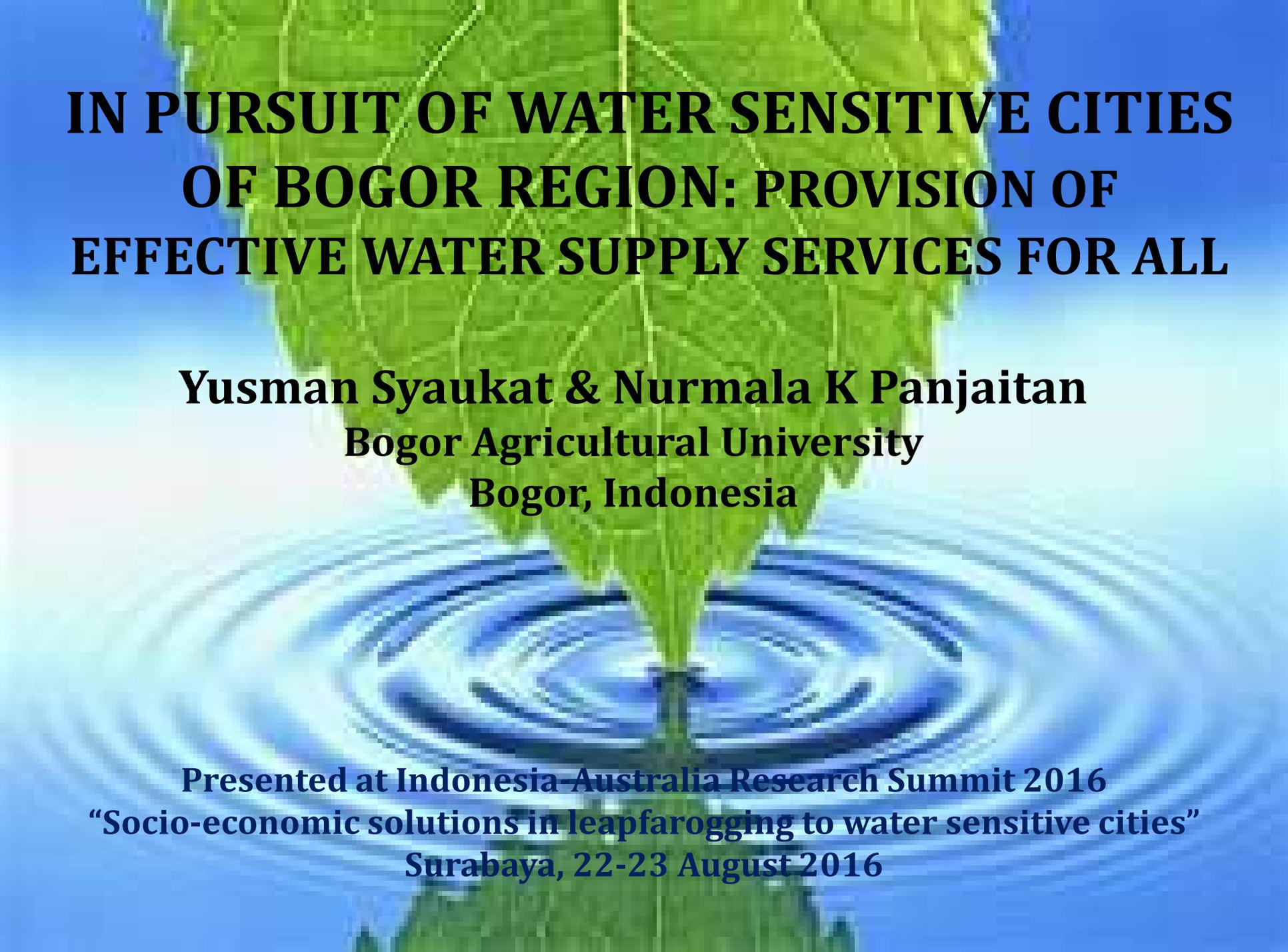


*Life
Begins
— With —
Clean
Water*

A black t-shirt with a white cursive graphic. The text reads "Life Begins With Clean Water". The word "With" is smaller and positioned between two horizontal lines. The graphic is decorated with small white clouds and blue water droplets.



**IN PURSUIT OF WATER SENSITIVE CITIES
OF BOGOR REGION: PROVISION OF
EFFECTIVE WATER SUPPLY SERVICES FOR ALL**

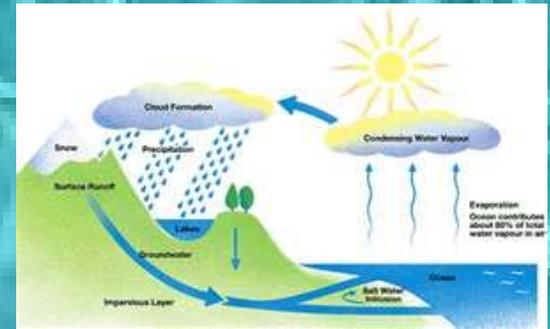
**Yusman Syaukat & Nurmala K Panjaitan
Bogor Agricultural University
Bogor, Indonesia**

**Presented at Indonesia-Australia Research Summit 2016
“Socio-economic solutions in leapfrogging to water sensitive cities”
Surabaya, 22-23 August 2016**

Outline of Presentation

- 1) Water Resources of Indonesia
- 2) Water Issues and Problems
- 3) Water Utilities in Indonesia and their Performance
- 4) Reasons for Sustainable Urban Water Cities
- 5) Sustainable Urban Water Cities
- 6) Research Objectives
- 7) Delineation of Research Activities

Water Resources of Indonesia



- With 2,700 mm/year of rainfall, Indonesia is endowed with plenty of water
- Potential of Renewable Water is **2,287** km³/year (**FAO, 2010**)
 - Surface water 1,829.61 km³/year (80%)
 - Groundwater 457.42 km³/year (20%)
- Water Withdrawal by Sector and Sources is **113.29** km³ in 2000
- Surplus of water...

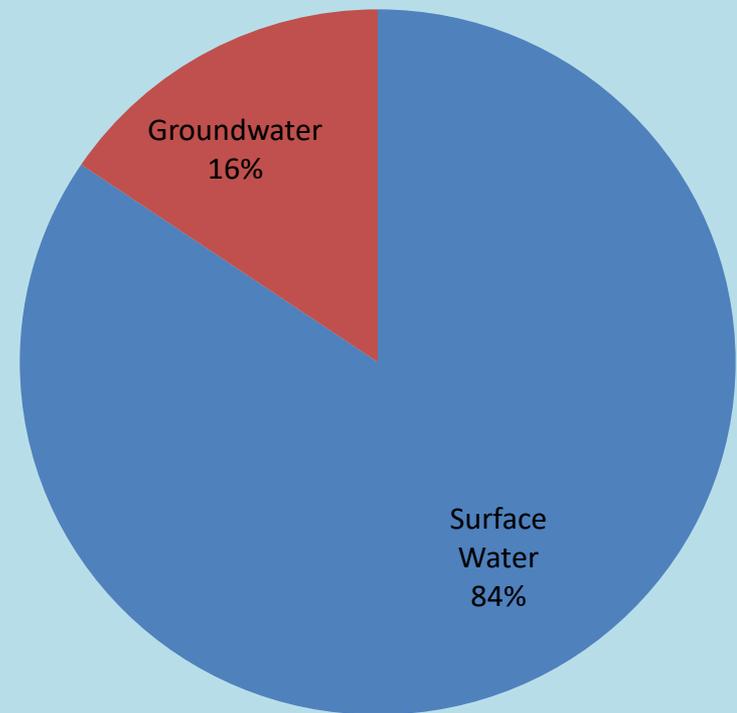
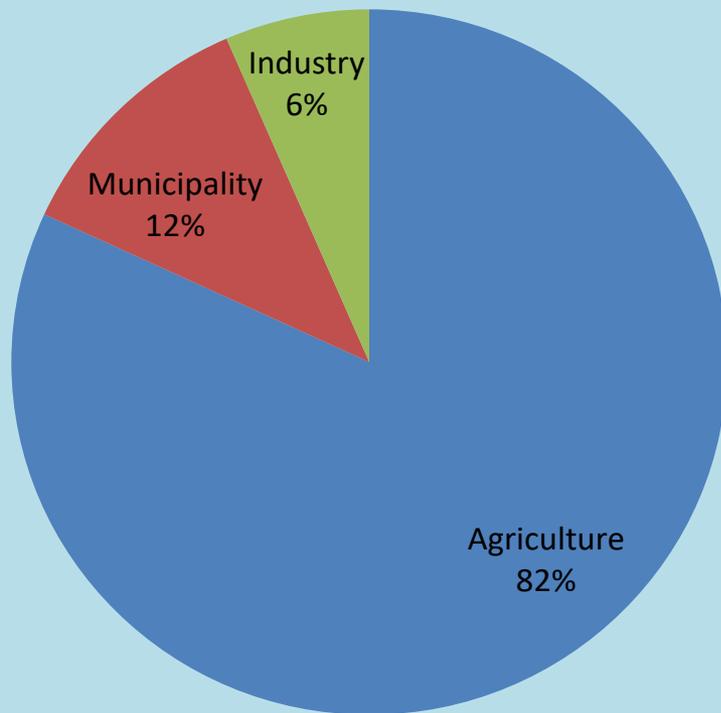
Table 1. Potential Surface and Ground Water, and Total Population by Island

Island	Potential Water in 2000 (%)*			Total Population **
	Surface Water	Groundwater	Total	
Sumatera	24.6	18.8	23.4	21.3
Java	6.4	5.6	6.3	57.5
Bali and Nusa Tenggara	2.0	0.3	1.7	5.5
Kalimantan	30.4	27.3	29.8	5.8
Sulawesi	9.4	3.6	8.3	7.3
Maluku	3.4	1.3	3.0	1.1
Papua	23.8	43.1	27.6	1.5
Total	100.0	100.0	100.0	100.0
Total Values (Km3/year)	1,829.61	457.42	2,287.04	237,661,327

Source: * FAO (2010), ** BPS (2011) – Year 2010

Water Withdrawal by Sector and Sources

Total **113.29 km³** in 2000



Source: FAO (2010)

Table 2. Total Water Availability, Withdrawal, and Balance of Indonesia, 2000 (km³/year)

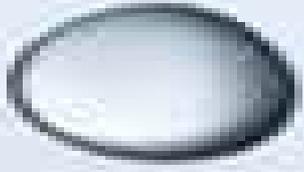
Island	Availability	Withdrawal	Balance
Sumatera	475.61	19.80	455.81
Java	125.61	64.84	60.77
Bali and Nusa Tenggara	37.06	6.53	30.53
Kalimantan	594.22	5.18	589.05
Sulawesi	177.06	16.29	160.77
Maluku	63.54	0.27	63.28
Papua	493.74	0.39	493.34
Total	1,966.84	113.29	1,853.55

Source: FAO (2010)

Water Issues & Problems



- In LDC: provision of clean water to the all population is important goals of public services.
 - Development of urban water supply, storm water and wastewater infrastructures have been considered as in isolation.
 - Planning, construction and management of each infrastructure are conducted autonomously, by different organizations.
 - Urban population in many areas of developing countries lack good-quality water and fall ill due to waterborne illnesses
 - Urban piped water service coverage is very low
 - Institutional arrangements governing water resources: weak
 - Over exploitation of groundwater resources
 - Inadequate Social & environmental considerations
 - Quantity & quality issue
 - Seasonal water characteristics and **climate change**
 - Postpone in water infrastructure development due to funding problems
 - Water pricing dilemma: a consequent of water as an economic good
- ➔ These lead to **WATER CRISIS**



Water Use & Management

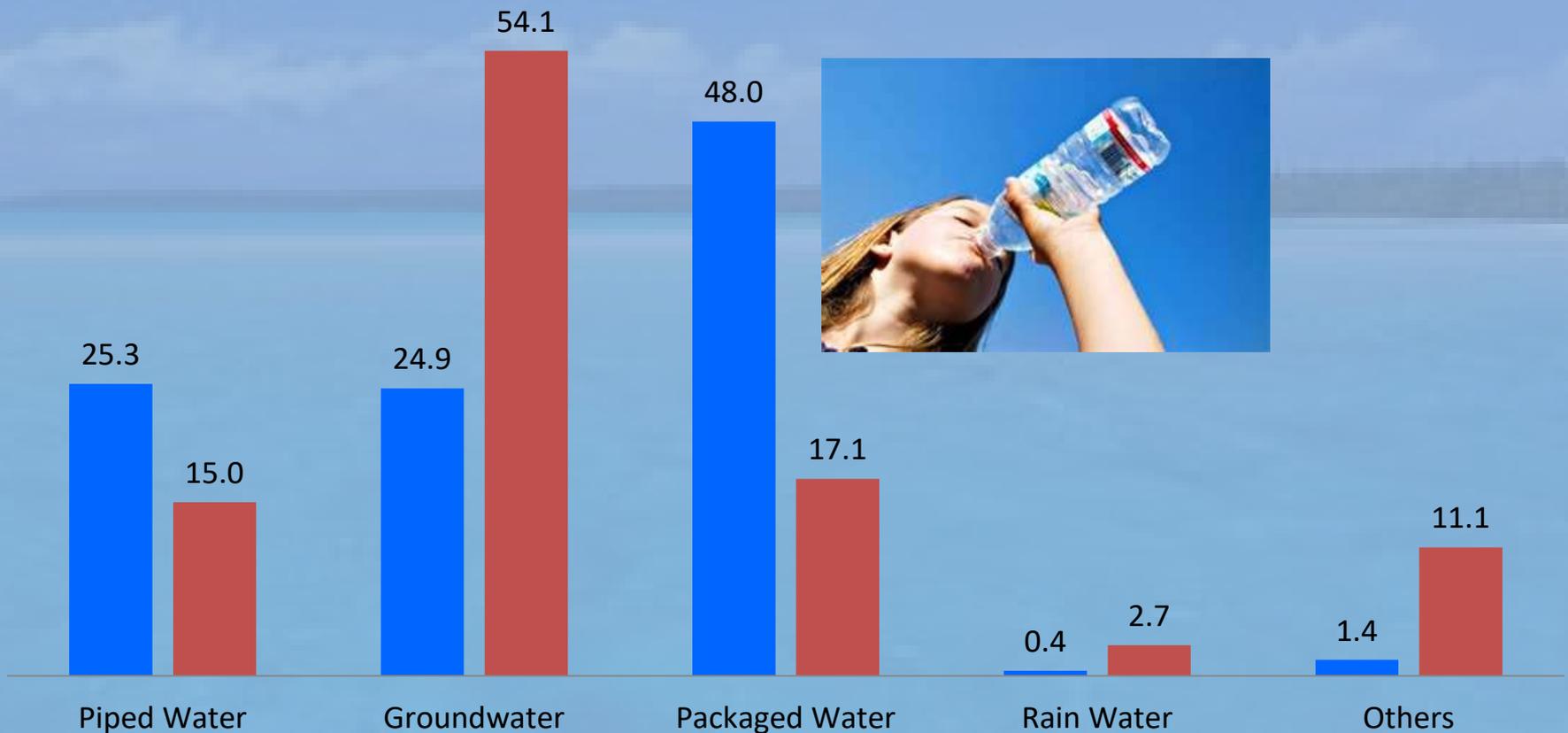
- Most of water users (households, commercials and industries) consume both surface water (**piped water**) and groundwater **conjunctively**
- Those water resources are managed separately across some Ministries and a number of lower level institutions
 - **Surface water management is a shared responsibility among various ministries and agencies (main actor: Ministry of Public Works)**
 - **Groundwater management is under the Ministry of Mining and Energy**
- **Current institutional arrangements:** no space in integrated management between surface and ground water resources → problems in water development

Drinking (Piped) Water Supply

- Provision of drinking water in a city/district is conducted by **Regional Water Utilities** (PDAM)
- PERPAMSI (Indonesian Water Supply Association) (2014): there are **394** Regional Piped Water Utilities in Indonesia
 - **31** Large PDAM (> 50,000 customers)
 - **53** Medium PDAM (20,000 - 50,000 customers)
 - **310** Small PDAM (< 20,000 customers)
- National Service Coverage: **24%**
 - Urban **47%**
 - Rural **11%**
- Total number of national customers: **8,628,822**

Sources of **Drinking Water** to the Households in Jakarta and Indonesia, 2009 (in %)

■ Jakarta ■ Indonesia



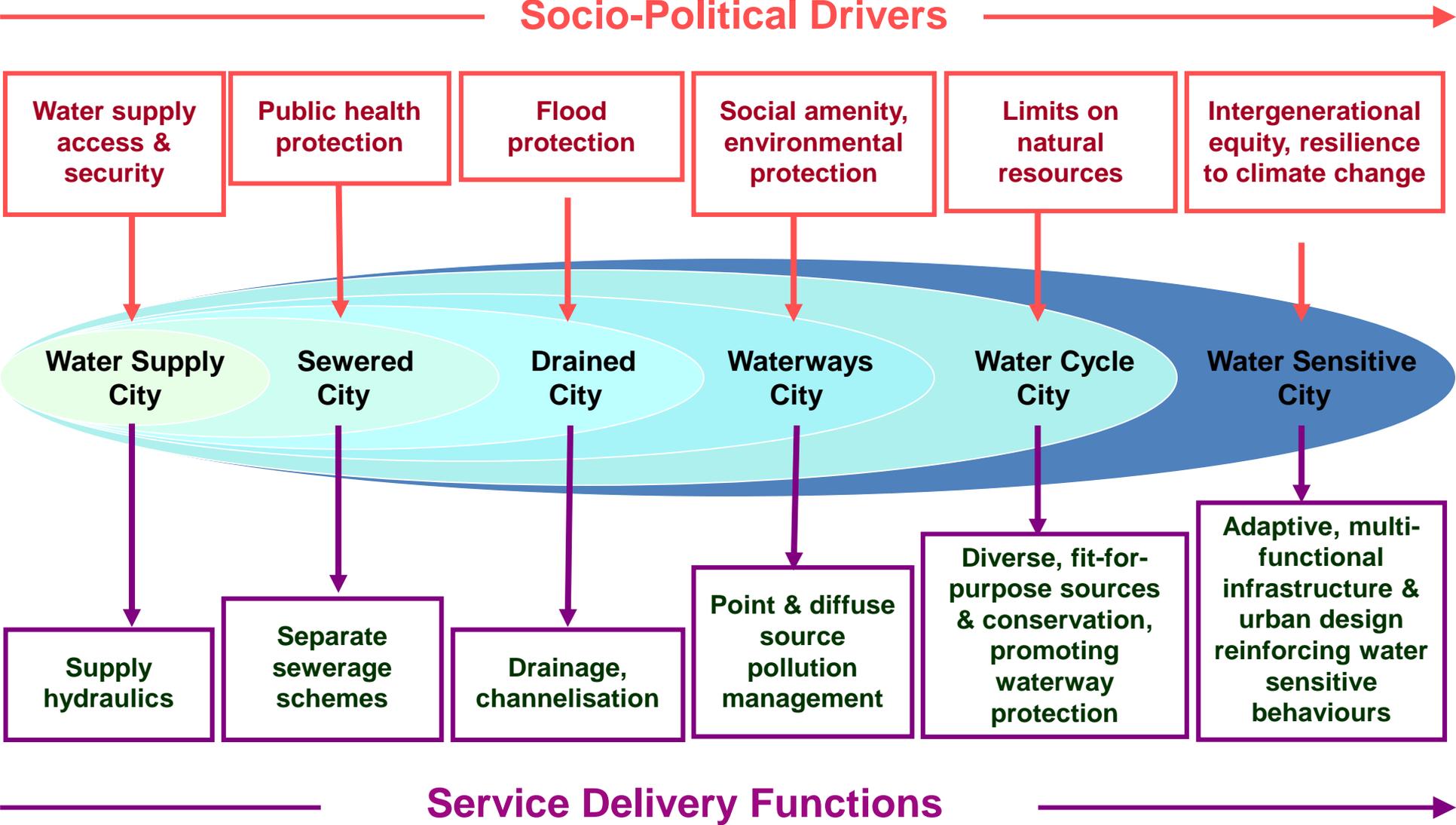
Reasons for Sustainable Urban Water Cities

- Problems of conventional urban water approach and separated surface and groundwater management, have caused increasing difficulties in managing the future cities when the water resources are scarcer and less reliable.
- With the significance of climate change, urban population are increasingly seeking to ensure resilience to future uncertainties in urban water supplies
- The city needs to transform its water management to more sustainable urban water cities, the Water Sensitive Cities
- This requires a major overhaul of the hydro-social contract that underpins conventional approaches (Wong and Brown 2009).

Sustainable Urban Water Cities

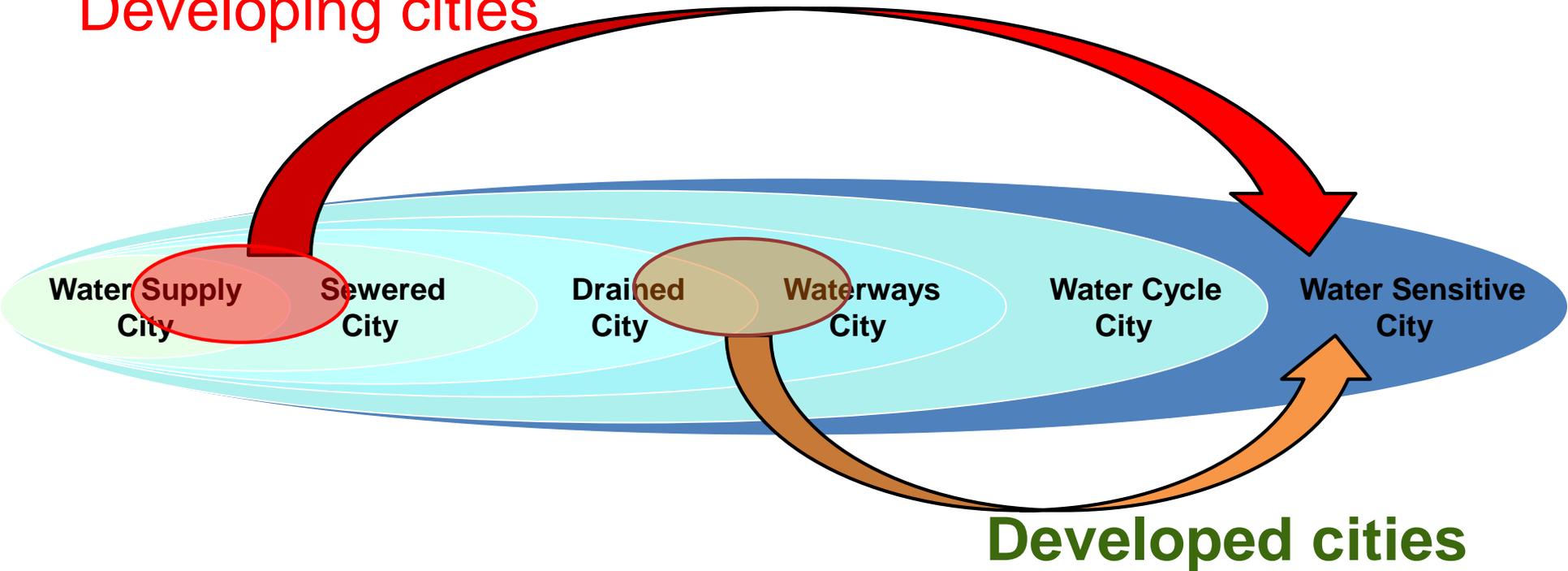
- The Water Sensitive Cities Framework presents a typology of different states that cities transition through when pursuing change towards more sustainable futures.
 - The ‘Cumulative Socio-Political Drivers’ reflect shifts in the normative and regulative dimensions of the hydro-social contract
 - The ‘Service Delivery Functions’ represent the cognitive response

Urban Water Systems: Hydro-Social Contract



Leapfrogging to Water Sensitive Cities

Developing cities

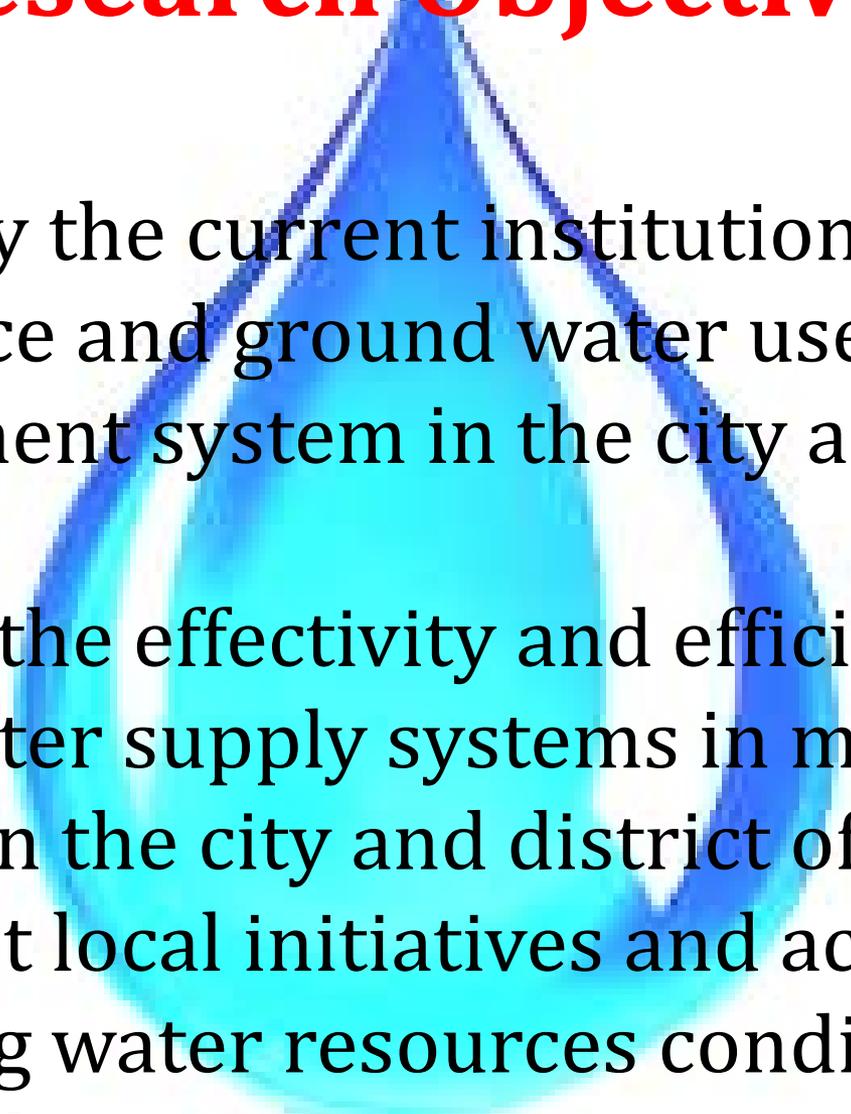


- Is it possible for us to jump into water sensitive city?
- Developing cities have better chance of becoming water sensitive since they have not heavily invested into old single-purpose systems

Water Improvement Efforts

- The government and community have done some programs and activities to improve water quality and environment and to increase the availability of water
 - Blue water (fresh surface and ground water which are available in freshwater lakes, rivers and aquifers)
 - Green water (water stored in soil which is available for crops and trees).
 - Grey water management
 - Improvement of rivers conditions: cascade development, change community's perspective, from water back landscape into water front landscape
- Are these efforts sufficient to jump to Water Sensitive City?
What are their effects to the society?

Research Objectives



- 1) to identify the current institutional setting of the surface and ground water use management system in the city and district of Bogor,
- 2) to assess the effectivity and efficiency of urban water supply systems in meeting water demand in the city and district of Bogor,
- 3) to portrait local initiatives and activities in improving water resources conditions which could lead to water sensitive city

Research Objectives (2)

- 4) to characterize the practices of conjunctive piped and ground water use by the communities of Bogor,
- 5) to assess the perception and expectation of the communities regarding their current and future water condition, use and consumption
- 6) to assess the social and economic implications of that water system, and
- 7) to formulate technical-social-economic engineering in the pursuit of water sensitive city for Bogor region



Delineation of Research Activities

	Year 1	Year 2	Year 3
Research Topic	<ul style="list-style-type: none"> Assessing of the institutional setting in governing water resources Assessing local initiatives in improving the condition of water resources to assess the effectivity and efficiency of the urban water supply systems in Bogor region 	<ul style="list-style-type: none"> Assessing the patterns of water consumption Assessing the consumers' perception and expectation, and Estimating the social-economic consequences of the current situation 	<ul style="list-style-type: none"> Formulating the technical-social-economic engineering in the pursuit of water sensitive city for Bogor region
Research Activity	Literature review, In-depth interviews and FGD (focus group discussion)	Technical-socio-economic survey and analysis	Institutional analysis, FGD



Delineation of Research Activities (2)

	Year 1	Year 2	Year 3
Stakeholders	Academician, Government officers, PDAM/PAM, Companies, Community	Community, Companies	Academician, Government officers, PDAM/PAM, Companies, Community
Research Products	<ul style="list-style-type: none"> • Information on water resources management and use • Conditions of urban water supply system of the regional PDAMs • Portraits of local initiatives on improving water and environmental condition • Capacities of water availability and supply 	<ul style="list-style-type: none"> • Information on the patterns of water consumption and their volumes • Technical-socio-economics portraits of water consumptions • Cost and benefits associated with water consumption 	<ul style="list-style-type: none"> • Optimal water supply and use for the area • Institutional setting for achieving water sensitive city



Delineation of Research Activities (3)

	Year 1	Year 2	Year 3
Market National/ Regional/ International	Central and local government, Companies, International agencies	Central and local government, Companies, International agencies	Central and local government, Companies, International agencies

Thank You

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