The Third International Yellow River Forum (IYRF) on Sustainable Water Resources Management and Delta Ecosystems Maintenance

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The European Water Framework Directive and sustainable water management

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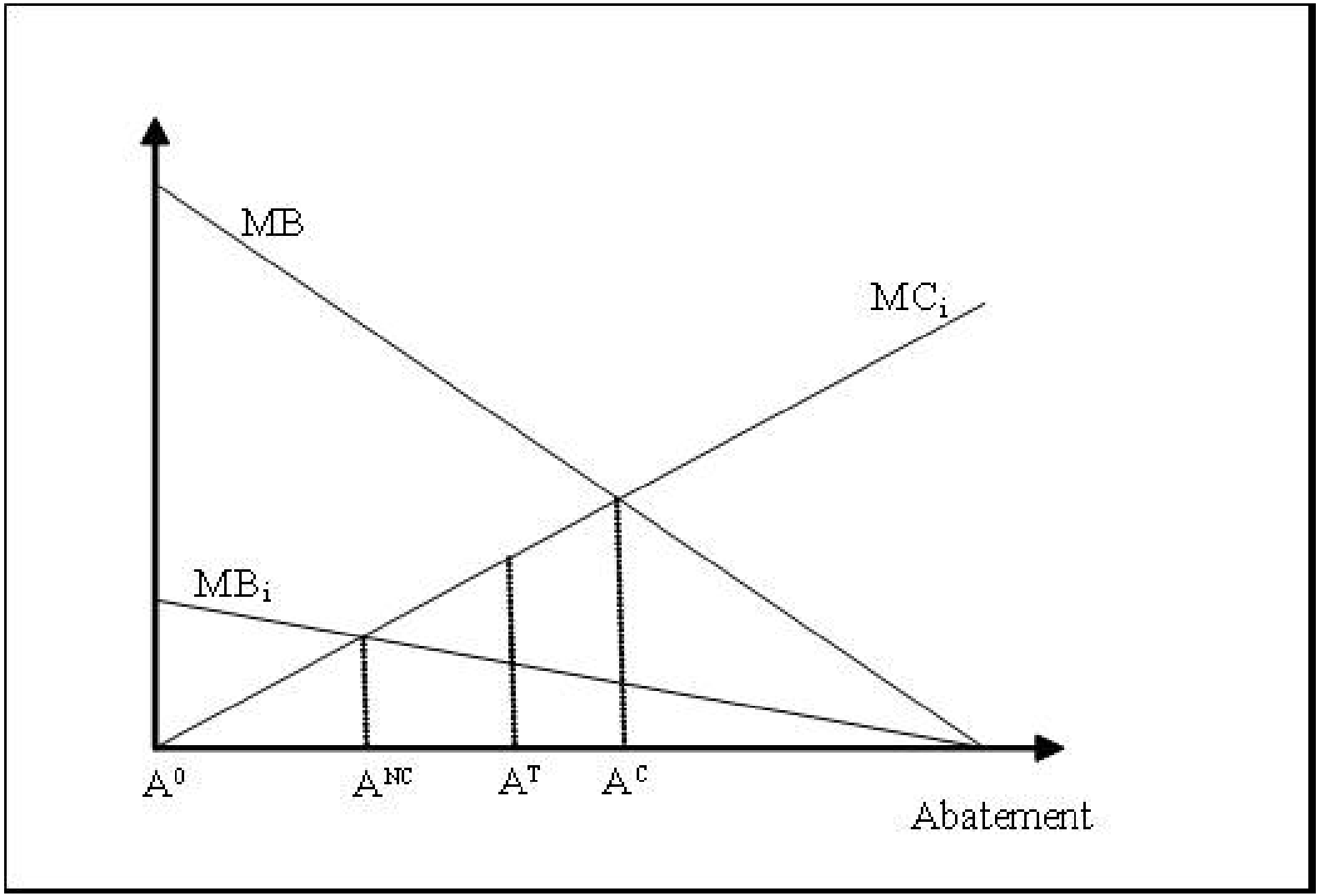
Introduction

Measures leading to sustainable water management require understanding the basic concepts of policy analysis:

objectives, instruments (institutional, economic, command and control), optimum, target, cost-efficiency, private good, common pool good, cooperation among stakeholders, collective action.

Next figure shows the importance of these concepts.

Pollution abatement under non-cooperative and cooperative solutions



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Water quality in selected European rivers

Country	Watershed	BOD (mg O_2/l)	Nitrates (mg N/l)	Phosphorus (mg P/l)	Lead (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Copper (µg/l)
Norway	Skienselva	0,2*	0,2	0,02	0,1	0,01	0,15	0,58
Sweden	Dalalven	0,1*	0,1	0,02	0,5	0,02	0,37	1,46
Denmark	Gudena	2,6	1,3	0,10				
UK	Thames	2,0	7,4	1,36	3,3	0,10	1,27	6,63
Netherlands	Maas	2,6	5,2	0,21	3,4	0,21	2,34	4,47
Belgium	Meuse	2,2*	2,5*	0,70*	3,2*		1,00*	2,05*
Germany	Rhein	2,9*	2,6	0,14	3,8	0,20	2,99	8,59
	Elbe	8,8*	3,3	0,19	2,5	0,23	1,76	5,42
	Weser	2,2	4,0	0,17	4,5	0,20	2,03	4,40
France	Loire	3,7	3,3	0,26		0,37*		
	Seine	3,1	5,6	0,63	22,1*	2,18*	24,67*	15,03*
Spain	Guadalquivir	4,2	6,1	0,95*	10,2*	2,27*		5,73*
	Ebro	5,0	2,5	0,20	7,7*	0,23*	0,64	1,61
	Guadiana	2,6	2,0	0,69*				
Portugal	Tejo	2,3	1,0	0,24	24,3*	5,00*	22,33	1,67
Italy	Po	2,2	2,1	0,23				
Greece	Strimonas	1,3*	1,4	0,08		0,64		
Turkey	Porsuk	1,2	1,2	0,07	4,3	5,00	6,33	5,00

Nutrient problems: Thames, Guadalquivir, Seine

Heavy metals: Seine, Tejo, Guadalquivir, Porsuk

Related to tertiary treatment (Northern countries)

The emphasis of the Water Framework Directive on water pricing in order to achieve efficient water use and promote conservation and protection, follows the Dublin declaration of 1992, but it is a flawed approach.

The problem of the this “economic good” approach assumed by the WFD and by many environmental decision makers in Europe is that, the price mechanism can work only where water is a private good (rivalry in consumption and exclusion) which is traded in markets.

Domestic and industrial uses have characteristics of a private good, but irrigation is different because it has characteristics of an impure public good and environmental externalities. Water pricing could modify consumption where markets exist, such as in urban networks for domestic and industrial demand, but not in agricultural or environmental uses.

Furthermore, water markets are useless to internalize environmental externalities, as the California and Australia cases show. Protection and conservation of water resources, which are common pool resources, requires the cooperation by agents to achieve collective action.

The lack of basic information and knowledge on biophysical processes favors the strategic behavior by countries, basins and stakeholders in the whole implementation process of the Directive.

The description of the basic measures and supplementary measures in the Water Framework Directive does not make much sense. The writing of measures which are listed by the WFD does not take into account the state of knowledge in policy analysis from the field of environmental economics.

The Directive does not consider either the concepts of private good, public good and externality, and therefore ignores that different types of measures are needed for the different kind of problems in water resources.

The conceptual and empirical misunderstanding in the policy analysis of the Directive is such, that there is a large confusion among many environmental decision makers in Europe.

In order to elaborate reasonable measures, it is essential to clarify the conceptual methodology of policy analysis, and determine the requirements regarding water statistics and scientific knowledge on biophysical processes for the design of measures.

Even when all biophysical knowledge is available, the management of quantity and quality aspects of surface and subsurface water is a complex task, because of the public good characteristics of water and their environmental externalities. The design of measures must take account the strategic behavior of stakeholders, creating incentives able to encourage cooperation among stakeholders in order to achieve resource conservation through collective action.

(Nobel prize just awarded to Hurwicz, Maskin and Myerson, working on mechanism design)

Both aspects, biophysical knowledge and collective action, are unlikely to be achieved by 2015 which is the deadline for the good ecological status of water resources.

In Spain and other Mediterranean countries, the best measures to be pursued by water authorities are:

- Irrigation modernization which abates substantially nonpoint pollution and saves water
- Investments in tertiary treatment, protection of water sources and storm tanks (Water Quality National Plan 20 billion euro in Spain), which will disminish further urban and industrial point pollution.

Together with these two measures, cooperation from stakeholders is needed in basins to reduce both nonpoint pollution and excessive water extractions, especially where they produce large damages because of the high value of aquatic ecosystems.

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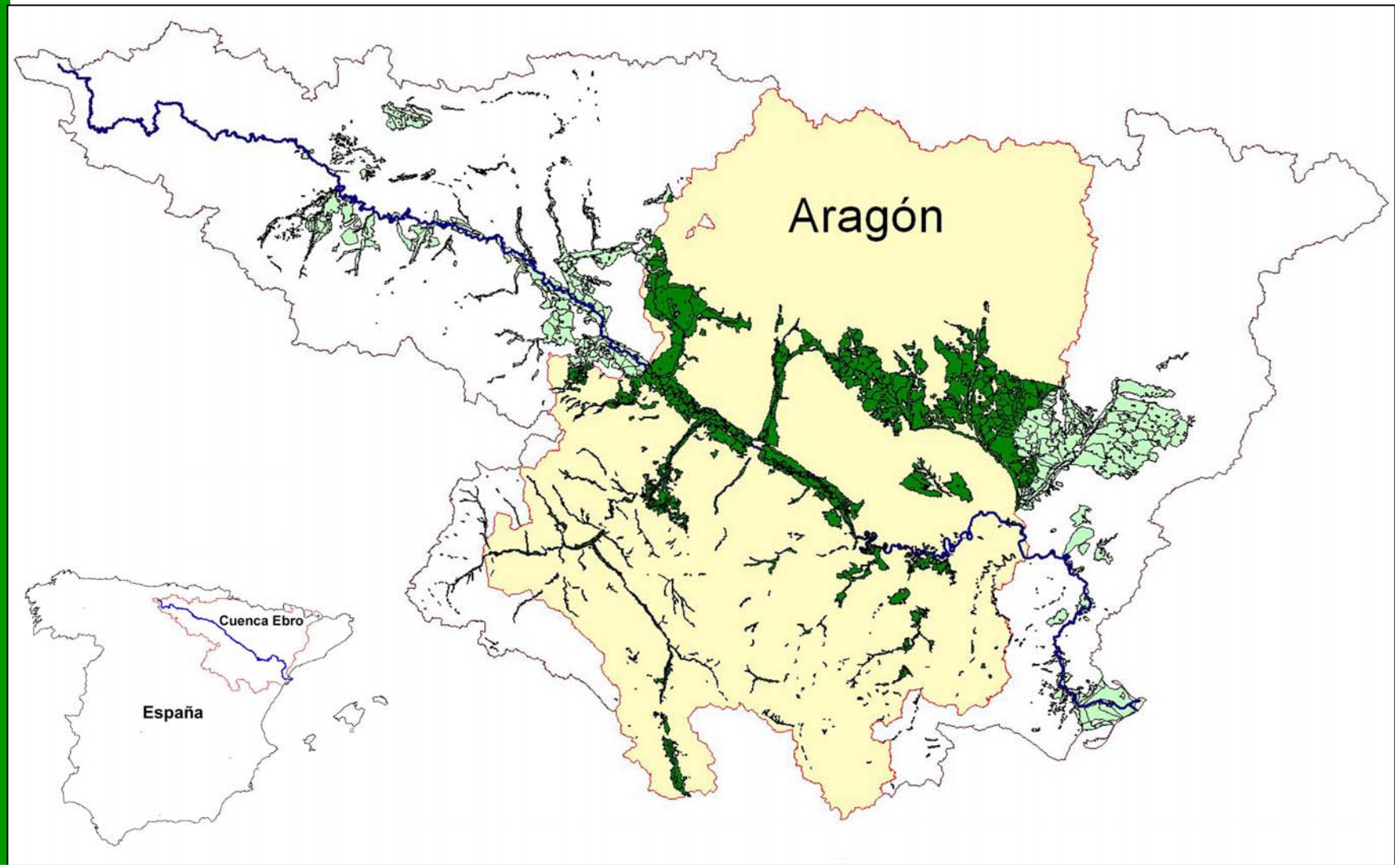
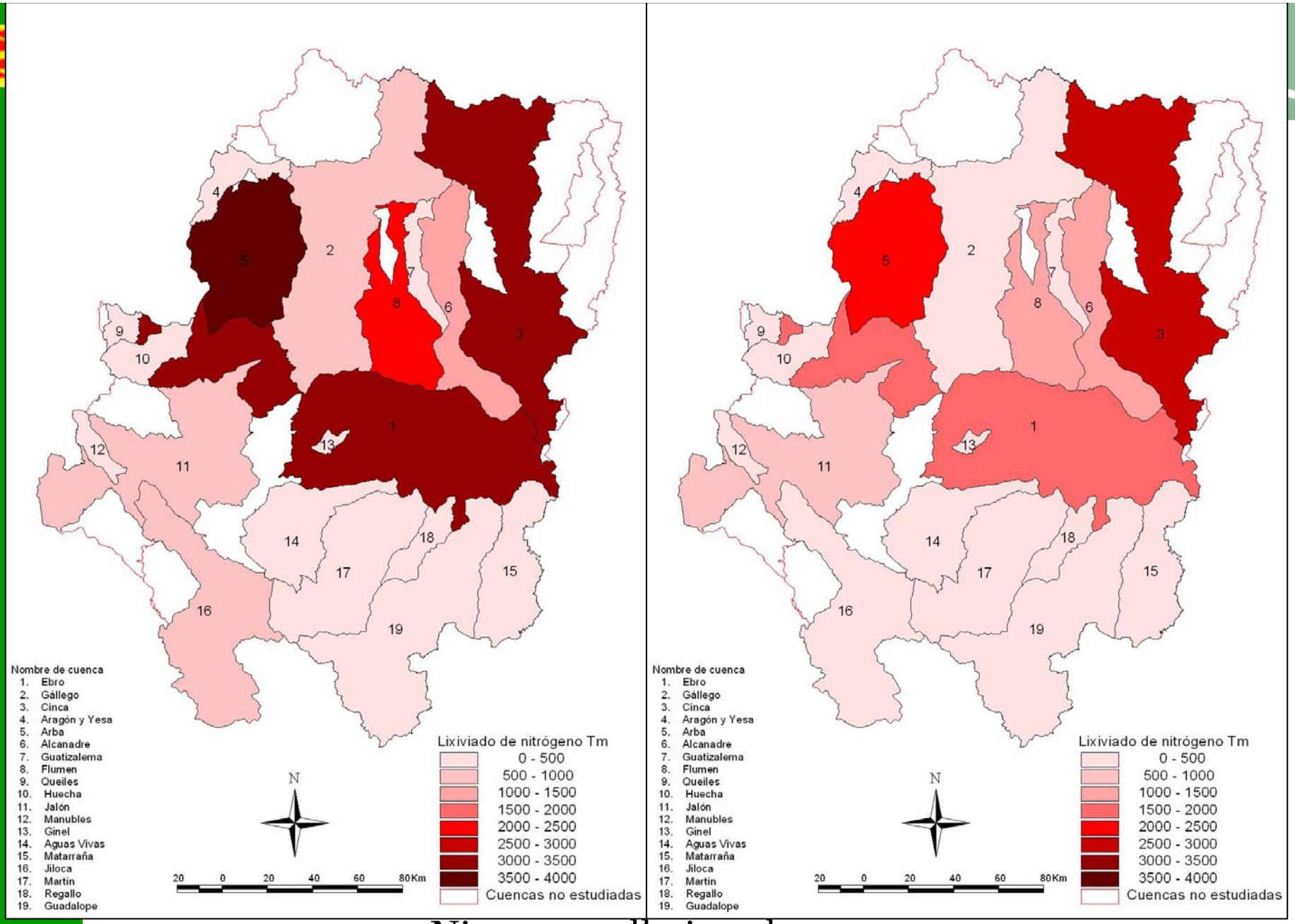
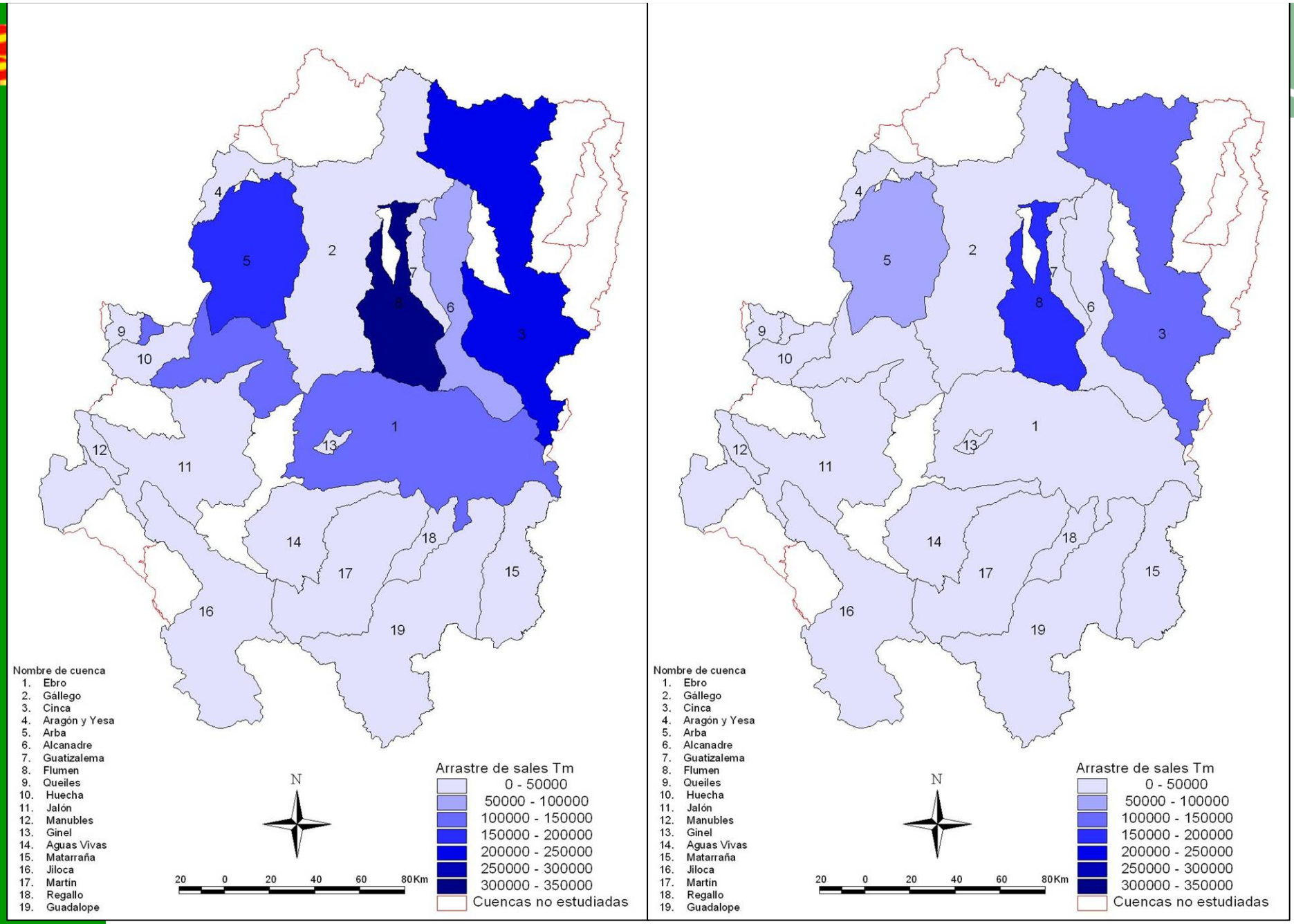
Nitrogen and salinity pollution from the 400.000 ha of irrigation in the middle Ebro basin.





Nitrogen pollution abatement
from irrigation modernization (-40%)



Salinity abatement from irrigation modernization (-50%)

Implications for China:

Water problems in China are more similar to southern European countries. The main water use in China is also irrigation (common pool resource or impure public good) rather than urban or industrial demand (private good), so economic instruments such water pricing or water markets are useless.

1. Surface water: China needs command and control and strong water basin authorities to allocate irrigation in systems based on dams and canals.

2. Groundwater: China needs to set up incentives to give rise to cooperation among farmers leading to collective action. Examples of sustainable management: eastern La Mancha (Alfredo Calera) and Idaho (Rick Allen)

Implications for China:

3. Point pollution: China should continue the effort of investing in abatement of urban and industrial point pollution

4. Nonpoint pollution: China needs to design incentives for stakeholders cooperation leading to collective action (+ investments in advanced irrigation systems).

Points 2 (aquifers) and 4 (nonpoint pollution) require generating biophysical knowledge, which takes resources and time.