

- ICIWaRM as partnership with access to full range of USACE water resources technical capabilities – government, academia, NGO, and private sector.
- Fully support USG foreign policy priorities, goals and initiatives with respect to international water resources, science and technology, and capacity-development assistance.
- Seek alignment with USG national goals & priorities, and bridge outcomes targeted by MDG's with science, technology, and education goals of the UNESCO IHP program.
- Seek leadership roles and provide “value-added” programmatic impetus and support to identified priority areas, again consistent with USG goals and objectives.
- Work through, and support existing IHP initiatives, programs and centers as means to influence and contribute to the implementation of IHP-VII and VIII .

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**MARSEILLE, FRANCE '12**



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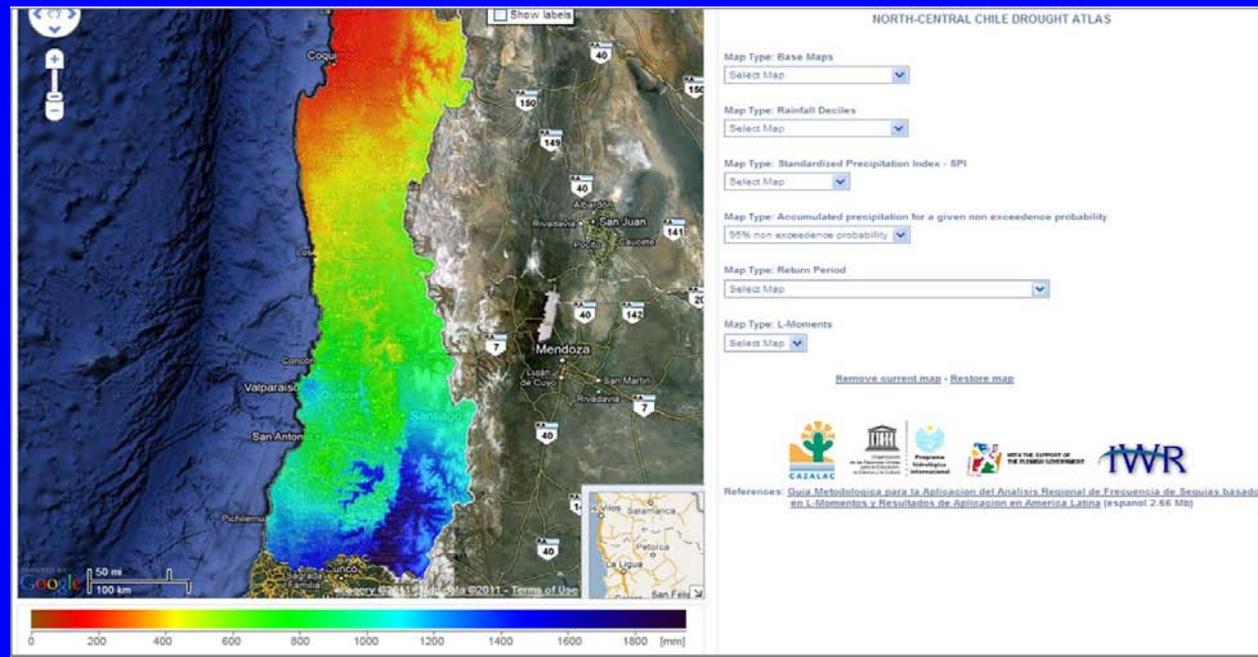
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# Illustrations of Ongoing or Recently Completed Activities

# Drought Atlas for Pilot Regions of Latin America

- CAZALAC with ICIWaRM support has been leading development of drought atlases for parts of Chile, Perú, Ecuador, Argentina, and México
  - ICIWaRM has helped with technical workshops on the methodology and brought in experts on L-moments.
  - L-RAP, a commercial software package, has been used.
    - ICIWaRM and CAZALAC ran an April 3-4 workshop to train Latin American water professionals in regional rainfall frequency analysis.

Regional Drought Atlas  
for Northern Chile.  
Source: CAZALAC

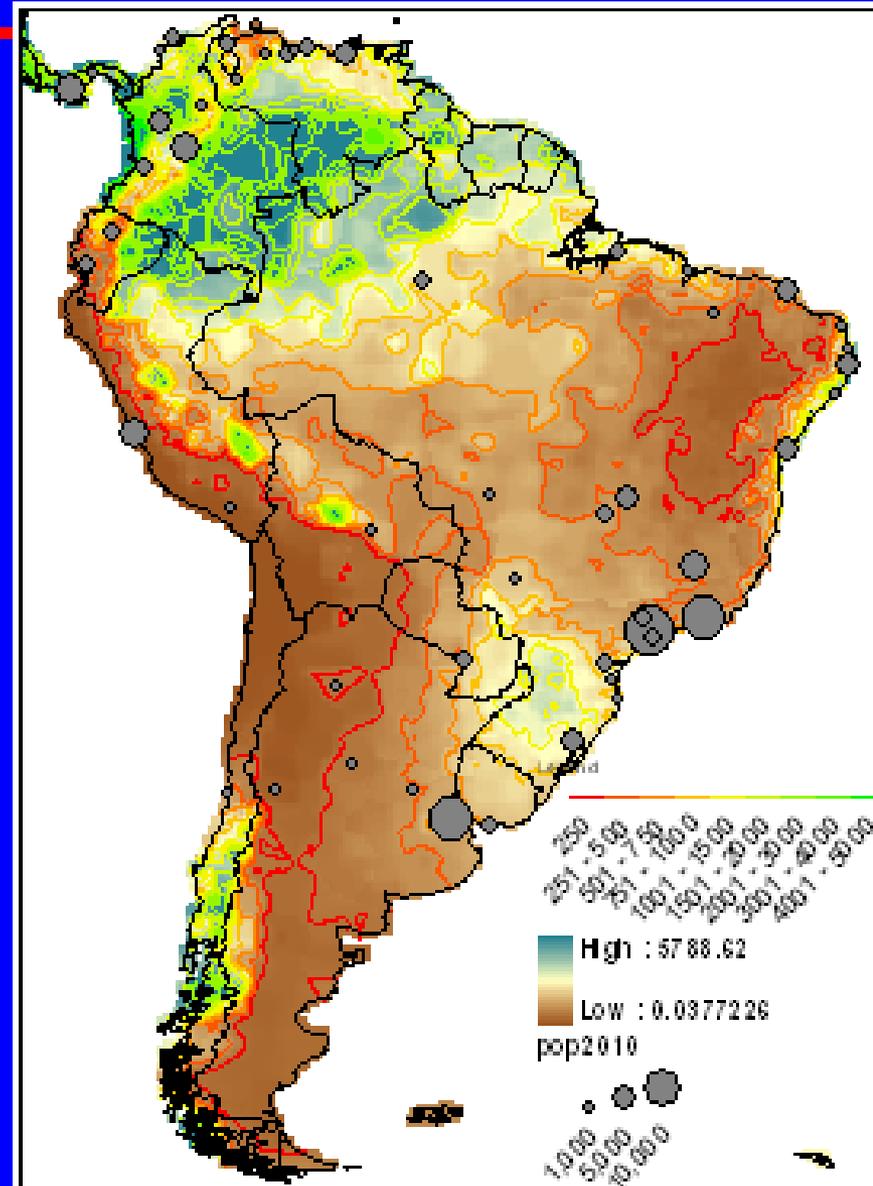


# Ultimate Goal: Drought Maps for all Latin America

- Continental, national and regional scales
- Continue collaborating and building capacity
- Need to complete free, open-source program to correspond to the “spirit of UNESCO
- Support country teams for regional analysis.

Preliminary Drought Atlas of South America using ICIWaRM non-proprietary software and NOAA data. This example answers the question: What is the total May-October rainfall that one can expect to exceed with 90% probability?

Source: ICIWaRM.



# Assisting Peru's National Water Authority (ANA) in IWRM

- Providing training, guidance, and supervisory assistance in Shared Vision Planning (SVP) for IWRM plans at six pilot basins
- Partners: World Bank, Inter-American Development Bank, ANA (US\$40M)
- Progress to date:
  - TOR / adaptation of approach for project implementation
  - Feedback workshops w/ ANA staff & stakeholders at all pilot basins
- Developing Foreign Assistance Sec. 607 Agreement for 3-year support
  - Phase I: Training and Finalizing SOW (6 months)
  - Phase II: Implementation/advisory support (2.5 yrs)

SVP will pragmatically integrate:

- Systems modeling
- Structured participation
  - IWRM planning



# *Hydrologic-Hydraulic ResSim Modeling Short Course UNESCO Hydroinformatics Center (CIH), Asunción, Paraguay*

- Seven days of HEC model training in Spanish, March 2011
  - Basic theory, application, tips in hydrology, hydraulics, reservoir operations modeling
  - 2 days problem solving / advice on ongoing modeling projects
  - 40-45 participants (!) - Paraguay, Brazil, Uruguay, Argentina & Chile
  - Young professionals, academics, and a few graduate students
- Team: ICIWaRM, HEC, & U. Arizona
- Future collaboration interests:
  - HEC models in Spanish
  - internship exchanges
  - non-proprietary GIS interface





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Capacity-building (e.g.,  
customized short courses  
on hydrologic and  
hydrogeologic modeling)



- Kenya and Ethiopia
- Collaborative effort of  
USACE & USGS



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# *Technical Secretariat for UNESCO global network "Water and Development Information for Arid Lands" (G-WADI).*

1. Networks of scientists working on arid zone hydrology
2. New website nearly complete
3. Regional groups "GWADI-Arabia", G-WADI Sub-Saharan Africa, and GWADI Latin American and the Caribbean recently formed
4. NASA attended GWADI-SSA meeting in December
5. GWADI-Arabia very active already



6. Our close partner CAZALAC will be GWADI-LAC Secretariat



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## *Participation in Design of Middle East—North Africa Network of Water Centers of Excellence (MENA-NWC)*



- Developing a regional-scale short course on the WEAP (Water Evaluation And Planning) System.
- To be held in Jordan ~September 2011.
- In collaboration with the Ministry of Water and Irrigation, and the UNESCO-Jordan office.
- With support from the MENA-NWC.



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International  
Hydrological Programme  
of UNESCO



World Water  
Assessment Programme  
Appraisal Bulletin for the United  
Nations World Water Assessment  
Programme



NARBO

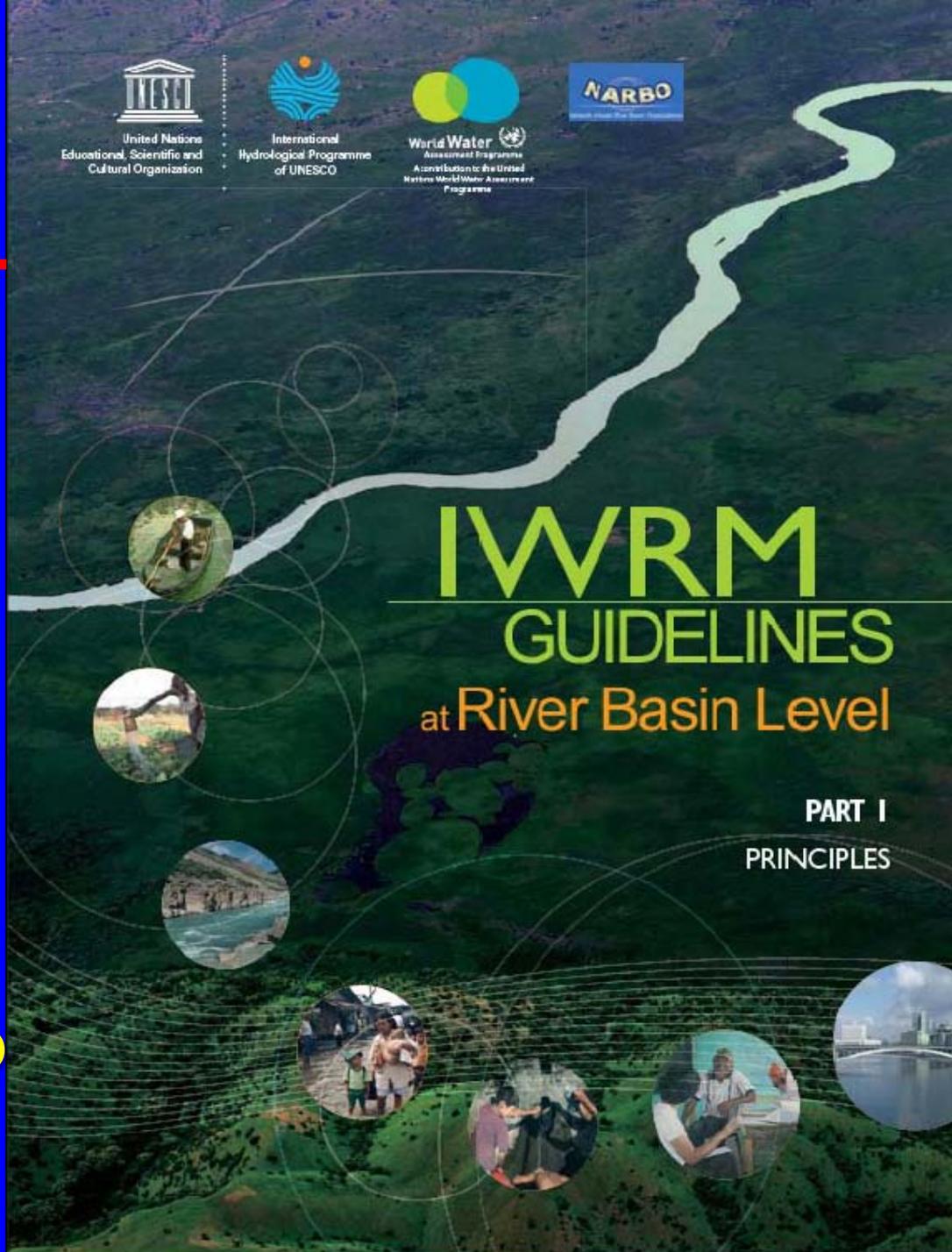
North American River Basin Organization

Steering Committee Co-  
Chair:

UNESCO IHP/ WWAP/  
NARBO publication series

“Integrated Water Resources  
Management Guidelines at  
River Basin Scale”.

Coordination of translation  
to Spanish of parts of this  
series as an ongoing  
collaboration with UNESCO  
and Inter-American  
Development Bank.



# IWRM GUIDELINES at River Basin Level

PART I  
PRINCIPLES



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# ICIWaRM-UNAM MOU for Mexico National Wetlands Inventory

- ICIWaRM helped coordinate first Mexico International Conference on Wetlands
- Some benefits:
  - Leverage Federal experience and knowledge from US National Wetlands Inventory



- Coordinate cross-border efforts, such online North American wetland plants database, managed by USACE.



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# Tabasco, Mexico Flood Commission

- ICIWaRM (via core partners ASCE and AWRA) is working thru UNAM to provide expert review of Tabasco 2007 Flood Commission report
  - 1<sup>st</sup> field visit of Technical Committee: April 11-15
  - Kyle Schilling, ASCE - EWRI & IHP National Committee Member
  - Gerry Galloway, AWRA





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# Other ICIWaRM Program Components

- World Water Assessment Program – technical support in cooperation with other USG agencies and WWAP Secretariat
- North America HELP Program, including session at this year's summer AWRA specialty conference in Snowbird, UT
- Co-organized and co-sponsored conference on “Echohydrology and IWRM” in Lodz, Poland, June 2007
- Co-organized and co-sponsored conference on “Global and Regional Climate Changes” in Kyiv, Ukraine, November 2010



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# Emerging Initiatives and Agreements

- New agreement with UNESCO Category 2 Center on Sustainable Mgt of Water in Caribbean Island States - Dominican Republic



## MEMORANDUM OF UNDERSTANDING BETWEEN

**THE INSTITUTE FOR WATER RESOURCES  
U.S. ARMY CORPS OF ENGINEERS**

**AND**

**INSTITUTO NACIONAL DE RECURSOS HIDRÁULICOS**

**The Institute for Water Resources (IWR)**, United States Army Corps of Engineers (USACE), primarily working through the International Center for Integrated Water Resources Management (ICIWaRM), and **The Instituto Nacional de Recursos Hidráulicos (INDRHI)**, primarily working through The Centre for the Sustainable Management of Water Resources in the Caribbean Island States (Centro para la Gestión Sostenible de los Recursos Hídricos en los Estados Insulares del Caribe (CEHICA)), hereinafter jointly referred to as "the Parties":

*Having* a common interest in integrated water resources management (IWRM):



# Questions? Discussion

