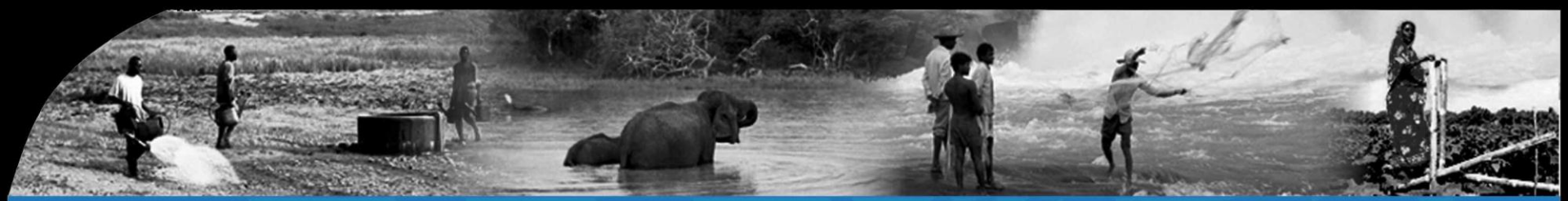

The role of river basin planning and development in climate change adaptation: Experience in Asia

Andrew Noble

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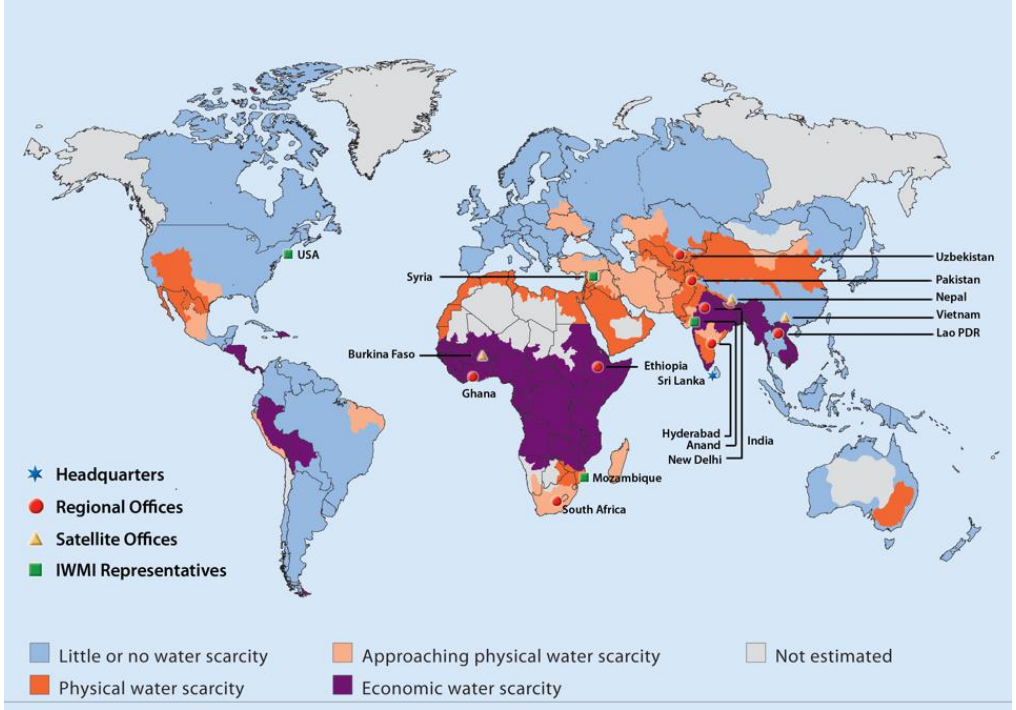
Vientiane, Lao PDR

Water resources: a defining issue for the 21st Century

- Water is vital to food security
- It is also becoming apparent it is the critical factor for overall economic development for most countries



How we plan and manage water resources at a basin level will determine whether we meet future demand

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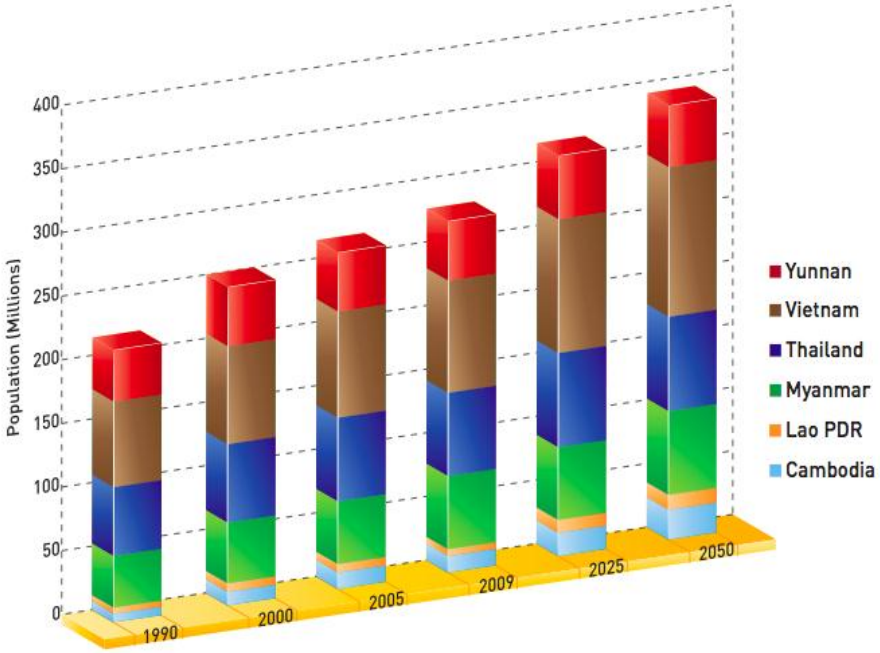
Contents of presentation

- What do we know about the **consequences** of climate change: the Mekong Basin?
- What are the **options** in basin planning and development?
  - Stage of evolution of the water sector in the basin.
  - Water balance approach.
  - Water storage options – groundwater and MAR.
- How do we make **IWRM** work at a range of scales?
- Data is critical in any planning exercise – a challenge for most basin?
- Concluding remarks.

1. Drivers of water demand within the Mekong Basin: Critical in basin planning

- The **major drivers** are:
  - *Population growth*
  - *Dietary change*
  - *Urbanisation (mega-cities)*
  - *Globalisation*
  - *Biofuel production*
  - *Climate Change*

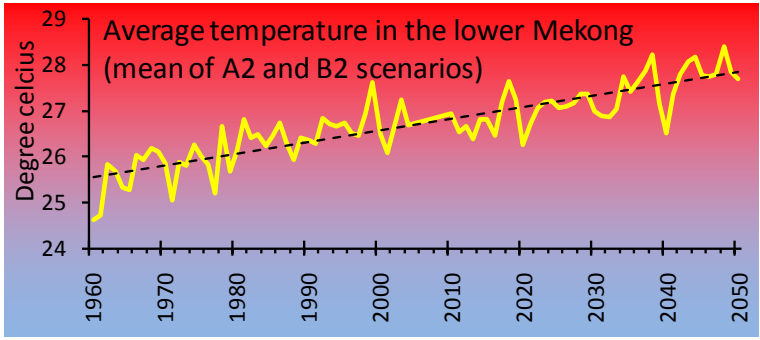
The significance of these drivers varies in time and space.

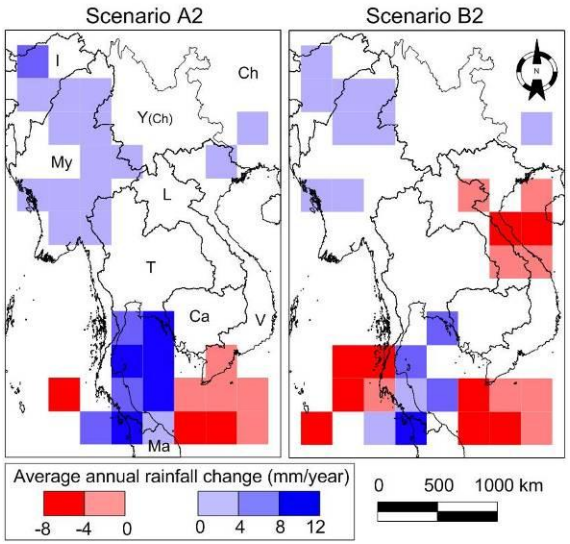


Population growth across the Greater Mekong Subregion
Source: FAOSTAT, 2009, World Gazetteer, 2009.
Note: Yunnan figures calculated from total population for China and apportioned using the Yunnan population from 2009

1. Climate change 1960 to 2050 in the GMS

- *Analyses based on downscaled ECHAM4 climate model data*
- Temperature increase of 0.02 - 0.03°C per year
- **No significant change in annual rainfall across most of the region**
- Some seasonal shift in rainfall, with drier dry seasons, and shorter, more intense wet season
- Greater probability of extreme events
- Sea level rise of 50-60 cm (1960-2050)
- Impact on flows and water availability *highly uncertain* but estimated of order of 0-20% increase in annual flows.





Variability will be key to planning

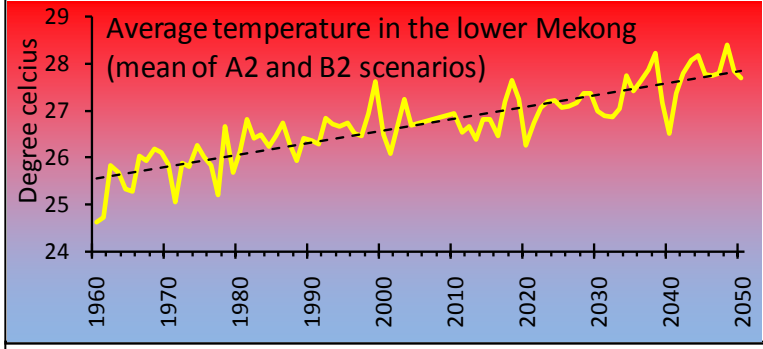
1. Understanding variability

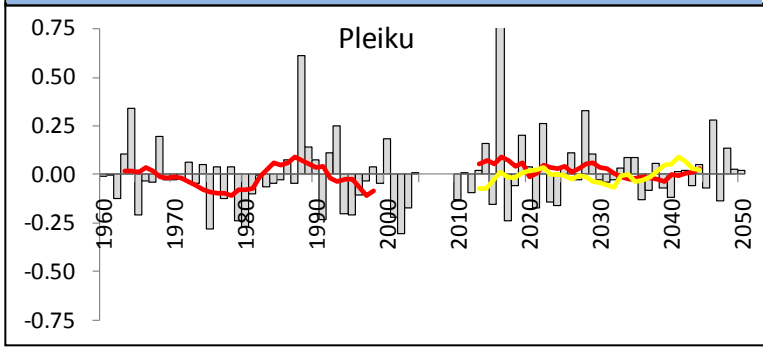
- Variability vs trends
- Step changes – alternative (un)stable states

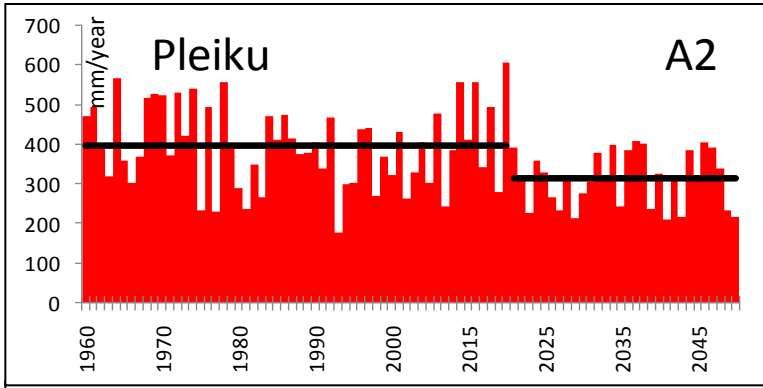
vs

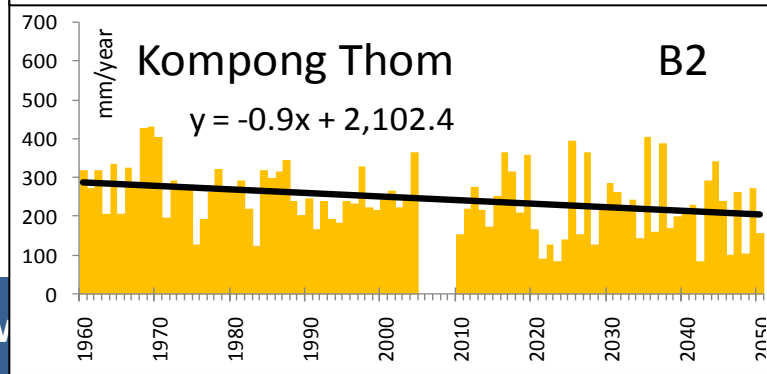
- Gradual shifting of the envelope
- Stationarity is dead – the past no longer predicts the future (hydrology / climate) *Milly et al 2009*

Need to rethink planning at the basin level – Storage!



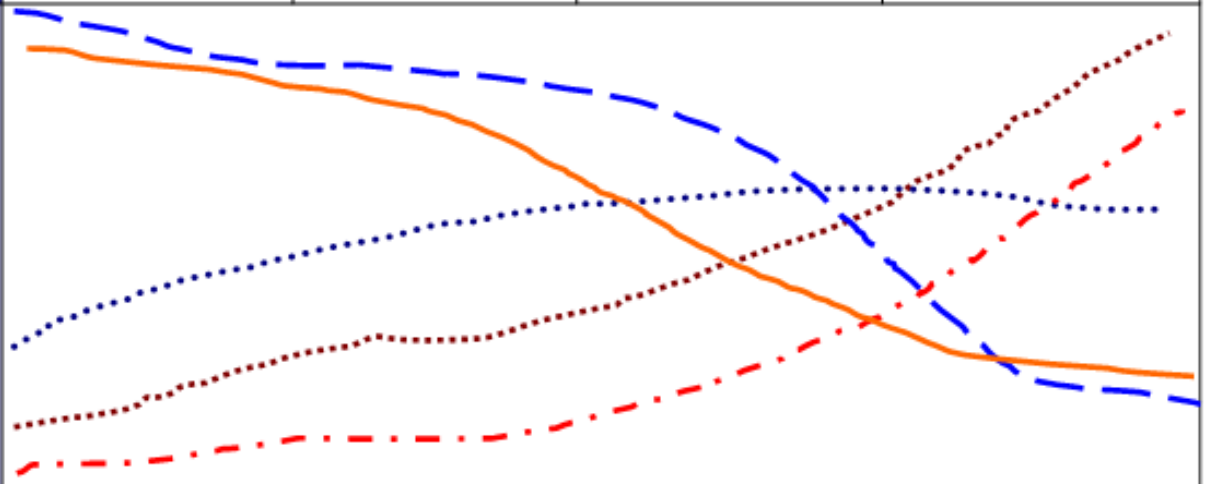






2. Transformation of informal water economies in response to overall economic growth: Basis for planning at the basin level.

	Stage I: Completely Informal	Stage II: Largely Informal	Stage III: Formalizing	Stage IV: Highly Formal Water Industry
% of water users in the formal sector	<5%	5-35%	35-75%	75-95%
Examples	Sub-Saharan Africa	India, Pakistan, Bangladesh	Mexico, Thailand, Turkey, Eastern China	USA, Canada, Western Europe, Australia
Dominant mode of water service provision	Self-supply and informal mutual-help community institutions	Partial Public Provisioning but self-supply dominates	Private-public provisioning; attempts to improve service and manage the resource	Rise of modern water industry; High Intermediation; self-supply disappears
Concerns of the Governments	Infrastructure creation in Welfare Mode	Infrastructure and Water services, especially in Urban areas	Infrastructure and service in towns and villages; Cost recovery; Resource protection	Integrated mgt. of water infrastructure, service and resource; Resource protection
Institutional Arrangements	Self-help; mutual help and feudal institutions dominate	Informal Markets; Mutual help and community management institutions	Organized service providers; self-supply declines; informal institutions decline in significance	Self-supply disappears; all users get served by modern water industry.



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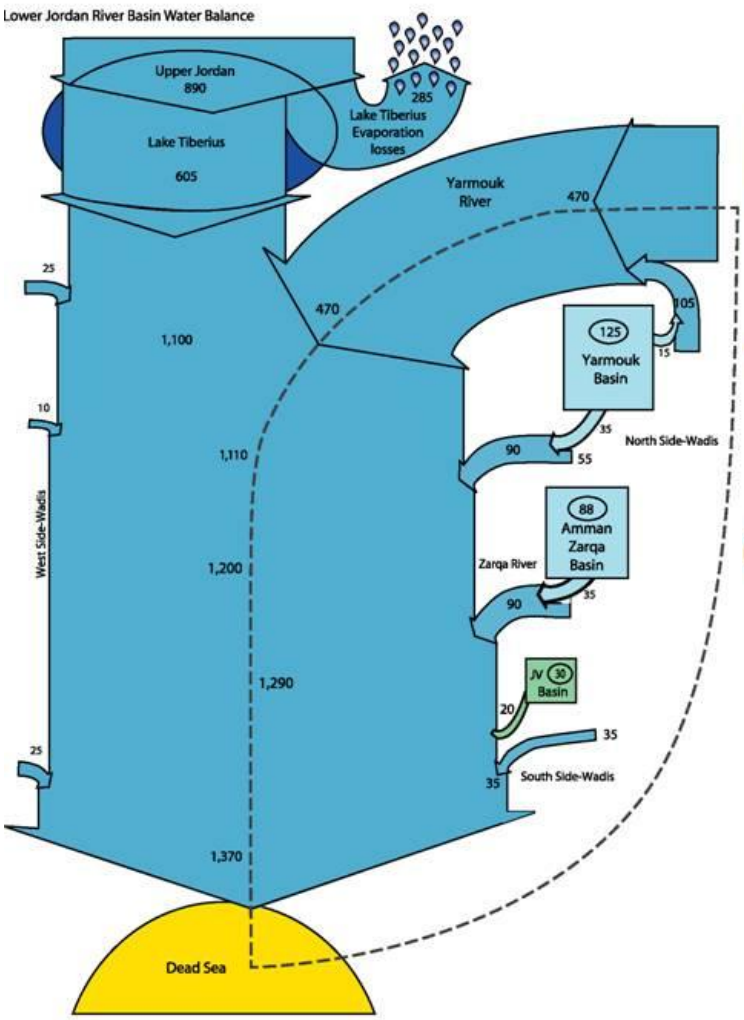
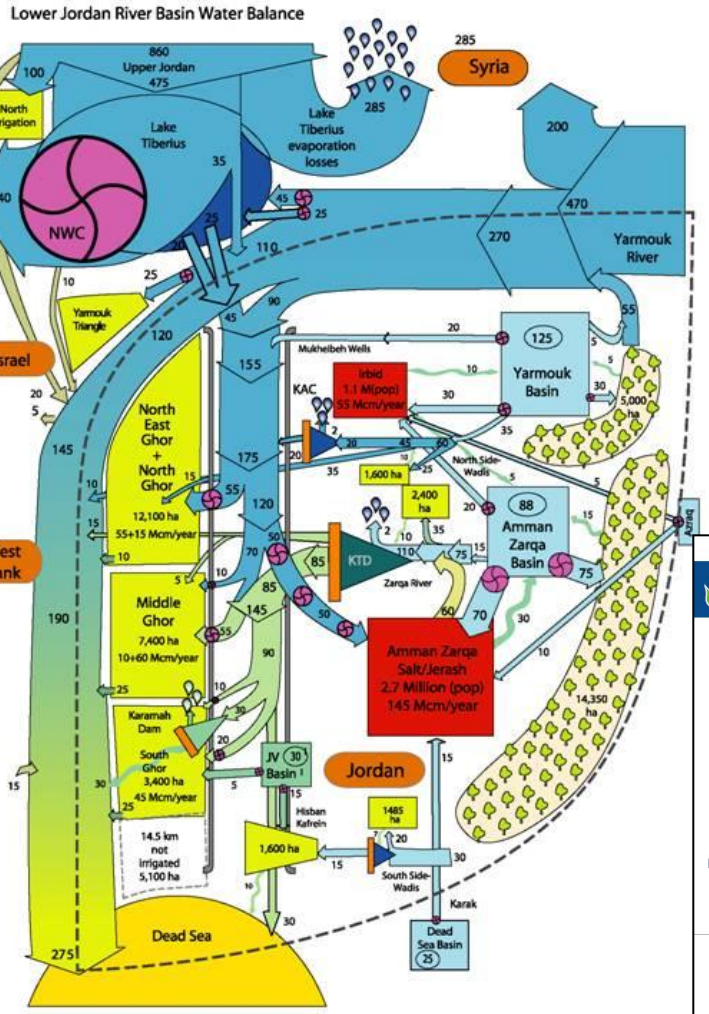
Developing countries are transitioning between informal and formal water economies

"Cookbook-style replication of successful models from developed and formal economies is unlikely to work in the largely informal, developing country water economies. Such mindless replication, besides being ineffective, diverts policy attention and scarce public resources away from the real issues."

(IWMI *Water Policy Briefing* No 24, 2007)

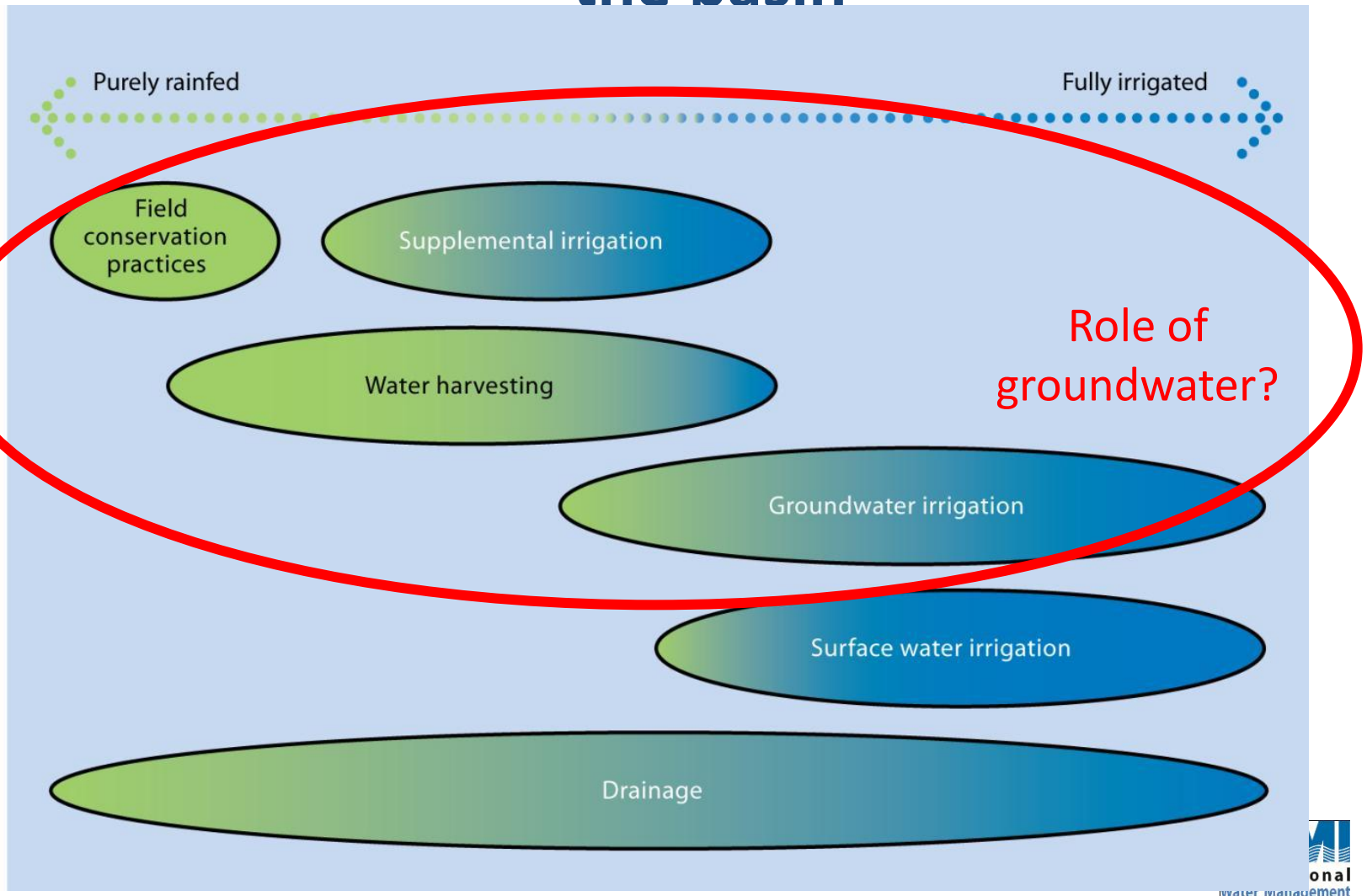
2. Lower Jordan River: Original Hydrology and year 2000





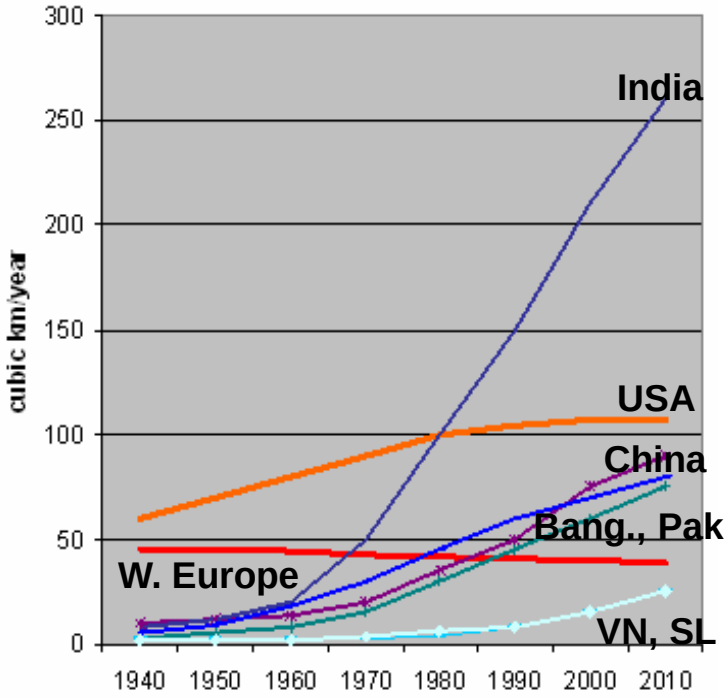
Source: Courcier, Venot & Molle 2006 (CA RR 9)

Need to re-think storage in the context of the basin



2. EVALUATING CC ADAPTATION OPTIONS – the case of groundwater in India

Groundwater use in Asia



CC and water storage alternatives

Measurable criteria	Small Surface Storage	Large Dams	Managed Aquifers
Water where needed	3	2	5
Water when needed	1	2	5
Level of water control	1	2	5
Non-beneficial losses –e.g. evaporation	-4	-2	-1
Protection against a single annual drought	1	2	5
Protection against successive droughts	-1	1	4
Ease of recovery during monsoon	5	4	3
Other			

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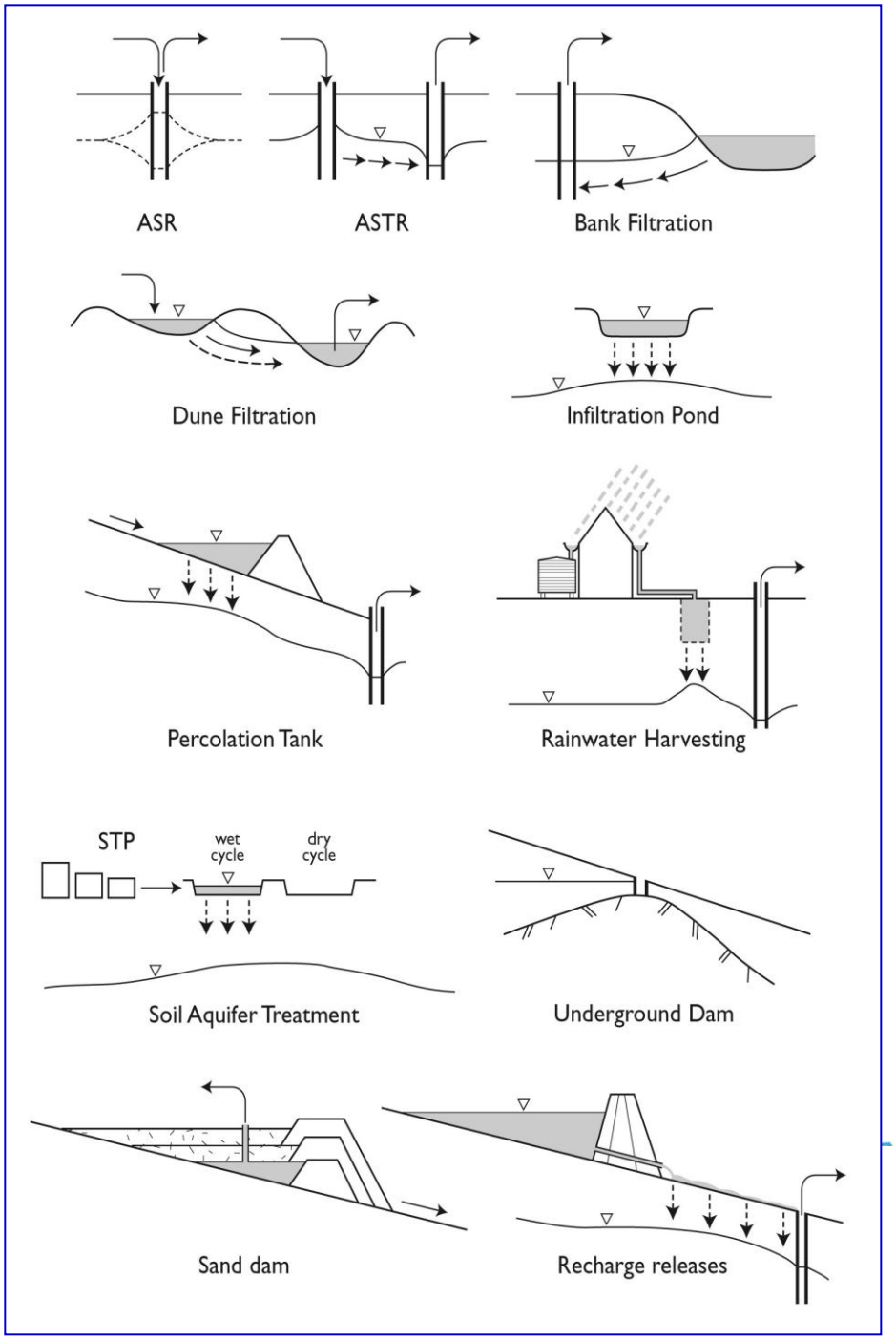
2. Methods to store and recover water via Managed Aquifer Recharge (MAR)

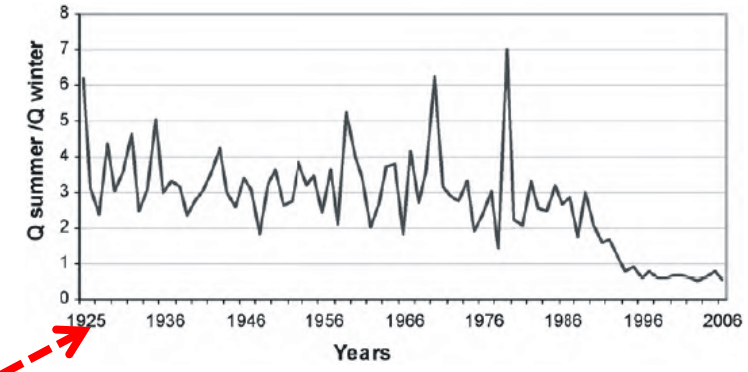
" A process of replenishment of ground water reservoir by human activities in a planned manner – by spreading basins, trenches, wells etc. for replenishing the aquifer "



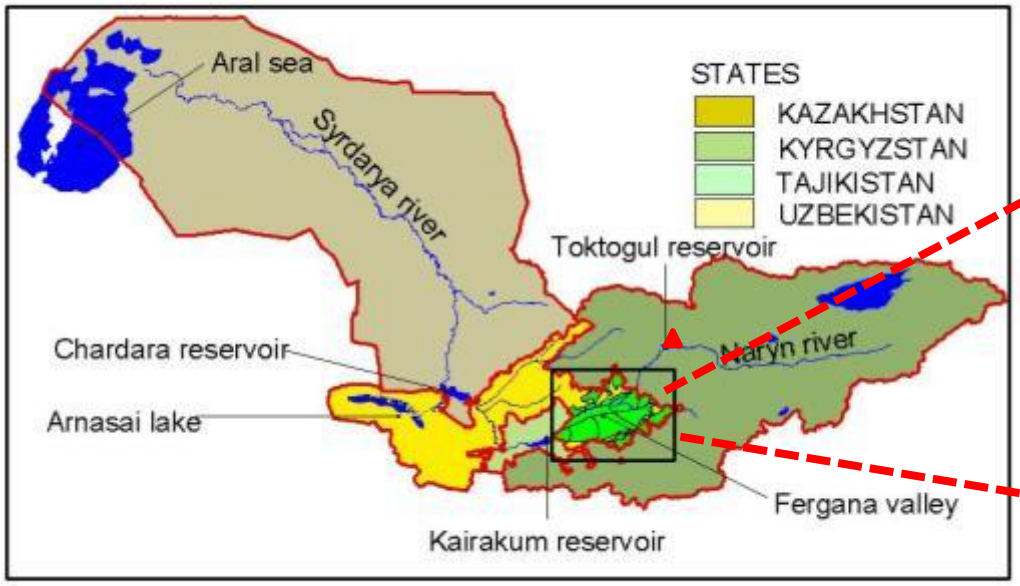
Source: Dillon, (2005)

2. The role of MAR in IWRM - Syrdarya River Basin, Central Asia

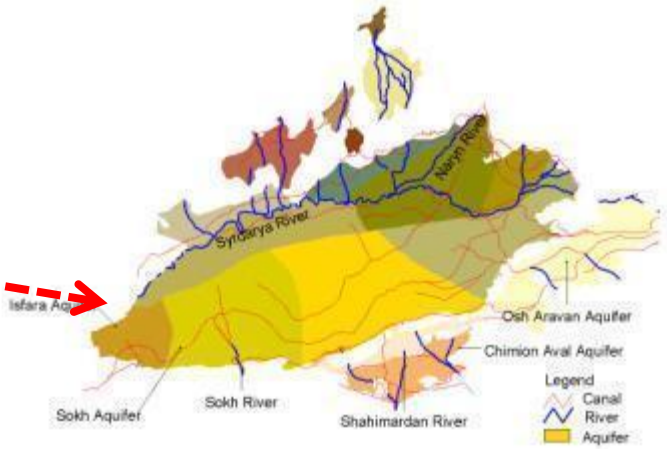
Ratio of summer to winter flow



Syrdarya River Basin



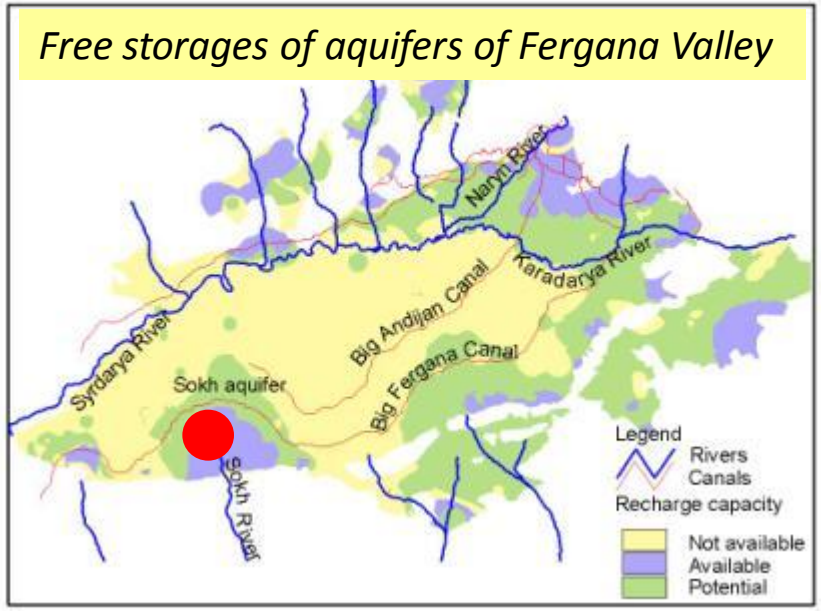
Irrigation & Hydropower Nexus



Fergana Valley Aquifers

Source: A Karimov, IWMI

2. Potential of aquifers of Fergana Valley as storage and source of water



Enhancing natural recharge from river floodplain in Sokh River Basin

3. Integrated Water Resources Management

GWP:

"Integrated water resources management 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."

Lofty ideals, but how do we make it work?

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3. The Challenge

- How can we think at basin level and act locally?
- What do we need to do to ensure water resources management is mainstreamed in economies?
- IWRM is enshrined in law in many jurisdictions but how can we turn rhetoric into good practice?

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3. How do we put the IWRM concept into practice in basin planning and development?

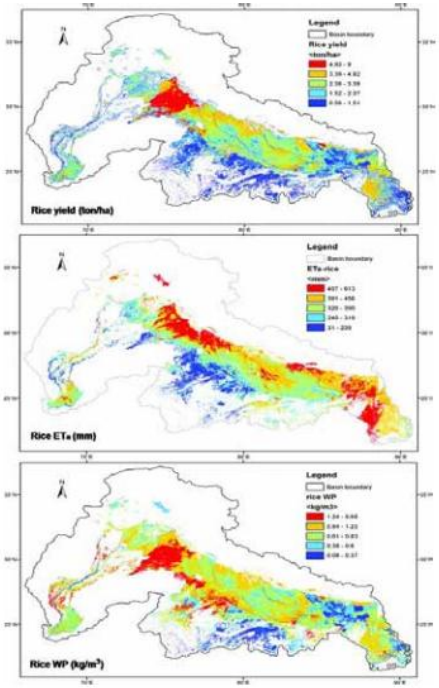
- Context is critical
- We need to consider the state of knowledge and information at local and national levels
- We have to know how water supply and demand change at national and international levels



4. Data is the key to evidence-based management

Good data and **information** are critical to:

- Basin water allocation processes (policy)
- Determining **environmental flow** needs
- Assessing water contamination and salinity
- Determining sustainable groundwater yields
- Negotiation of trans-boundary issues
- Scenario modeling at basin level – may not be



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4. So where do we start?

- Water data: If you can't measure it, you can't manage it
- Often data is available at national level
- Local information is much sketchier
- But ultimately …

"Good data is the key to good decision-making"

5. Concluding remarks

Planning for climate change at the basin level will require:

- Plan for uncertainty within the context of a large number of change drivers.
- Basin level storage to meet demand will be critical – diversity in storage is required.
- Data is critical in the planning and decision making process – flexibility will be paramount.

Thank you

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