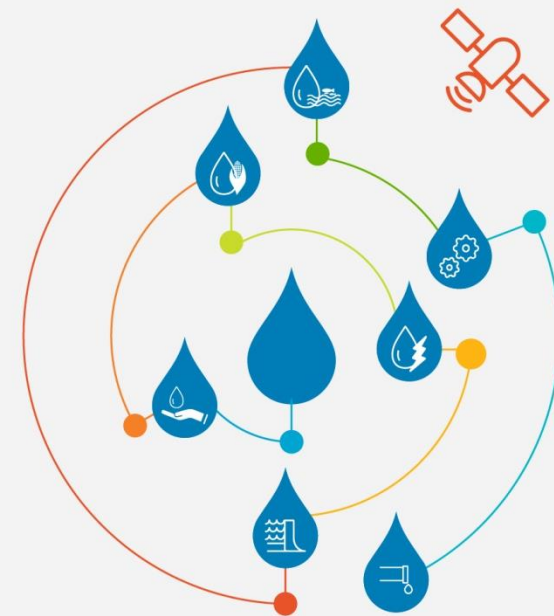


Water Accounting in Asia: From Governmental Statistics to Spatially Discrete and Absolute Water Resources Information



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IHE-Delft

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With inputs from Elga Salvadore, Bert Coerver and Claire Michailovsky

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Problem description

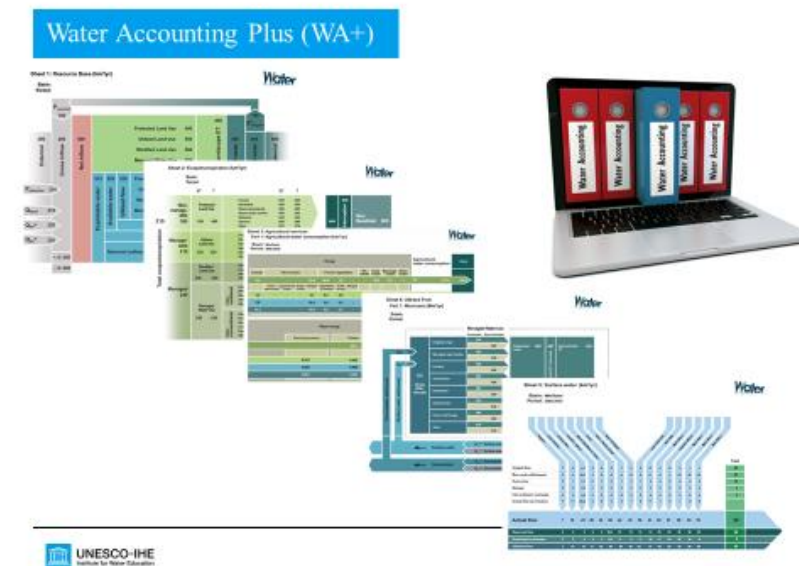


- Water scarcity and data scarcity occur simultaneously
- Databases are not shared
- Most water resources information are based on statistical data (no geospatial component)
- River basin profiles are not-standard and often based on planning data
- Poor longer term planning as a consequence
- Poor common understanding on water resources conditions between ADB and Governments of recipient countries

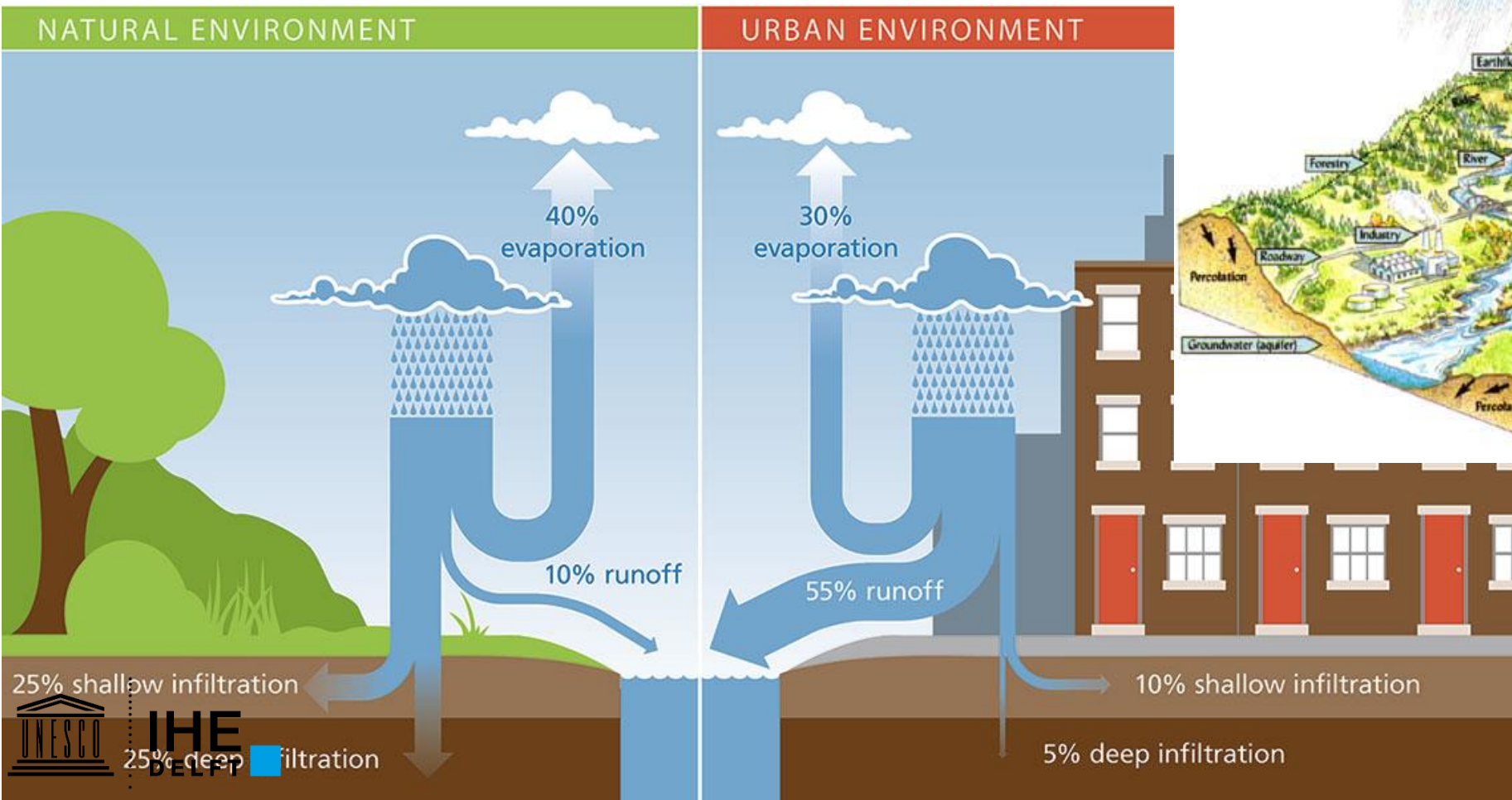


Water Accounting Plus (www.wateraccounting.org)

- Water withdrawals, fluxes, consumption and return flows
- Utilizable water, utilized water and non-utilizable water
- Beneficial and non-beneficial water consumption
- Food security and ecosystem services
- Natural and manmade withdrawals
- Longer term sustainability and healthy rivers



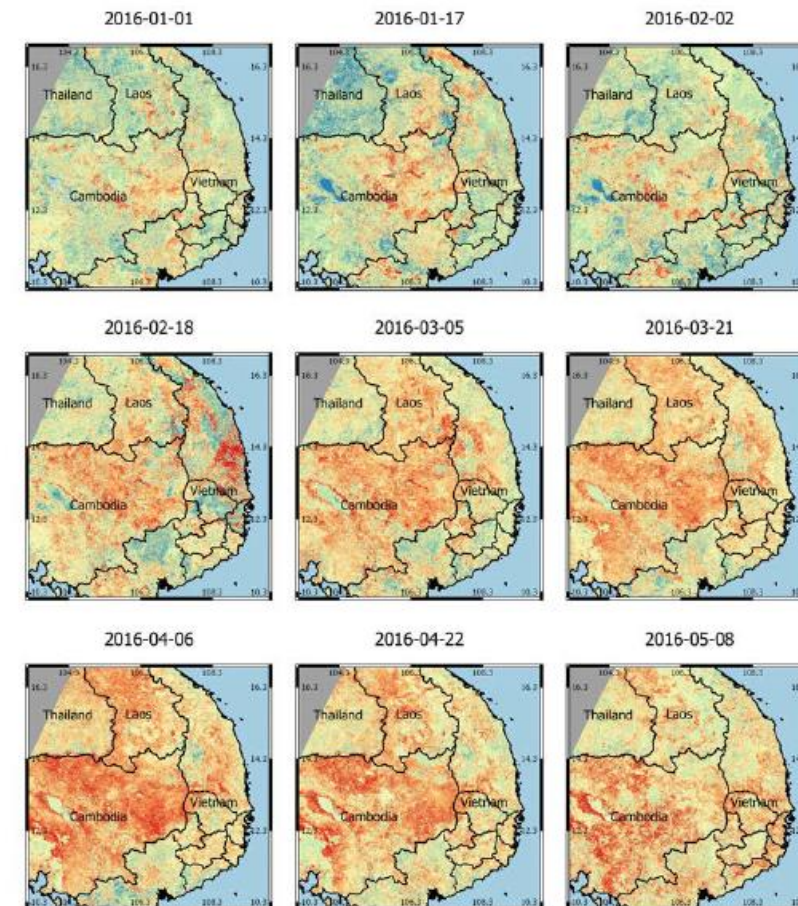
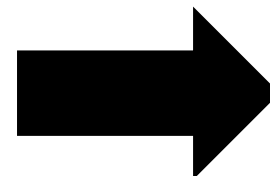
Linking water and land use in a river basin context



From statistical to geographic data

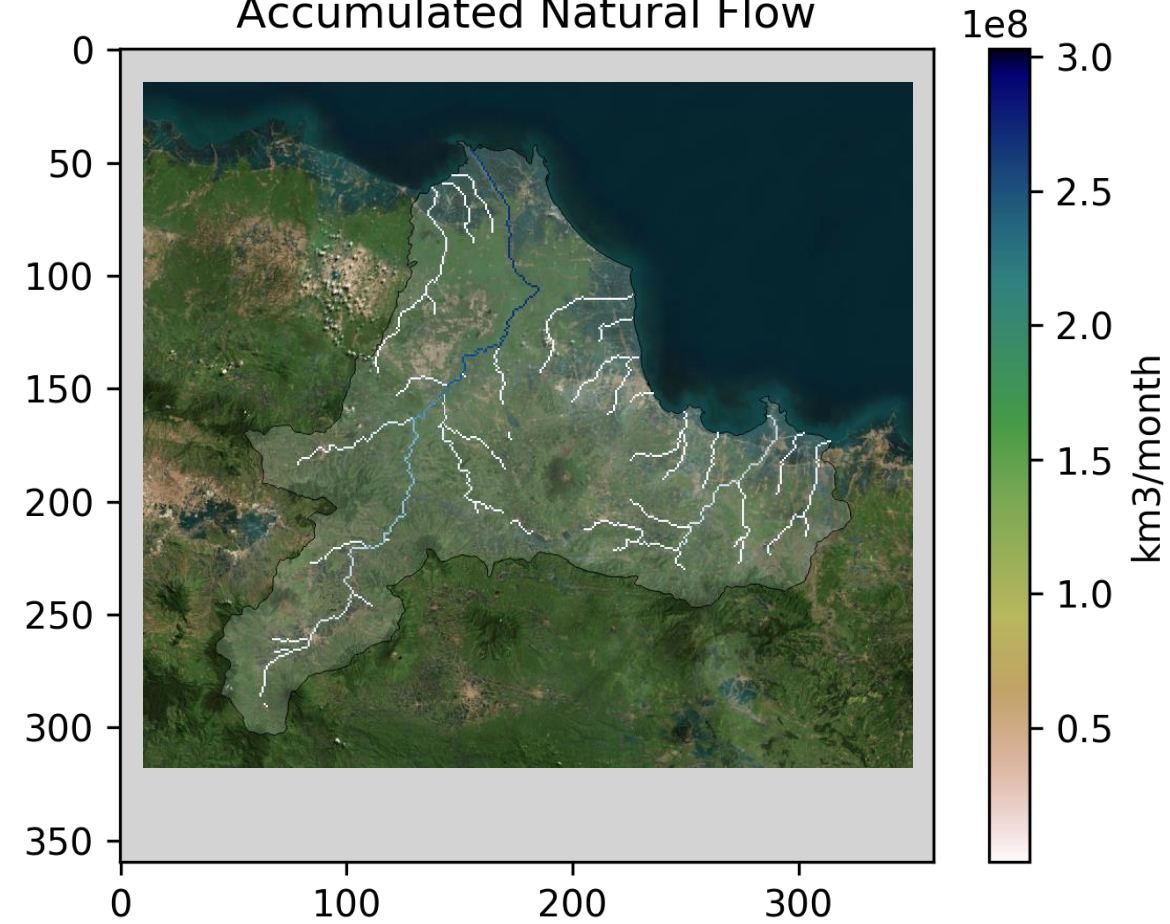
Water withdrawal by sector, around 2010

Continent Regions	Subregions	Total withdrawal by sector						Total water withdrawal *	Total freshwater withdrawal	Freshwater withdrawal as % of IRWR
		Municipal		Industrial		Agricultural				
		km³/year	%	km³/year	%	km³/year	%			
World		464	12	768	19	2 769	69	4 001	3 853	9
Africa		33	15	9	4	184	81	227	220	6
Northern Africa		14	13	3	3	89	84	106	101	215
Sub-Saharan Africa		19	16	6	5	96	79	121	119	3
	Sudano Sahelian	2.1	5	0.6	1	40.2	94	42.8	42.8	26.8
	Gulf of Guinea	6.5	39	2.6	16	7.4	45	16.5	16.5	1.7
	Central Africa	1.3	45	0.5	19	1.0	36	2.8	2.8	0.1
	Eastern Africa	3.0	15	0.3	1	16.8	84	20.1	20.1	7.0
	Southern Africa	5.5	22	2.1	9	16.9	69	24.6	23.0	8.5
	Indian Ocean Islands	0.6	4	0.2	1	13.5	94	14.3	14.3	4.2
Americas		123	14	321	37	415	48	859	855	4
Northern America		79	13	289	47	241	40	610	605	10
	Northern America	68.0	13	281.5	53	179.8	34	529.3	526.0	9.3
	Mexico	11.4	14	7.3	9	61.6	77	80.3	79.5	19.4
Central America and Caribbean		8	23	6	18	20	59	33	33	5
	Central America	3.3	27	1.3	11	7.5	62	12.1	12.1	1.9
	Caribbean-Greater Antilles	4.0	19	4.6	22	12.0	58	20.5	20.5	22.2
	Caribbean-Lesser Antilles and Bahamas	0.4	60	0.1	23	0.1	18	0.6	0.5	9.7
Southern America		36	17	26	12	154	71	216	216	2
	Guyana	0.1	5	0.2	8	1.8	87	2.1	2.1	0.6
	Andean	10.9	18	3.9	7	45.2	75	60.1	60.0	1.1
	Brazil	17.2	23	12.7	17	44.9	60	74.8	74.8	1.3
	Southern America	7.9	10	9.0	11	62.4	79	79.3	79.1	5.7

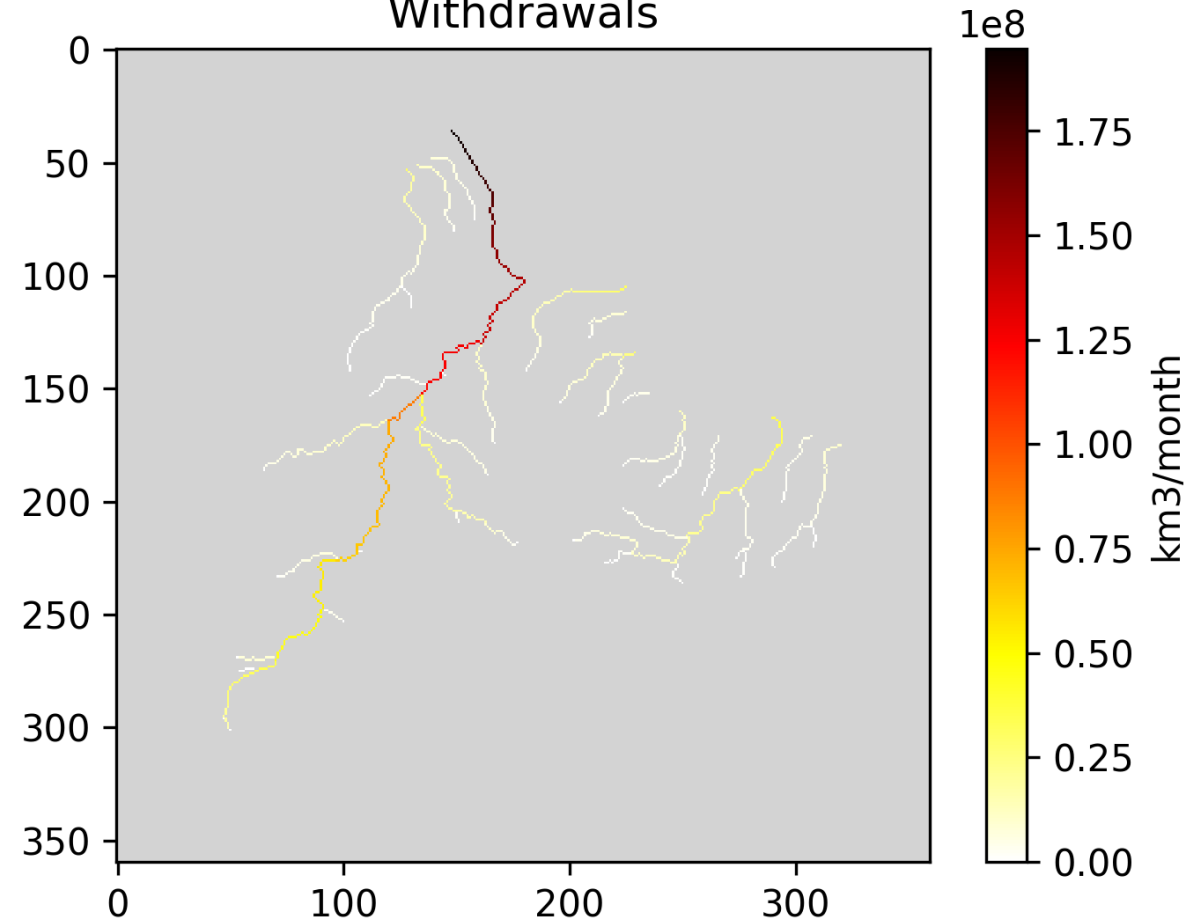


Local water availability and withdrawal data

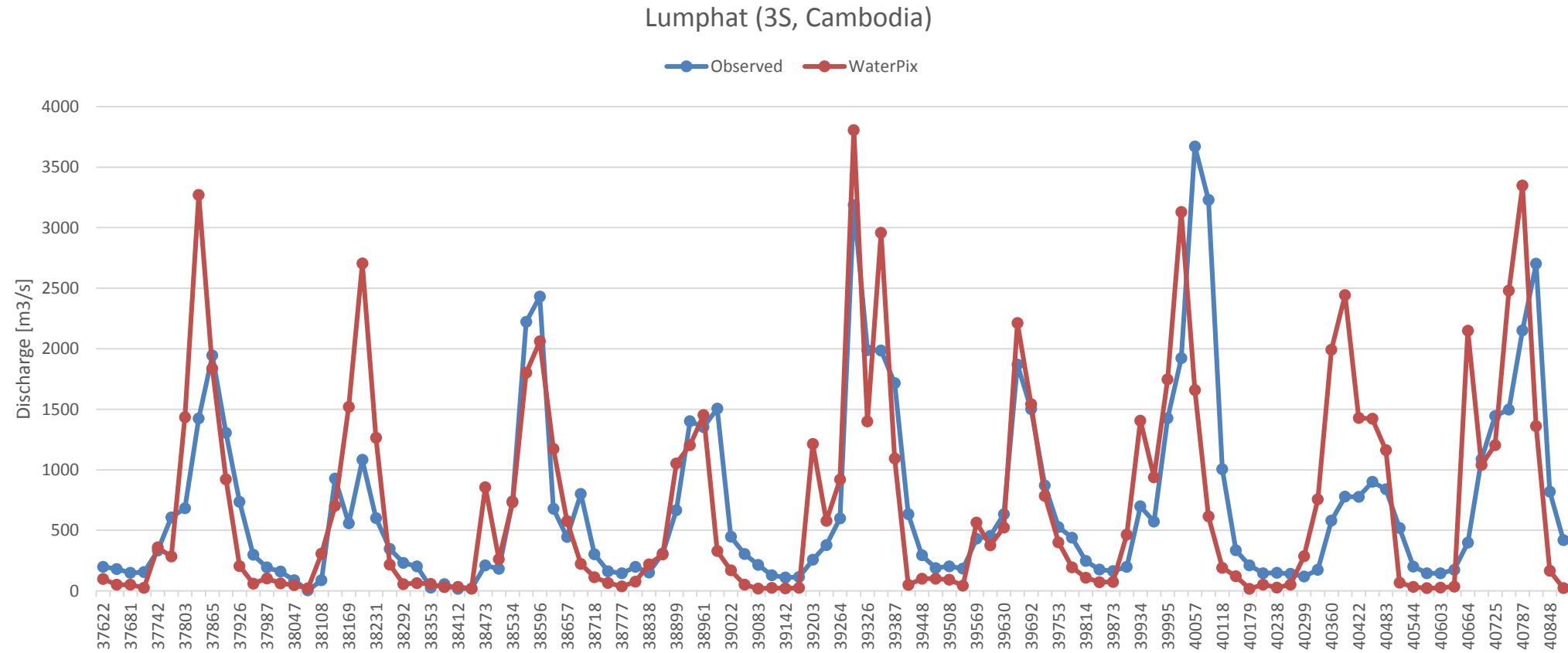
Accumulated Natural Flow



Withdrawals



Validation in Cambodia



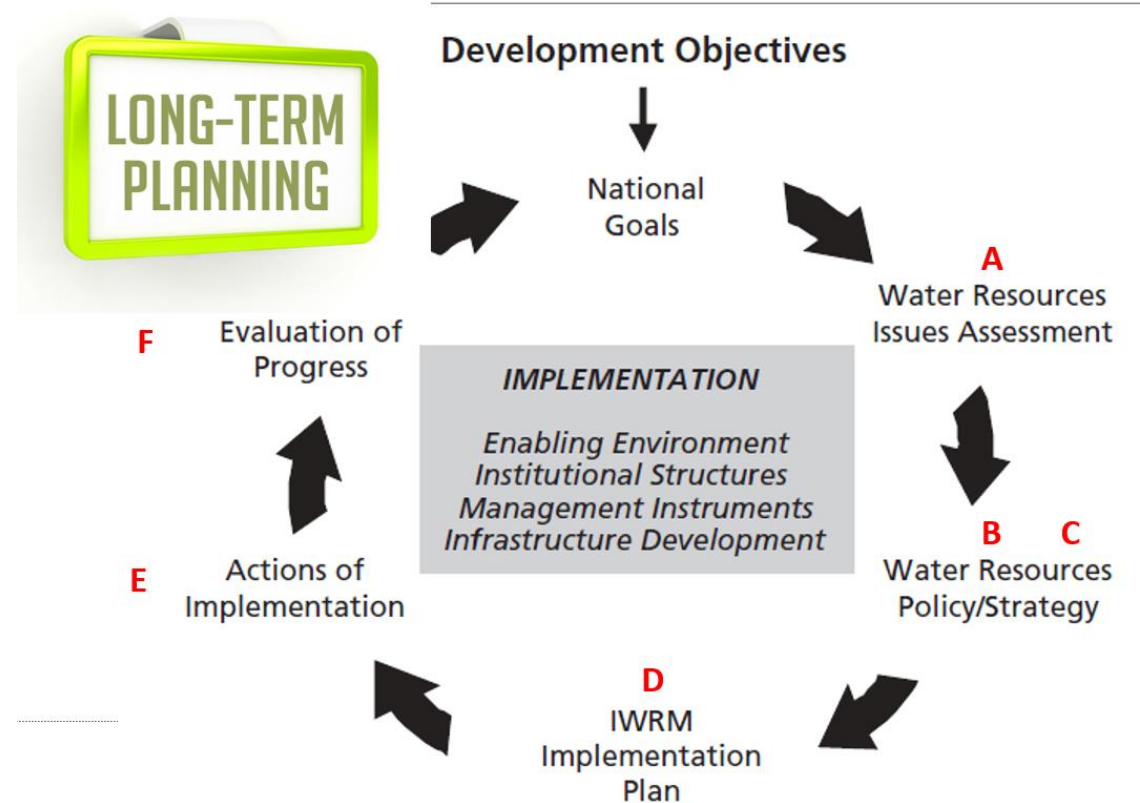
WA+ information usable for Design & Monitoring Framework (DMF)

- Vegetation and crop intensity
- Land degradation and desertification
- Cropland
- Irrigated area
- Irrigation intensity
- Water availability
- Water withdrawals
- Water consumption
- Irrigation efficiency
- Water scarcity
- Equity in irrigation water distribution
- Reliability of irrigation water distribution
- Crop yield
- Water productivity (water use efficiency)
- Climate vulnerability



How to use Water Accounting information ?

- River basin profiles
- Water allocation plans
- Transboundary disputes
- Resilience to climate change
- Take away erroneous perceptions
- More transparent decision making



Key findings

- Kundalia irrigation project (Madhya Pradesh) had 145,000 ha more irrigation than according to official statistics
- Sustainable expansion of irrigated areas based on available water resources in dry years is now feasible (Cambodia, Indonesia, Sri Lanka, India)
- Determination of “left-over” utilizable flows from the wet season or wet areas in Sri Lanka and Indonesia to plan water storages
- More insights in dependency of external water resources (Vietnam, Cambodia)
- Maharashtra is getting wetter, mainly due to increased rainfall
- Environments (forests) should become part of water allocation plans
- Knowledge on local water availability statistics
- Irrigation modernization can be prioritized

Way forward

- Building Water Accounting online tool that is easy to use for all catchments requiring attention or investments; not only operated by scientists
- Governments together with ADB implementing WA+ information in longer term investments (irrigation, dams, drainage canals, wetland protection) and local watershed management solutions (water harvesting, recharge, retention)
- Study drought impact on the basis of WA+ as a standard water resources reporting tool
- Emphasize training more on data interpretation and policy making
- ADB staff and international consultants being confident to use WA+ and explain opportunities and limitations to clients