

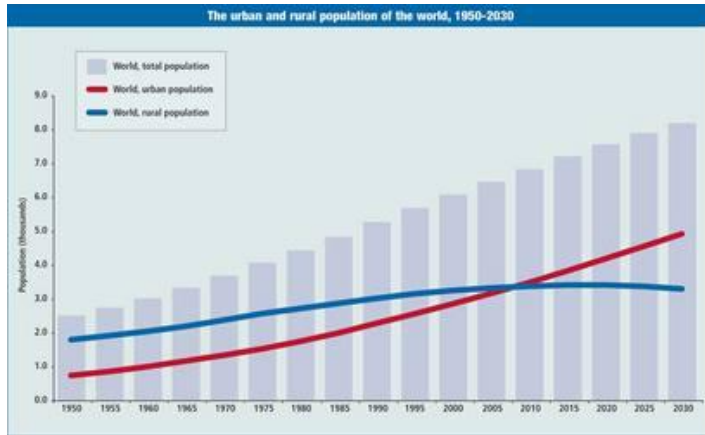
# Urban Water

*in a rapidly urbanising world*



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# The Mega-trend of the 21<sup>st</sup> century



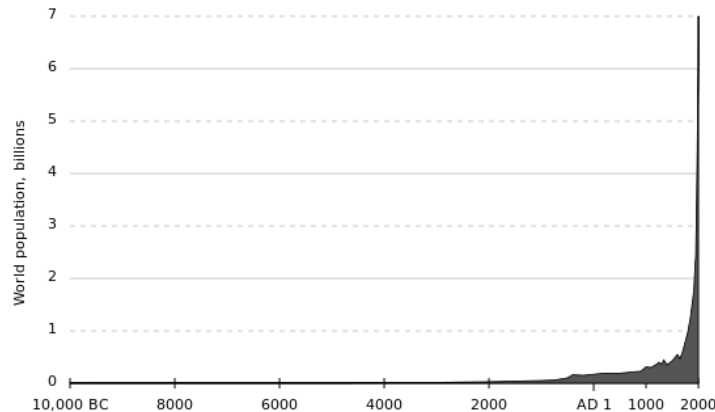
## World Population:

2000 - 6.1 billion

2015 - 7.2 billion

2030 - 8.1 billion

2050 - 9.2 billion



## Urban Population:

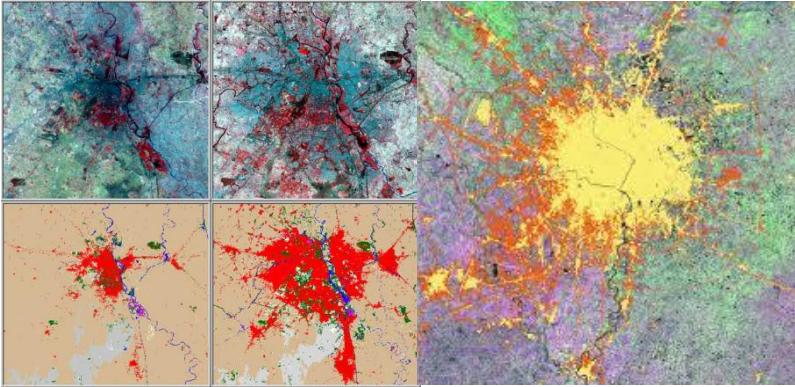
2000 - 2.9 billion

2015 - 3.8 billion

2030 - 4.9 billion

2050 - 6.4 billion

# The Challenges



India:	+ 497 million
China:	+ 341 million
Nigeria:	+ 200 million
USA:	+ 103 million
Indonesia:	+ 92 million

## Slum population:

2010:	830 million
2020:	890 million?
2030:	940 million?

## Deficit in water:

Africa:	150 million
Asia:	700 million
LAC:	120 million

## Deficit in sanitation:

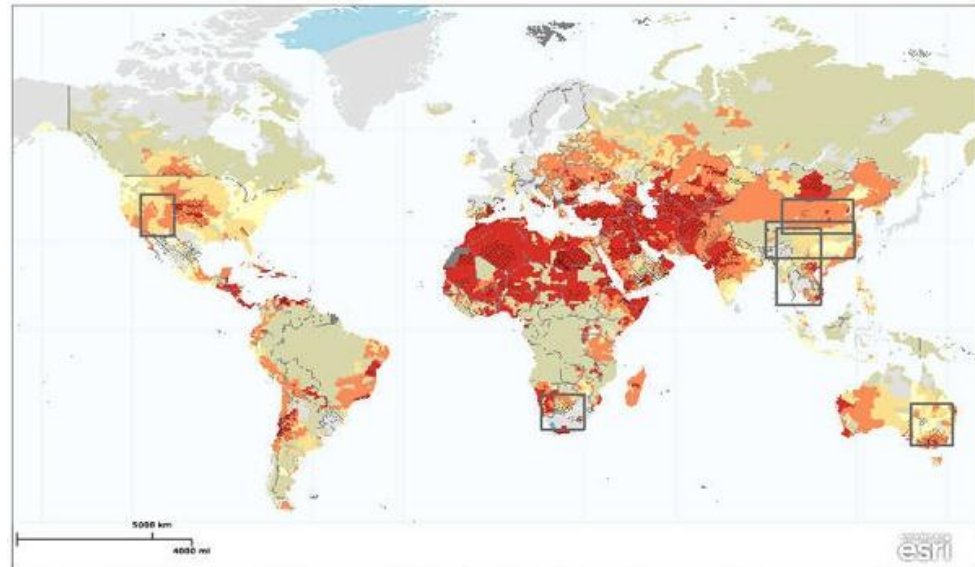
Africa:	185 million
Asia:	800 million
LAC:	140 million





# Energy-Water-Food Nexus

Of the three  
only **WATER**  
is in finite  
supply



Source: WRI

Energy

Water

Food Security



Source: Danish Center for Biofuels

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citistates  
group

# Where is our water coming from?

	1950	1975	2000	2025
<b>Barcelona</b>	0 Km Groundwater	Plus 25 km Llobregat river	Plus 100 km Ter river Water transfer	More desalination? Imports from France?
<b>Beijing</b>	0 Km Groundwater	Water reservoir 20 km away	Sangan and Yang 185kms	Yangtse <b>1000km?</b>
<b>Perth</b>	530 km pipeline	Addition of nearby rivers		<b>1900 km Kimberley</b>

Energy consumed worldwide for delivering water:  
26 Quads (1 Quad = 1015BTU)

Energy consumed in the US for water and waste water:  
75 billion kWh

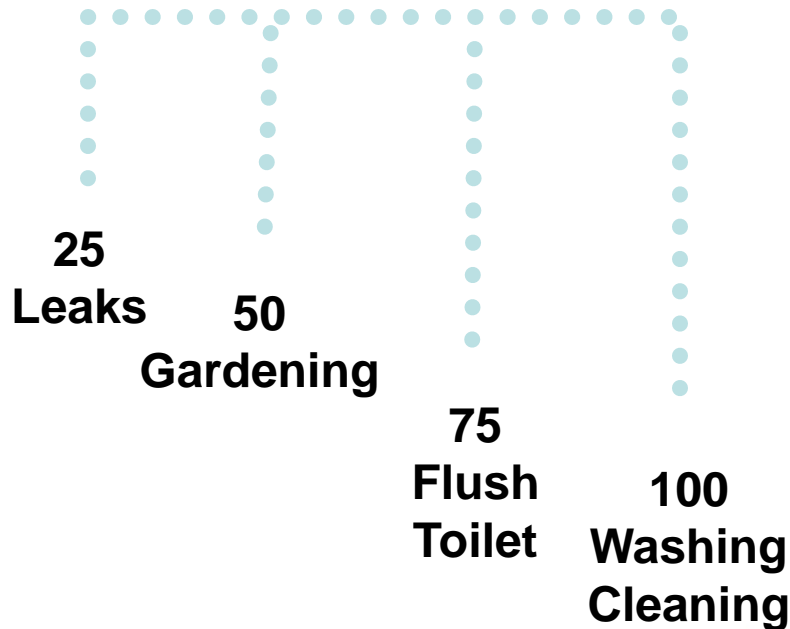
Energy used to transport water in California:  
19% of total energy consumption

Energy used for water and waste water treatment LA:  
30% of total



# Where does our water go?

250 Litres ppd



Recycling grey water  
alone would represent:



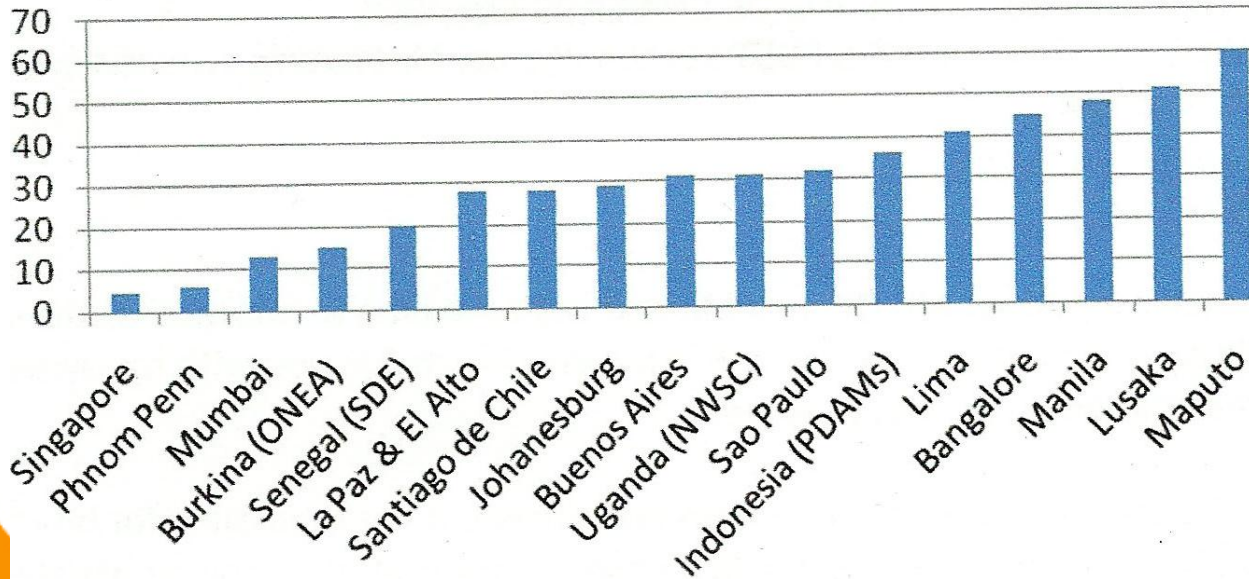
- Water supply
  - Sewage
- Technology & Infrastructure
  - Energy

# The challenge of water governance

- Life span of pipes: 50 to 80 years
- Required annual renewal rate: 1.3 to 2%
- Required revenue rate:  
O&M + Debt service + Equity depreciation  
+ Return on equity

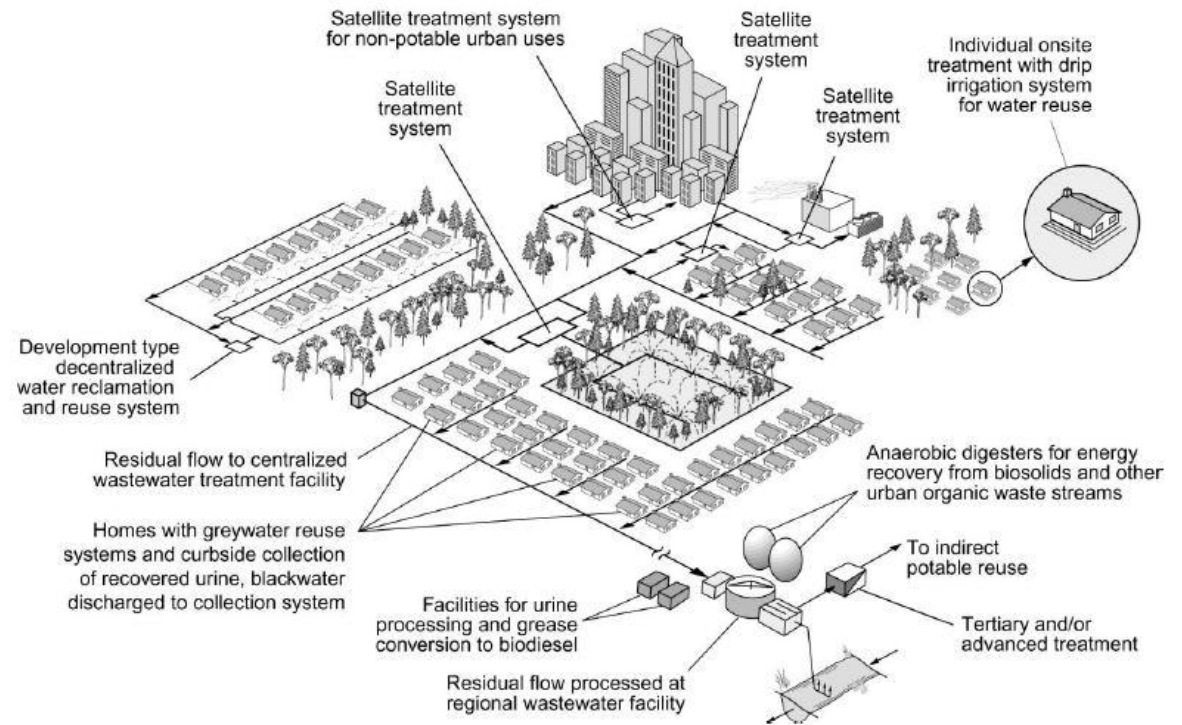
City	Renewal rate
Singapore	5.0 % ●
Zurich	1.7 % ●
London	0.1 % ●
Lagos	<0.1 % ●
Mumbai	<0.1 % ●
Nairobi	<0.1 % ●

Unaccounted for water (%)





# How water should be managed?



Source: A. Zehnder, Triple Z Zurich



# The Singapore story

## The Issue:

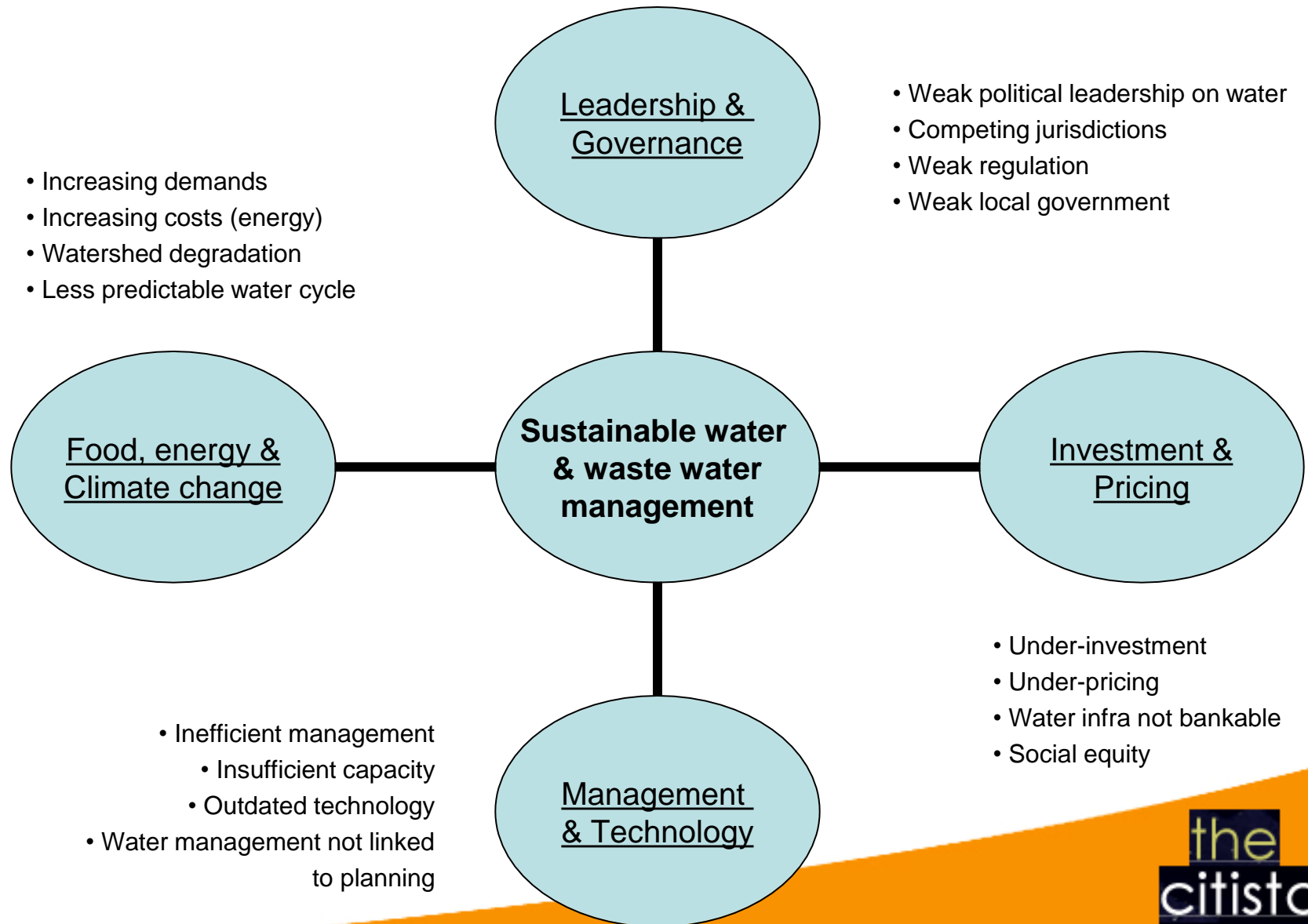
- Water stressed country 4.5 million inhabitants <700km<sup>2</sup>
- Water dependency (Malaysia)

## The Solution:

- Supply & demand management under one jurisdiction (PUB)
- Recycle & re-use (NEWater) and diversify sources
- Educate the public & become the world's premier hydro-hub

	m3 per capita per year
Water demand (domestic & industry)	180
• From Malaysia (2011)	80
• Rain water harvesting	52
• Water desalination	31
<u>Water Balance (2011)</u>	<u>- 17</u>
NEWater (2011)	110
<b><u>Water “surplus” in 2011</u></b>	<b><u>93</u></b>

# Summary of issues



# Some pointers for the future

- Water for cities will require a metro-wide regional planning approach that includes land use and energy
- Water management must be a multi-level cross-jurisdictional undertaking led by a strong authority
- Revisit (graduated) pricing systems to achieve equity and viability
- Invest in highest affordable level of technology – both hardware and software
- Demonstrate how to make the paradigm shift and fast-track going to scale