Water & Tourism Nexus

Achieving Sustainability Through Water Reuse

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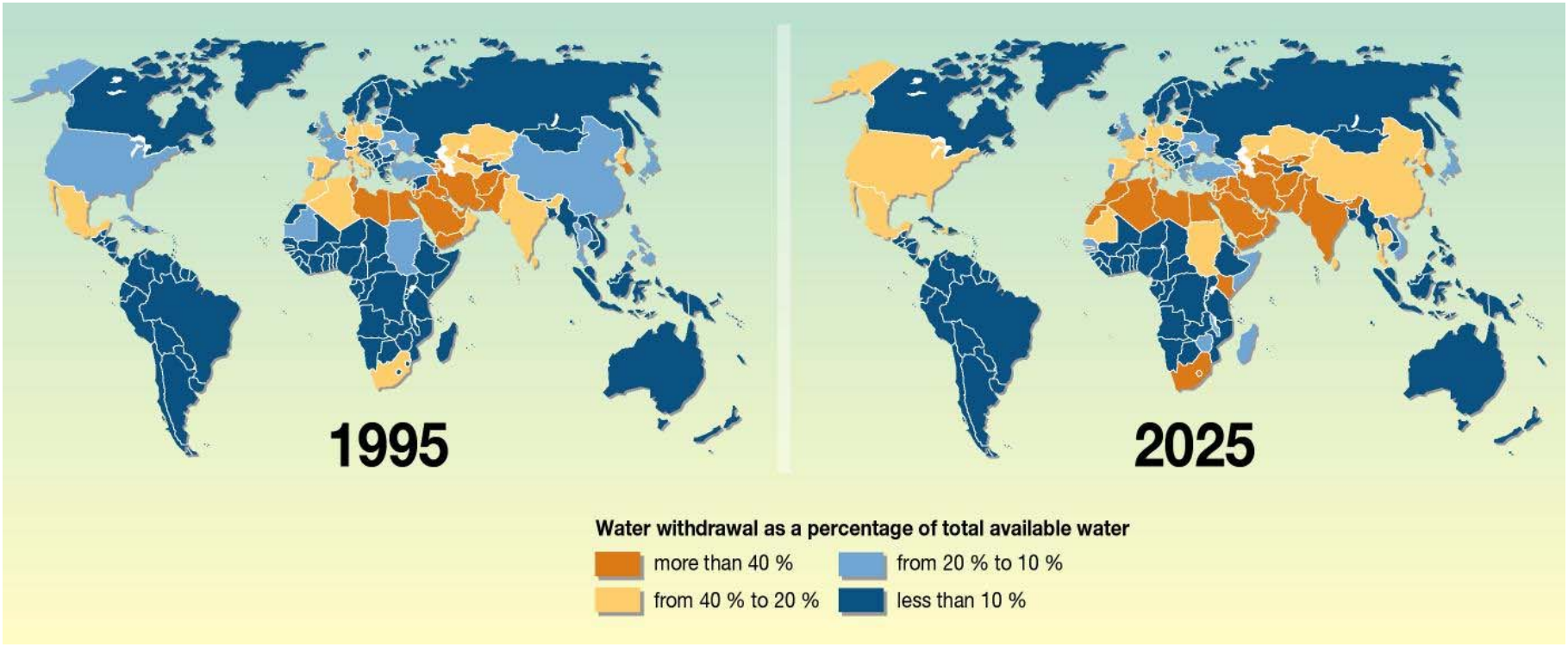
Barcelona, May 17th, 2017

An adequate supply of good-quality water is
a pre-requisite for economic and social progress

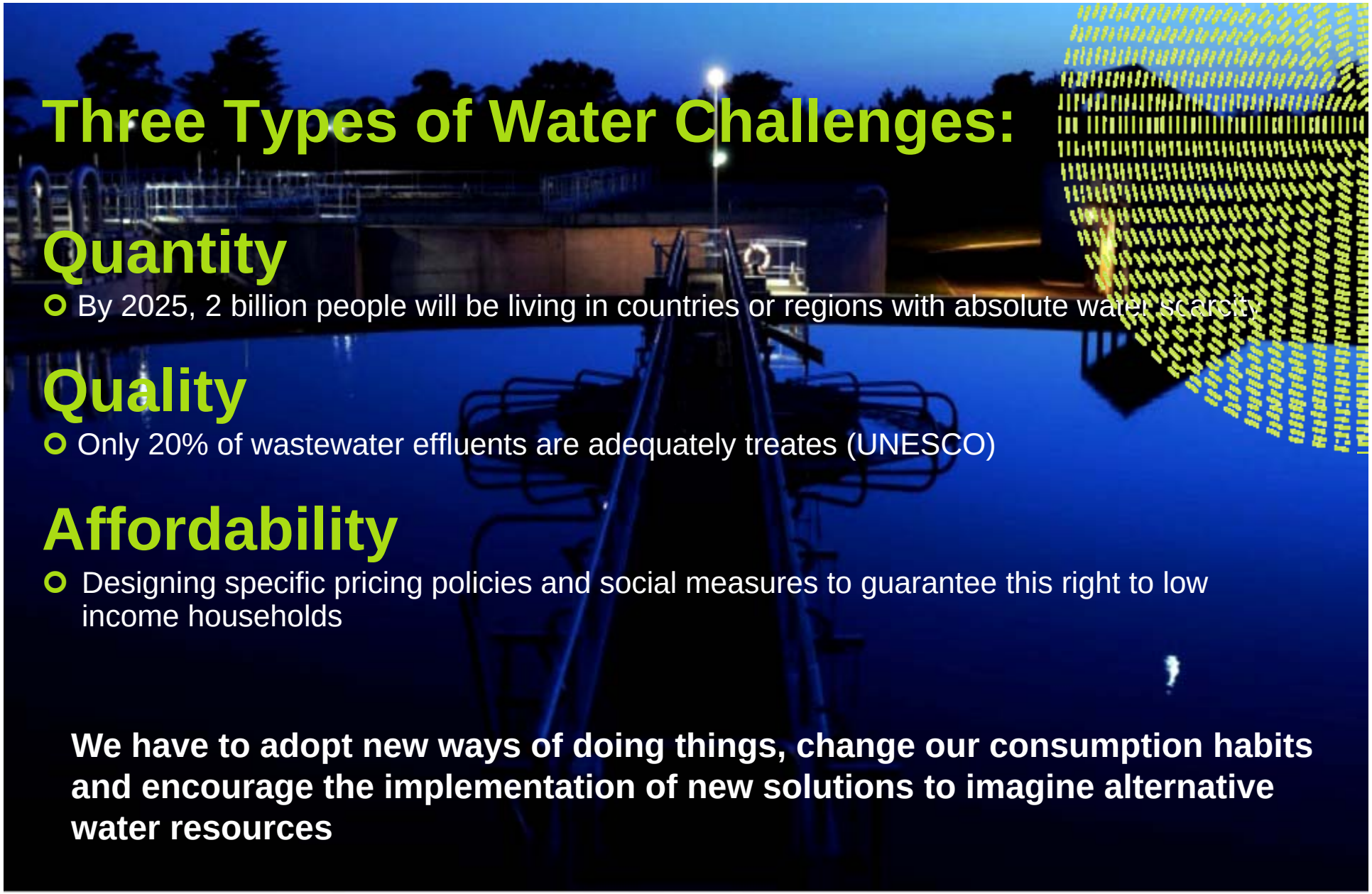
SUEZ

Water Under Pressure: Hydric Stress in the World



Water needs in the world –
70% agriculture, 20% industrial, and 10% drinking water

Water Under Pressure: Hydric Stress in the Mediterranean Region



Three Types of Water Challenges:

Quantity

- By 2025, 2 billion people will be living in countries or regions with absolute water scarcity

Quality

- Only 20% of wastewater effluents are adequately treates (UNESCO)

Affordability

- Designing specific pricing policies and social measures to guarantee this right to low income households

We have to adopt new ways of doing things, change our consumption habits and encourage the implementation of new solutions to imagine alternative water resources

Water & Tourism Nexus

New Water Management Challenges
Securing the various water uses
Solving water & energy nexus

- Water is critical resource for tourism
- Water scarcity threatens tourism industry
- Tourism industry is key element for economic development in Islands and coastal areas with increasing water scarcity
- Sustainable water management is critical to secure a future for tourism

40% of municipal and industrial water needs will not be met in 2030

Water & Tourism Nexus

How to control business risks and mitigate climate change impacts?

Develop adequate site-specific water risk management plans (well adapted to local conditions)

Apply holistic approach to water management to sustain desirable quality, efficiency, effectiveness and economic viability

Diversify your water portfolio with higher reliance on alternative resources,
e.g. water reuse and recycling, desalination, rainwater harvesting…

- Desalination is recognized as a main source for reliable and drought-proof supply in costal areas
- Wastewater treatment and reuse are becoming key components of circular economy for resource recovery and production of drought-proof recycled water

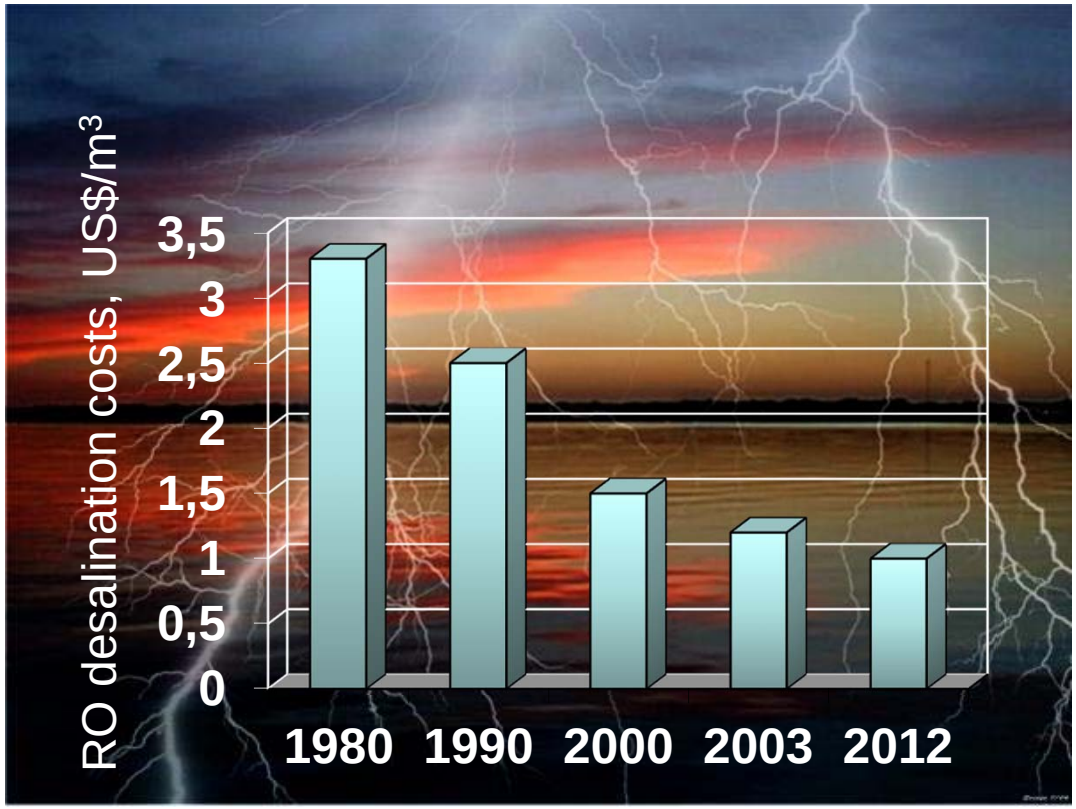
Address Water-Energy Nexus

Sustainable Water Cycles

How can technology and innovation create sustainability?

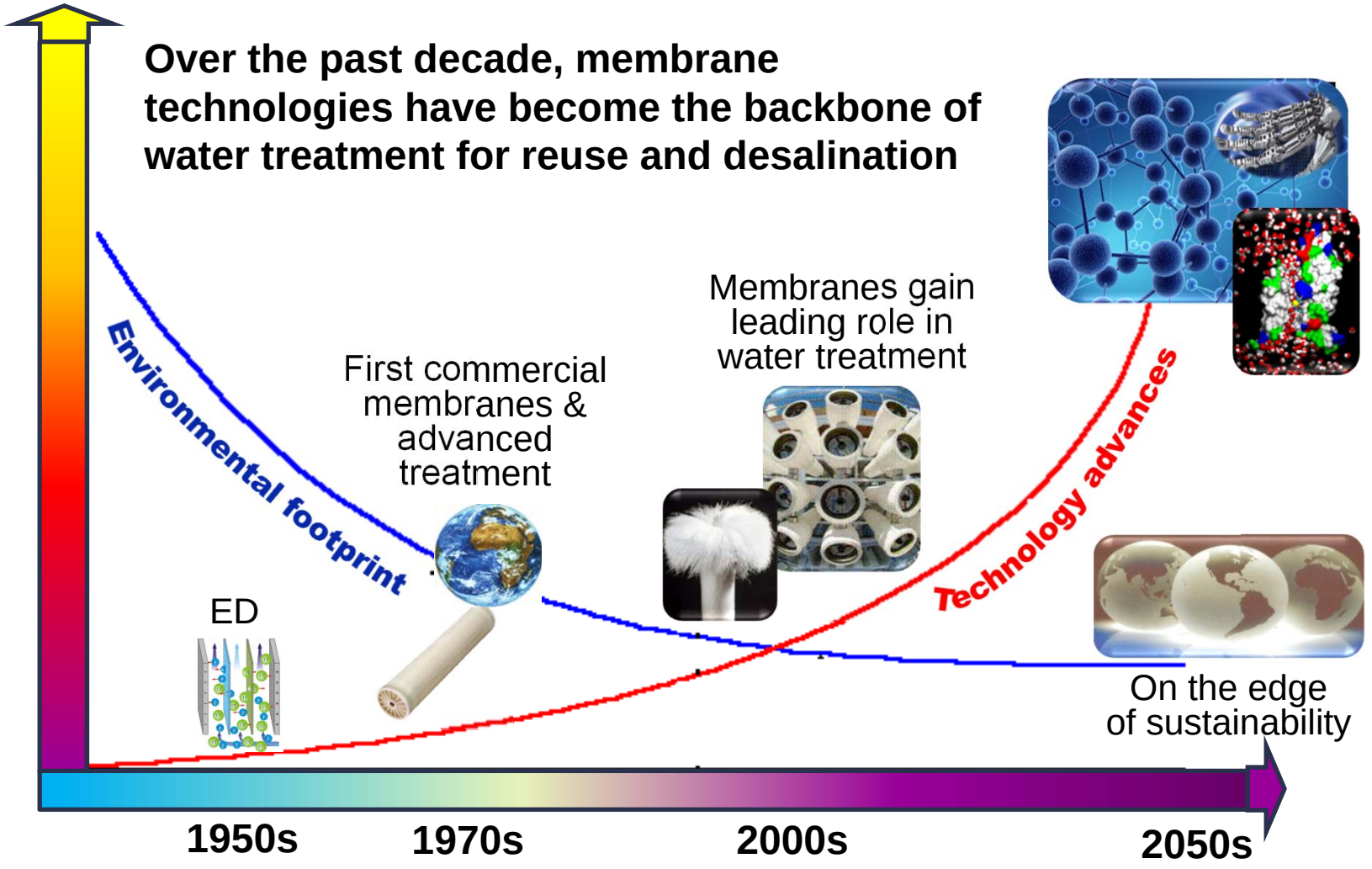
Latest water treatment technologies allow to accelerate industrial production and recover valuable by-products at competitive cost

- **Paradigm shift in technology and materials**
- **Green solutions**
- **Advance in membrane technology**
  - ✓ Reduction of membrane costs
  - ✓ High standardization and commoditization of RO membranes
  - ✓ Energy recovery

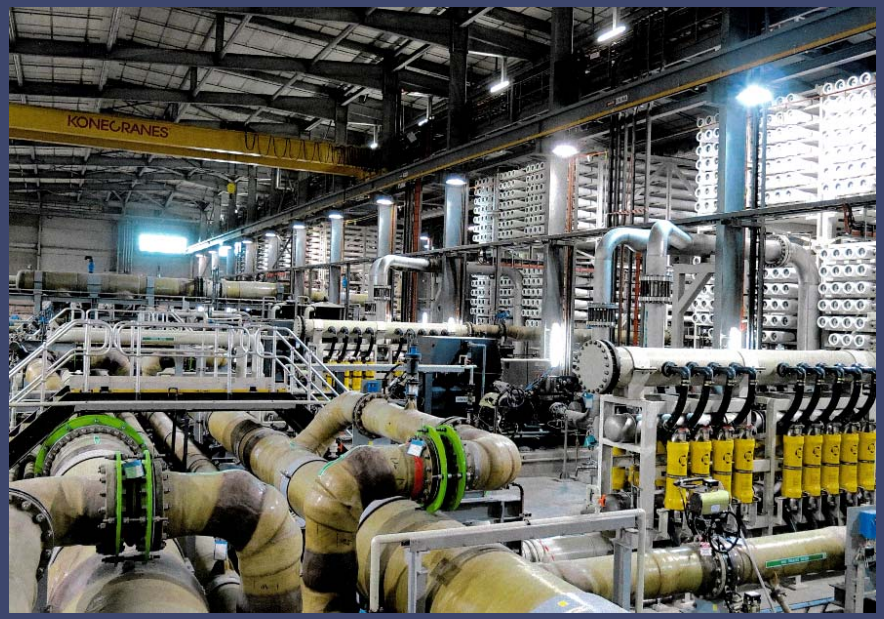


Sustainable Water Cycle

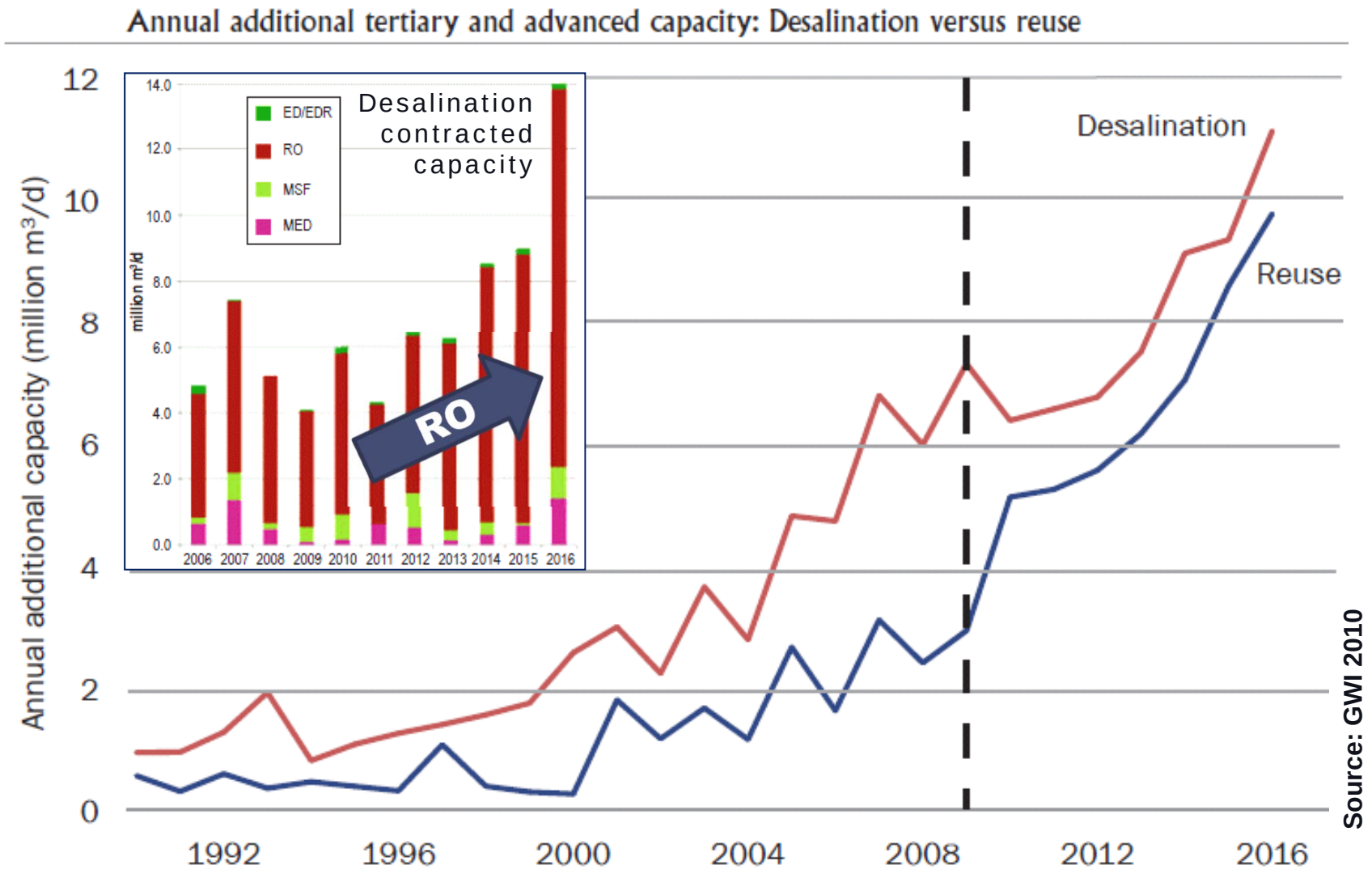
New challenges and new solutions



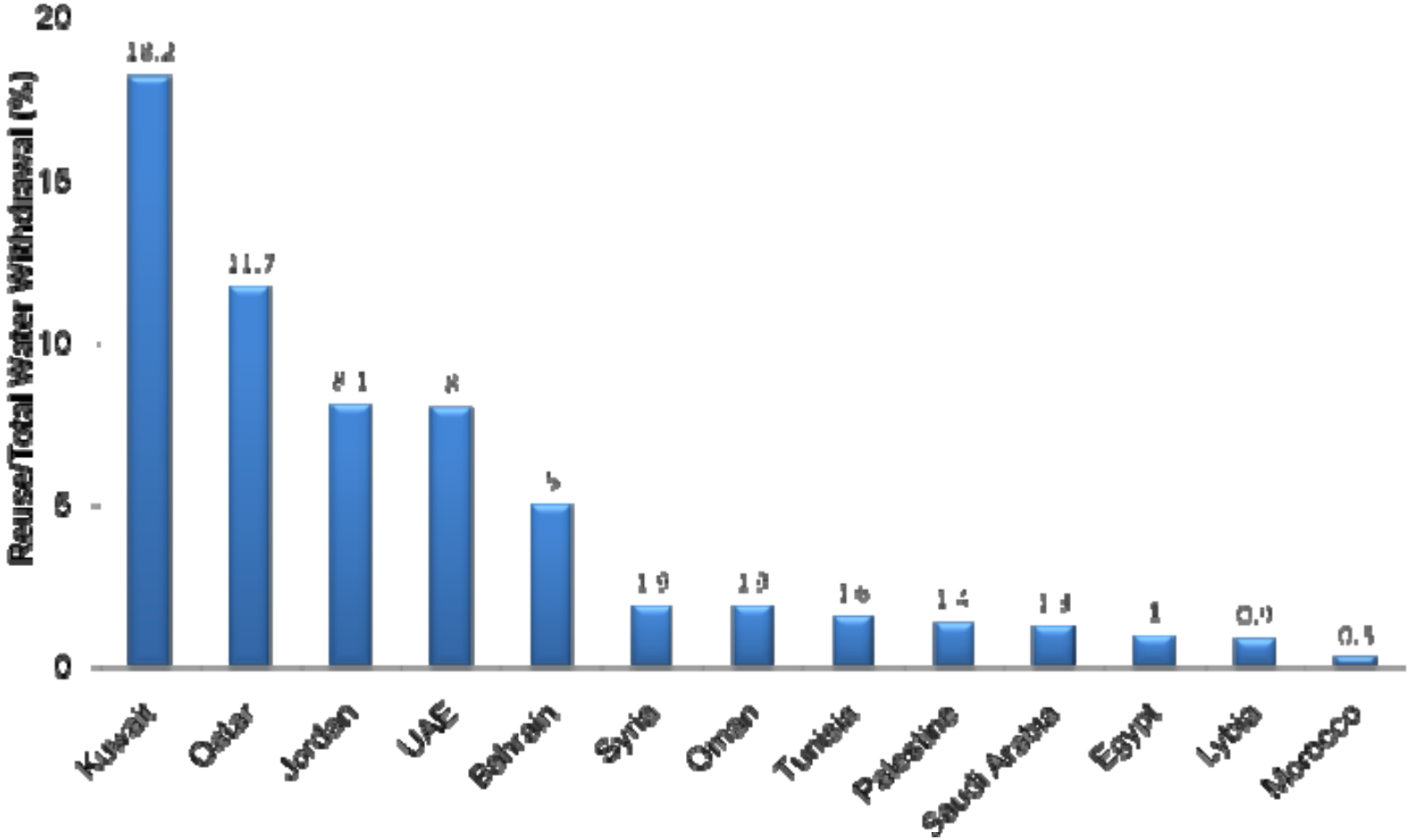
Role of Alternative Water Resources for Sustainable Water Cycles



Status and Trends in Desalination and Water Reuse

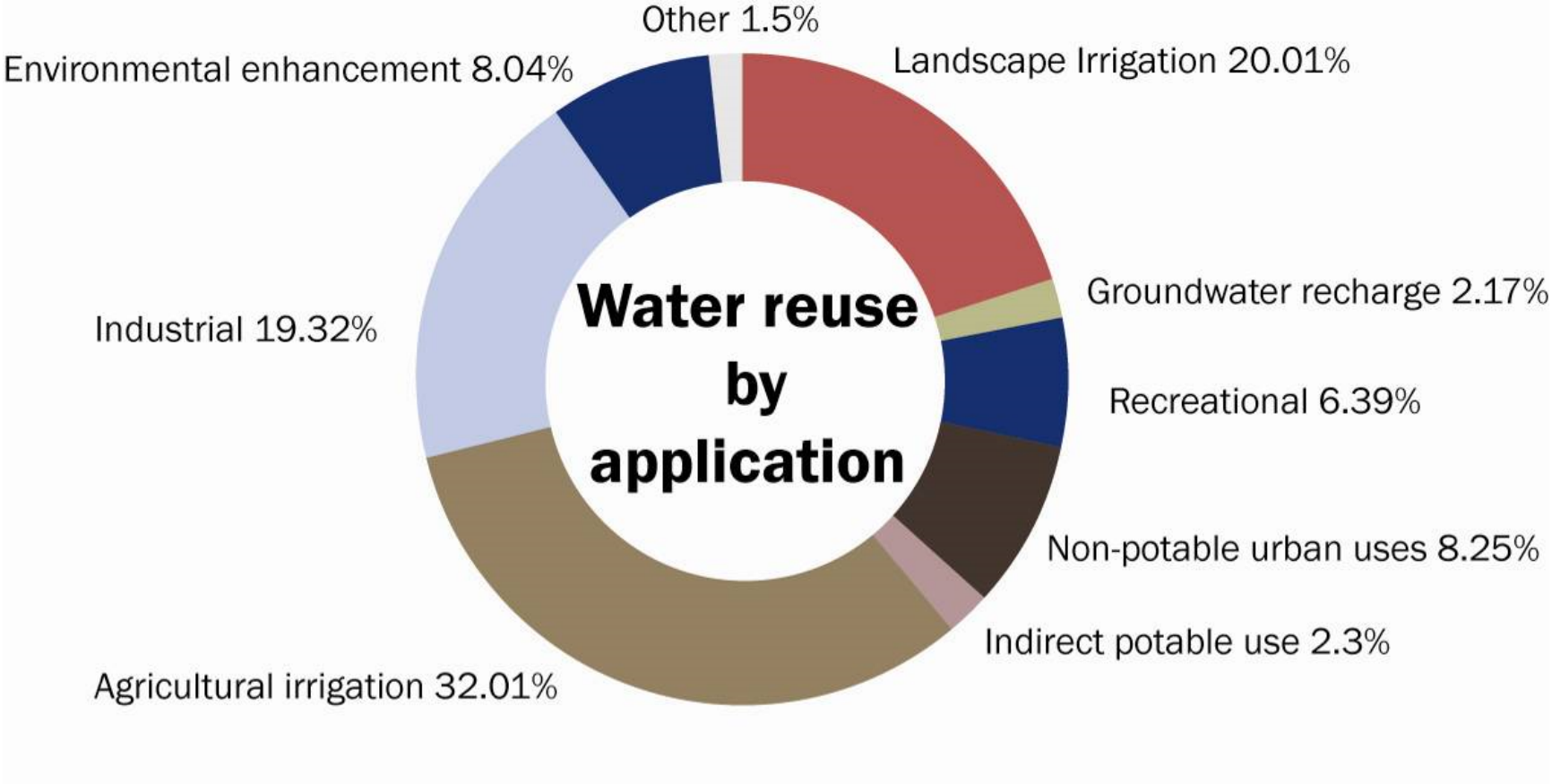


Recycled Water Reused as Percent of Total Water Withdrawal in MENA Countries



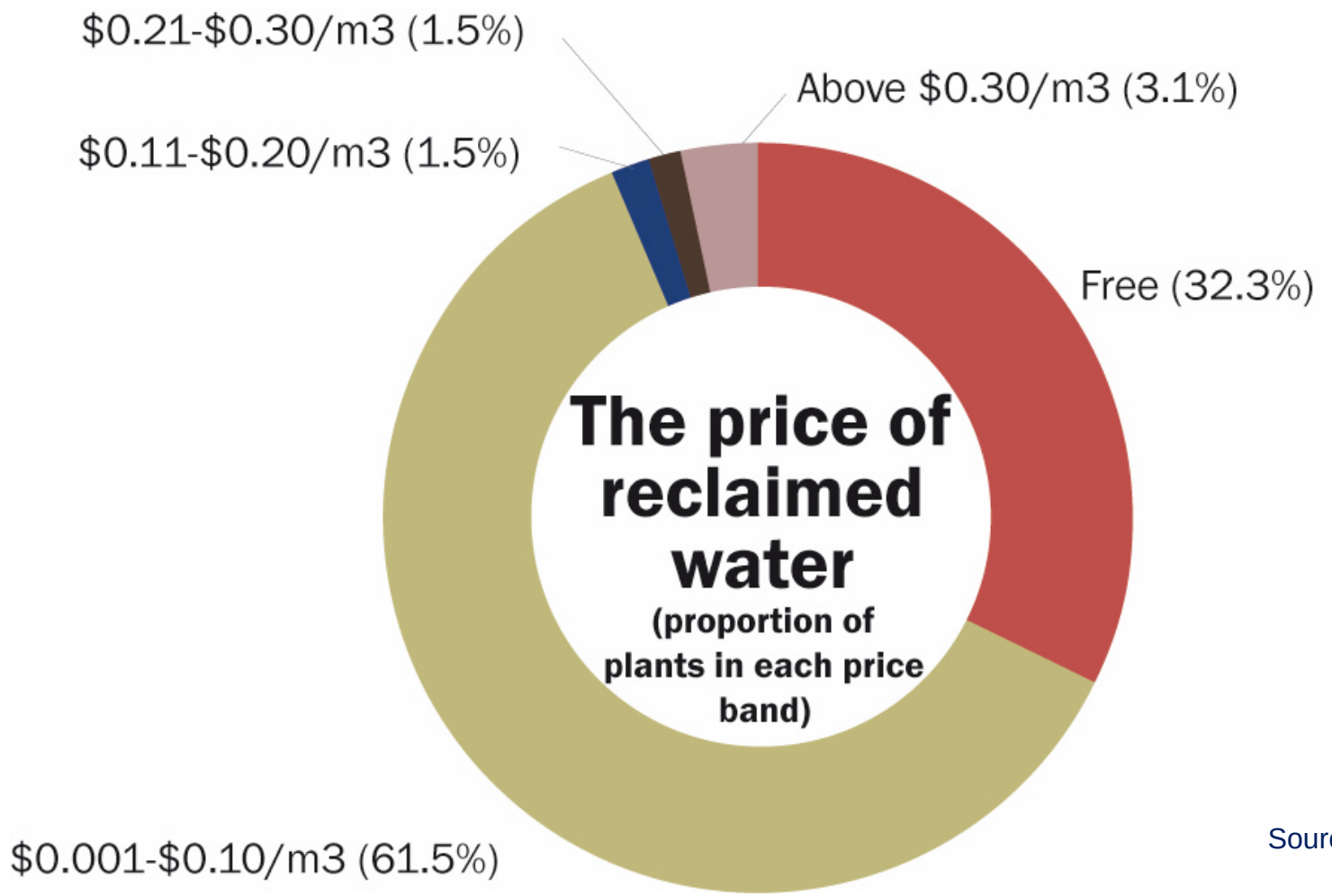
Source: Qadir et al., 2009 (Based on data from FAO-AQUASTAT 2009; USEPA 2004)

Water Reuse: Applications of Tertiary Treated Wastewater
(total all countries)



Source: GWI, 2010

Water Reuse: Pricing of Recycled Water
(total all countries)



Source: GWI, 2010

Status of Water Reuse in Europe

Key figures of water reuse

- Water reuse volume: 1 billion m^3/yr (1 km^3/yr)
- ~2.4% of the treated urban wastewater effluents
- <0.5% of annual EU freshwater withdrawals

Water reuse potential

- 6 billion m^3/yr

European strategy and policy on water reuse

- **Main policy objective**: to encourage efficient resource use and reduce pressures on the water environment
- Water reuse is a **top priority area** in the Strategic Implementation Plan of the European Innovation Partnership on Water
- Maximisation of water reuse is a **specific objective** in the Communication "Blueprint to safeguard Europe's water resources“

Main barriers of water reuse

- **Regulatory concerns** associated with process and water quality monitoring, as well as health risk assessment and management
- **Relatively high cost** of water reuse compared to conventional water supply
- Public acceptance and health liability

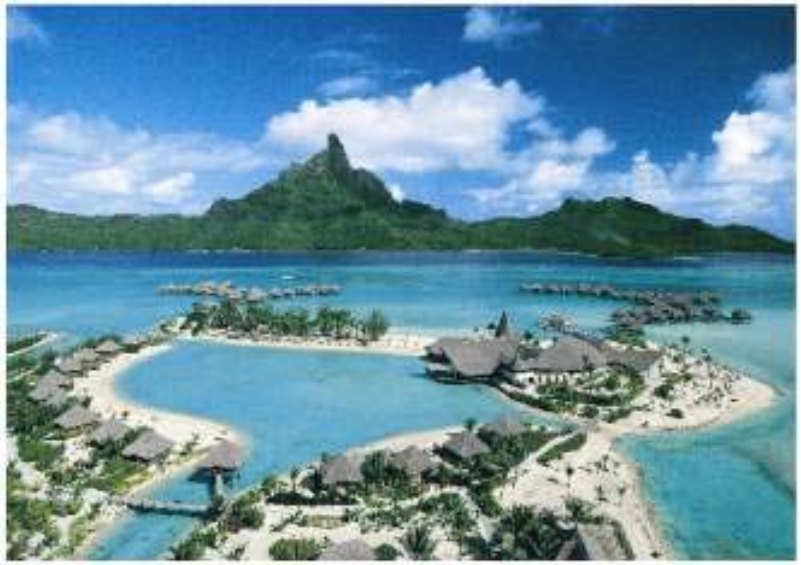
source: http://ec.europa.eu/environment/water/reuse.htm

Keys to Success of Water Reuse in Tourist Areas

- Political awareness: incentives of the Bora Bora's Major
- Policy of sustainable development
  - « Blue Flag of Europe »
  - 1st Price of SUEZ 2005 Innovation Trophies

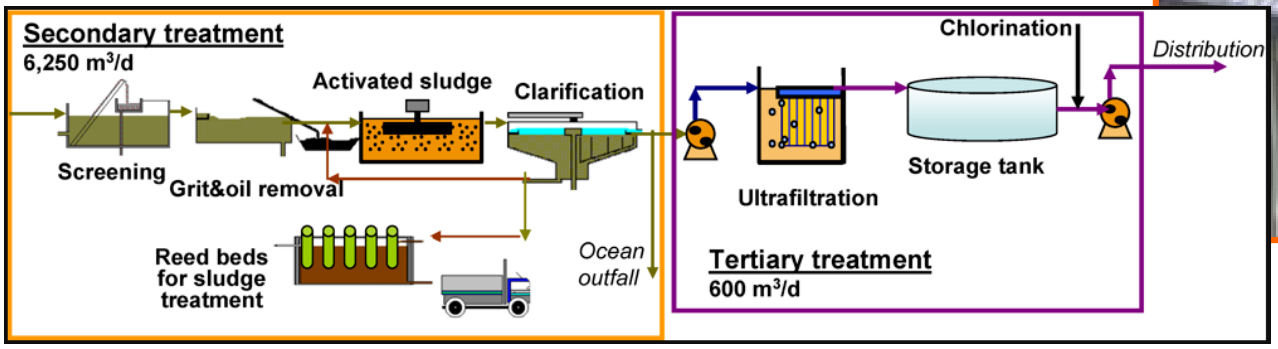
Bora Bora Touristic Island

- An unique and fragile environment to protect with sustainable and efficient solutions
  - ✓ 8,000 inhabitants + 200,000 tourists a year
  - ✓ The best of the image of French Polynesia
  - ✓ LUXURY Hotels and HIGH STANDARDS requirements from the tourism market



Driving Factors for Water Reuse in Bora Bora

- Water stress and increasing water demand
- Motivation of the municipality to protect water resources
- Strong community engagement
- Close cooperation between the stakeholders
- Adequate choice of the treatment technology and the ability to provide high-quality recycled water without any interruption



Recycled Water End-Users in Bora Bora

- Luxury hotels, mostly landscape irrigation, water falls, water bodies
- Boat washing
- Washing of construction engines and pressure tests of concrete
- Fire protection (boats)

Keys to Success of Water Reuse in Bora Bora

1. Strong political engagement

- The water reuse program in Bora Bora is an element of the global strategy of decision makers of integrated resource management
- Motivation of the elected representatives (leading role of the mayor)

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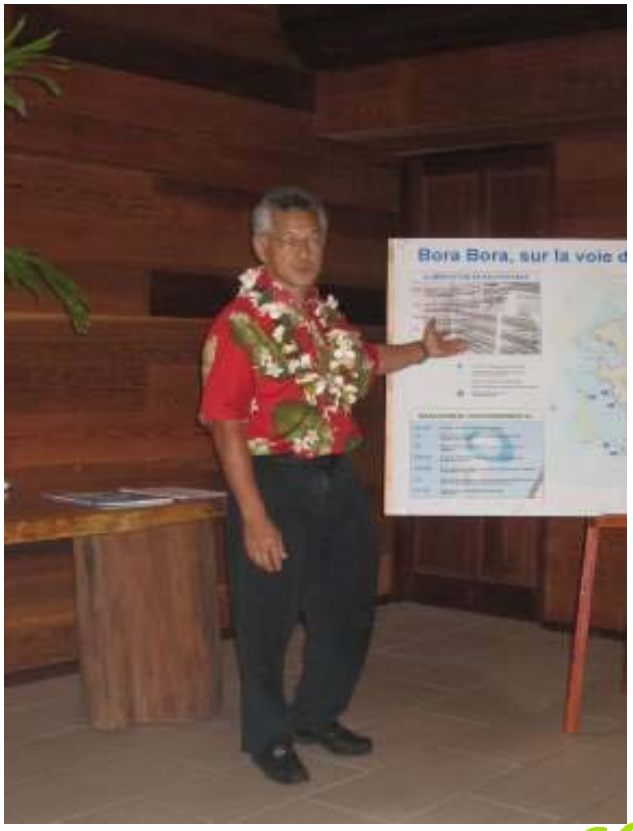
BORA BORA - 1er séminaire de la gestion de l'eau en milieu insulaire

L'eau, notre bien le plus précieux

► Interview

Éric Pommier

"Toutes les autres îles rencontrent des problèmes d'eau"



Keys to Success of Water Reuse in Bora Bora

2. Financial Incentives: pricing of recycled water

- Participation and satistaction of end user
  - ✓ The cost of high-quality recycled water = 2.5 to 3 times less expensive than potable water
  - ✓ Large users such as luxury hotels were the first to recognise economic benefits of water reuse
- Declining rate structure
  - ✓ Fixed annual charge of 187 € by connection

Parameter	Criteria	First block	Second block	Third block
Volume for large users, m^3/month	>350 m^3	<550	550 to 800	>800
Recycled water charge, €/m^3		2.35	2.18	1.65
Volume for medium users, m^3/month	<350 m^3	<110	110 to 200	>200
Recycled water charge, €/m^3		1.16	1.08	0.88
Volume for small users, m^3/month	<30 m^3	<5	5 to 10	>10
Recycled water charge, €/m^3		0.76	0.71	0.67

Keys to Success of Water Reuse in Bora Bora

3. Involvement and collaboration of all stakeholders

Keys to Success

4. Public education and communication

- Newspapers, TV, public meetings

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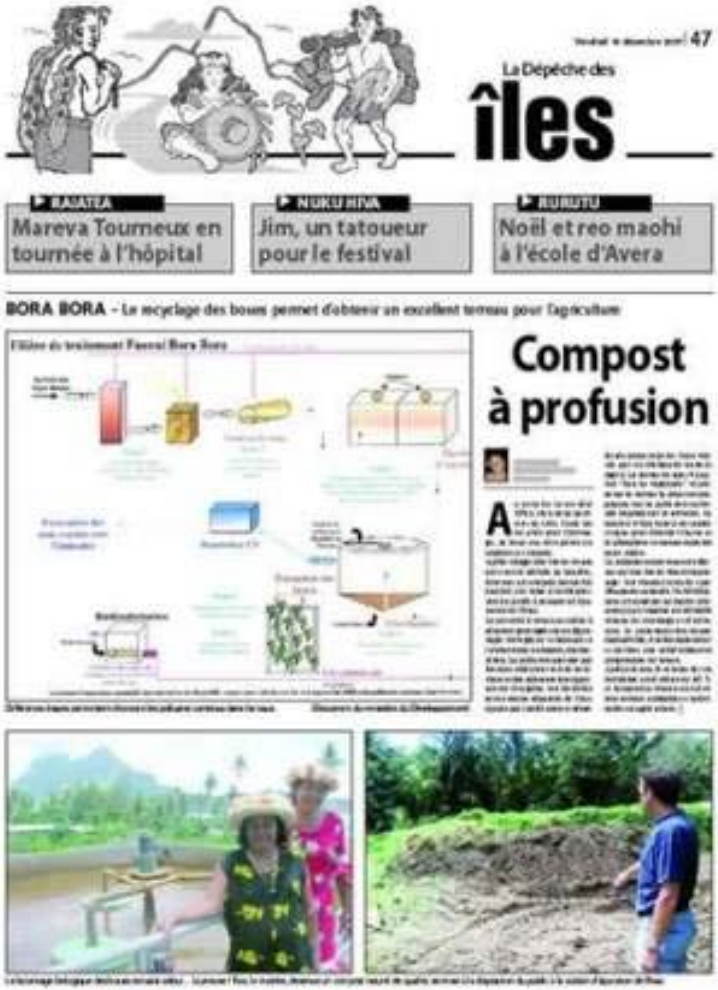
La Dépêche
Jeudi 15 novembre 2007

BORA BORA - Séminaire sur la gestion de l'eau, pour préserver la ressource

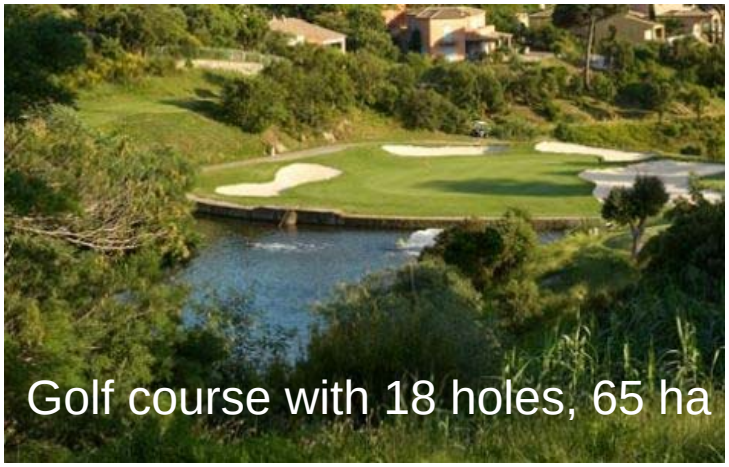
Eau potable : 8 % de l'eau utilisée




Case Study: Sainte Maxime

Keys to Success of Water Reuse in Sainte Maxime

1. Political awareness and subsidies
   - ✓ Subsidies from the General Council and Water Agency
   - ✓ Financial incentives (lower water price)
2. Reliable and sustainable operation
   - ✓ Public-private partnership
   - ✓ Proven and less expensive conventional tertiary treatment
     - Sand filtration + UV + Cl
     - Capacity of 2000 m^3/d (25% of the total plant capacity)
3. Well demonstrated benefits
   - ✓ Saving of potable water – 12%
   - ✓ Saving of fertilizers – 20%



Concluding remarks

Major Challenges for Sustainable Growth of Water Reuse

Adequate policy

- Converge regulatory frameworks
- Provide flexible legally binding framework taking into account local needs and feasibility for implementation
- Diversify water reuse applications

Economic viability

- Implement appropriate water management policy and pricing
- Provide appropriate incentives (administrative, institutional and financing)
- Select proven, reliable and easy to operate technologies

Public Perception

- Involve all stakeholders at early stages of the reuse project
- Improve communication and public education
- Frame best management practices

Innovation in technology & monitoring

- Improve health safety trough improved reliability and water quality control
- Support research and innovation


Develop sustainable water cycles and consider water reuse as a cost competitive and energy saving option to increase water availability
Each water drop is precious: so use water again safely and for the right purpose