CICS Research and Its Use by International Development Organizations

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EARTH OBSERVATION FOR WATER RESOURCES MANAGEMENT

CURRENT USE AND FUTURE OPPORTUNITIES FOR THE WATER SECTOR

WORLD BANK GROUP
Water

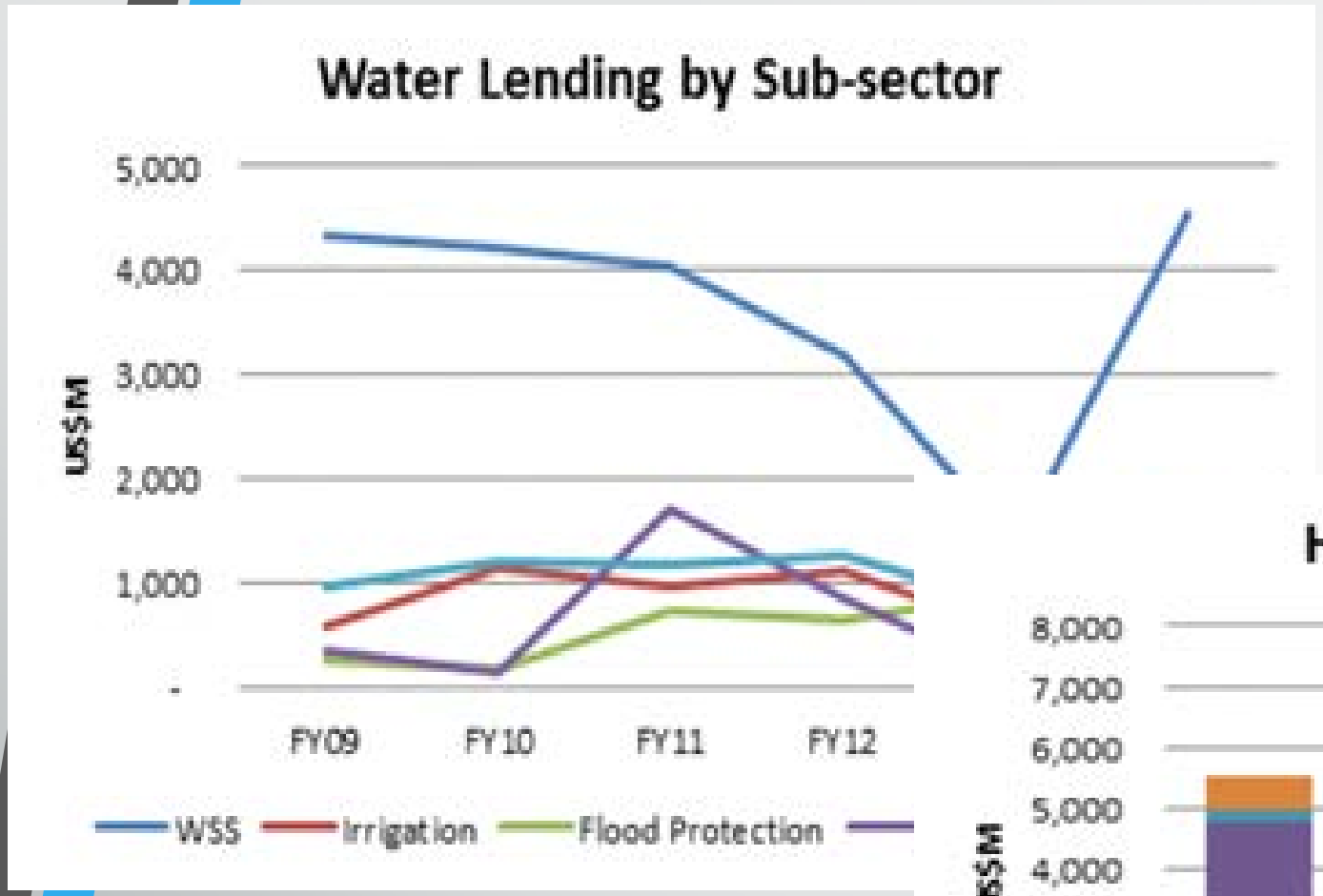
MAY 2015

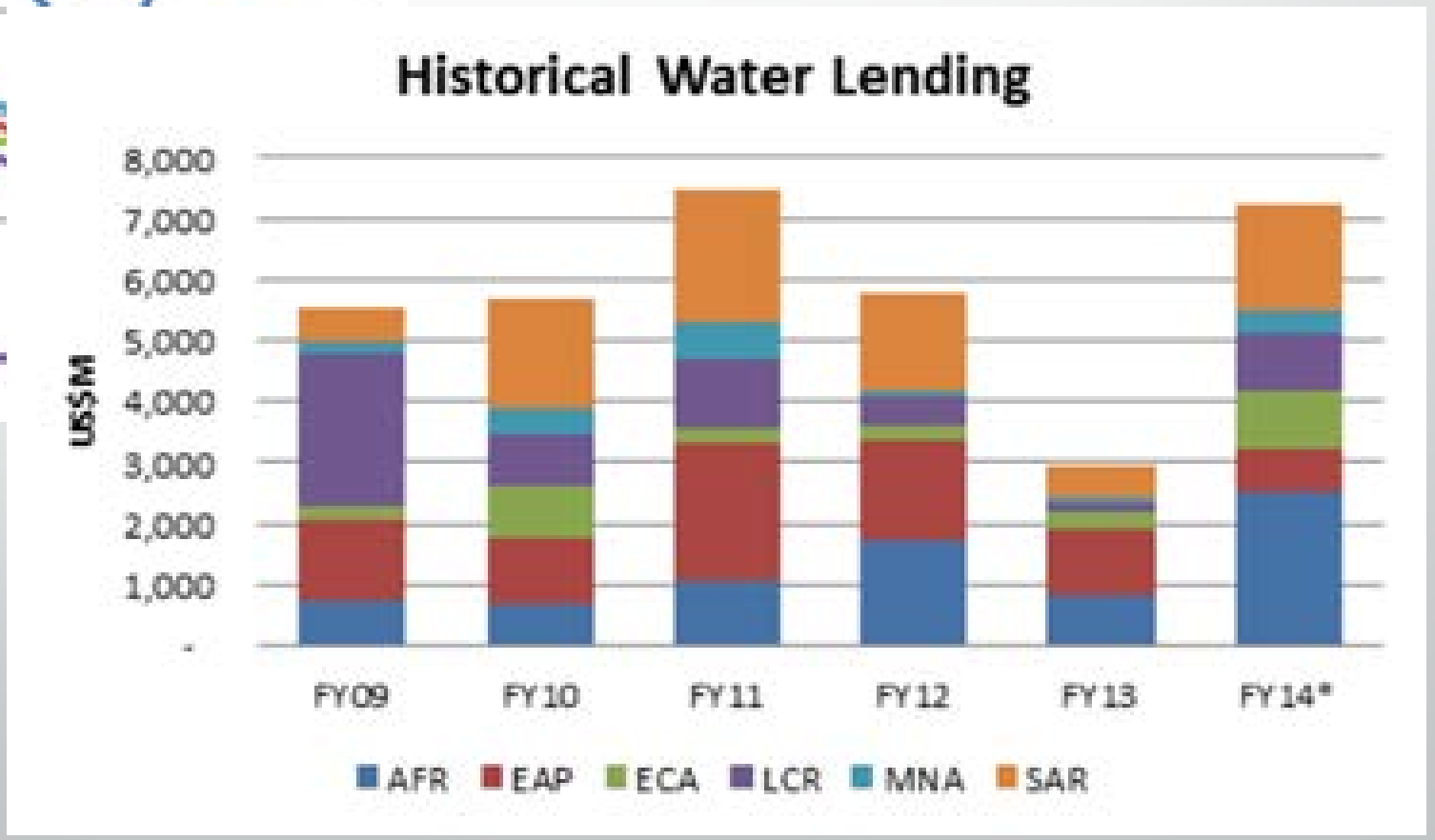
About development banks…

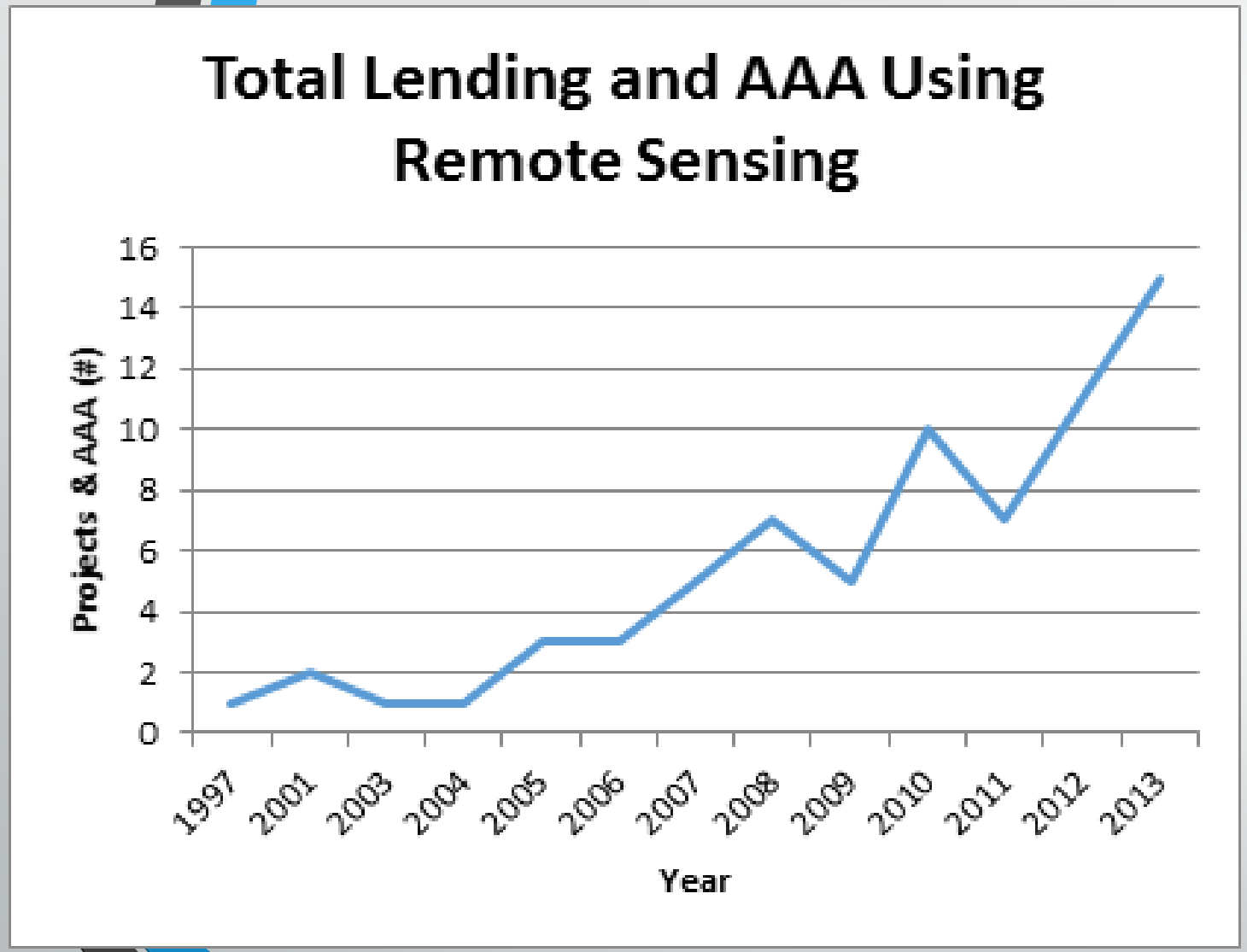
- “Cooperative” organizations, with capital provided by country members
- Bank owners are also bank clients
- Provide loans and technical assistance to countries in various development sectors: water, health, environment, safety/security, education, social and economic reforms, among others.
- Large focus on capacity building (local presence in the countries is a must)

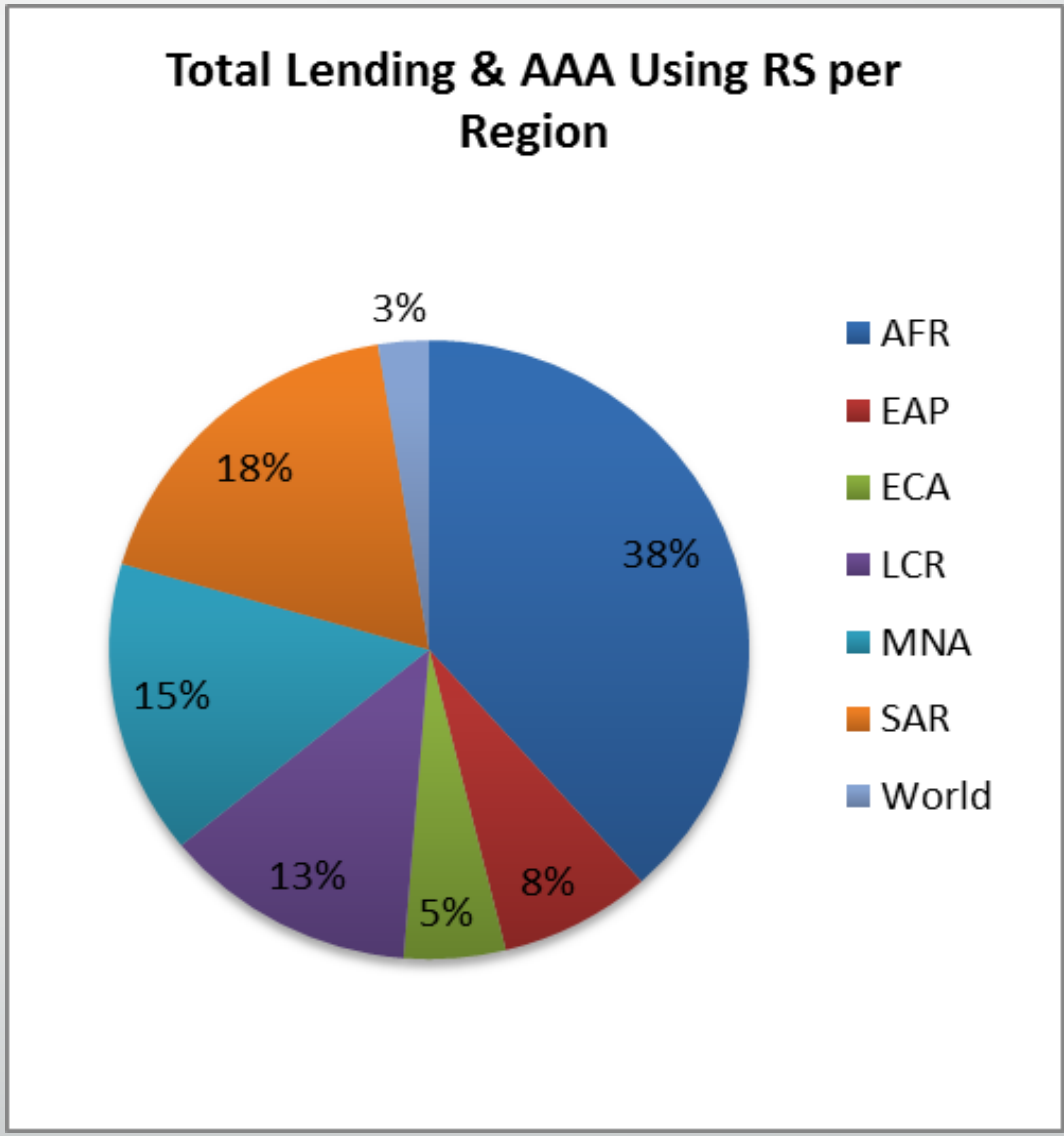
World Bank Regional Commitments, Fiscal 2015

Region	IBRD (millions)	IDA (millions)	Total IBRD/IDA (millions)	Total Share (percent)
Africa	$ 1,209	$ 10,360	$ 11,569	27%
East Asia and Pacific	$ 4,539	$ 1,803	$ 6,342	15%
Europe and Central Asia	$ 6,679	$ 527	$ 7,207	17%
Latin America and the Caribbean	$ 5,709	$ 315	$ 6,024	14%
Middle East and North Africa	$ 3,294	$ 198	$ 3,492	8%
South Asia	$ 2,098	$ 5,762	$ 7,860	18%
Total	**$ 23,528**	**$ 18,966**	**$ 42,495**	**100%**


Water Lending by Sub-sector
US$M
5,000
4,000
3,000
2,000
1,000
-
FY09
FY10
FY11
FY12
WSS
Irrigation
Flood Protection


Historical Water Lending
US$M
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
FY09
FY10
FY11
FY12
FY13
FY14*
AFR
EAP
ECA
LCR
MNA
SAR


Total Lending and AAA Using Remote Sensing
Projects & AAA (#)
16
14
12
10
8
6
4
2
0
1997
2001
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year


Total Lending & AAA Using RS per Region
3%
18%
38%
15%
13%
5%
8%
AFR
EAP
ECA
LCR
MNA
SAR
World

R2X Opportunities

Box I-21. Indicative Actual or Planned Uses for RS Products

Evaluation of project impact on agricultural water management: integrated landscape management and agricultural intensification, climate-smart agriculture, and agricultural value chains;

Agricultural water-saving measures and support services: irrigation planning and monitoring; reduction of non-beneficial ET; farm-level resilience to climate change, raising farm income by increasing farm yields and output value; planning and training tools at micro-watershed levels; maps and climate information for use by farmers in decision making; agroclimatic advisory risk systems; improved, web-based information on markets, post-harvesting and value addition; farm participatory field trials and demonstrations for specific technologies; and research management to strengthen the institutional arrangements for longer-term, needs-based research identification, technology transfer, research quality assurance, and coordination of rainfed agriculture and watershed management research;

Use of modern, basin-wide water resources information systems: Water Information System Platforms (WISP);

Feasibility studies: irrigation projects; hydropower stations; use of DEMs for reservoir inundation models and site identification;

Basin planning, monitoring, and forecasting: watershed planning and monitoring;

Transboundary options for flood risk mitigation: pilot non-structural flood preparedness and emergency response activities, regional flood forecasting, warning and communication systems, regional data sharing on flood operation mechanisms, urban mapping of buildings and infrastructure; urban growth monitoring; regional WRM assessment on shared regional aquifers;

Investment planning and basin decision support systems: systematic information base and tools for water investments in systems contexts; identification of different types of infrastructure considered in the calculation of the water balance;

Institutional and community planning frameworks for addressing environmental and social issues: basin-wide planning, that is, capacity building and coordination of government institutions in decision making for the sustainable use and conservation of water resources; conservation of habitats and biodiversity.

Remote Sensing and the WB Portfolio (Water)

		Lending		Total (Lending)	AAA		Total (AAA)	Total (Lending & AAA)	Total (%)
Category	Sector	Primary	Secondary		Primary	Secondary			
1	Flood Protection	9	0	9	2	0	2	11	14%
2	General Water, Sanitation and Flood Protection	19	3	22	10	3	13	35	45%
3	Irrigation and Drainage	16	3	19	0	0	0	19	24%
4	Public Administration – Water, Sanitation and Flood Protection	4	0	4	0	0	0	**4**	5%
5	Renewable energy/Hydropower	3	0	3	0	0	0	**3**	4%
6	Wastewater and Sewerage	1	0	1	0	0	0	**1**	1%
7	Water Supply and Sanitation	2	1	3	1	0	1	**4**	5%
*	General Agriculture, Fishing and Forestry *	1	0	1	0	0	0	**1**	1%
	Total			**62**			**16**	**78**	100%

>80%

Zeroth-Order Questions

Guiding questions	Characteristic
Do you need to use EO data?	*Justification*
Can EO provide the required data products?	*Suitability*
What is the appropriate pixel size?	*Spatial resolution*
How frequent do these observations need to be?	*Temporal resolution*
How far back in time does your data record need to go?	*Record length*
Do you need guaranteed continuation of data supply into the future?	*Reliability*
What degree of accuracy is needed in the data products?	*Accuracy*
Do you want to use only data products that are commonly used?	*Maturity*

Specific Questions and Decision Tree

Questions to Address When Considering the Use of RS for Water-Related Issues:

Nature of the WRM problem

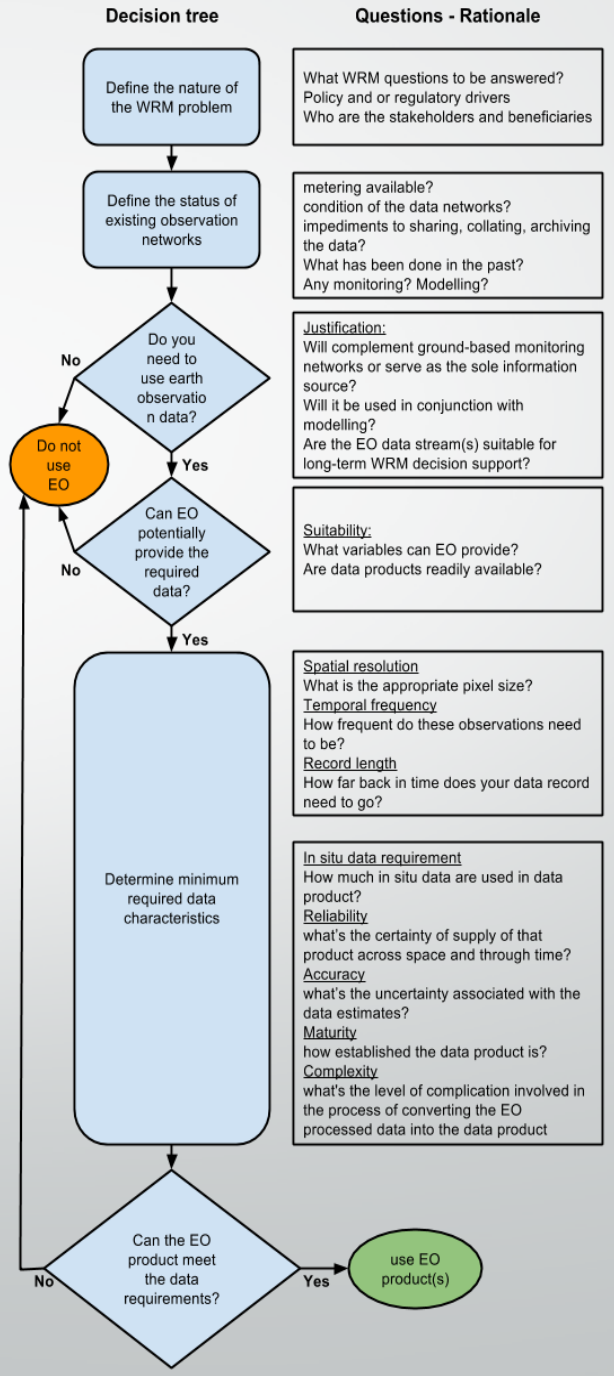
- What WRM questions need to be answered?
- What are the policy and or regulatory drivers of these questions?
- Who are the stakeholders and beneficiaries of a solution to the WRM problem?

Existing data and observation networks

- What metering is currently available?
- What is the condition of the data networks?
- Are there any impediments to sharing, collating, archiving the data (e.g., transboundary issues)?
- What, if anything, has been done in the past to address the issues at hand?
  - Any monitoring? Modeling?
- Can EO fill an information gap?
  - Will EO complement field monitoring networks or serve as the sole information source?
  - Will EO be used in conjunction with modeling?
  - Are the EO data stream(s) suitable for long-term WRM decision support?

Sustaining and maintaining WRM decision support and monitoring programs

- Is there capability to adopt a solution in the short and longer term?
- What are the key organizations nationally, and who the international experts, to partner with around EO?
- What is the local capability to adopt new techniques and technologies?
  - What computing infrastructure, if any, is needed? Is it available? If available, who owns it?
  - To what degree will local expertise require training in new techniques and technologies?
- What level of national versus international resourcing will be required?



Key applications: R2X

- Water balances: mapping and time histories of rainfall, ET, infiltration, and changes in soil moisture.
- Flood protection: mapping of flood depths and timing, relation of flooding to rainfall
- Irrigation: soil moisture mapping, irrigation allocation vs crops, support and monitoring towards smart agriculture systems
- Natural disaster prevention and mitigation: monitoring for early warning systems and support of adaptive action planning

Key element: include measures of "development impact" (economic and/or social impact)

Ongoing work

- World Bank: assessment of physical impacts of climate change on water resources worldwide: to be presented at COP21 (2015) and WEF-Davos (2016)

- Inter-American Development Bank: water-energy-food nexus, development of planning/modeling tools and case study applications

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT, AND THE INTERNATIONAL DEVELOPMENT ASSOCIATION (TOGETHER, THE WORLD BANK)

AND

THE GOVERNMENT OF THE UNITED STATES OF AMERICA

ON

COOPERATION RELATING TO WATER

FOR THE INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT, AND THE INTERNATIONAL DEVELOPMENT ASSOCIATION (TOGETHER, THE WORLD BANK):

THE WORLD BANK

Date: 03/22/11

FOR THE GOVERNMENT OF THE UNITED STATES OF AMERICA:

U.S. DEPARTMENT OF STATE

Date: 03/22/11

U.S. DEPARTMENT OF THE TREASURY

Date: March 18, 2011

MEMORANDUM OF UNDERSTANDING

between

THE INTER-AMERICAN DEVELOPMENT BANK

and

THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE

INTER-AMERICAN DEVELOPMENT BANK

Bernardo Guillamon
Manager
Office of Outreach and Partnerships

Date: MAY 12, 2014

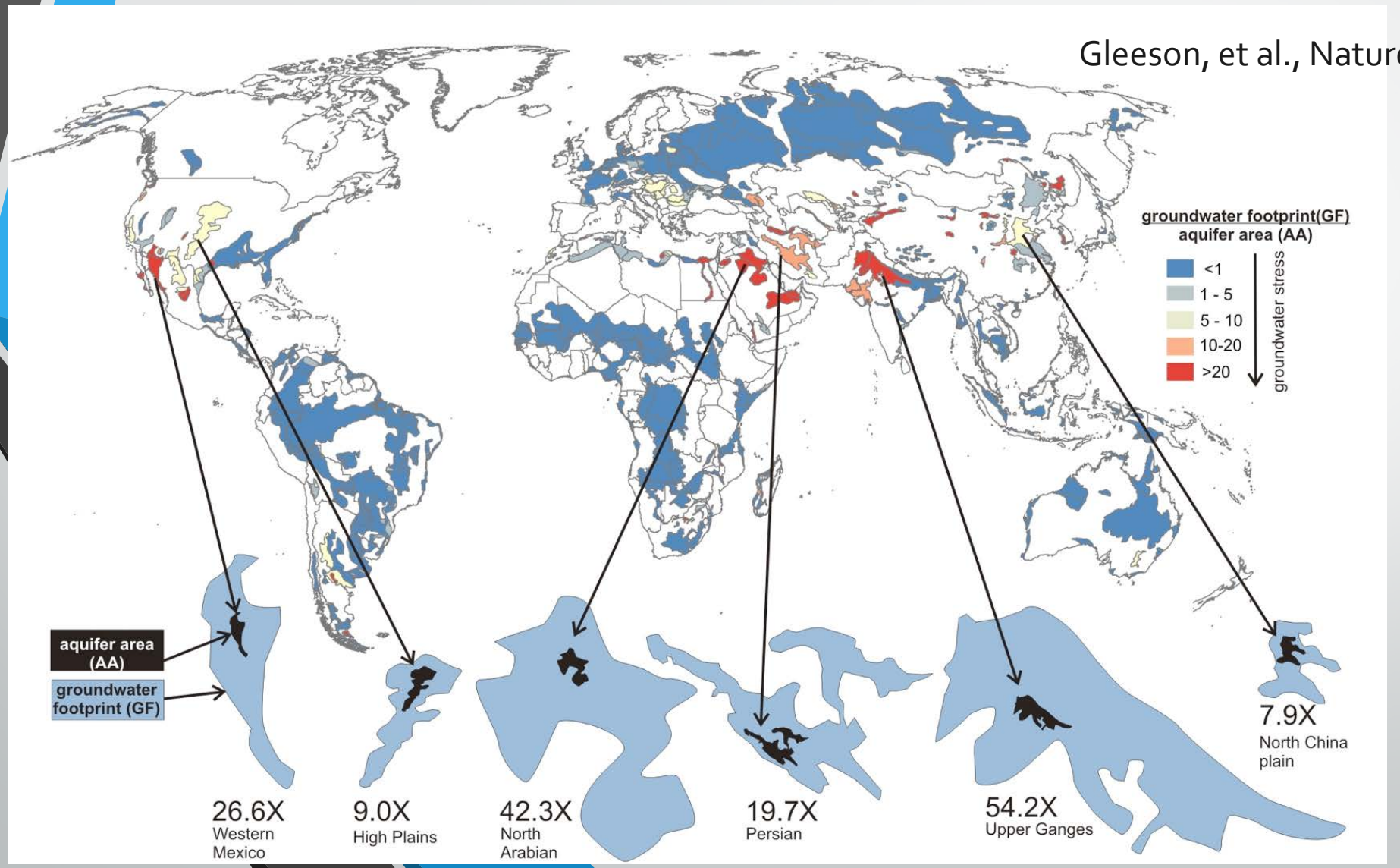
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE

Mary Kicza
Assistant Administrator
National Environmental Satellite, Data, and Information Service

Date: May 15, 2014

Groundwater footprint of major aquifers

Gleeson, et al., Nature, 2012.



Global groundwater footprint = 3.5 times the global area of productive aquifers