Water footprint assessment as a tool for water planning

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SS9: Water Footprint Assessment: A new frontier in water resource management, Water Footprint Network

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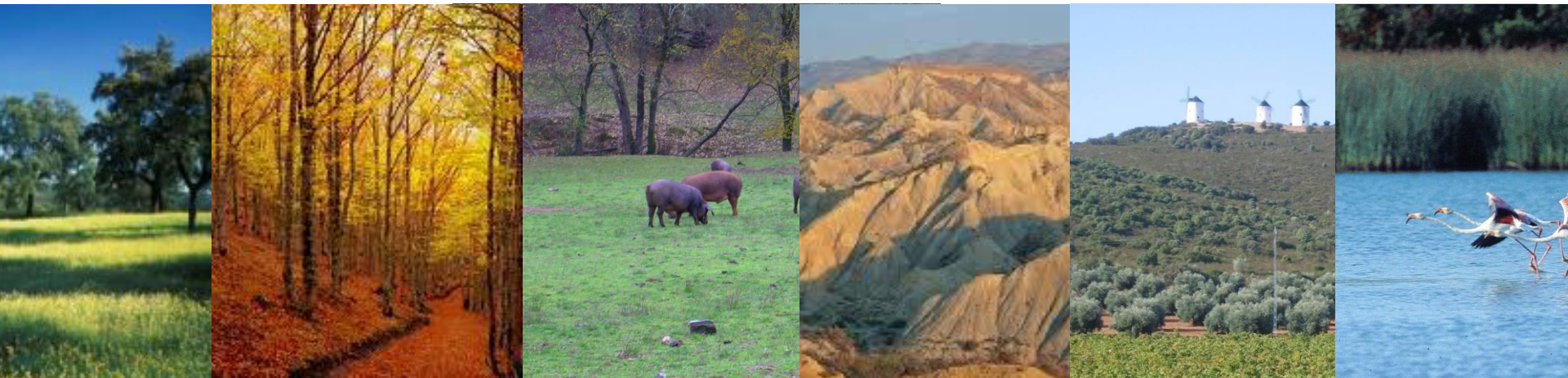
Water footprint into policy

Spanish water planning guidelines

3. Significant human uses, pressures and impacts / 3.1. Uses and demand /
3.1.1. Economic analysis of water uses / 3.1.1.1. Socio-economic activities

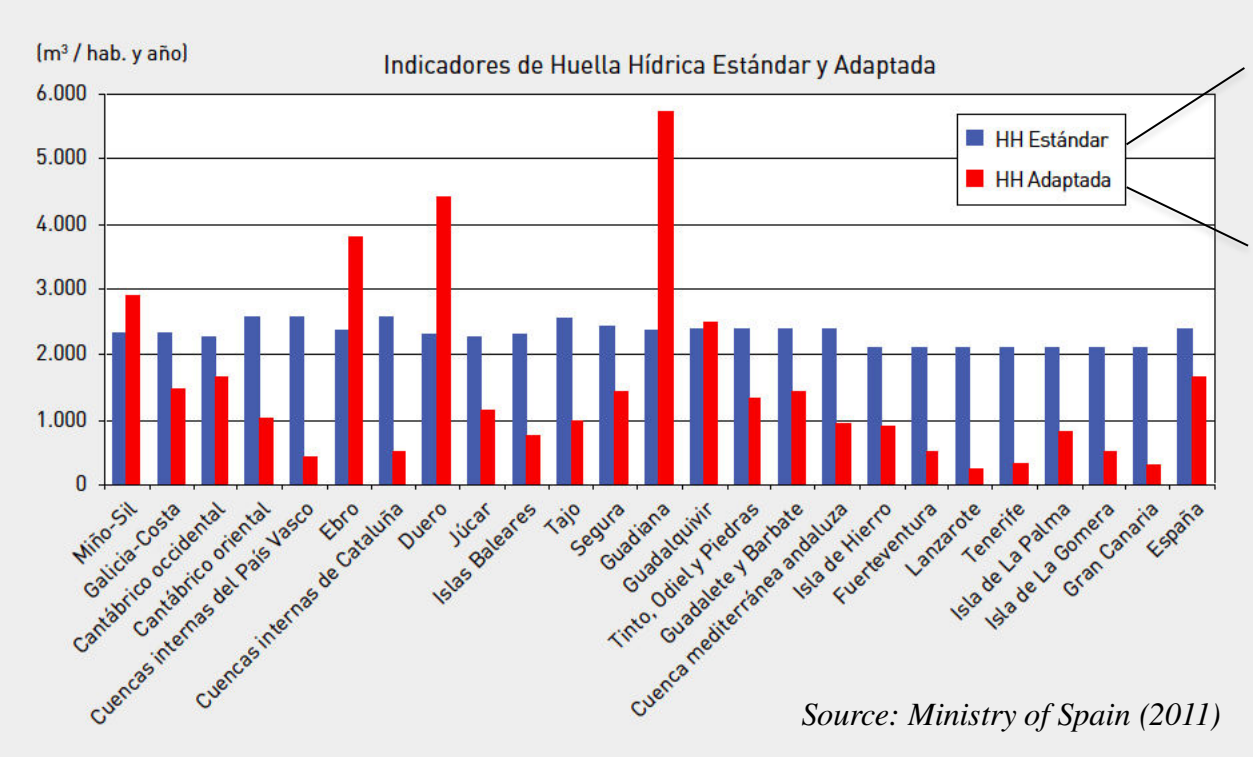
"The river basin management plans should include an analysis of the water footprint of the different socio-economic sectors in each river basin, understood as the total sum of the water used internally and the net balance of water imported and exported"

Source: Official State Gazette (BOE, 2008)



Water footprint of Spain

	Ministry of Spain (2011)
Phase:	WF accounting
Method:	Input-Output Analysis
Components:	Green, blue, grey WF
Scale:	River basin level
Terminology:	Own, different from WFN, ISO14046



WF of national consumption

WF within the area of a basin

Source: Ministry of Spain (2011)

Water footprint in the Spanish basin plans

River basin / 2009-2015	WF	disaggregated	Components		Other variables	Water available
Cantábrico	✔		✔	✔	✔	
Cantábrico Oriental (País Vasco)	✔		✔	✔	✔	
Cataluña						
Duero	✔					
Ebro	✔	✔	✔	✔		
Galicia Costa						
Guadalquivir	✔		✔	✔		
Guadalete & Barbate						
Guadiana	✔		✔	✔	✔	✔
Islas Baleares						
Islas Canarias						
Júcar	✔		✔	✔		
Mediterráneas Andaluzas						
Miño-Sil						
Segura	✔		✔	✔	✔	
Tajo						
Tinto, Odiel & Piedras						

Source: River Basin websites (2015)

General framework

Nº	RESULTADOS (hm³)	Uso del Agua (AD)	AV transvasada entre sectores	AV producción*	AV EXPORT	AV IMPORT	Balance neto comercio	HH TOTAL
1	Agricultura	38.494,4	-18.717,6	19.776,8	12.566,6	27.479,1	14.912,5	34.689,3
2	Ganadería y caza	17.962,4	-16.443,3	1.519,1	529,1	712,1	183,0	1.702,0
3	Selvicultura y explotación forestal	8.811,0	-4.810,4	4.000,6	934,0	2.863,8	1.929,8	5.930,4
4	Pesca	20,2	70,5	90,8	12,7	43,1	30,4	121,2
5	Industrias extractivas	134,3	-105,5	28,8	27,3	910,1	882,8	911,6
6	Industria de la alimentación cárnica y láctea	56,7	12.883,3	12.940,0	1.363,5	1.810,6	447,0	13.387,0
7	Resto Industria de la alimentación, bebidas y tabaco	120,4	9.095,8	9.216,2	3.257,9	3.886,0	628,1	9.844,3
8	Industria textil, de la confección, del cuero y del calzado	122,3	726,2	848,5	395,4	536,6	141,2	989,7
9	Industria de la madera y del corcho	27,1	225,6	252,7	217,3	430,2	212,9	465,6
10	Industria del papel; edición, artes gráficas y reproducción	289,0	592,7	881,7	545,4	761,1	215,7	1.097,4
11	Refino de petróleo y tratamiento de combustibles nucleares	46,1	24,4	70,5	34,1	36,0	1,8	72,3
12	Industria química	504,7	60,7	565,4	392,2	684,8	292,6	857,9
13	Industria del caucho y materias plásticas	199,1	25,6	224,7	216,4	254,2	37,8	262,4
14	Industrias de otros productos minerales no metálicos	91,4	-8,0	83,4	79,6	43,5	-36,1	47,3
15	Metalurgia y fabricación de productos metálicos	208,6	40,0	248,6	183,5	253,5	70,0	318,6
16	Industria de la construcción de maquinaria, electrónica y óptico	23,7	306,2	329,9	228,2	471,5	243,3	573,2
17	Fabricación de material de transporte	27,3	368,6	396,0	312,4	321,4	9,0	405,0
18	Industrias manufactureras diversas	82,6	471,8	554,4	148,0	178,8	30,8	585,2
19	Captación, depuración y distribución de agua	925,6	-467,9	457,8	0,0	0,0	0,0	457,8
20	Producción y distribución de energía y gas	341,6	-204,8	136,8	3,2	3,0	-0,2	136,7
21	Construcción	44,1	1.798,0	1.842,2	0,2	0,4	0,2	1.842,4
22	Actividades de tratamiento de aguas residuales y alcantarillado	181,0	-6,3	174,7	0,0	0,0	0,0	174,7
23	Hoteles (Turismo)	61,1	441,4	502,5	0,0	32,7	32,7	535,2
24	Restaurantes	561,6	7.129,7	7.691,3	0,0	1,4	1,4	7.692,7
25	Otras actividades económicas (Servicios)	854,9	6.503,2	7.358,1	753,2	538,0	-215,2	7.142,9
TOTAL		**70.191,2**	**0,0**	**70.191,2**	**22.200,4**	**42.251,7**	**20.051,4**	**90.242,6**
Consumo humano		**2.425,1**	**0,0**	**2.425,1**				**2.425,1**
AD Total		**72.616,3**		**(hm³/año)**			**HH Total**	**92.667,7**
AD per capita		**1.793,0**		**(m³/habitante y año)**			**HH per capita**	**2.288,1**

Source: Ministry of Spain (2011)

Water uses, related economic values and employment in Spain

Activity	Consumptive use (10^9 m^3)	GDP (10^9 Euro)	Workforce (%)
Agriculture & livestock	15 (75%)	25 (3%)	4
Industry	1 (5%)	160 (16%)	17
Urban uses	3 (12%)	5 (0.5%)	1
Services (excl. tourism)	0.5 (4%)	600 (60%)	67
Tourism and golf courses	0.5 (4%)	110 (11%)	11
Bottled water	0.1 (-%)	3 (0.2%)	0.1
TOTAL	20 (100%)	900 (100%)	100

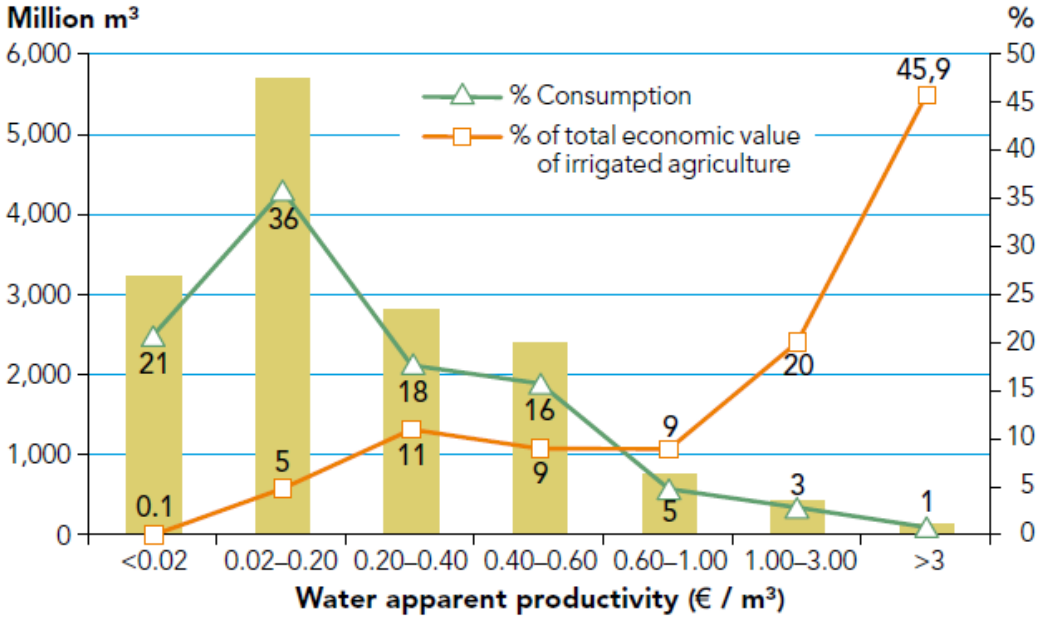
Source: Llamas et al. (2013)

Water economic productivity

Most blue water irrigation in Spain is used for low value crops:

- 10% of the blue water (mainly groundwater) produces 80% of the economic value of irrigated agriculture
- 80% of the blue water produces low value crops

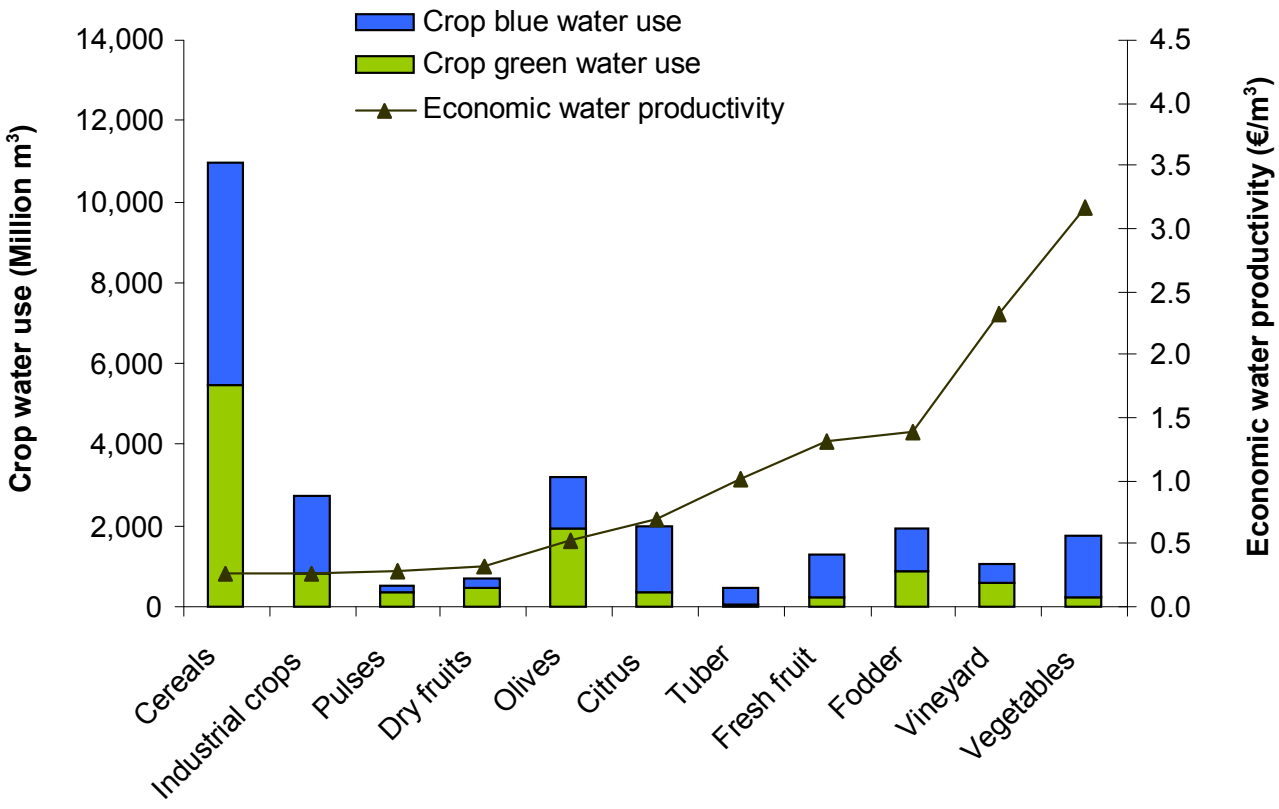
Total water use in agriculture by crop productivity range as percent of volume and value added (2001-2002)



Source: Aldaya et al. (2008)

Water economic productivity

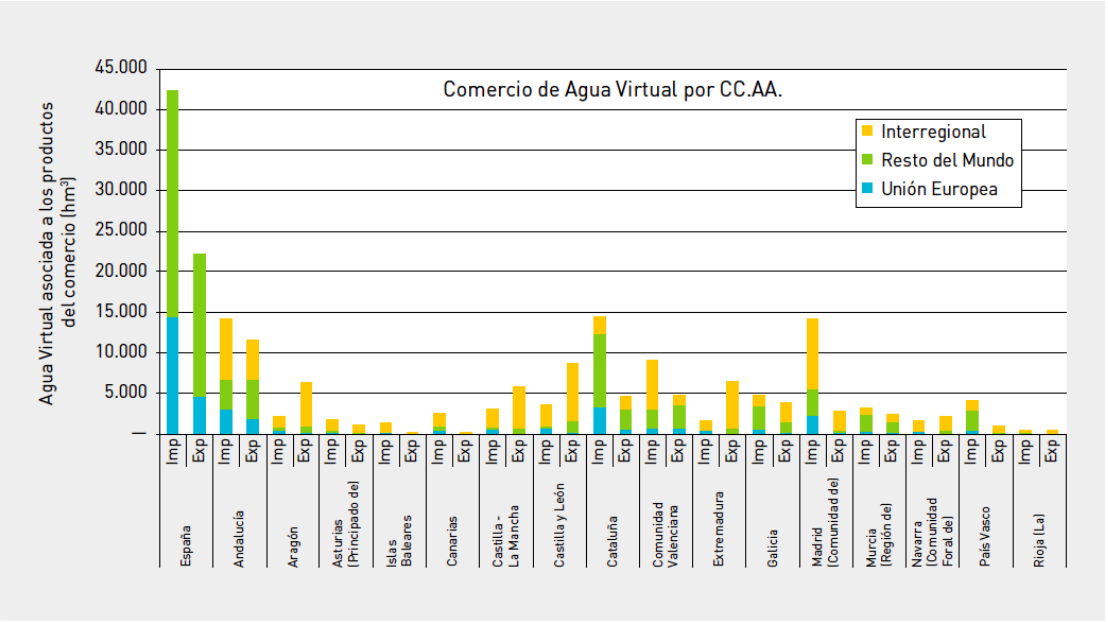
Comparison of blue and green water uses and economic productivity in Spanish agriculture



Source: Garrido et al. (2010)

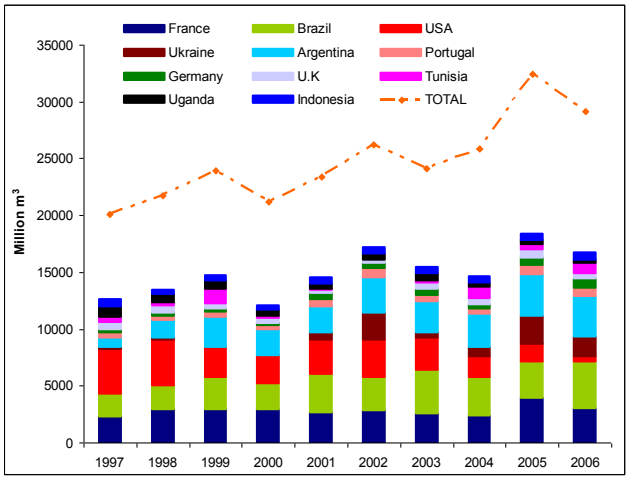
The role of virtual water trade

- Livestock economic relevance has increased during the last decade;
- Most livestock is exported (mainly pork) while grown with imported fodder (virtual water);
- Increased water dependency.



Source: Ministry of Spain (2011)

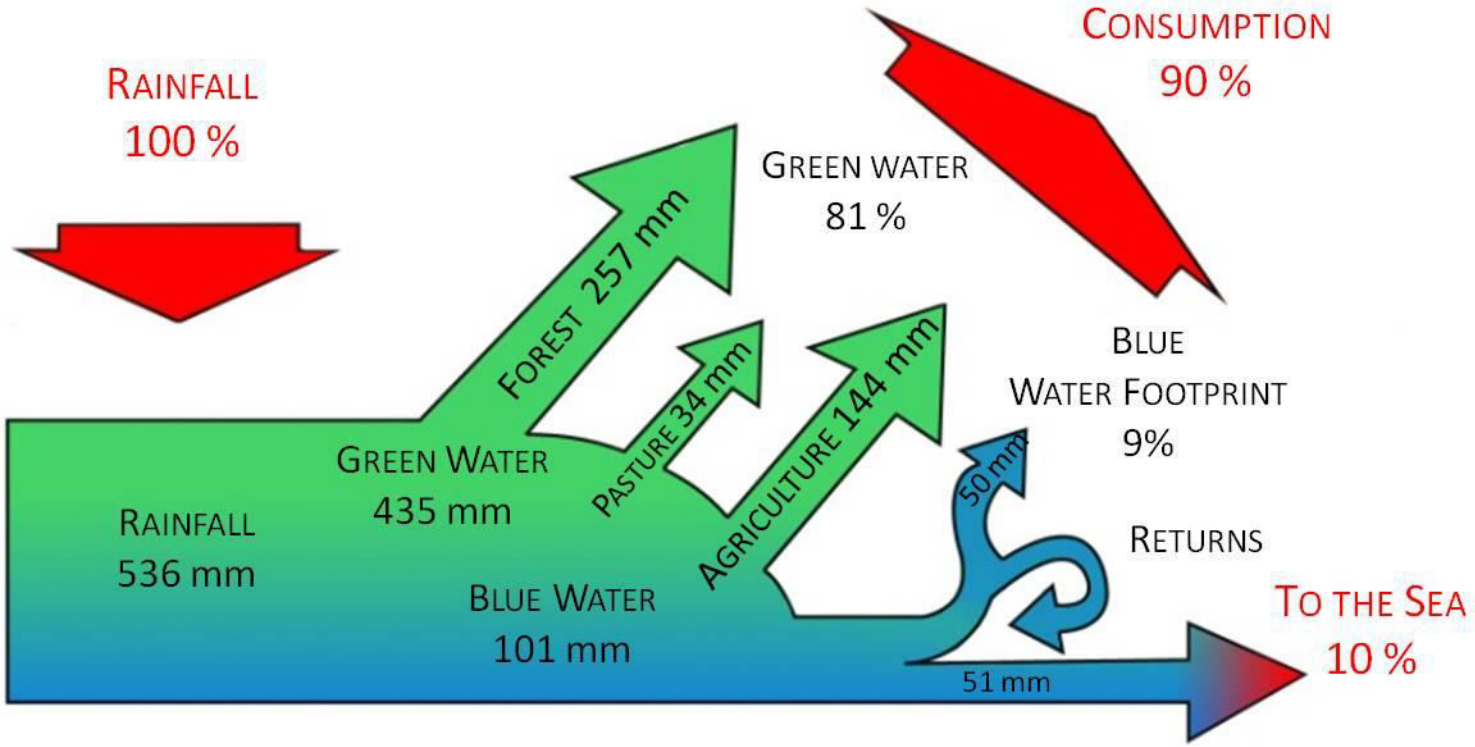
Crop-related virtual water imports by country of origin



Source: Garrido et al. (2010)

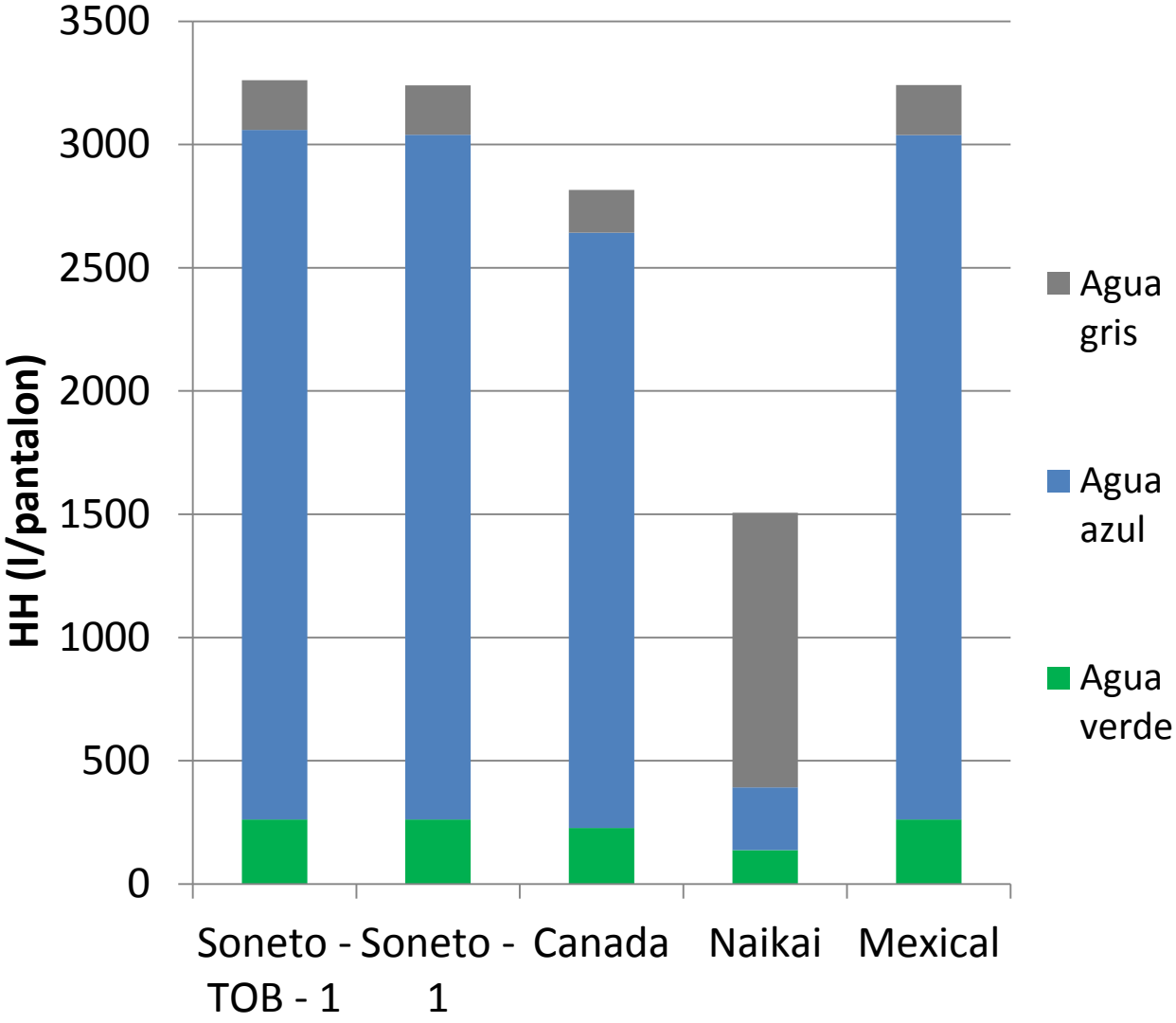
Guadalquivir river basin

Green and blue water balance in the Guadalquivir river basin



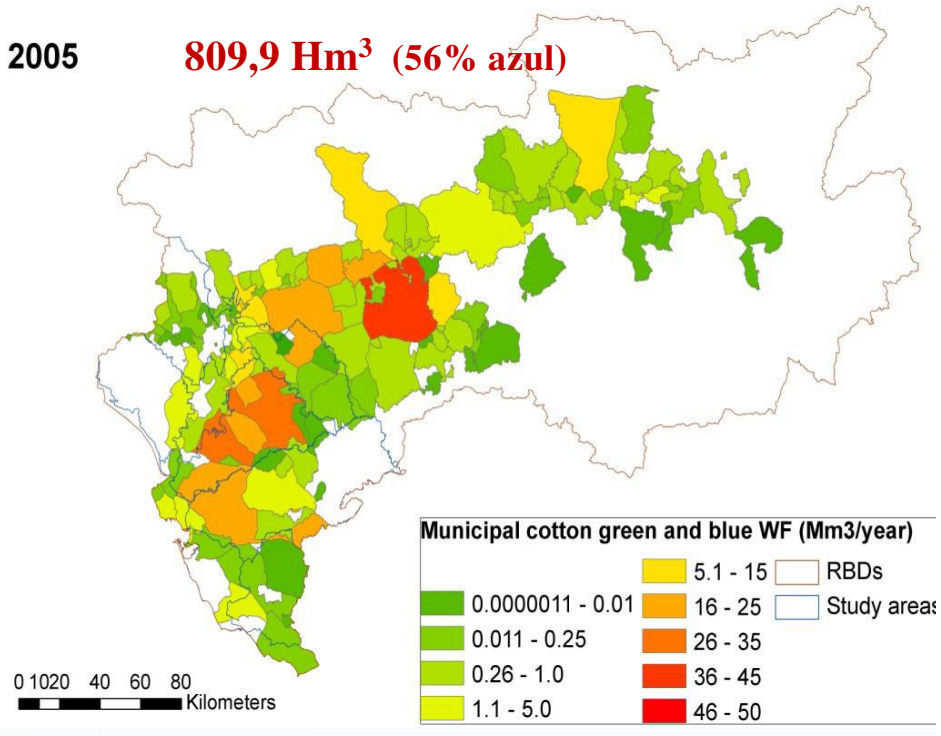
Source: Salmoral et al. (2012)

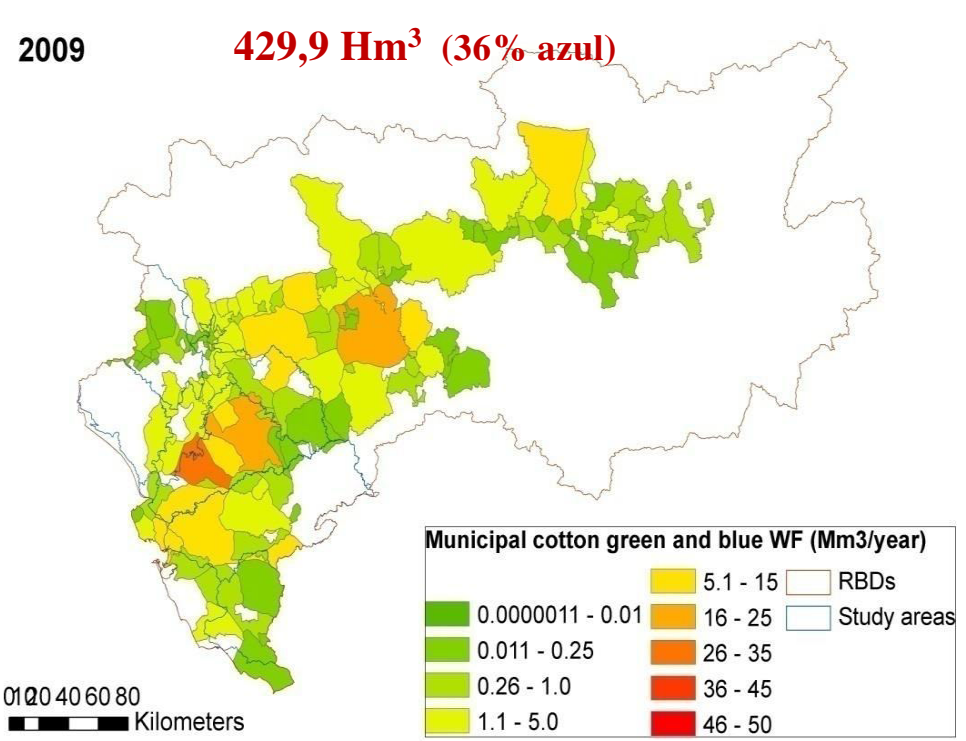
The textile sector



Source: Chico et al. (2012)

The textile sector





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A water footprint assessment of a pair of jeans: the influence of agricultural policies on the sustainability of consumer products

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Conclusions

The Spanish experience shows:

1. The world's water problems are mainly due to bad **governance**, not to physical water scarcity.
2. The use of the **IWRM**, with its pros and cons, may be useful to foster good decision making.
3. Valuable **tools** for a more effective IWRM include water accounting, virtual water (food) trade, water footprint, evaluation of the natural and social capital, ethical issues and transparency.
4. **Water reallocation** is needed for releasing current pressure on the environment and for new uses.
5. Need to find formulas that make reallocation acceptable for all the parties.
6. **Transparency and accountability** in decisions and public spending

Conclusions

7. **Socio-political factors** in water management might be as important as the environmental and economic ones. Moving away from nested positions ("this water is mine") or water as a political "weapon". An equilibrium between utilitarian and intangible values is necessary.

8. Spanish situation suggests that it is time to change to a policy of '**more social, economic and environmental value per drop**'

9. The current paradigm of water and food **self sufficiency** has to be revisited. Probably the role of the WTO in global water policy will increase in the near future.






Thank you

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