

2<sup>nd</sup> Mediterranean Water Forum  
Murcia – 25<sup>th</sup> of November

# Inter-sectoral water allocation

Sébastien LOUBIER  
[sebastien.loubier@irstea.fr](mailto:sebastien.loubier@irstea.fr)



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# Overview

1. Introduction
2. Water allocation: what says the theory?
3. Water allocation : why reality is different from theory
4. Water allocation and priority management
5. Can virtual water a useful concept for water allocation?
6. Conclusion / recommendations (for economists)

# 1- Introduction

How to support decision for water allocation / sharing ?

How to explain why theoretical recommendations are not followed ?

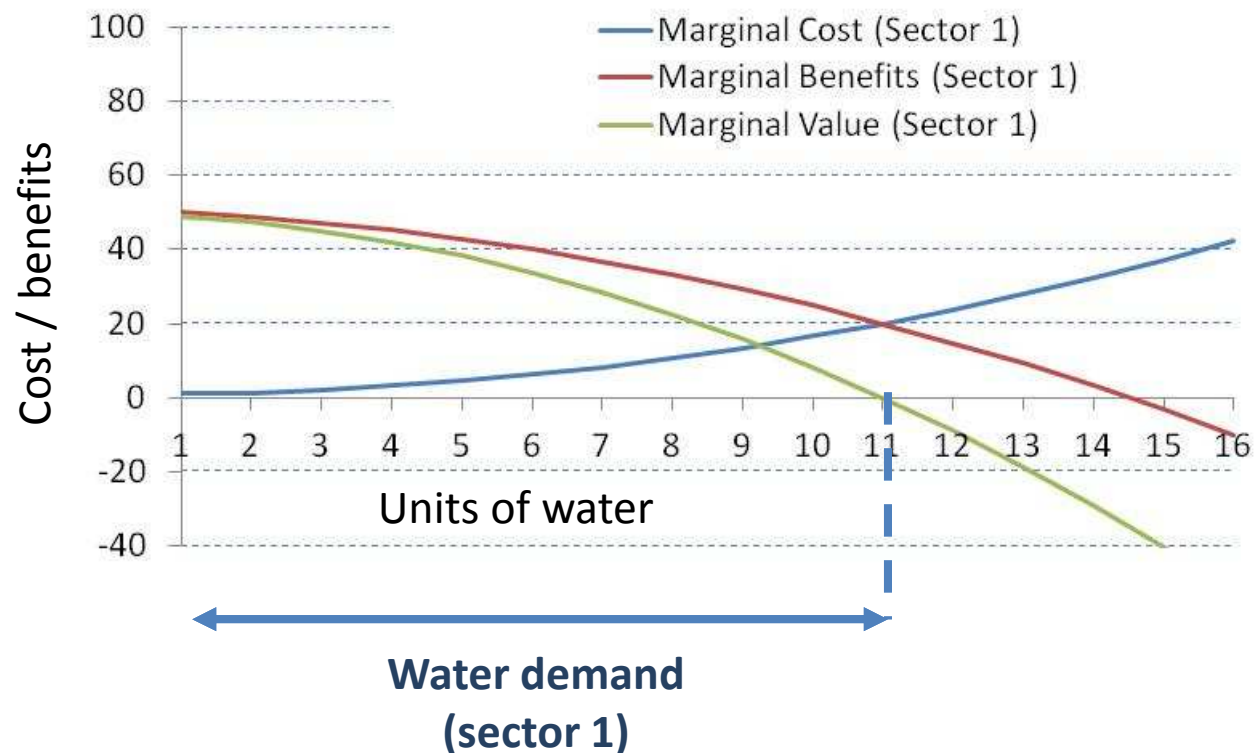
What are the objectives behind real allocation decisions?

What are the specificities of water compared to other goods, is there an impact on water allocation?

Can economics be useful to contribute to a “better” water allocation / to solve a part of the problem?

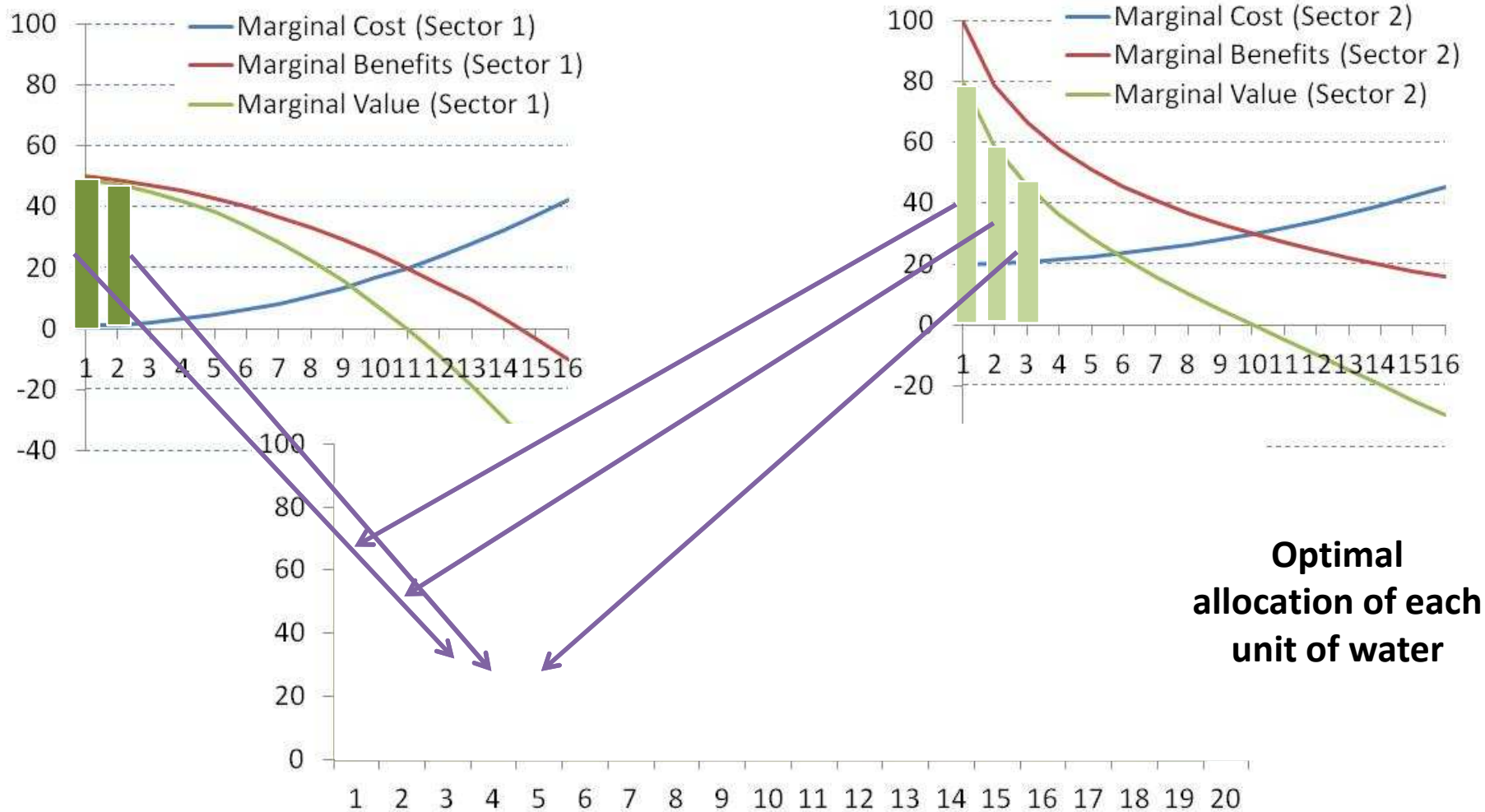
## 2-Water allocation: what says the theory? (1)

From marginal value of water to a sectoral water demand



# 2-Water allocation: what says the theory? (2)

## The case of several sectors / users

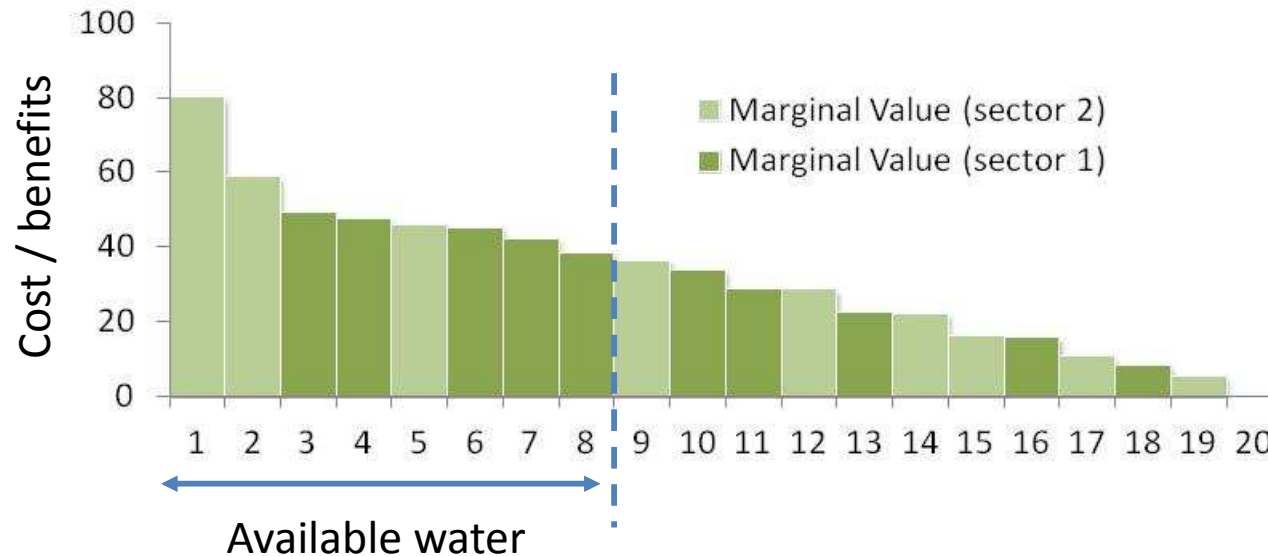


# 2-Water allocation: what says the theory? (3)

## Allocation and limited water resource

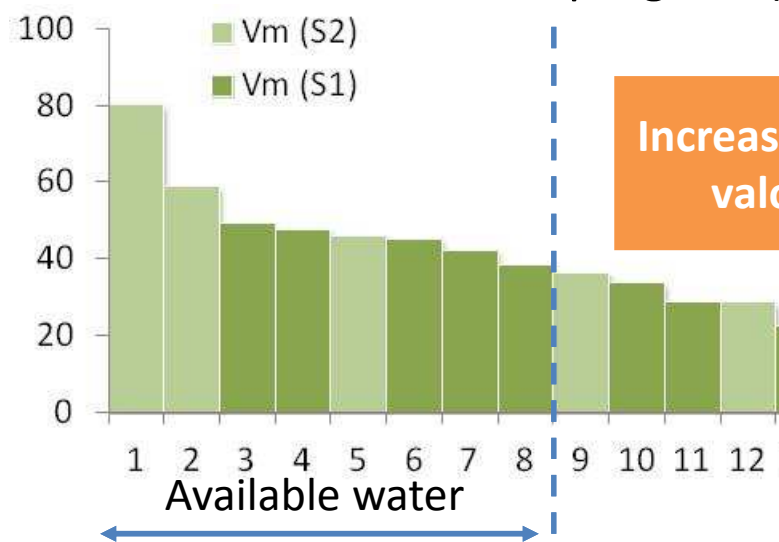
### Theoretical limited water allocation

- Sector 1: 5 units – total benefits ~ 220
- Sector 2: 3 units – total benefits ~ 190

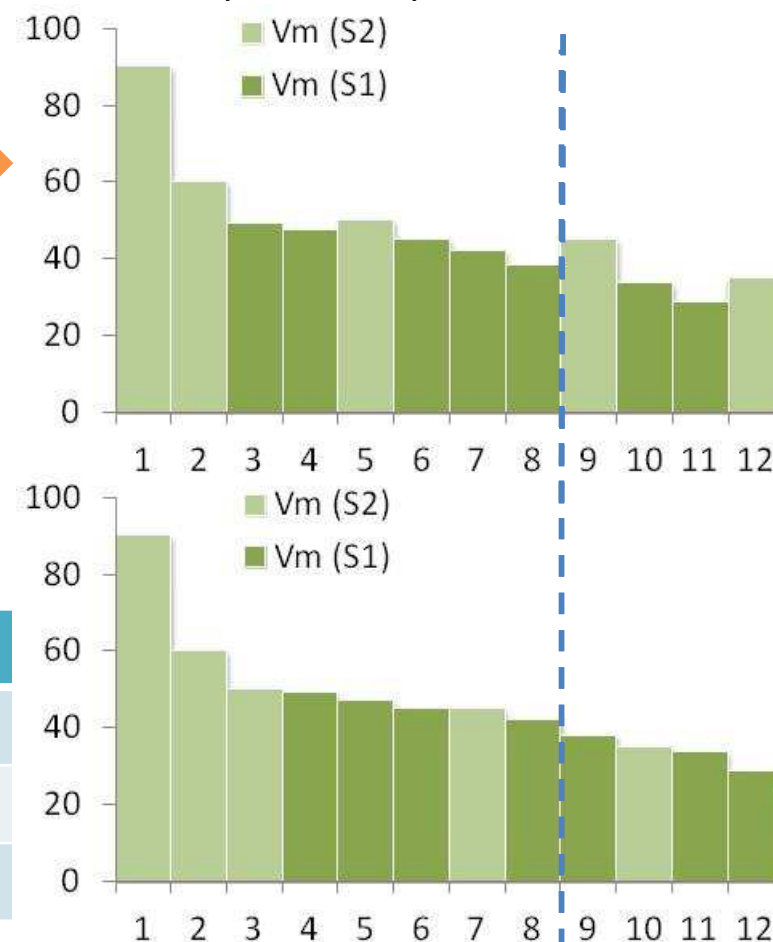


# 3-Why reality is different from theory? (1)

Changes in marginal costs or benefits structures leading to inadequate allocation. Technical progress (costs) new opportunities (benefits)



Increase in sector 2 valorization



Allocation	Sector 1	Sector 2	Total
Initial	5 / 220	3 / 190	8 / 410
Present	5 / 220	3 / 200	8 / 420
Theoretical	4 / 183	4 / 245	8 / 428

## 3-Why reality is different from theory? (2)

Costs or benefits assessed from a private instead of collective point of view

- Temporal dimension implications: short, middle or long term view
- Spatial dimension: up-stream / down stream, field / river basin
- Actors dimension : user / manager / collectivity

Different approaches according to the previous dimensions considered

Marginal approach

Average approach

Total cost approach

Past investments and allocation:

Water sector is highly capitalistic in nature

Risks of future regret

A risky bet on future / hydraulics infrastructures / territory development



# 3-Why reality is different from theory? (3)

**A large diversity of reasons:** Geographical, Historical, Political, Social, Cultural, Legal, ...

**A part of economic effectiveness several other (most?)important criterions:** equity, justice, social cohesion, health, sanitation ...

**Objective for economists:** Identifying the conceptual model underlying decision maker reflexions' for more effective, transparent, shared... water allocation.

## 4 - Water allocation and priority management

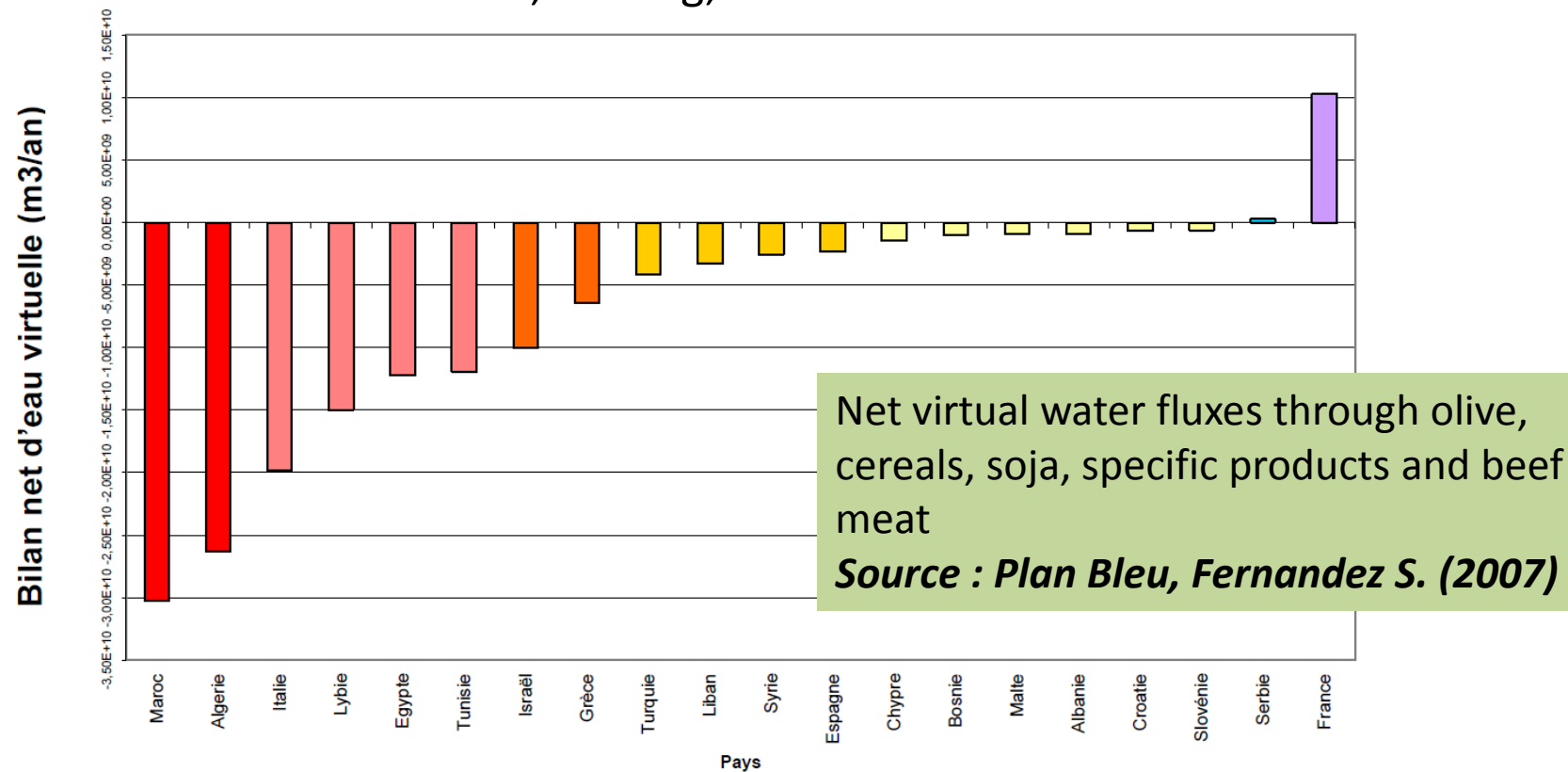
**Managing water allocation as constraints successions:**  
sector first (Drinking water then environment or industry or agriculture?)

**This priority management risks to generate low incentives** in terms of effectiveness improvement of water management / allocation by the priority sectors / users.

The priority sectors are generally those getting a higher water valorisation and for which effectiveness improvement is proportionnally less costly then other sectors.

# 5 – Can virtual water concept be useful? (1)

**Virtual water:** Quantity or value of water incorporated in a good. Very soft concept, can be expressed as m<sup>3</sup>/kg, m<sup>3</sup>/\$ generated, m<sup>3</sup>/K calories... It allows to highlight potential gains from virtual water transfers ineffectiveness, sharing, uses...



# 5 – Can virtual water concept be useful? (2)

## A need for clearer borders

- ✓ Which resource is concerned? Blue, Green?
- ✓ Do we also consider virtual water of the intermediary goods?
- ✓ Must the valorization be based on production or consumption territory / country?
- ✓ What is the value of the water used in the production territory / country?
  - the opportunity cost of water? i.e. the cost associated to a non-optimal water allocation (previous allocation problems)
  - the environmental cost / values, the total economic values?

## 5 – Can virtual water concept be useful? (3)

- ✓ Does it exist risks associated to a virtual water based decision?
- ✓ What about agricultural and energy policies? Won't we generate more distortion in looking only at water?
- ✓ The virtual quantity of water can be useful but it seems to be a part of foot-print analysis or Life Cycle Assessment process.
- ✓ Will the knowledge of the "real" virtual water value orient differently water allocation decisions or international trade?

# CONCLUSION

## **Economics can provide coherent information for decision making process but:**

- ✓ Must identify decision makers conceptual models for a better representation,
- ✓ Need to know what is a constraint or a parameter (sectors),
- ✓ Should develop specific tools to allocate according to territorial development
- ✓ Can identify incentives for constraint managed sectors,
- ✓ Can better take into account irreversibility due to initial investments,
- ✓ Can provide tools to assess vulnerabilities and vulnerabilities changes due to water allocation changes,
- ✓ Should provide useful tools for continuous adaptation of the allocation face to several important changes (climate, political, social, environmental...)
- ✓ Can provide recommendations regarding the necessary conditions for a respected water allocation (see E. Ostrom principles)
- ✓ Virtual water seems to be an effective concept for large public information / eventually orient decisions related to food security policies

Thank-you for  
your attention