

Water scarcity and pricing policy

PECC roudtable, Bora Bora,
13-15th of November, 2007

Nicolas Renard, Statistics and Economics Specialist Group, IWA



“The drying up of the Aral Sea is far more advantageous than preserving it.... Cultivation of cotton alone will pay for the existing Aral Sea.”

Could pricing policies reduce or prevent exposure to future water shortages?

- Contents:
 - ➔ how we moved from water abundance to scarcity in many regions;
 - ➔ the generalized water underpricing and its shortcomings
 - ➔ the resort to non conventional resources in order to escape to the so called “*gloomy arithmetic of water*”
 - ➔ the way ahead toward a coherent water resource strategy, combining tariff and non-tariff solutions



Part I

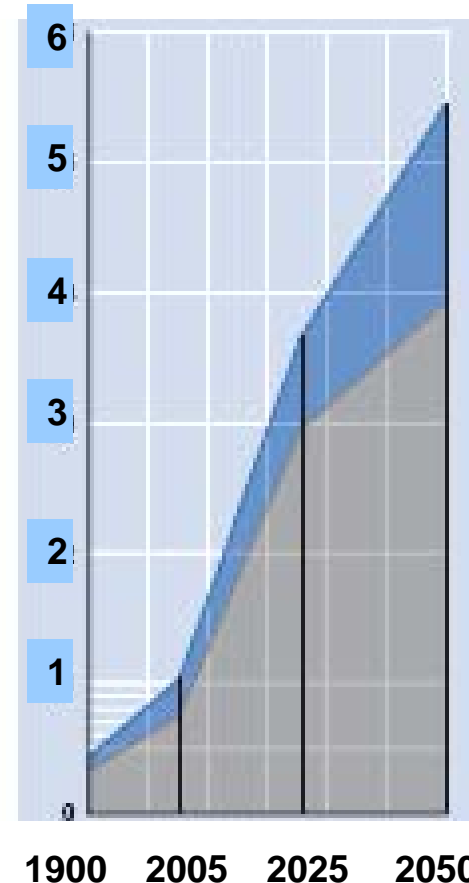


Welcome
in a world
of scarce resources!

A context of growing scarcity

- For thousands of years, people lived without paying much attention to water, except in arid regions. But today, water resources appear to be dwindling.
 - ➔ We are seeing a resurgence of the problems of quantity that we thought had been solved.
 - ➔ Today, 700 million people live below the water-stress threshold.
 - ➔ In northern China, an estimated quarter of the flow of the Yellow River is needed to maintain the integrity of the environment. Human withdrawal currently leaves less than 10%;
 - ➔ In few decades, many Asian coastal cities have consumed a large part of their groundwater resources, which sometimes took centuries to fill.

**Billion people
in water scarcity
or stress**



**Water scarcity:
less than 1,000
m³/pers./year**

**Water stress:
less than 1,700
m³/pers./year**

Source: Human Development
Report 2006, UNDP

There are ever increasing withdrawals from finite resources

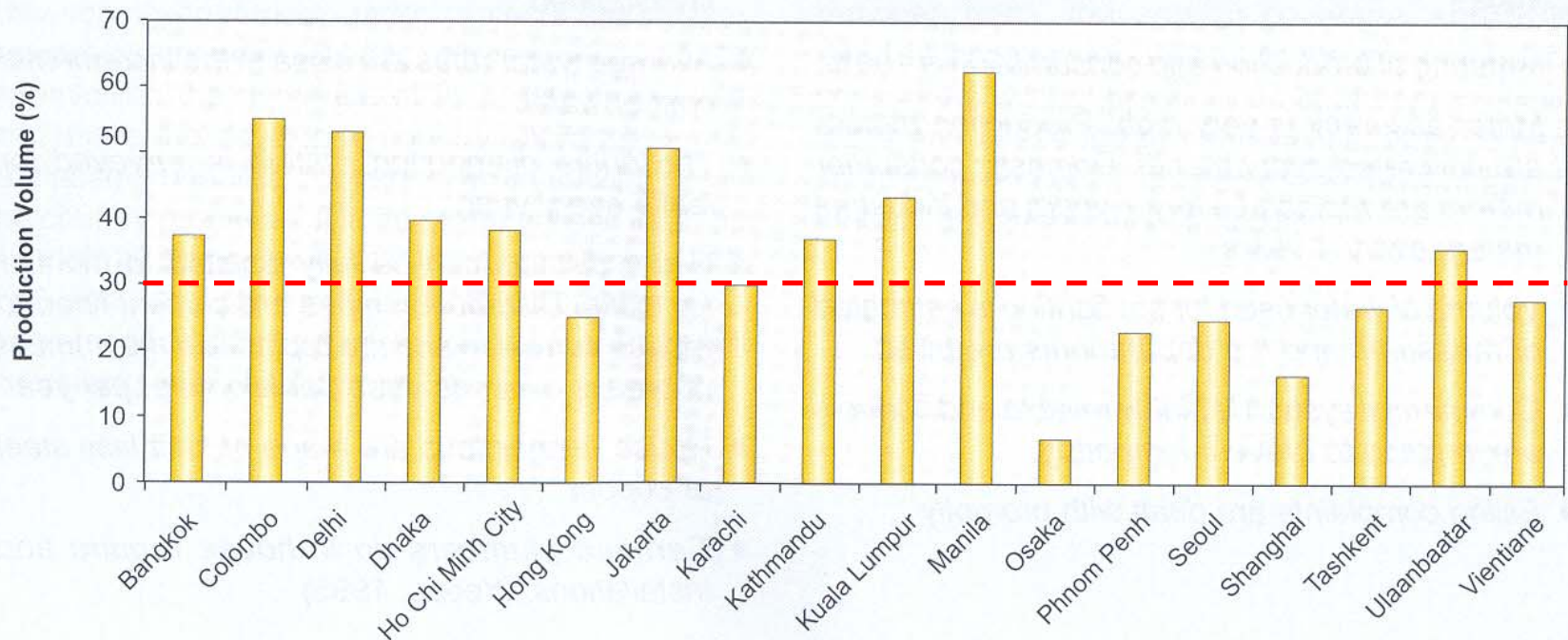
- A lot of human communities are living beyond their hydrologic means.
 - ➔ Dubai is located in the desert, but its water demand is rising by an average rate of 15 % each year!
 - ➔ 15 countries annually consume more than 100 % of their renewable water resources.
 - ➔ Nearly all Caribbean islands are facing water stressed situations or quality deficits.
- Supplying water has little to do with nature:
 - ➔ Vietnam and Cambodia receive tremendous amounts of rainfall but urban dwellers suffer from drinking water shortages;
 - ➔ On the contrary, in the western United States, good infrastructure compensates for low levels of water reserves.



The continuously growing demand means that there will no longer be sufficient water to afford ourselves the luxury of misusing it.

- The carefree era of profusion is coming to an end. And with it, poor water management must also be brought to a halt.
- Absolute scarcity is the exception, not the rule. Most countries have enough water to meet human and environmental needs. The problem is management.

Figure 9.1 Non-Revenue Water in Asian Cities (2001)



Part II



Does
water pricing
reflect
water scarcity?

A generalized water underpricing (1)

- Customer economics has always been based on the concept of scarcity.
 - ➔ When a product grows scarce, its price, supply and demand become an issue. Scarcity has therefore led to the extraordinary expansion of human activities.
- Water is a very specific good and service.
 - ➔ Unlike food or oil, water is not economically transferable in bulk quantities, there is limited scope for trade to even out imbalances.
 - ➔ Water is predominantly a fixed costs business, which product – the cubic meter – is mainly billed on a variable basis: the volumes consumed.
- Water has been treated as an environmental resource with no scarcity value.
 - ➔ There is obvious asymmetry in the way that governments measure the value of financial capital and natural resource capital, such as water.
 - ➔ The large-scale application of low tariffs led to massive wastage of water because the consumer has not been given any sense of responsibility.
 - ➔ Many developed countries fix uniform rate for water tariff. The economic signal given is that the m³ used for basic needs has the same value than the one dedicated to luxury use.
 - ➔ In developing countries, increasing block tariffs are widely used to lower the price of water for the poorest rather than to prevent overuse of scarce resource

Different roles of a tariff policy



In most of the cases, this environmental function of a water tariff policy has been completely let aside.

A generalized water underpricing (2)

- Agriculture consumes more water than any other sector, and wastes the most:
 - ➔ In many irrigation systems, 60% of the water is lost before serving its purpose
 - ➔ Irrigation water is essentially not priced. If environmental cost recovery were organized at a fair price and sector by sector, most American and Asian farmers would go bankrupt.
 - ➔ Nobody pays the scarcity costs: they are not integrated into the price of water, although the economic theory recommends internalizing all the costs in tariffs.
- The cost of drought reveals the shortcomings of imbalanced consumption patterns and inappropriate resource management strategies.
 - ➔ The cost of the 2003 European heatwaves amounted to 8.7 billion €
 - ➔ In England, the 2006 drought was dramatic. only 20 % of consumers have a meter.
 - ➔ in 2005, Belle-Ile was plagued by a water shortage after a 3 year drought. Local authorities had to supply the island by a 7,000 m³ water tanker. The cost of this rescue operation amounted to 2.8 million €, either 23 €/m³.



What can we learn from these water crises?

- We need to better anticipate the couple supply-demand, in particular in isolated communities which can't be connected to neighbour networks in case of shortage.
- We need to recover extra-costs on those who generate them, in particular in regions which are tourist destination.
- Acknowledging scarcity means that we must introduce mechanisms to manage it better.
 - ➔ Every time that scarcity is ignored by economic mechanisms, the result is sure to be, in addition to scarcity, wasting of the remaining resources. Pricing policies need to better reflect the scarcity value of water and discourage depletion of groundwater.
 - ➔ Thirsty world needs higher water prices. Scarcity is ultimately a function of supply and demand. The linkage between supply and demand is established by the price of water and public choices.
 - ➔ The objective is to gradually switch from a culture of water supply to a culture of water demand management.



Part III



Namibia

New resources
to deal with
new scarcities

Water is too precious to be used only once before being returned to nature

- Wastewater recycling is a tried-and-tested solution for producing water suitable for industrial, agricultural and even domestic use.
- Turning wastewater into a resource is all the more a positive strategy since it is the only water resource which expands as a town's or country's economy expands.
- In the world, 165 billion m³ of wastewater are collected and treated, but only 2% are reused. In Windhoek, direct water reclamation for potable use has been operating since 1968.
 - ➔ It was a world first. This solution makes it possible to manage the Windhoek's chronic water deficit.
 - ➔ Without the new reclamation facility, the city's population will be deprived of 35% of its actual water resource availability.
 - ➔ The water reclamation scheme has been commonly accepted by the public for 40 years.



Windhoek new production plant

What are the costs and prices of regenerated wastewater?

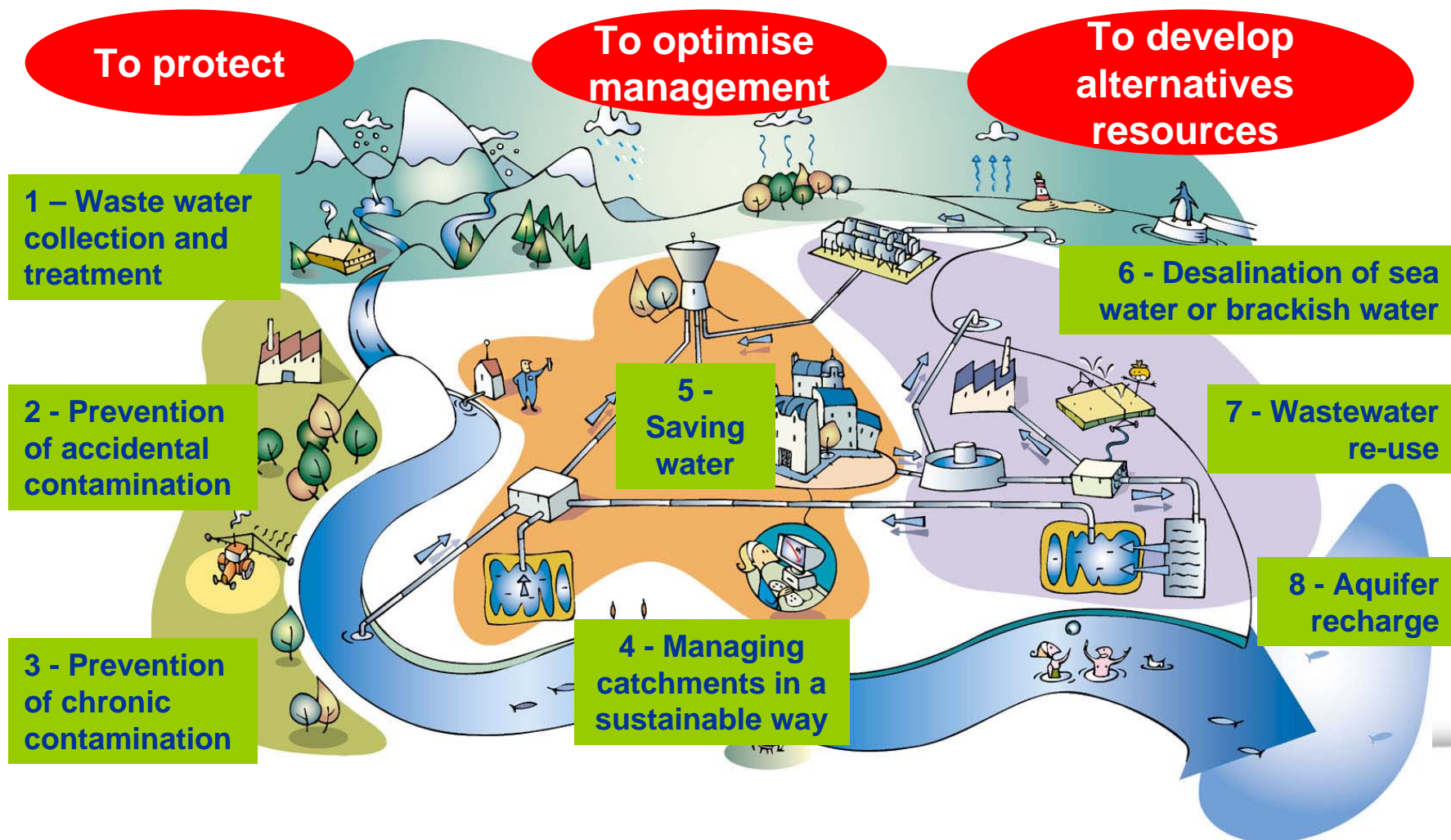
- In Windhoek:
 - ➔ the price of water is 0.87 US\$ below 6 m³/month, 1.45 US\$ between 6 and 45 m³/month and 2.67 US\$ over.
 - ➔ Recycling waste water is less expensive than transporting fresh water from distant sources such as Okavango River.
- Usually the price for regenerated water is lower than that of conventional water in order to encourage its use.
- Very few water reuse projects achieve financial sustainability through recovering total costs. A 2005 study carried out on 79 projects on an international scale found that only 12 recovered total costs.
- The fact that total costs are not covered by subscriber does not mean that these projects are not justified. But reuse won't develop up to its promising potential without establishing appropriate pricing policies.
- User view on this type of resource has an impact on their willingness to pay.
 - ➔ In Windhoek, inhabitants had no choice but to rely on their local resources, making the best possible use of them.
 - ➔ In France, 90 % of people would accept recycled wastewater for irrigation and watering, according to a CECOP 2006 survey.

Seawater is an alternative resource available in unlimited quantities

- It's the most abundant water resource on the planet: it represents 97% of the earth's water resources. In spite of this and while it is estimated that 25% of the world's population lives within 25 km of the coast, desalination provides only 1% of the world's drinking water.
- In the Arabian Gulf, 60 % of freshwater needs are met through desalination.
- Installed capacity for desalination will duplicate over the next 10 years.
- At a time when countries are rediscovering the benefits of energy independence, it is helpful to recall the advantages of "*water independence*".
- Is desalination a competitive solution?
 - ➔ Desalination costs usually range from 0.5 €/m³ to 1.5 €/m³.
 - ➔ In Ashkelon (Israel), the cost of water produced amounts to 0.58 US\$/m³: it is one of the lowest ever reached. This desalination cost is equal to the cost of pumping groundwater and half the cost of importing irrigation water from eastern Mediterranean regions.
 - ➔ Desalination alleviates water scarcity but with the risk to increase energy scarcity. → Research is needed to make this technology "*energy competitive*"

However, large desalination or recycling plants should not obscure the importance of real water resource conservation.

A comprehensive resource policy should also encompass:



Part IV



The way ahead
with tariff
and non-tariff
solutions

4 actions toward a coherent water resource strategy (1)

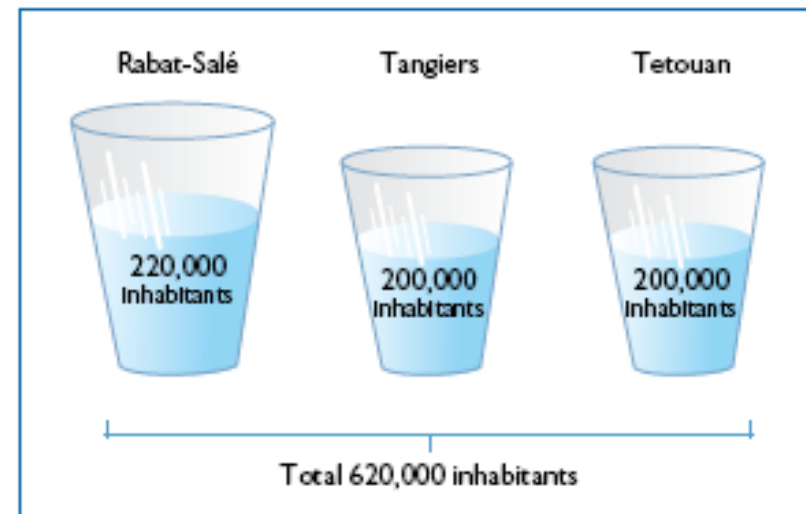
- **Stop policy-induced scarcity**

- ➔ Water provides a vehicle for transferring environmental costs, distorting market signals.
- ➔ Perverse subsidies are visible in many stressed environments.
- ➔ Water regulation very often halts at the frontier of the town. The underpricing of irrigation water creates disincentives for conservation.

- **Saving water resources**

- ➔ Water savings in urban network are often the resource that is immediately available in the largest quantity.
- ➔ A good operator of water services is both a water saver and a new resources creator .
- ➔ The priority is to save irrigation water. Agricultural production cannot continue to increase to feed the world's people unless water is used less extravagantly.

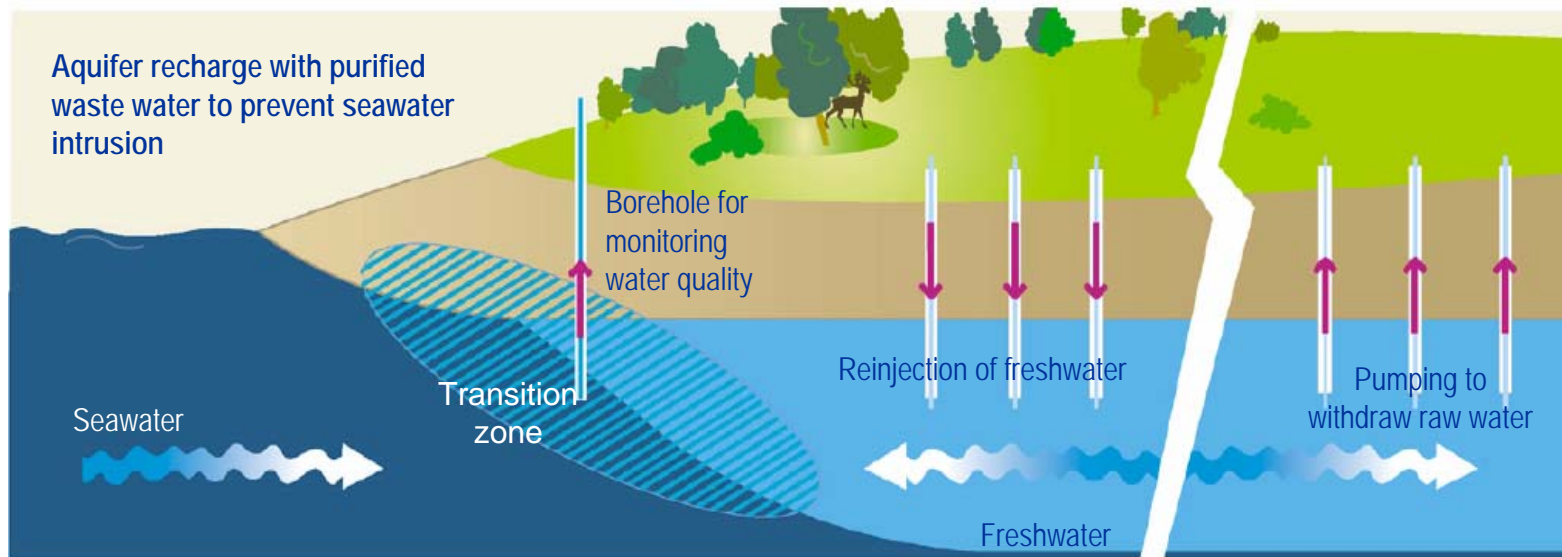
Water savings achieved since 2002 by the three Moroccan concessions, in population equivalents



4 actions toward a coherent water resource strategy (2)

- Increasing water productivity

- Living in a world with limited resources means that we have a moral obligation to use in the most efficient way each m^3 and each \$ directed to water sector.
- China produces twice as much rice as India with the same volume of water. But for each unit of GDP produced, China uses 6 times more water than South Korea and 10 times more water than Japan.
- Wastewater recycling is one of the most prominent way to increase water productivity. By adding one or several extra cycles of use before the water is discharged to the natural environment, it maximises the number of uses per m^3



4 actions toward a coherent water resource strategy (3)

- Dealing with risk, vulnerability and uncertainty

- ➔ Many arid regions and islands are the hostages of hydrology. But if we can't control the weather, we can manage the water.
- ➔ With a more unpredictable hydrological cycle, increasing water security becomes a priority.
- ➔ Investments in water infrastructure play a crucial role to mitigate risk and vulnerability. And pricing policy provides also an appropriate vehicle for risk sharing.
- ➔ “*Security through diversity*” is the slogan of Sydney. Its desalination program, which was recently extended, aims at organizing a water supply system independent of uncertain and erratic rainfall.



To conclude



Conclusion

- Water is a field where all interests converge. Therefore water is a complex business and water pricing also. The price of water always results from a consensus between various legitimate but divergent objectives. Scarcity obliges to review the hierarchy of all these contradictory objectives.
- There are direct links between overused water resources and underused pricing tools. In a context of growing scarcity, a key target of pricing policies should be to give a price to nature and a cost to pollution.
- During centuries, human beings had the sense of scarcity. Our current generation has to learn again how to live with scarcity and to move from an economy of affluence to an economy of scarcity.





**Thank you
for
your attention**

