

Water Reuse in Egypt

Safwat Abdel-Dayem
Secretary General
Arab Water Council

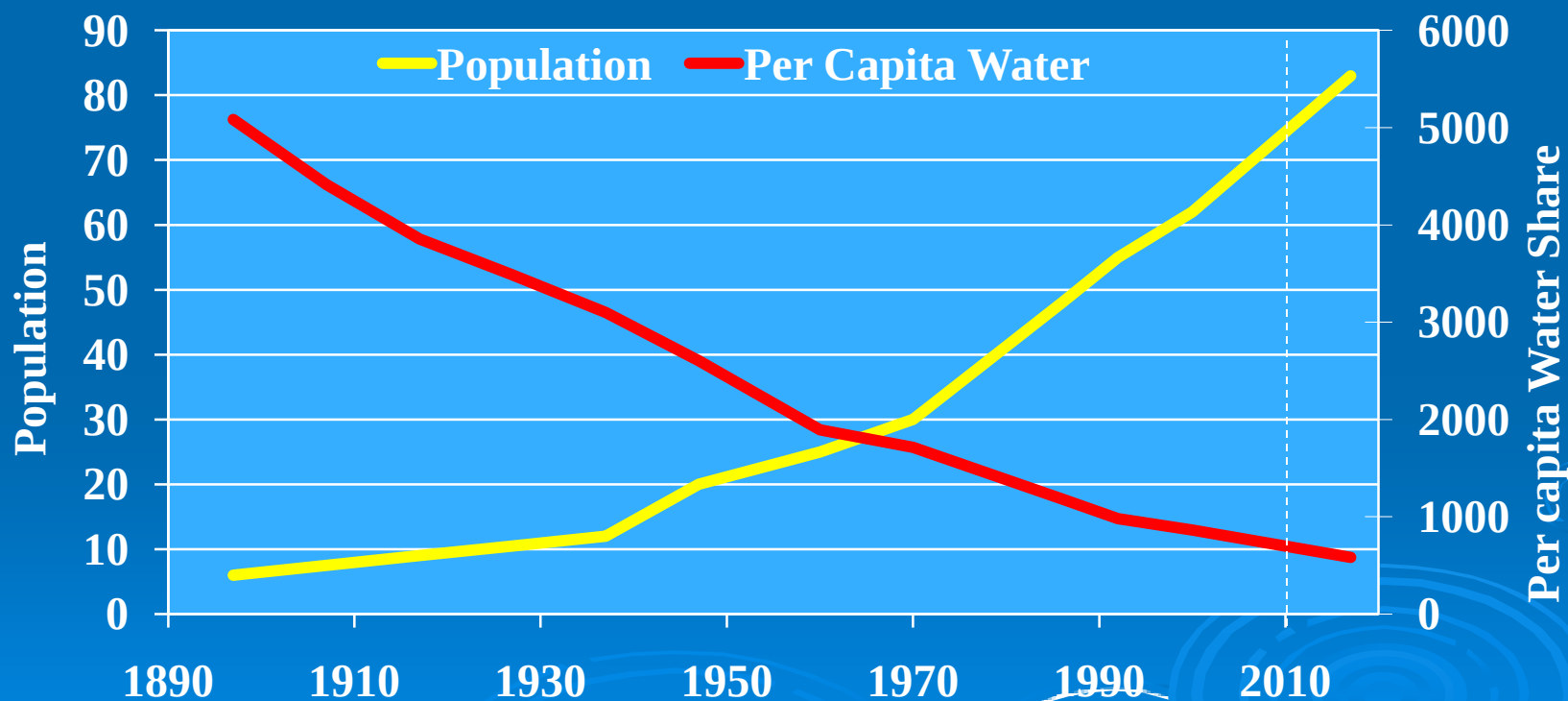
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Highlights

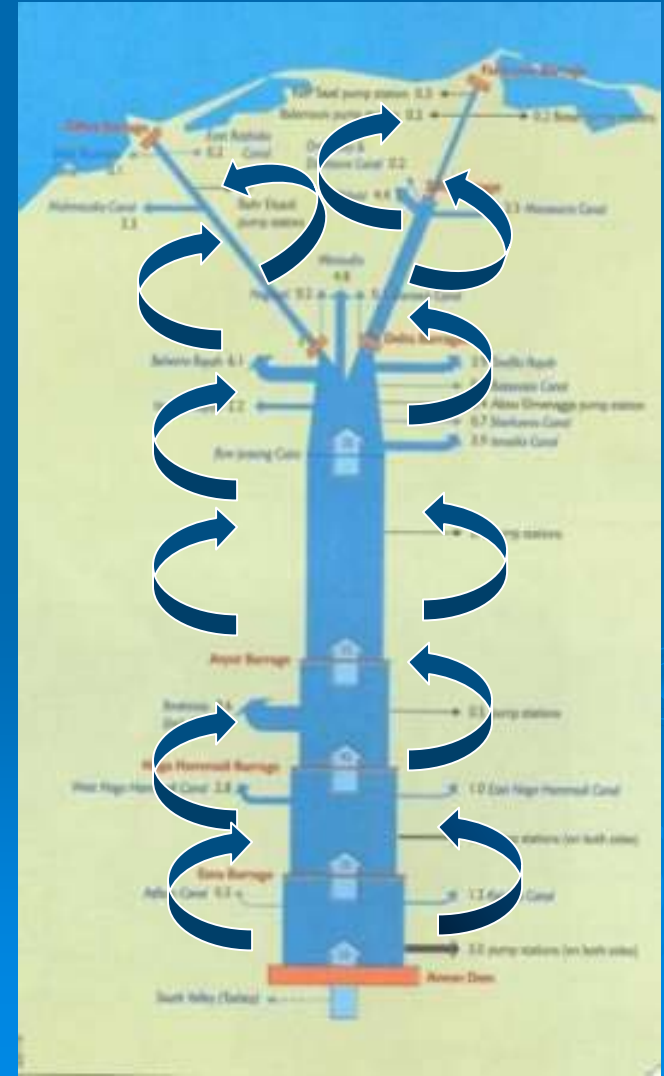
Location :	Northeast Africa
Climate:	Hyper Arid
Surface Area:	1, 000, 000 km²
Population:	77x 10⁶ (~2% increase/ yr)
Inhabited Area:	4 % of the total area
Water Resources:	98% provided by the Nile



Water Scarcity



Closed Basin



Water Supply and Demand in 1977

Supply Sources

Nile Water	55.5
Non-renewable groundwater	00.6
Rainfall harvesting	01.0
Total	57.1

Demand

Agriculture	57.8
Municipal and Domestic	4.7
Industrial	7.5
Navigation	0.2
Total	70.2

Deficit =13.1 BCM/Yr

Water Supply and Demand in 2007

(BCM/Yr)

Supply Sources

Nile flow	55.5
Non-renewable groundwater	3.8
Rainfall harvesting	1.5
Total	60.8

Sectoral Demands

Agriculture	63.6
Municipal and Domestic	6.6
Industrial	18.7
Navigation	0.2
Total	89.1

Deficit = 28.3 BCM/Yr

Meeting the Supply –Demand Challenge

Supply Augmentation

Upper Nile basin

Groundwater

Water Reuse

Desalination



Ag. Drainage water



Wastewater

Demand Management

Water use efficiency

Water reallocation

Crop pattern

Economic instruments

Water Reuse

BCM / yr

Source	1977	2017
Reuse of agricultural drainage water	4.4	8.4
Treated wastewater reuse	0.2	2.0
Groundwater in the Nile Valley and Delta	4.8	7.5
Total	8.4	17.9

Water Reuse Considerations

➤ Technical

- ☐ Space
- ☐ Time
- ☐ Quantity
- ☐ Quality

➤ Health & Environment

- ☐ Pollution
- ☐ Water born diseases
- ☐ Northern lake ecology
- ☐ Salinization

➤ Economic

- ☐ Cost/Benefit
- ☐ Financing

➤ Social

- ☐ Acceptance
- ☐ Practices
- ☐ Awareness

➤ Legal, Regulation and Institutional

- ☐ Law 48 and Law 4
- ☐ Law enforcement
- ☐ Monitoring and enforcement
- ☐ Guidelines

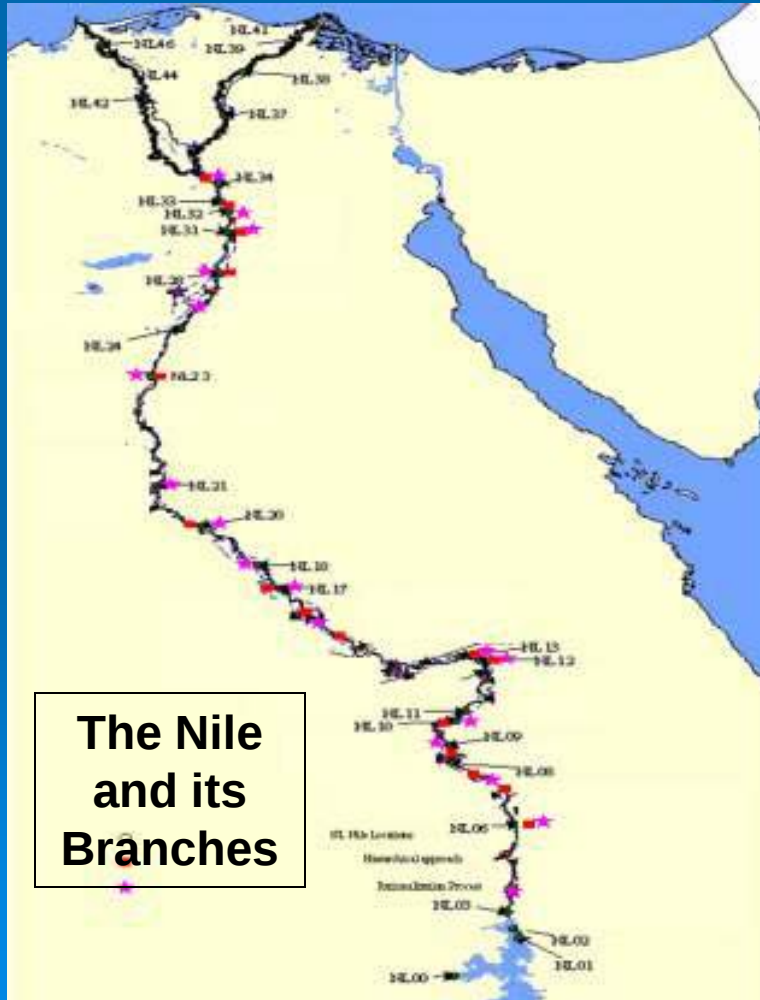
Agricultural Drainage Reuse



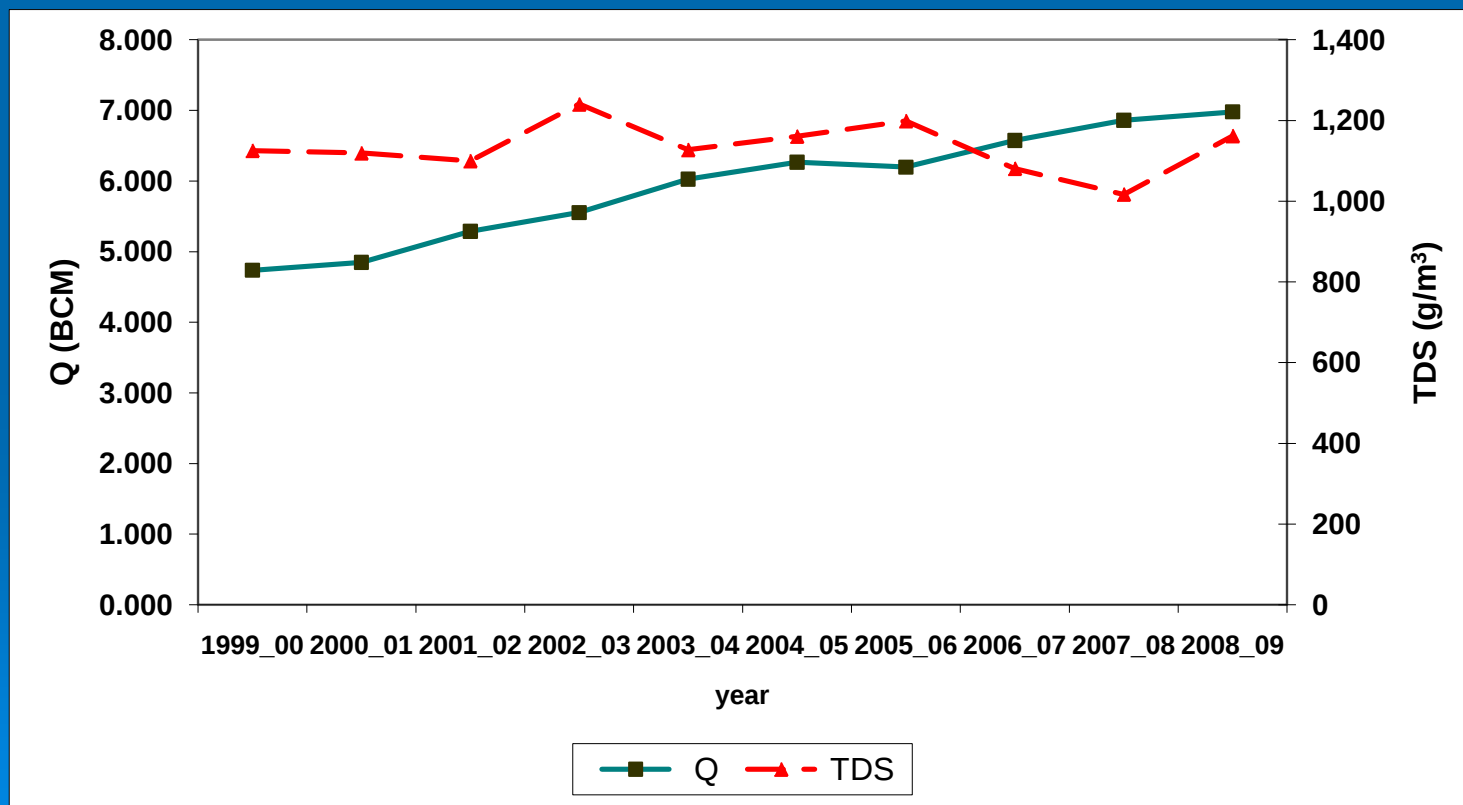
Irrigation & Drainage System in the Nile Delta



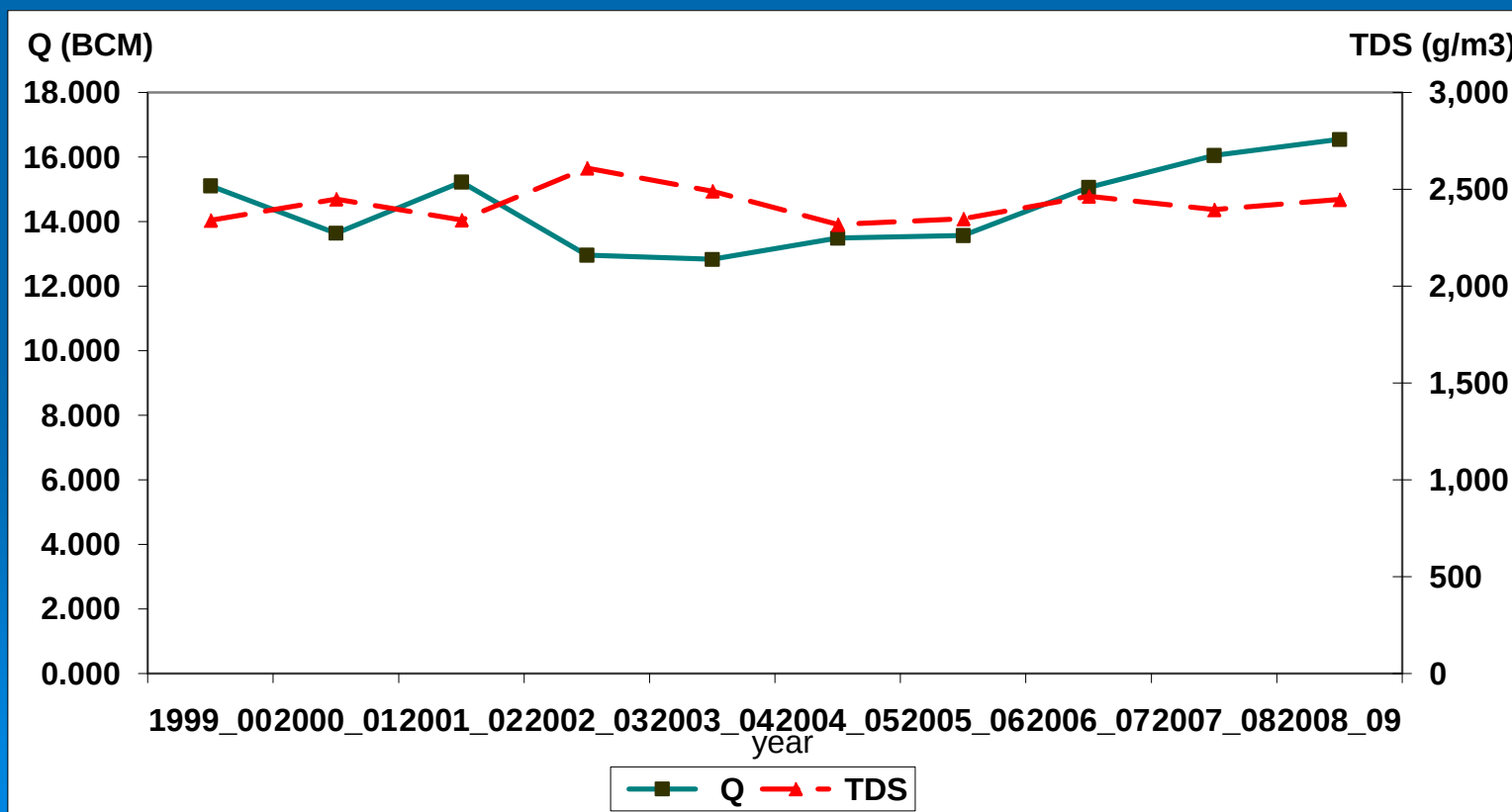
The National Water Quality Monitoring Network



Drainage Water Reuse (1999-2009)



Agricultural Drainage to the Sea (1999-2009)



Reuse of Agricultural Drainage Water

Advantages

- Large quantities
- Limited infrastructure needs
- Low cost

Disadvantages

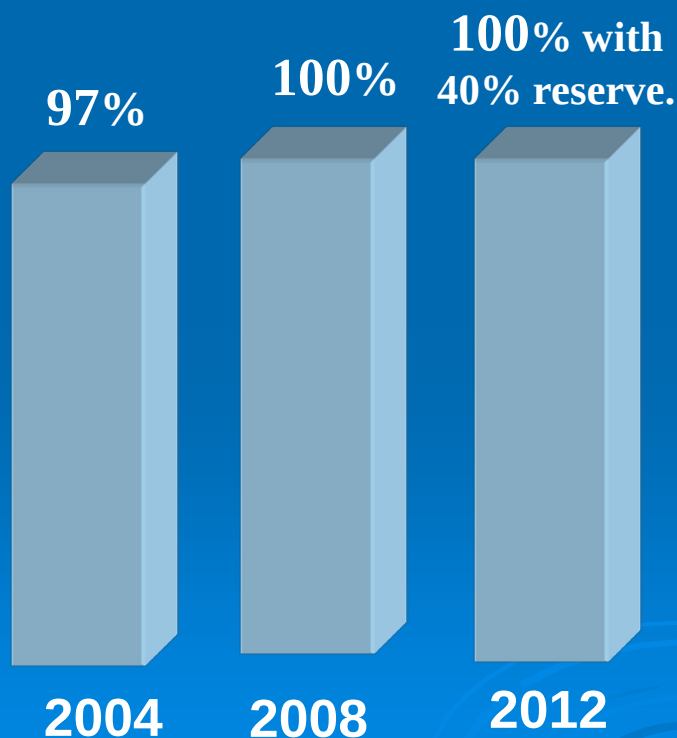
- High salinity
- Pollution
- Health risk
- Environmental degradation

Wastewater Reuse



Water Supply Coverage in Egypt

Cities (217)

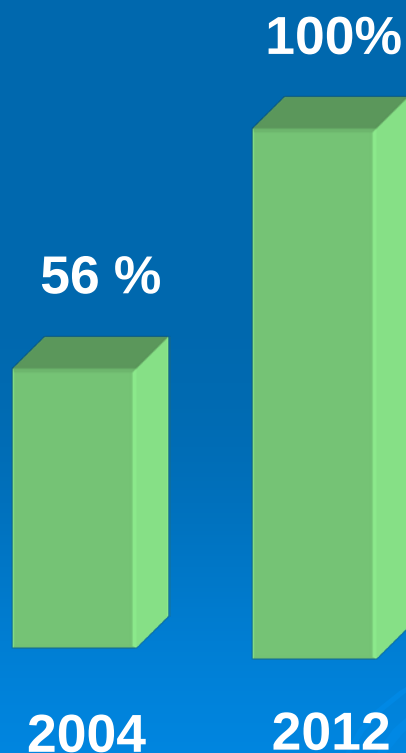


Villages (4617)

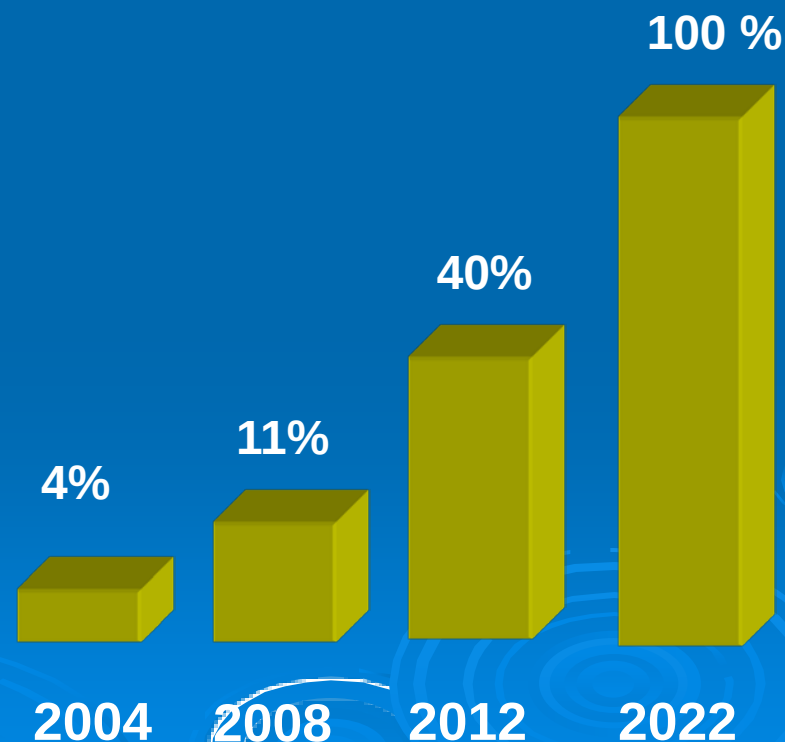


Wastewater Coverage percentage in Egypt

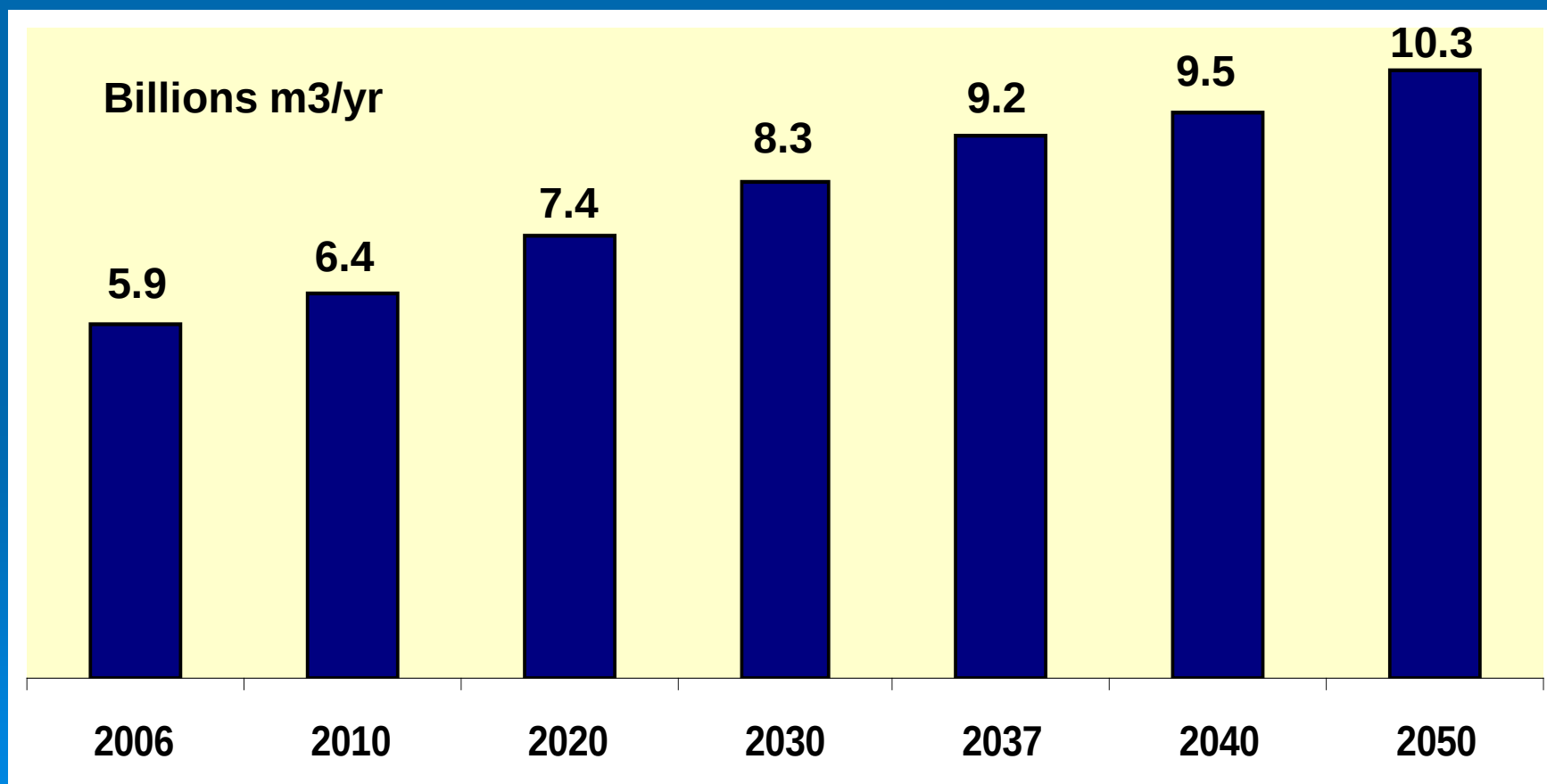
Cities (217)



Villages (4617)

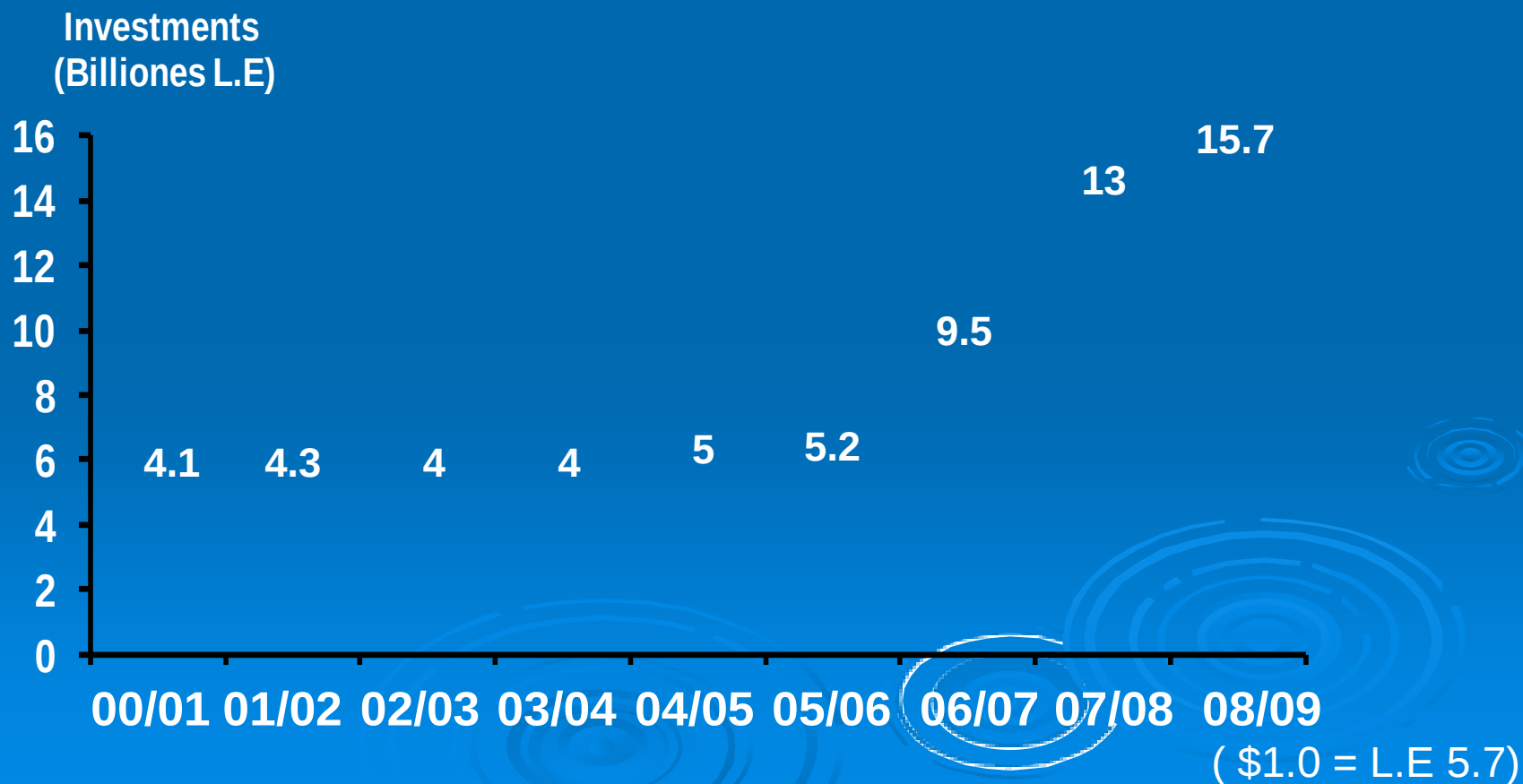


Wastewater Quantity According to the Egyptian Code



Quantity of Wastewater according to Egyptian code is 80% about of water quantity

Annual Investments in Water & Sector Wastewater



Treated Wastewater Reuse

**Total amount of wastewater is 6.4
Billions m³/yr**

**About 3.6 Billions m³/yr is
treated wastewater**

**About 2.8 Billions m³/yr is
not treated**

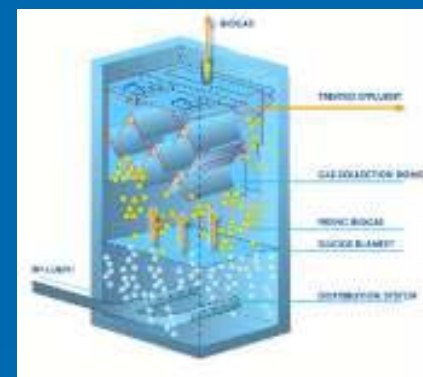
**20% Primary
treatment**

**80% Secondary
treatment**

Low-cost wastewater treatment for rural sanitation.

Drivers

- Low cost (initial & running).
- Population intensity.
- Community participation.
- Minimum energy requirements.
- Availability of skilled labor.
- Minimum area required.
- Locally Manufactured System.
- Low excess sludge production.



Conclusions

- Water reuse plays a key role in closing the gap between the water supply and demand in Egypt
- Quality of reused water is a source of health and environmental concerns.
- The increasing trend of drainage water pollution should be reversed.
- High investments are made to improve the wastewater collection and treatment

THANK YOU

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www.arabwatercouncil.org