Economic instruments and pricing
for Integrated Water Resources Management

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WATER AND ECONOMICS: FROM THE "OLD" TO THE "NEW" WATER CULTURE

The economic policy in the “old water culture”

- The logic of subsidizing water through public budget
  - Essentialness of water creates a political support for waterworks
  - Public finance needed for first-time investment
  - Emphasis on positive externalities provided by universal service
  - Private systems unsustainable unless for the “happy few”
  - System more sustainable in the long run if many users connect
- What went wrong with the “old water culture”
  - Favours irresponsive development of water demand (low marginal cost of supply until capacity is reached)
  - Water allocation driven by capacity to lobby for public funds
  - Considers pressures (urban growth, irrigated agriculture etc) as independent variables; no automatic signal
  - Budget constraint ⇔ increasingly difficult to rely on taxation

The economic policy of the “new water culture”

- Economic logic
  - Allocation of *wate*r should reflect its economic value ⇔ uses with higher value should have priority
  - Allocation of *money* should reflect a benefit / cost calculation ⇔ increasing supplies is not necessarily beneficial
  - Understanding interactions btw uses is crucial ⇔ externalities
- Economic instruments
  - Provide correct signals to all actors involved (users, operators)
  - Provide an acceptable way for sharing costs
  - Guarantee that water service costs are recovered in order to ensure that operation remains viable
  - Guarantee that (negative) externalities are accounted for and (positive) externalities are promoted adequately

Pricing in the “new water culture”

- Addressing pressure factors
  - Economic incentives might help reducing pressures
  - might address target users towards desired actions (eg water saving)
- Achieving efficiency
  - Pricing might ensure that water is allocated to the most valuable uses
  - Pricing might ensure that water services are developed and improved up to the limit where the marginal effort is overcompensated by a marginal gain
- Financial sustainability
  - Prices generate endogenous and more reliable revenues
  - Can be adjusted more flexibly than government grants
- Equity
  - Prices may be constructed in a way that avoids impact on sensitive customers and the poor
  - Pricing systems might be designed in order to foster some degree of cost-sharing among areas, categories and households
  - Economic instruments might be designed in order to compensate losers

Water as an economic good

- What does it meen exactly ?
  - Water has an *economic value* ⇔ there is an economic demand for water, meaning that one would be willing to pay (WTP) for having it
  - Water is *scarce* ⇔ nothing to do with *absolute quantity* !!
    - Water on the moon is not “scarce” in economic terms
    - Water in the Po basin is scarce (although natural availability is one of the highest in Europe)
  - Scarcity is a function of *rivalry* ⇔ a resource is scarce if there is competition for using it
- What are the implications ?
  - Economic scarcity of water adds a new dimension to water management
  - Policy shift: from “supply side” to IWRM

Perspectives on water value (demand)

Private dimension

- WTP (Net benefit)
  - The maximum one would be willing to pay for an extra m3
  - residual economic value that can be appropriated after covering private costs
  - Influenced by economic and social dynamics
- ATP (individual affordability)
  - The maximum one is able to pay, given his income and capacity to access credit

Social dimension

- Social WTP (net social benefit)
  - Social value > private value
    - Includes externalities (eg public health)
    - Includes merit goods (eg value of universal service)
    - Includes ecosystem services
  - Social cost > private cost
    - Includes externalities (aquifer depletion)
    - Includes costs that are socialized through public budget or other subsidies
    - (should) include costs/benefits transferred to next generations
- Social ATP (collective affordability)
  - The maximum effort that the collectivity is able to perform
  - Depends on GDP and on available means for mobilizing economic resources

Perspectives on (water) scarcity

Scarce resource = money

- Water abundant, but costly to mobilize
- Social value of water > private value ⇔ market demand not enough
- Emphasis on water service infrastructure as public goods
- Key economic driver: financial cost
- Policy: funding water services from the public budget
- Emphasis on supply-side and infrastructure (limit = social ATP)
- IWRM not a priority unless for sharing the cost of infrastructure: each use has its own water policy

Scarce resource = cheap water

- Available resources can be increased, but the social value is lower than the extra cost
- Key economic driver: resource cost
- Policy
  - Regulation of water use
  - Attention to the economic dimensions of water management
  - Attention to economic dimensions behind pressure factors
- Emphasis on:
  - Demand management
  - Addressing pressure factors
  - Increasing efficiency of use
  - Increase multilateral externalities
- IWRM as an opportunity for sharing water in a more effective way

Absolute vs. marginal value

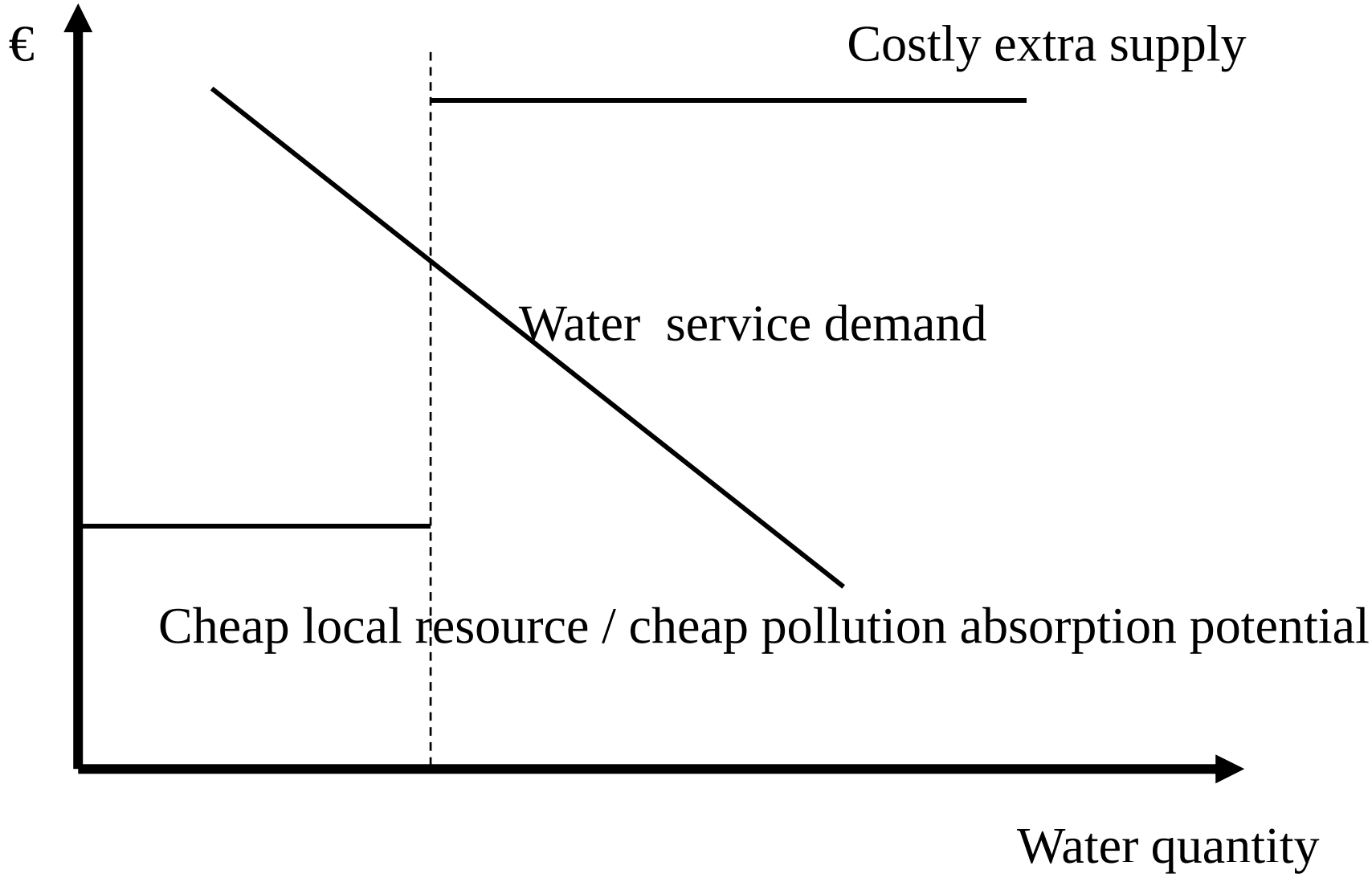
- Economic value does not depend on how much a good is "necessary" ⇔ *absolute value*
  - Air is fundamental for life, but has no economic value ⇔ we cannot survive without air, but there is plenty of air available
  - A m3 of water has a higher value in Cyprus than in Norway: this is not to say that water in Norway is less fundamental than in Cyprus
  - A Ferrari is not fundamental for life, but has an economic value ⇔ one can have an extra Ferrari only at a very high cost
- Economics is concerned with value *at the margin*
  - Most private goods can be reproduced at some cost; the additional cost of an extra unit should be confronted with its additional value
  - Water supply can be expanded in the same way, but only up to a certain point (carrying capacity threshold)
  - In general, expansion of water supply entails transformations in the way it is owned, shared and managed; society should become ready to handle this change (technical, institutional, political)

Evolution leading towards a carrying capacity threshold

- Dynamics of pressure factors
  - Urban development
  - Industrial pressure
  - Irrigation
- Dynamics of resource availability
  - Climate change
  - Ecological constraints
  - Budget constraints

WATER POLICY ISSUES IN MEDITERRANEAN COUNTRIES

The economics of water stress



Implications of the dilemma

- Difficult to expand the supply
  - Expansion of supply not affordable nor economically efficient
  - If feasible, requires new institutional developments (eg for delegating management to professional systems)
  - Conflicts about the new governance of management systems
- Unsustainable to maintain the status quo
  - Status quo encourages a dissipative use of available resources (unless an effective regulation of all impacts is provided)
  - Conflict among users

Alternative strategies - I

- Expand supply ⇔ doing more with more raw water
  - Eg dams; water transfers; desalination
  - very costly, most of the times inefficient
  - Subsidizes also uses that do not need to be subsidized
  - Usually not affordable if FCR (and not even for the state)
  - requires that other communities are affected and forced to share problems with the water-stressed one
- Increase productivity ⇔ doing more w/ same raw water
  - Eg reduce leakage, wastewater reuse, adopt water saving appliances, treatment of polluted water
  - saving water ≠ saving money (it actually costs a lot of money)
  - how will this extra cost be shared? need to ensure that low-value uses are not excluded and extra cost remains affordable
  - need for public subsidies at least in the initial phase
  - Requires professional managing systems ⇔ delegation + regulation + confidence

Alternative strategies - II

- Segmentation of uses
  - Force new users to adopt more costly systems in order to reserve cheap water for “incumbents” and “politically preferred” ones
  - Eg: force touristic resorts and industry to build desalinators; force urban supply to buy long-distance supplies and leave local resources to agriculture and hydropower; force new developers to pay higher connection fees; promote rainwater harvesting for some uses
  - Relatively inefficient
  - Affordable only for high value uses
  - Not necessarily equitable (incumbents are preferred to new uses), but often acceptable as a second-best solution
  - Does not guarantee that pressure factors are addressed (except for high-value uses)
- Phase-out some uses: doing less with same raw water
  - “irrigar los turistas vale mas que irrigar los campos”
  - socially or politically difficult; enforcement problems if based on C&C
  - drivers of demand should be addressed as well (eg pressure for urban development)
  - compensation can alleviate political opposition

Implications for policy - I

- Typology of economic problems
  - Infrastructural solutions impact on *water service costs* and require an effective strategy for minimizing them
  - In particular, a financial strategy is needed in order to keep capital cost as low as possible ⇔ it depends on how the risk is allocated
  - Demand-based solutions impact on *residual value for users* and require an effective way for implementing property rights
- Need of politically acceptable ways of sharing costs
  - Incumbents normally unwilling (often unable) to pay more
  - New entrants are willing to pay (some) more, but are reluctant and prefer to lobby for having the same rights as incumbents
  - Public participation is fundamental

Implications for policy - II

- Trade-off: (resource) scarcity may be solved by infrastructure, but:
  - Limited by budget constraints and not always efficient
  - It also implies a need to develop a professional and technology-intensive system: who will manage it? Who will regulate it? How will the people become confident?
- Case for using economic instruments
  - Communicate the right value of water services in order to prevent wasteful demand
  - Ensure the economic viability of water services
  - Support policy actions by sending an incentive to target users

HOW ECONOMIC INSTRUMENTS CAN HELP?

Wrong perceptions on economic instruments

- Supporters (the “Water Washington Consensus”)
  - The scarcity problem is (just a) pricing problem ⇔ get the price right and all problems will be solved automatically
  - Inefficient allocation derives from lack of economic support to decision ⇔ do CBA and allocation will be efficient
  - Inefficient management derives from the public sector ⇔ provide water services as commercial utilities
  - State vulnerable to “capture”: let market operate
- Adversaries (the “Water Anti Globalism”)
  - Paying for water = privatizing resources
  - Water prices ⇔ profits for shareholders of water companies
  - Paying for water = privileging the rich and denying social rights

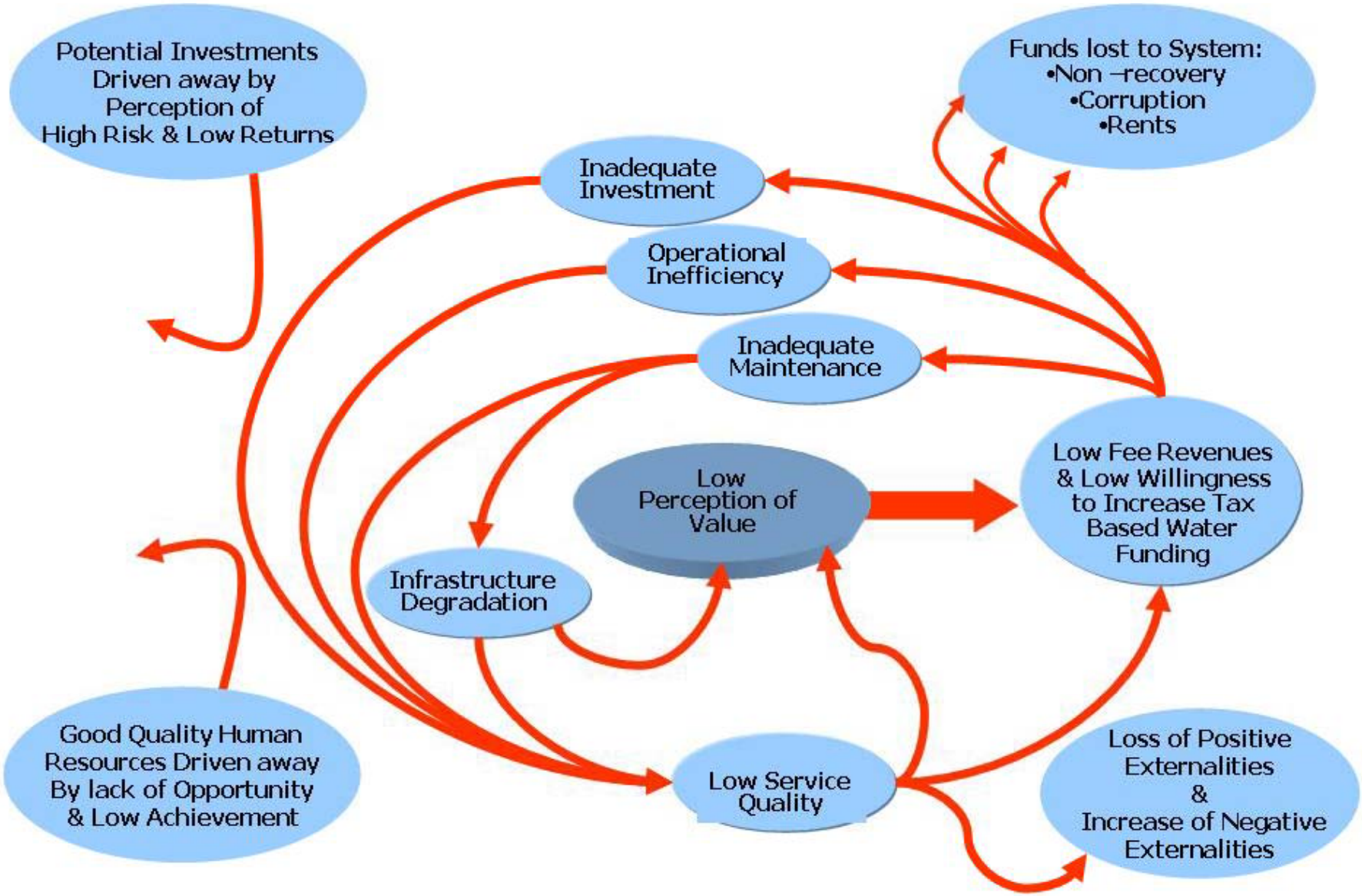
Some more realistic views - I

- Many problems at the same time: no “one best way”
  - Efficiency vs. distributive vs. financial vs. environment
  - Economics is important but not the sole
- Stakeholder response to EI not obvious
  - Need of appropriate models for understanding reaction
  - Target matters
  - Short-term and long-term reaction usually different
  - Sudden price increase during a drought may be useless
- Design of economic instrument not obvious
  - Pricing: trade-offs entailed by alternative tariff structures (eg IBT vs. affordability, cost recovery)
  - Economic instruments ⇔ new costs (eg metering)
  - Not all policy targets depend on “cubic meters” (especially for pollution control)

Some more realistic views - II

- Affordability is a hard constraint, but should not be overemphasized, at least in developed countries
  - Collective affordability is a f of GDP ⇔ what is not affordable today may be affordable in the future; let's adapt solutions to the path of development of the economy
  - Individual affordability can be achieved with appropriate cost-sharing ⇔ don't overemphasize marginal cost pricing as a rule
- Political acceptability is also a constraint
  - The vicious circle of low funding (see next figure)
  - Established uses perceive themselves as holders of right
  - "Devil's agreement" between delinquent payers and politicians
- Private sector might help but:
  - Not for free nor problemless
  - Requires economic regulation
  - Needs social confidence on the private sector

The Vicious Spiral of Low Funding



Source: UNESCO, World Water Development report 3 (forthcoming)

FROM THEORY TO REAL WORLD: ISSUES IN DESIGNING ECONOMIC INSTRUMENTS

Conflicting targets

- Provide signals to water users aimed at avoiding externalities
  - Keep the use of renewable resources below the recharge level
  - Human water uses should not hamper basic ecosystem services
  - Address pressure factors
- Efficient allocation of resources
  - Available water should be allocated to the most productive uses
  - Available economic resources should be invested for improving water supplies only if B>C
- Financial sustainability of water services
  - Water service assets should maintain value over time
  - Water undertakings should be able to gather the necessary resources from the market and be able to remunerate them
- Equity
  - The cost and benefits of water policies should be shared equitably
  - Accessibility should be granted to all at fair conditions, regardless the ability to pay

Alternative approaches to pricing

- Ecological sustainability
  - Prices should be high enough so as to provide an incentive towards the desired policy target (eg water saving)
  - Not necessarily related to cost
  - Not necessarily to be intended as “prices”
  - Constraint: elasticity to price
  - Targeted subsidies might be useful (eg for adapting facilities)
- Efficiency
  - Resource scarcity cost should be reflected into prices
  - Focus on marginal cost (typically MRC is very high in water-stressed situation, but MFC is usually very low)
  - Problem: short-term demand very inelastic to price
  - Emphasis on marginal cost (but cost of infrastructure is mostly fixed)
  - Subsidies should be avoided

Alternative approaches to pricing

- Financial sustainability of water services
  - Total revenues should match total cost (regardless how)
  - Revenues should allow a margin over operational costs for compensating capital expenditures (loan reimbursement)
  - Not necessarily related to consumption (volume pricing encourages suppliers to maximize sales)
  - Once infrastructure is in place, it is inefficient to limit the use of those who don't pay until capacity is reached; recovering fixed cost through tariffs efficient as a second-best solution
- Equity
  - Prices should remain affordable
  - Focus on the way costs are shared
  - Subsidies might be useful (but they must be financed in some way)

	Ecological sustainability	Economic efficiency	Financial sustainability	Equity / affordability
Uniform license fee	Very poor. No incentives to water saving	Acceptable as a way to recover the fixed cost; inefficient if MC component is relevant	Potentially OK, but commitment to cost recovery required Avoid political determination of fees	Very regressive
Non-uniform flat rate	Poor, unless rates are eventually calculated according to specific circumstances (eg surface of gardens; swimming pools; water recycling devices)	Acceptable as a way to recover the fixed cost; inefficient if MC component is relevant	As above, provided that total revenues are guaranteed	Potentially good effects, provided that criteria used correspond to personal wealth
Uniform volumetric rate + stdng charge	High, depending on the marginal rate + individual metering	Potentially the best solution provided r = SRMC and fixed charge = lump-sum; particularly suited in case SRMC is constant (eg electricity, reagents)	Good	Potentially good effects, provided that criteria used correspond to personal wealth
Uniform volumetric rate	As above; higher, since std charge = 0 means marginal rate >	Not very efficient especially for capex; inefficiency depends on demand elasticity (the lower e, the lower inefficiency)	Good	Encourages connection
Uniform volumetric rate + rebate	As above Highest if rebates take into account specific circumstances (eg surface of gardens; swimming pools; water recycling devices)	As above; In turn, could be efficient in combination with a positive fixed fee (idea: r = SRMC; fixed cost redistributed including a rebate for the poor)	Good	Progressive and useful for reducing impact on poor Best if rebate is targeted; otherwise, distributive effect depending on income elasticity
Traditional IBT + st charge	Highest, provided that metering is individual and marginal rates in the upper blocks are high	Potentially the best solution provided r = SRMC and fixed charge = lump-sum; particularly suited in case SRMC is increasing (eg costly extra supply to be purchased)	Good potential for FCR Attention in case of a sudden move from flat charges to IBT: consider effect on demand	Regressive, according to demand elasticity to income
IBT + exact occ. amendment	Highest, provided that metering is individual and marginal rates in the upper blocks are high	As above	As above	Reduces impact on large families
IBT+ default 1st block + targeted subsidies to low income	Highest, provided that metering is individual and marginal rates in the upper blocks are high	As above	As above	Not very useful; subsidies tend to miss the target. Subsidized block not targeted to the poor
Additional temporal tariff	Not very useful unless used as a complement to bans to certain uses (eg garden irrigation)	Good for reducing demand in peak periods and optimizing capacity use	No effect (unless extra revenues are used for compensating RC)	Potentially regressive: poor more likely to give up using water in peak/stress periods

Different problems

Infrastructure⇔ cost recovery

- Labur and capital needed for providing water services
- Dominated by fixed cost
  - Long economic life of assets
  - Cost of capital depends on patterns of risk allocation
- Main issues:
  - Guarantee that costs are recovered in some way
  - Guarantee that costs recovered do not include monopoly rents
  - Guarantee that the capital provision is cheap (allocation of risk)
- Typical conflicts:
  - cost sharing (who pays what)
  - privatization / commercialization

Demand management⇔ incentives

- The value of water in alternative competing uses
- By definition it is a marginal cost (varying with m3)
- Main issues
  - Enforcing property rights
  - Promoting awareness and collaborative behaviour
  - Short-term elasticity is low; simply raising prices during water stress not a solution
  - Requires information that is most unavailable and costly to obtain
- Not only prices!!
  - Taxation (ear-marked)
  - Targeted subsidies
  - Market-based transactions (eg direct bargaining)
  - Regulation

CONCLUDING REMARKS

Evidence from case studies

- Completing / improving the infrastructure still a priority
  - Need for a more effective financial strategy
  - Collective affordability vs. individual affordability
- “Tragedy of commons” in Mediterranean countries
  - Groundwater overexploitation, mostly due to uncontrolled private abstraction
  - Uncontrolled urban and industrial development
  - Water governance lagging far behind the problem; so far concentrated in supplying concrete, but unable to keep the path of explosive demand
- Decoupling cost recovery from economic incentive
  - Cost recovery mostly deals with capital cost in the long run; priority to guarantee reliability and timeliness of fund availability, not the fact that they are paid by users in proportion of water demand
  - Incentive mostly deals with (marginal) impact on individual behaviour; priority to targeting the signal, regardless costs are recovered or not

Main recommendations

- Pricing is a fundamental tool, but not a magic stick
- Design of economic instruments is critical
- Political acceptability should be built through PP
- Affordability important, but do not overemphasize
- Conflicting objectives require alternative approaches targeted at policy priorities
- Do not overlap incentive purposes and cost recovery
- Define a financial strategy for capitalizing water service provision; cost recovery mostly a financial (and not economic) issue
- WFD art. 8 should be adapted in order to be applicable to Mediterranean countries