Project team

Coordination

Water Cap & Trade

Water market scenarios for Southern Europe

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Funded by :

As part of the programme

Outlines of the presentation

2

- **Introduction**
- **Project presentation**
- **Economic modelling results**
- **Barriers to trade**
- **Conclusion**

Introduction

3

> **Context**
- Water resources fully allocated
- Administrative rationning procedures (quotas) / historical water rights (Cap)
- Prevents entry of new user & source of inefficiency
- Reallocation procedures are needed
- Water trading is one option
- Can operate with different types of rights / concessions

> **Designing water markets**
- Type of resource
- Object of the transfer
- Type of users involved
- Spatial extent of trading
- Permanent / temporary trade
- Characteristics of water rights
- Market structure / trading mechanisms
- Government role

> **WM in Spain**
- Public purchase
- Agricultural markets
- Interbasin transfers
- Inter-sectoral transfers

Project presentation

4

> **Research questions and activities of the *Water Cap & Trade* project**

Benefits of establishing WM ?
- Simulation of exchanges between farmers - farm economic models (Fr, It)
- Simulation of option contract - Stochastic economic model (Tajo-Segura)
- Experimental evaluation of agricultural WM using stated preferences (Guadalquivir-Andalucia)
- Simulation of water trading between cities – cost minimisation model (Fr)

Estimated benefit
Volume traded
Equilibrium price

Model prediction are generaly optimistic
Sucessful WM development depends of farmers attitudes (Spain Australie, Chile)

Analysis of WM perception
- Surveys, focus groups
- Farmers, stakeholders, lay public
- France, Italy, Spain

Barriers to trade

Perception of WM against other economic instruments
- Scenario workshops

Project presentation

5

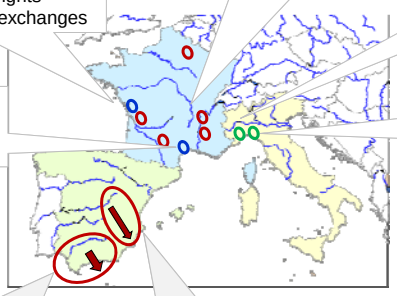
> **Case studies**

Groundwater basins (5) Fr
Agricultural use
Groundwater pumping rights
Temporary / permanent transfers

Marais Poitevin (Fr)
Agricultural & urban use
Surface & groundwater rights
Temporary / permanent exchanges

Emilia Romagna (It)
Agricultural use
Private harvesting reservoirs

Hérault (Fr)
Urban use
Water saving certificates



Reno basin (It)
Agricultural use
Collective irrigation system

Guadalquivir – Andalucia (Sp)
Agricultural use
Permanent / temporal exchange
Inter-basin transfer

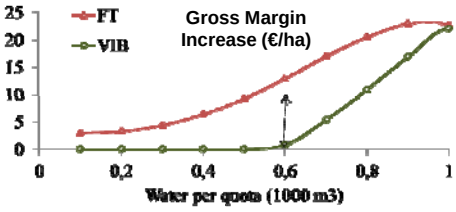
Tajo-Segura (Sp)
Agricultural use
Option contracts
Inter-basin transfer

Economic modeling results

6

Case study 1: Ravena province, Italy

- Exchange between farmers using small reservoirs
- Voluntary exchanges already exist, no monetary compensation, under supervision of Irrigation board
- Simulation of free trade

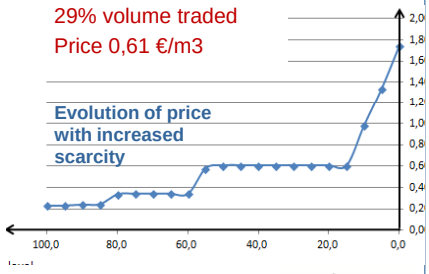


Results
Limited economic gains (+3%)
Water exchanged : 7%

Case study 2: Marais Poitevin, France

- Agriculture
- Surface, GW, reservoirs
- Farm ecionmic model (LP)
- Free trade simulation with TC

Results
Economic gains : +9%
29% volume traded
Price 0,61 €/m3

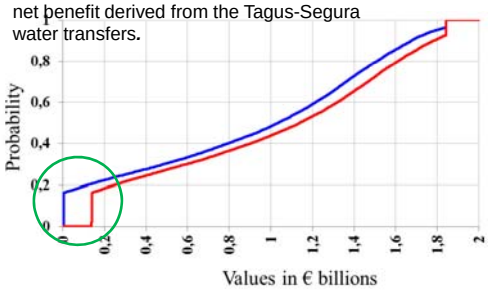


Economic potential of water markets

7

Case study 4: Option contract among water users (Tagus and Segura basins)

Cumulative ascending curves of pdfs of the net benefit derived from the Tagus-Segura water transfers.



SCENARIO 1A : New Tagus-Segura Transfer Management Rule
SCENARIO 2C*: *New Rule + Option contract

Results

- A change of the Transfer's management rule would have severe impacts (estimated on average at nearly 75 € million)
- Option contracts can reduce the negative impact of this change, mainly in the left-tail of the distribution, reducing scarcity risks

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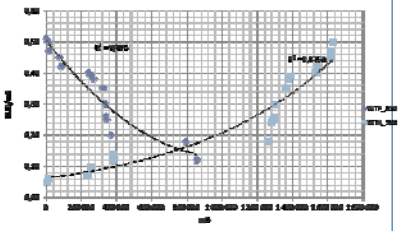
Economic potential of water markets

8

Case study 5 : a stated preference approach (Guadalquivir – Andalucia)

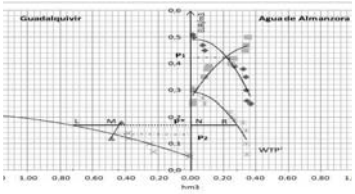
- Survey 241 farms in Guadalquivir & Almeria
- Willingness to pay, willingness to accept
- Construction of demand / supply curves (bids ordering) for each basin
- Simulation of trade within basins
- Simulation of interbasin exchange



Results

	€/m3	Guadalquivir	Almeria
Normal year	WTP	0,08	0,39
	WTA	0,1	0,4
Drought year	WTP	0,15	0,54
	WTA	0,17	0,55

		Point	Price €/m3
Intra	Almería	**P1**	**0,42**
	Guadalquivir	**P2**	**0,13**
Inter	Joint- basin	**P***	**0,17 (0,37*)**

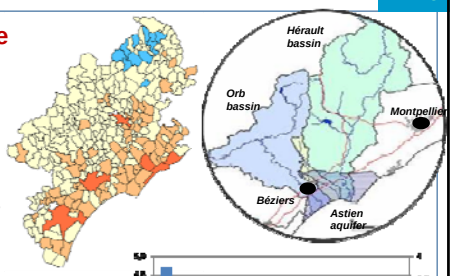


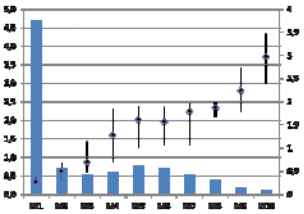
Economic potential of water markets

9

Case study 6: Urban WM, Hérault, France

- Context and scenario
  - Simuated future urban demand $D_{2030,\,i}$
  - Quota system: $Q_{2030,\,i}$
  - If $D_{2030,\,i} > Q_{2030,\,i}$ => implements water conservation measures or purchase water from other utility
  - If $D_{2030,\,i} < Q_{2030,\,i}$, sells water
- Simulation
  - Cost / volume of water conservation (i,j)
  - Optimisation without /with hydrological constraints





Cost-effectiveness ration (€/m3) for 300 municipalities

Results

- Equilibrium price = 0,54 / 1,03 €/m3 (2 bassins)
- 25% cost reduction
- Volume traded = 39% of total water saving target
- Hydrological constraint => +17% cost
- Transaction costs could be significant

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Barriers to trade

10

> **Farmers' attitudes can determine the successful development of water markets** (Australia, Chile, Canada)

> **Empirical studies**

	Farmers	Stakholders	Citizen
Quantitative survey	Guadalquivir (N= 241)	Guadalquivir (N=47)	Italy (N=53)
Focus groups	Guadalquivir (N=47) Marais Poitevin (N=)	Spain (national level) Italy (national level)	
Scenario workshops	France, groundwater basins (N=80)	France groundwater basins (N=44)	France (N=110)

> **Main findings**
(Spain, France, Italy)

Strategic behaviour	**Pressure on Gov to increase CAP or create new resources**
Ethics	**Not a commercial good Privatisation Link water & land**
Social justice	**Unfair initial allocation, illegitimate rents**

Pre-conditions to water trading are not met

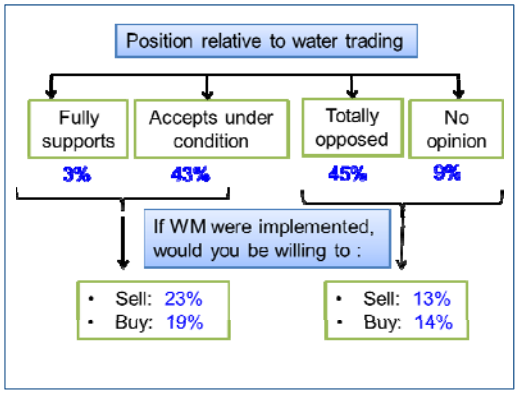
Definition of rights	**Unsecured rights** (enforcement, irrigation bans risk, use it or loose it)
Market structure	**Transparency problems, asymetric negotiation power, speculation**
Environmental impact	**Increase water use, negative externalities**
Impact on rural development	**Farm concentration, social issues** Agricultural decline

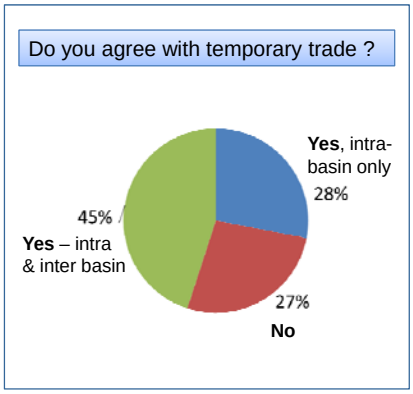
Design of appropriate mechanisms

Barriers to trade

11

> **Willingness to participate: survey ersults**





France, 5 regions
80 farmers, 44 stakeholders

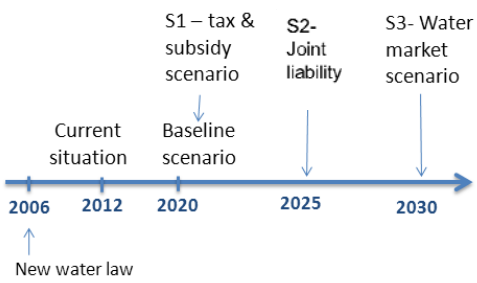
Guadalquivir
241 farmers

Alternative economic instruments

12

> **Scenario workshops in France**
- Alternative economic instruments

Tax & subsidy | Joint liability contract | Tradable quotas



16 workshops in 5 regions
80 farmers, 44 stakeholders

Alternative economic instruments

13

> **Scenario workshops in France**
- Results




Preferred scenario:

	Farmers	Stakeholders
Joint liability contract (JLC)	38%	84%
Current quota system (TQ)	38%	7%
Tradable quotas	**9%**	**7%**
Tax & Subsidy	8%	2%
None	5%	
Mix JLC & TQ	4%	

N=124

Introducing flexibility in water allocation through
- market based instruments (focus on individual decisions)
- Institutions (consider interactions within groups)

Conclusion

14

> **Policy recommandations**
- Spain
  - Agreement among stakeholders of the need to improve the current system.
  - Legal reform needed. Formal and effective separation of water rights and allocations.
  - Flexibility. Eliminate barriers to enter the market and restrictions to trade. Reduce political interference in inter-basin trading
  - Better information and transparency (water volumes subject to trade, administrative procedures, prices, …)
  - New water trading formats (option contracts).
- France and Italy
  - Cap first ! Global abstraction ceiling; monitoring of water withdrawal; enforcement; equity of initial allocation
  - Creating rights: remove priorities, restrictions …
  - WM, an option for the long term (2030)
  - Keep land and water linked / separate right from allocation
  - String societal barriers to overcome
  - Environmental constraints will restrict the potential (no storage); groundwater in particular

Conclusion

15

> **Research perspective**

- WM as part of a more general tool box; other instruments can be used to introduce flexibility
- Institutional economics can help to design innovative instruments
- Need for experimental approaches to investigate stakeholder behaviors (choice modeling; exp. econ; games; …)
- Participatory foresight approaches (long term)
- Integrate economics with hydrology (hydro-economic modeling)
- Common approach with other natural resources (forestry

A challenge for Horizon 2020 ?