

# **Water for Energy, Energy for Water**

**- a Singaporean Perspective**

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September 2008

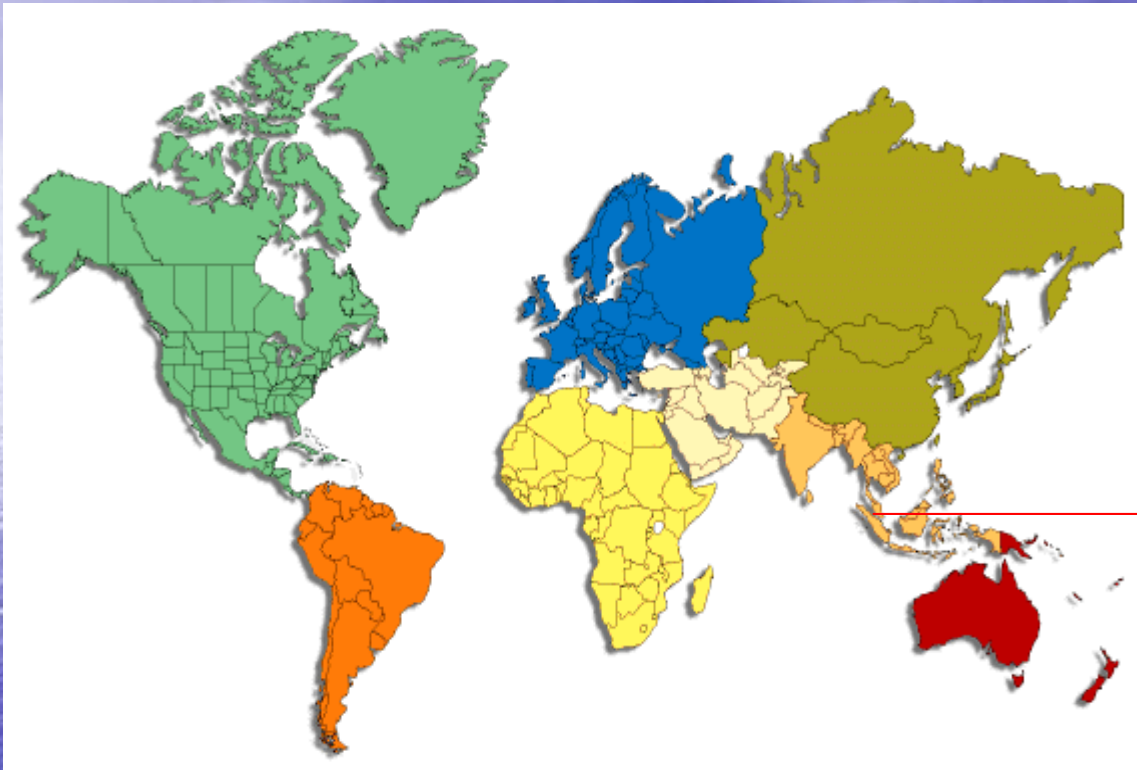
A joint study between  
DHI-NTU Water & Environment  
Research Centre and Education Hub  
and  
Public Utilities Board (PUB)



# Objectives of Study

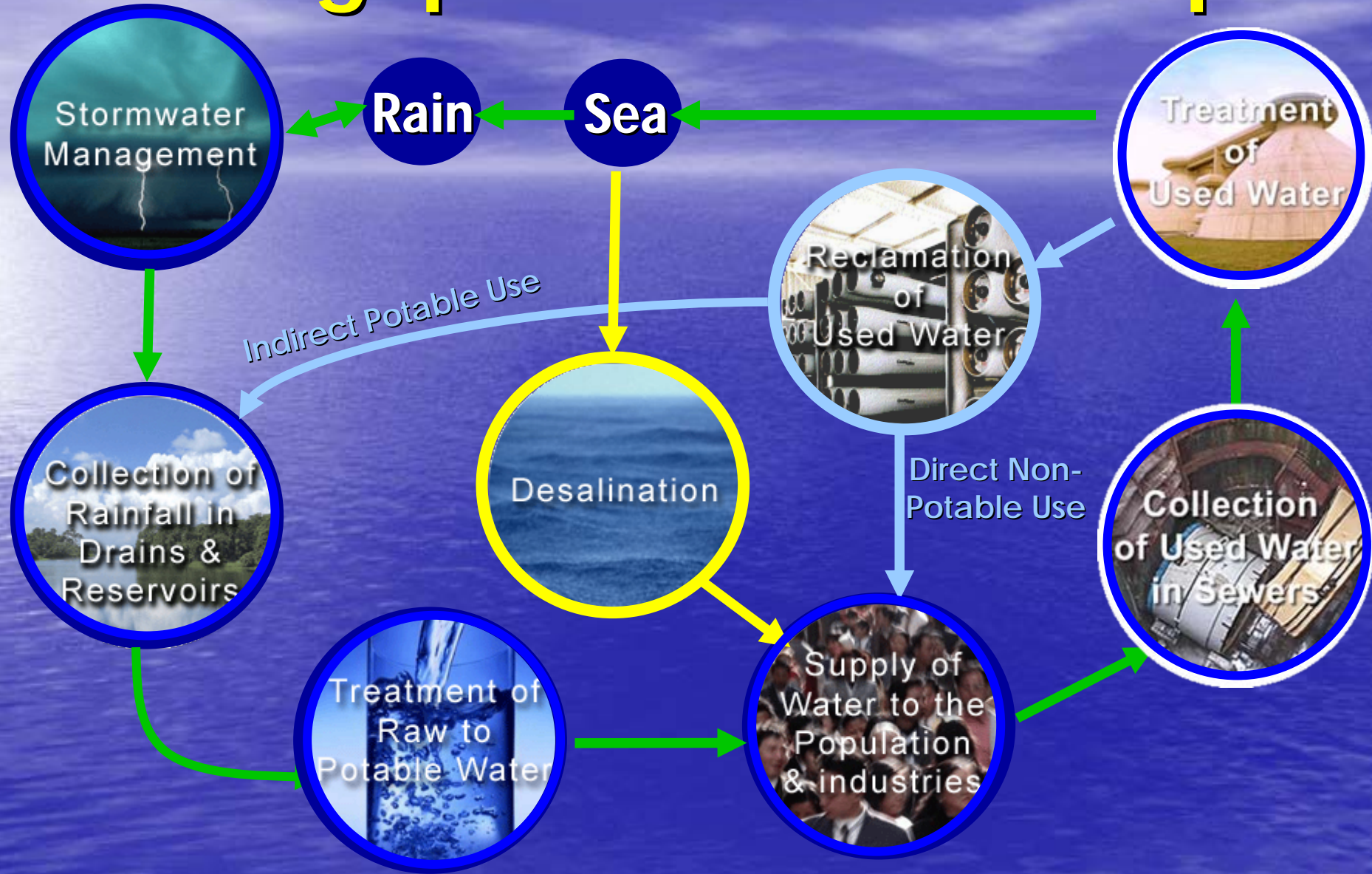
- To determine energy footprints of water supply and used water management in Singapore
- To determine water footprints of energy production in Singapore
- To analyze the energy and water sector developments in view of climate change scenarios for Singapore
- To assess policy implications and to prepare related policy advice

# Singapore



<b>Land Area</b>	<b>704 km<sup>2</sup></b>
<b>Population</b>	<b>4.6 mil</b>
<b>Average Annual Rainfall</b>	<b>2,400 mm</b>
<b>Average Water Demand</b>	<b>1.3 mil m<sup>3</sup>/day</b>

# Singapore's Water Loop



# Four National Water Taps



# Energy Footprints of Water

Type of water supply	Approximate total Energy Footprint of Water supply and treatment (kWh/ m <sup>3</sup> )
Surface water (rivers and reservoirs)	0.5 - 4
Desalinated water	4 - 8
Recycled water	1 - 6
Bottled water	1000 - 4000

- ★ Note that these figures do not include energy use by consumers (domestic/industry)

# Water Footprints of Energy

- More than 80% of Singapore's electricity is produced in gas-fired power plants
- All power plants use sea water for cooling
- Singapore has a very low freshwater footprint of energy production



# Observations

- Singapore has adopted a multiple 'tap' solution to meet the challenge of water scarcity
- Comparing Energy Footprints of Water between Nations need to be done carefully as contexts may differ (e.g. water availability and quality)
- Each Country has their unique situations and these different situations can result in different water solutions to meet their water needs
- Decoupling water supply from climate may reduce risk but increase energy footprints