Efficient Sustainable Urban Water Resource Management – Probable State-specific initiatives

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IT MAINLY REFERS TO **CONTINUOUS AND UNINTERRUPTED DRINKING WATER SUPPLY THROUGH PWD TRANSFER PIPELINES TO RESIDENT**

Thus, the emphasis should be largely on Sanitation and Health & Hygiene

The factors affecting these are manifold and often inter-related and **THREE types** -

(1) Anthropogenic :

(a) Population growth (resident and floating) – temporal and seasonal variation, (b) Accessibility v/s Economy, (c) Augmentation of Water Treatment Plant, (d) Dependence on Govt. supply in spite of availability of alternate source through open dug wells – rendering them unfit susceptible for dumping vis-a-vis reclamation, (e) Behavioural change in lifestyle adaptability

(2) Natural :

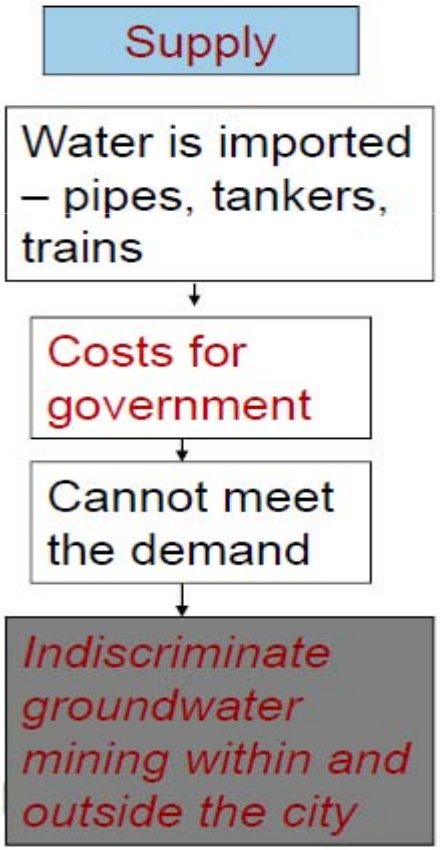
(a) Availability of resources – physiographic set-up, climate and rainfall pattern, (b) Climate change

(3) Institutional :

(a) Mechanism for setting up of Water Treatment Plant, (b) Laying of pipeline for its transfer, (c) En route loss of resource, (d) Lack of priority operationalization

The current paradigm – water supply

More water supplied = More waste water generated = more costs for treatment = Unsustainable



The water-sewage connection

The conventional way:

Bring water into the city – storage, diversion, pipe, pump, treat – from further and further away.

Flush and carry the waste out of the city – pipe, pump, divert, treat – further and further away.

Present Water Paradigm - Inefficient

Water Supply

Surface water

Ground Water

Wastewater (Blackwater + Greywater)

How much is the treatment ?

Wastewater Treatment Plant

30-50% loss in leakage

POLLUTION

Recycle ?
Reuse ?

AND, THAT'S WHY..WE HAVE TO OPT FOR OPTIMAL RESOURCE EFFICIENCY

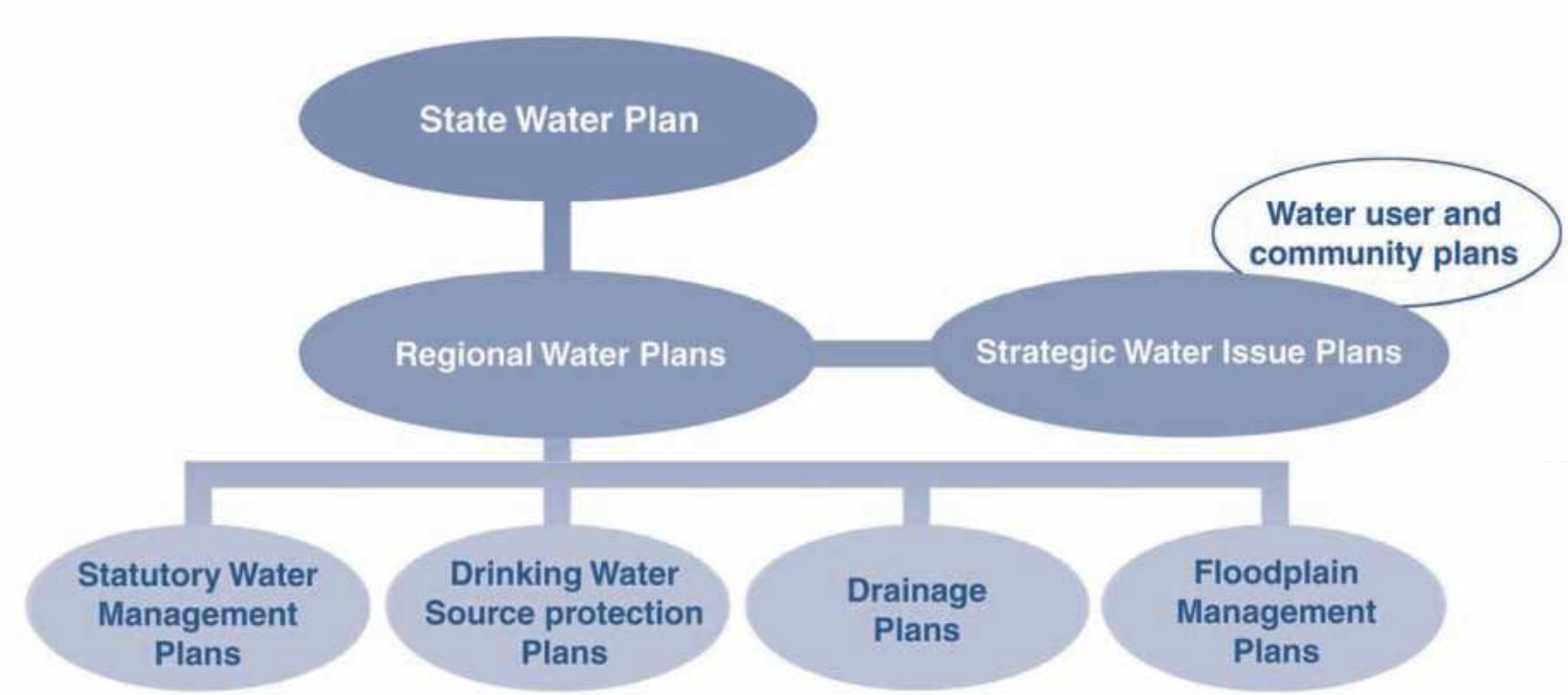
1. Roof-top rainwater harvesting
2. Recharging of bore-wells / Environment-friendly construction of storm-water drains (i.e. Unlined bottom)
3. Avenue plantation
4. Rejuvenation of unused wells
5. Maintenance and conservation of natural ponds / lakes / tanks / nala / creek
6. Effective utilization of treated water for out-of-home applications
7. Utilization of water-efficient fixtures
8. Decentralized wastewater management including its recycle and reuse, wherever practically feasible.

Thus, one must attempt to facilitate better management and use of urban water resources by ensuring that appropriate level of consideration is given to the total water cycle at each stage of the planning system right from its INTAKE up its OUTPUT.

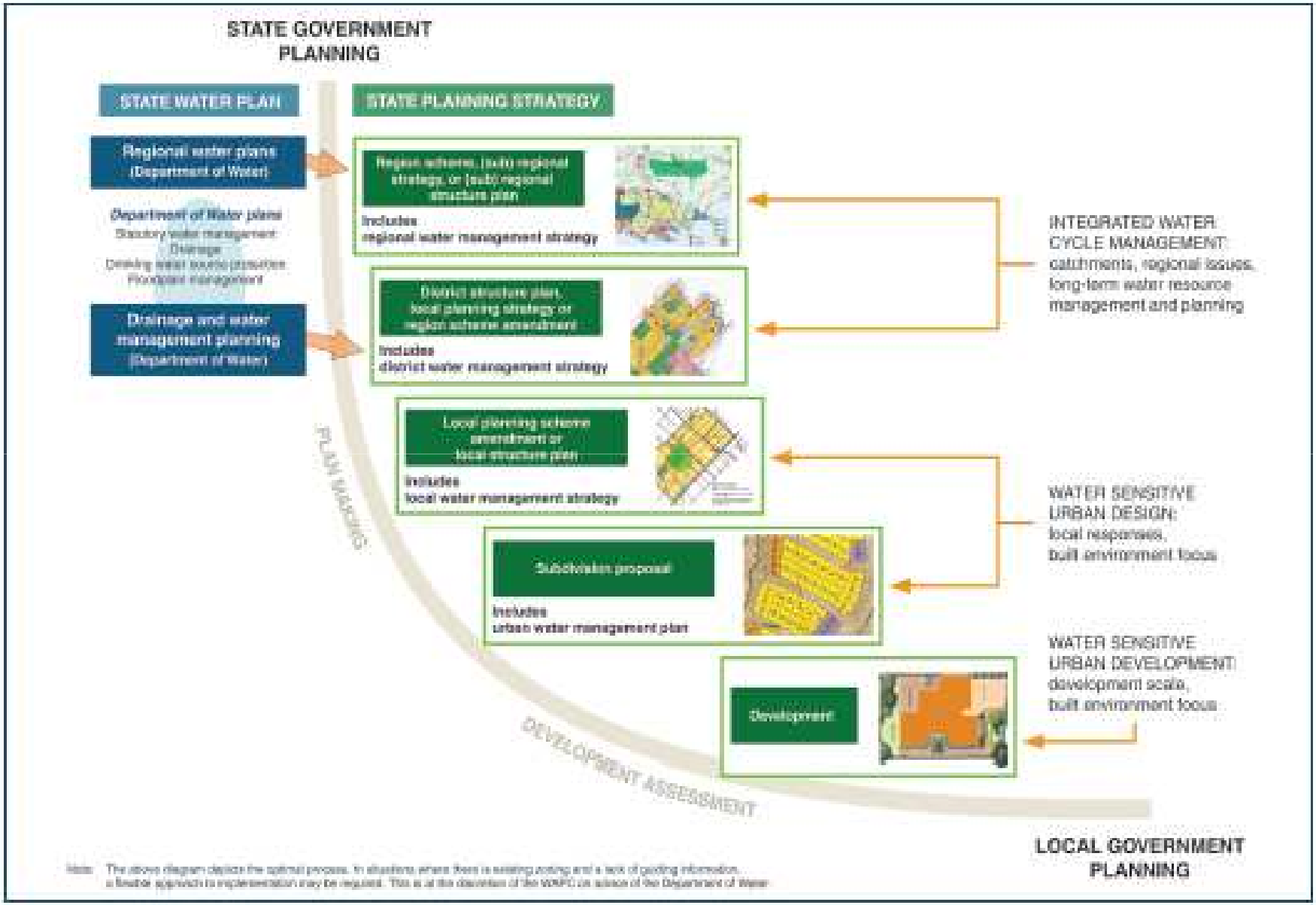
To achieve this...what is required is **PLANNING**

Source : Better Urban Water Management – Western Australian Planning Commission, October 2008

Good Practices in Urban Water Management – Decoding Good Practices for a Successful Future : ADB- National University of Singapore, 2012

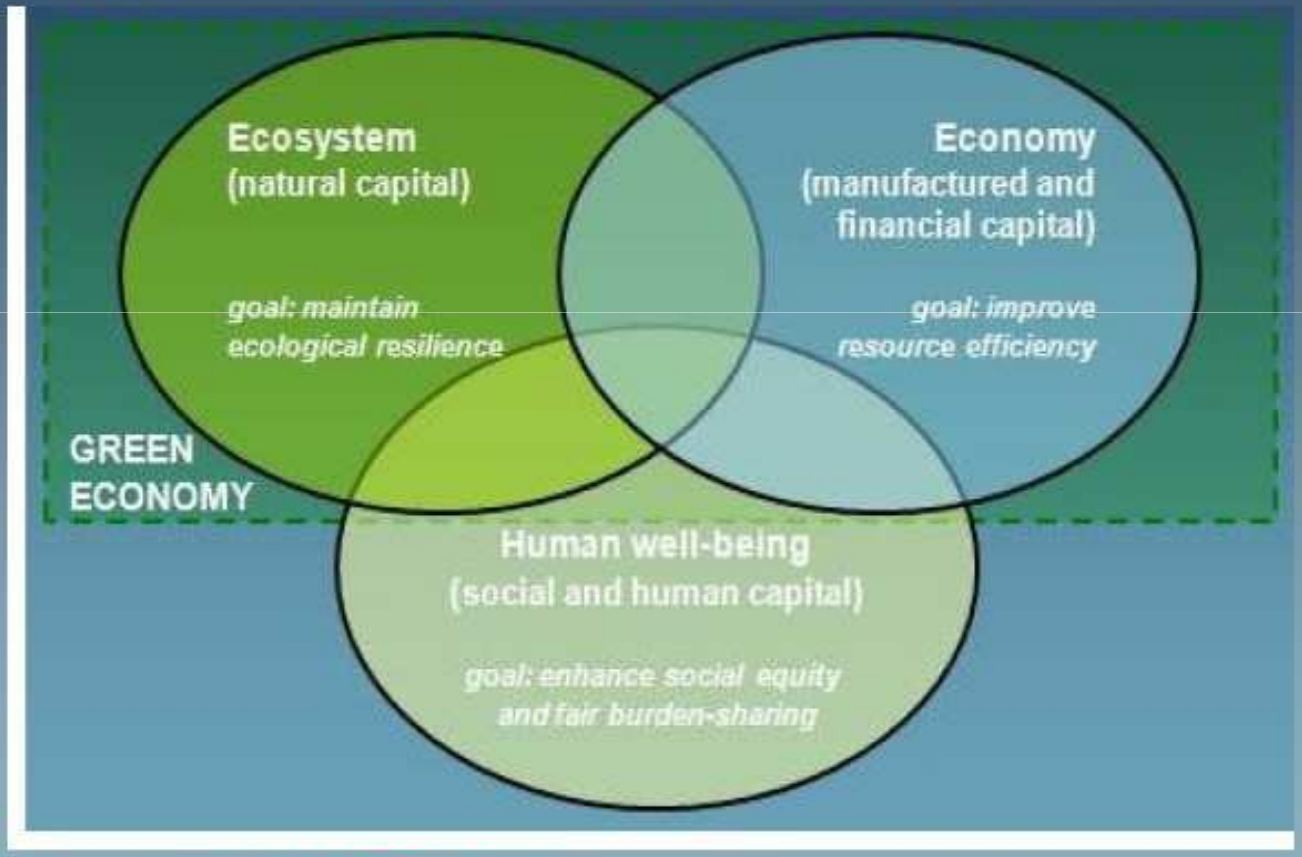


Water Planning Framework


STATE GOVERNMENT PLANNING
STATE WATER PLAN
STATE PLANNING STRATEGY
Regional water plans (Department of Water)
Department of Water plans
Statutory water management
Drainage
Drinking water source protection
Floodplain management
Drainage and water management planning (Department of Water)
Region scheme, (sub) regional strategy, or (sub) regional structure plan
Includes regional water management strategy
District structure plan, local planning strategy or region scheme amendment
Includes district water management strategy
Local planning scheme amendment or local structure plan
Includes local water management strategy
Subdivision proposal
Includes urban water management plan
Development
PLAN MAKING
DEVELOPMENT ASSESSMENT
INTEGRATED WATER CYCLE MANAGEMENT: catchments, regional issues, long-term water resource management and planning
WATER SENSITIVE URBAN DESIGN: local responses, built environment focus
WATER SENSITIVE URBAN DEVELOPMENT: development scale, built environment focus
LOCAL GOVERNMENT PLANNING
Note: The above diagram depicts the optimal process. In situations where there is existing zoning and a lack of guiding information, a flexible approach to implementation may be required. This is at the discretion of the WAPC on advice of the Department of Water.

Green Economy

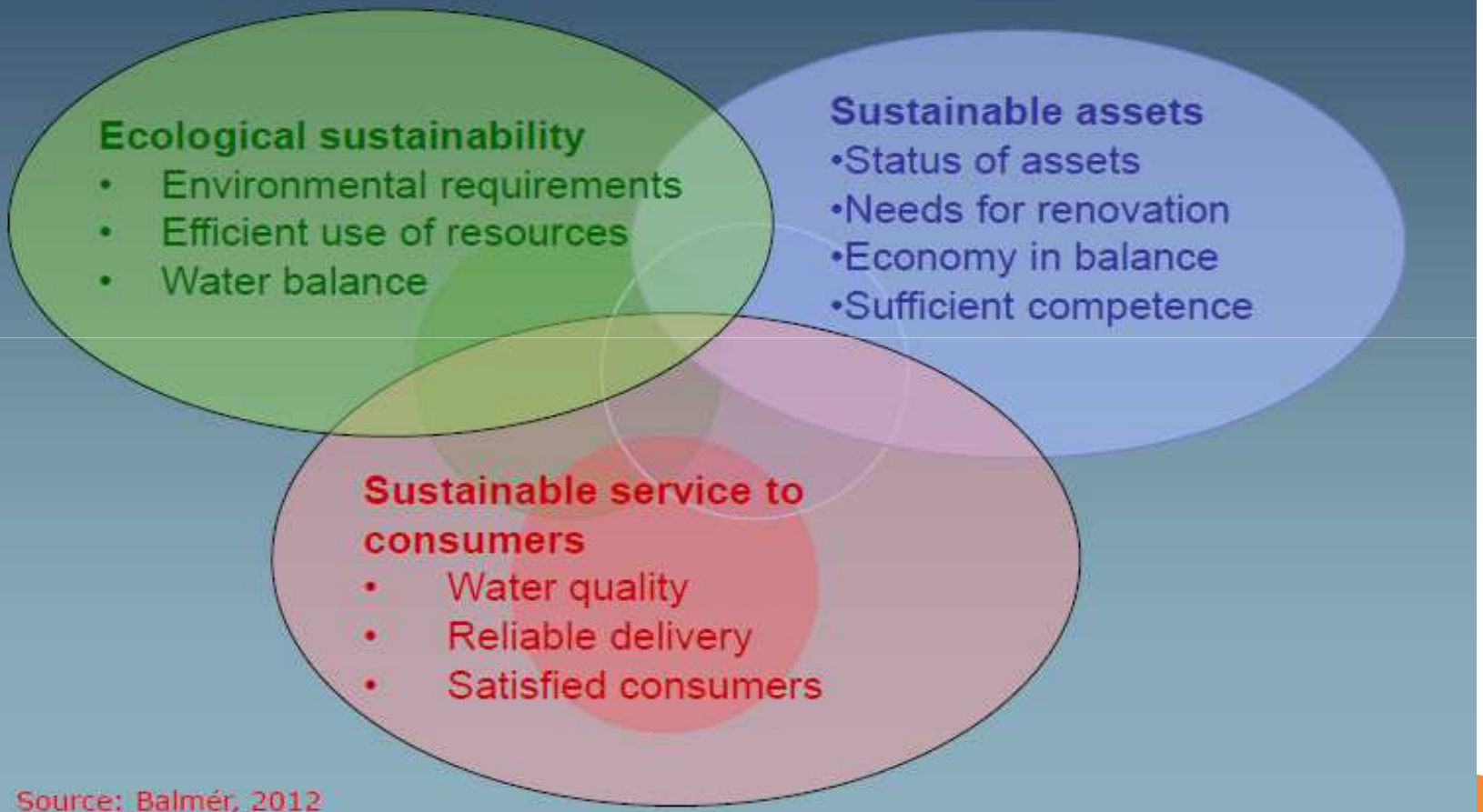
- allows us to consider resource efficiency in the context of ecological resilience and social equity



(Source: UNEP, 2012; EEA, 2011)

Water Utility sustainability components

- inspiration in indicator development (SE)



Source: Balmér, 2012

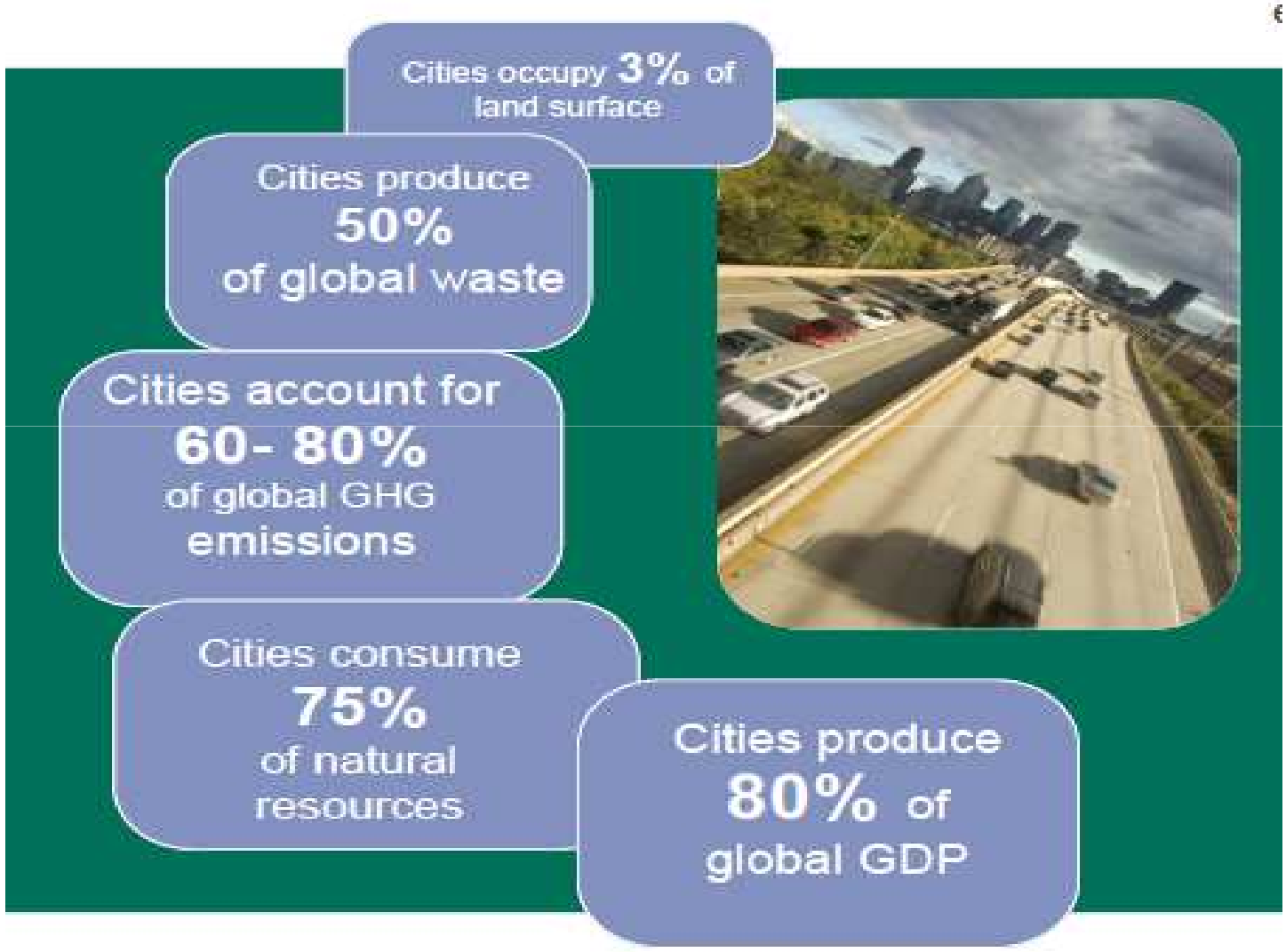
What is Resource Efficiency?

Resource Efficiency is a key driver of success that promotes Sustainable Consumption and Production (SCP), facilitates a transition to a Green Economy and thus contributes to achieving global sustainable development. In cities, resource efficiency enhances the quality of life in urban areas by minimizing resource extraction, energy consumption and waste generation and while simultaneously safeguarding ecosystem services. UNEP defines resource efficiency from a life cycle and value chain perspective. This means reducing the total environmental impact of the production and consumption of goods and services, from raw material extraction to final use and disposal.

Why Resource Efficiency in Cities?

Over half of the world's population resides in cities, and up to 80% is projected for 2050. The conditions for urban inhabitants, in terms of employment, environment, health, education and overall quality of life not only depend on how urbanisation is planned and managed, but also how cities source, process and use resources. The decisions and actions needed to move our society towards more sustainable patterns of consumption and production will have to be decided and implemented, to a large extent, by cities. There are genuine opportunities for national and city leaders to contribute to sustainability by improving resource efficiency, reducing carbon emissions, minimizing environmental risks and enhancing ecosystems.

IT IS REQUIRED BECAUSE -



What are the benefits of Resource Efficiency?

There is a strong link between quality of life in cities and how cities draw on and manage the natural resources available to them. Resource efficient cities combine greater productivity and innovation with lower costs and reduced environmental impacts, while providing increased opportunities for consumer choices and sustainable lifestyles. In addition, 'urban mining', the reduction of influx of resources by making better use of the existing stocks of materials available in the urban environment through increased recycling rates, is a strategy that can scale up these benefits. Resource efficiency is key for cities to contribute to local and global sustainability and offer at the same time high potential for financial savings.

Water Resource Efficiency Indicators

in development in co-operation with water utility associations
(IWA, EWA, EUREAU, WssTP and benchmarking networks)

- Is drinking water distribution and water consumption in urban areas resource efficient ?
  - Specific water losses
  - Specific consumptions in household sector
- Is pollution load generation and emission intensities from urban areas resource efficient ?
  - Specific effluent loads from UWWTPs
- Is urban water supply and sanitation operated with high energy efficiency ?
  - Specific electrical energy consumption and co-generation in UWWTPs

Energy in the Urban Water Cycle

inners

Drinking water supply
- transport, treatment, distribution ~0.5 kWh/m^3

Wastewater
- treatment
- 0.9 - 10 kWh/m^3

chemical and operational energy

Domestic water use
- cooking, washing, cleaning
- **> 50** kWh/m^3

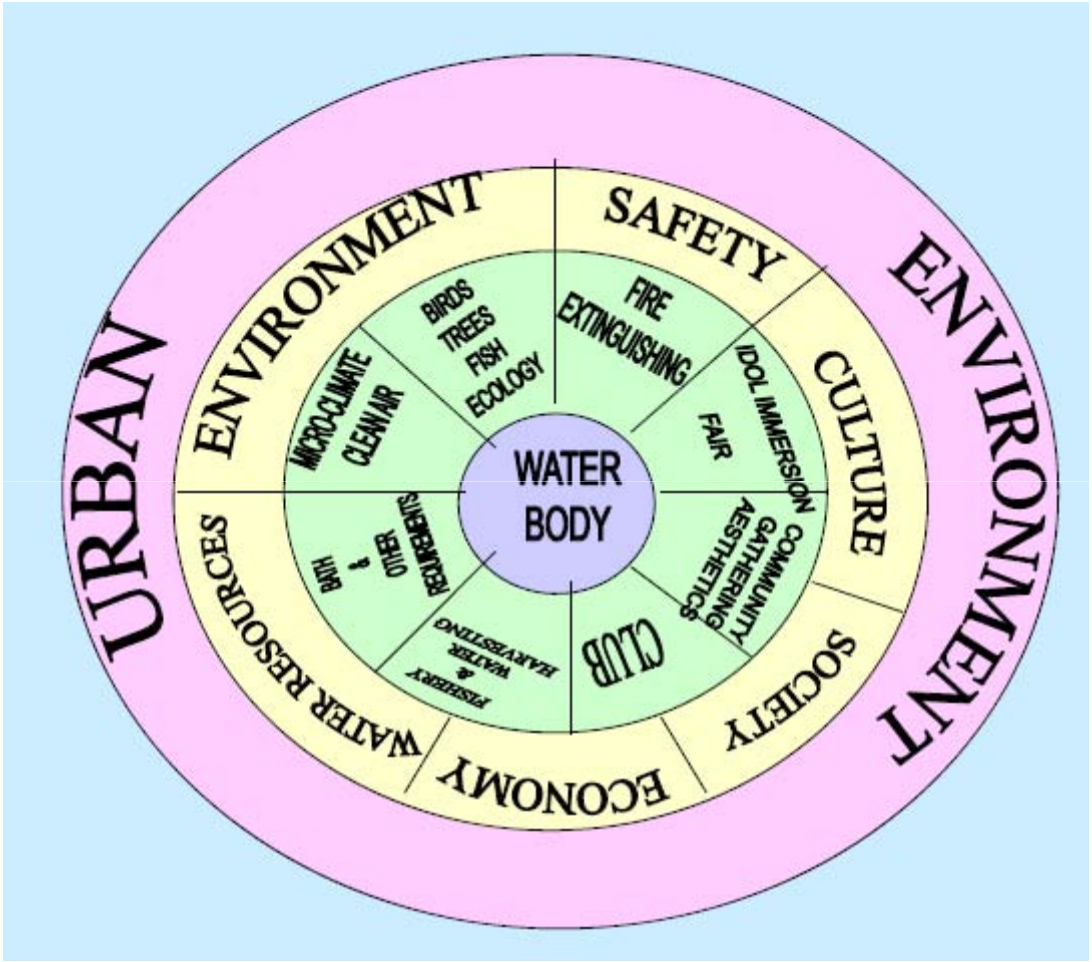
thermal energy

Wastewater
- collection
- 0-16 kWh/m^3

operational energy

(data by Olsson, 2011)

Source: Tait *et al.*, 2012


URBAN ENVIRONMENT
ENVIRONMENT
SAFETY
CULTURE
SOCIETY
ECONOMY
WATER RESOURCES
BIRDS
TREES
FISH
ECOLOGY
FIRE EXTINGUISHING
IDOL IMMERSION
FAIR
COMMUNITY GATHERING
AESTHETICS
CLUB
FISHERY & WATER HARVESTING
RECREATIONS
HUNT
OTHER
MICRO-CLIMATE
CLEAN AIR
WATER BODY

Wetland and Pond

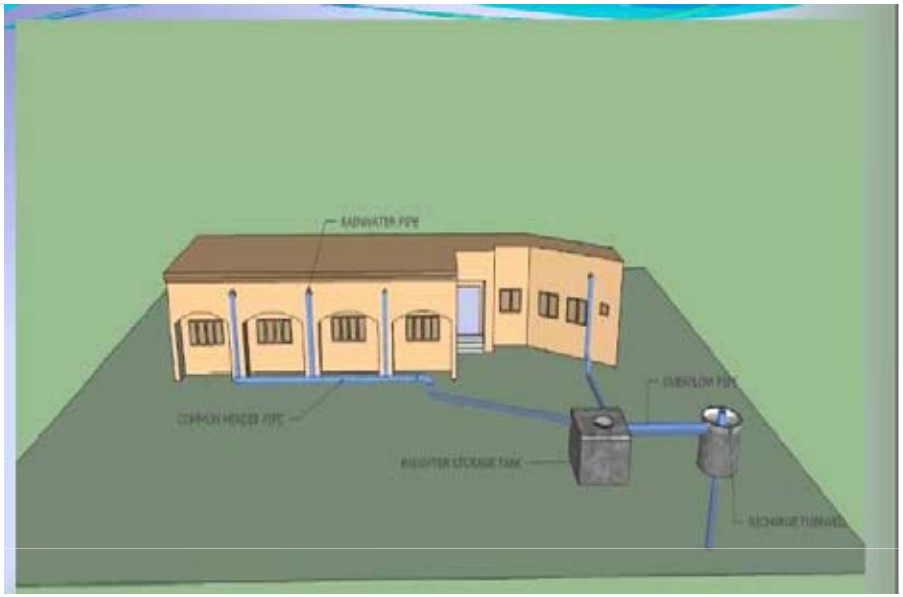
Functions	Wetland	Urban Pond
Location	At the margin of human habitation	Inside Human habitation
User	A specific group of people like fishermen	Different groups of Common people
Size	Covers a wide area	Small but many in numbers
Ecological Importance	Important	Important
Wastewater Treatment	Can be utilised	Should not be utilised
Social importance	Less	Significant
Flood Control	Important role	Not so important
Management Level	Regional	Community

Effective Water-efficient fixtures

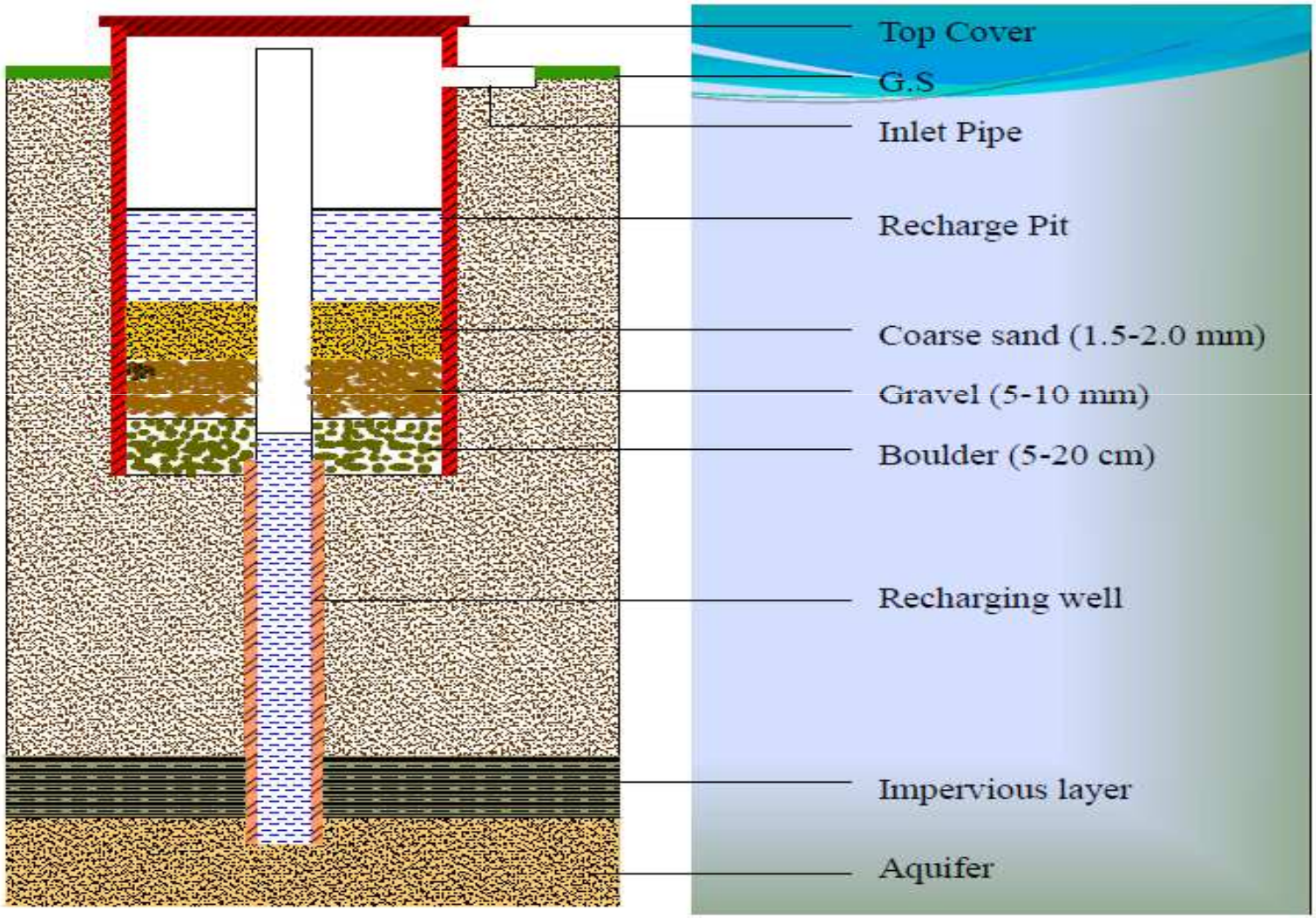
	Fixture	Water use in standard fixtures	Water-efficient fixture	Water saved
	Toilets	Single flush toilet uses 10-13 litres/ flush	Dual flush toilet in 3/6 and 2/4 litre models	4-11 litres/ flush
	Urinals	4 liters; 10-13 litres if toilet pan is used	Sensor operated adjustable flush	2.2 – 10 litres per flush
	Taps	10-18 litres/minute depending on pressure	Sensor taps	5.5- 15.5 litres/ minute
	Showers	10-25 litres/minute	Flow restrictors	4-20 litres/minute

Source: Parryware Roca and others

ROOF-TOP RAINWATER HARVESTING



For effective bore well recharging



Channelization of storm-water drains for optimum infiltration

Rejuvenation and maintenance of lakes and ponds

As these water bodies serve the purpose of –

1. an open space in the crowded urban localities – i.e. Aesthetics.
2. Improving Air Quality
3. Controlling Micro-Climate

Avenue plantations

Revival of neglected open dug-wells

Optimal resource utilization of temple or heritage ponds

Thank You all