WORLD WATER WEEK
in Stockholm, August 17–23, 2008

Presentation

Presentation from the 2008 World Water Week in Stockholm

Stockholm Water Week 2008
Virtual Water and Water Footprint: From Theory to Practice

Virtual Water and Water Footprint: A Case Study from Spain

M. Ramón Llamas[§]
Alberto Garrido*, Maite M. Aldaya [§], Paula Novo*,Roberto Rodríguez Casado*, Consuelo Varela-Ortega*

[§] **Universidad Complutense, Spain**
***Universidad Politécnica de Madrid, Spain**

Project Funded by Fundación Marcelino Botín

ceigram
Research Centre for the Management of Agricultural and Environmental Risks

NeWater

Sylabus

Motivation
Objectives
Data
Results
Discussion

Motivation

- WF + VW are indicators that inform water policy decisions
- There are critical issues that the literature has covered only superficially:
  - The Green-blue water components, and drought cycles
  - Virtual water trade as water policy indicator
- A few but crucial methodological issues question hitherto WF+VW evaluations for Spain

Objectives

1. Obtain new evaluations of WF and VW at lower scale (provincial) and for different years
2. Evaluate water scarcity in light of the evaluations of WF and VW
3. Distill water policy and farm policy lessons drawn from the WF and VW

Data sources

1. Area/yield of 93 crops, rainfed and irrigated, in each province along 9 years (1997-2005) (Ministry of Agriculture)
2. ETP evaluated for each crop, province and year (Allen *et al.*, 1998; INM, 2007)
3. Blue water estimated as a complement to available green water and checked with Water Authorities
4. Trade of all crop products and years (MITYC, 2007)

Results

1. Comparisons from previous evaluations
2. Spanish agricultural and livestock footprints
3. Agricultural Virtual Water Trade
4. Hydrological and economic water productivity
5. Does international agricultural trade increase water use in Spain?
6. Does agricultural footprint depend on water scarcity??
7. River basin analysis: the Guadiana case

1. Comparisons from previous evaluations

Strong differences in agricultural water use and virtual water 'trade'…

	Agricultural Water Use (Mm^3/year)	Virtual water 'trade' (Mm^3/year)	
		Exports	Imports
Year 2003	25,602[1]	9,861[1]	24,140[2]
Chapagain y Hoekstra[3]	50,570	17,440	27,110

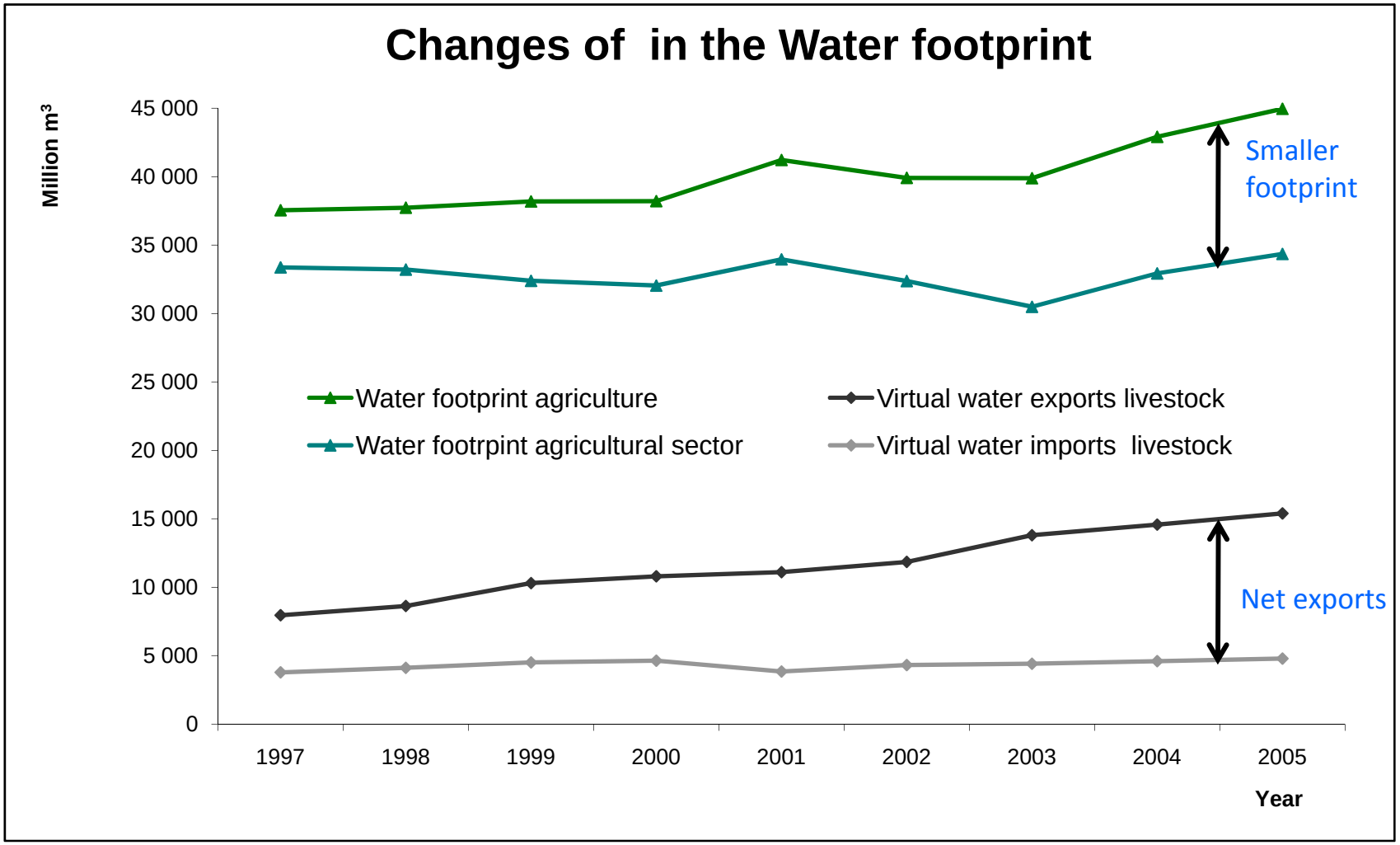
Source: 1 Own elaboration; 2 MAPA (2005) and Chapagain y Hoekstra (2004) ; 3 Chapagain y Hoekstra (2004), 1997-2001

…due to:

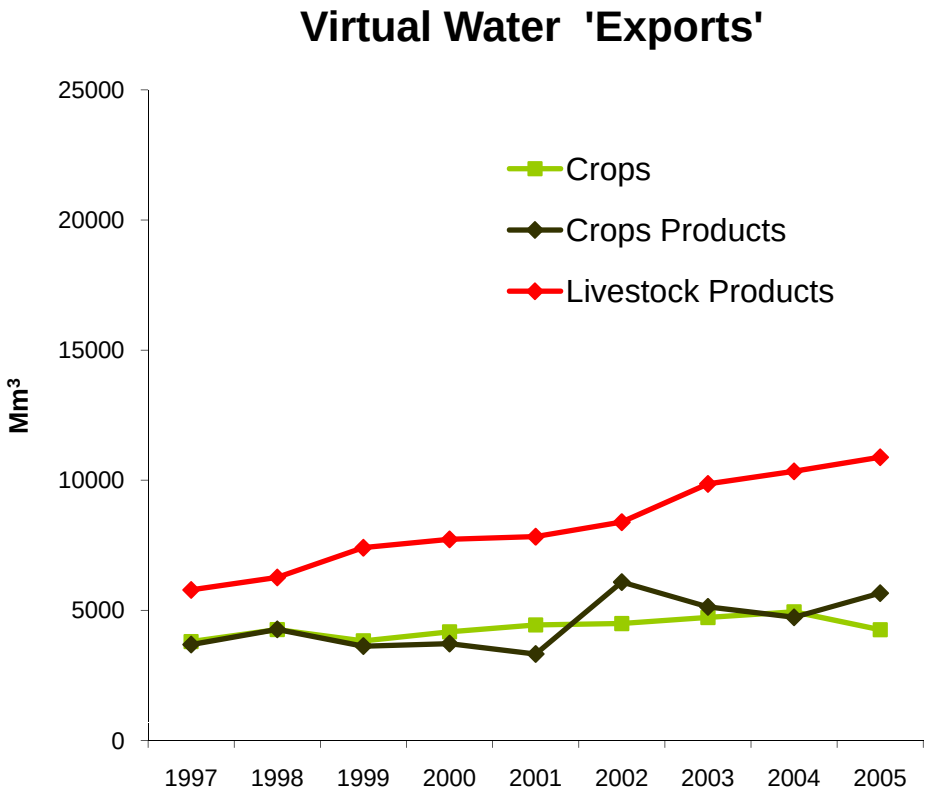
- Distinction between rainfed and irrigated agriculture
- Different data sources

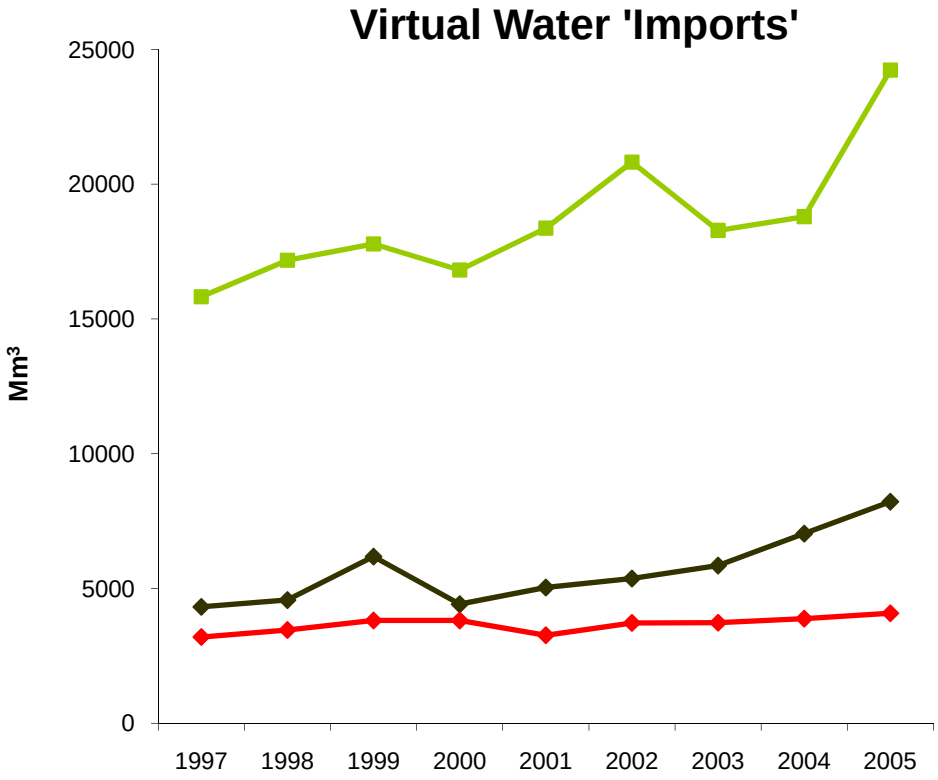
VIRTUAL WATER CONTENT (m^3/ton)	Our Work	Chapagain y Hoekstra
Wheat	507	1227
Barley	434	1070
Maize	727	646
Orange	326	362
Tomato	93	53
Olive	496	3295

2. Agricultural Water footprint

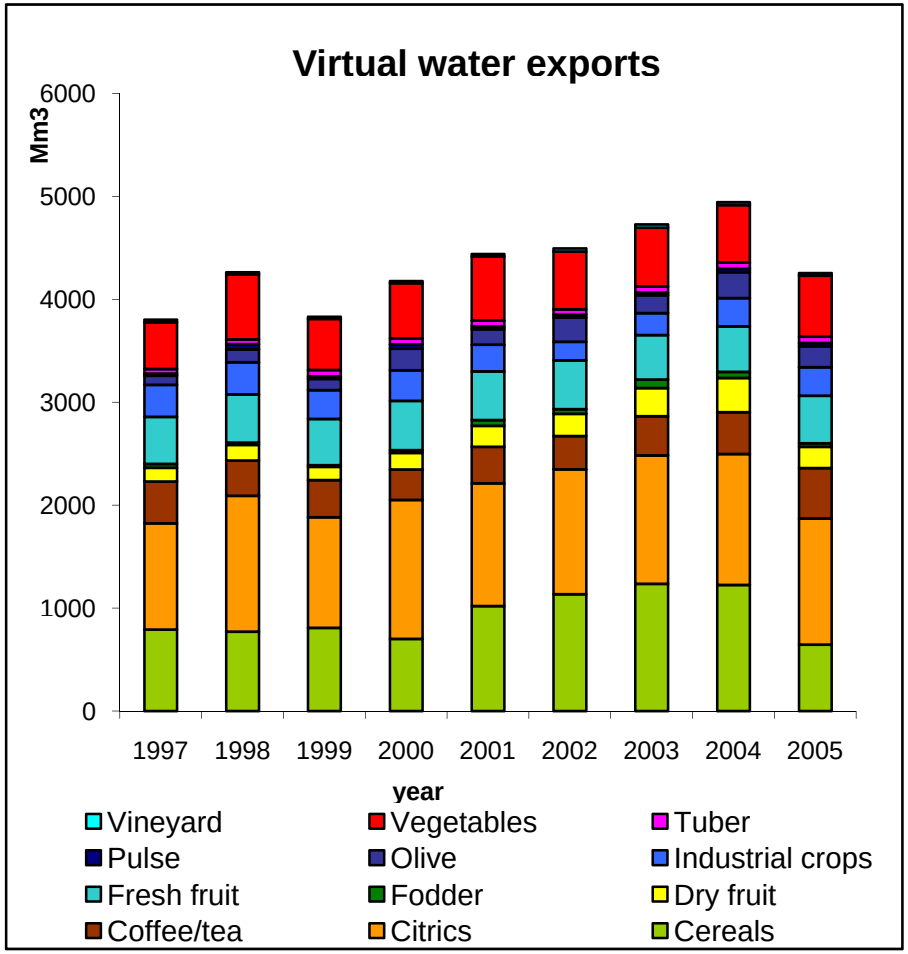


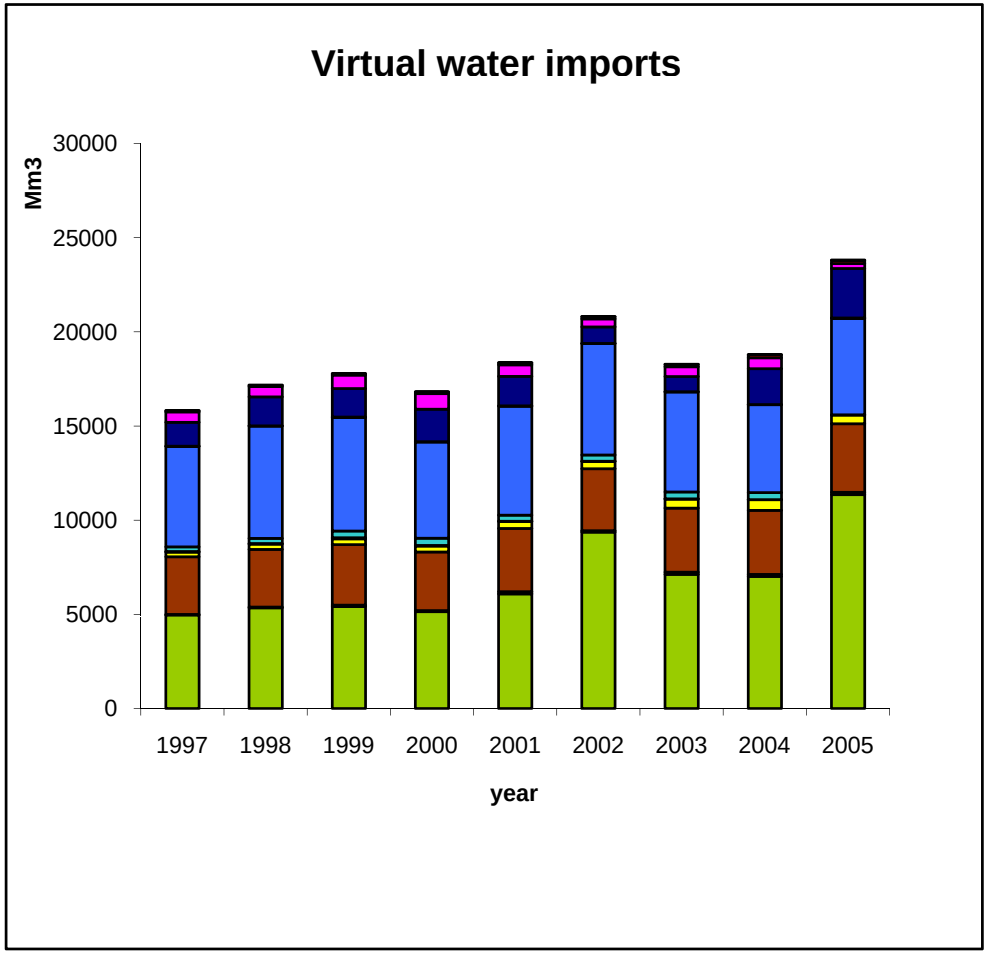
3. Agricultural virtual water trade



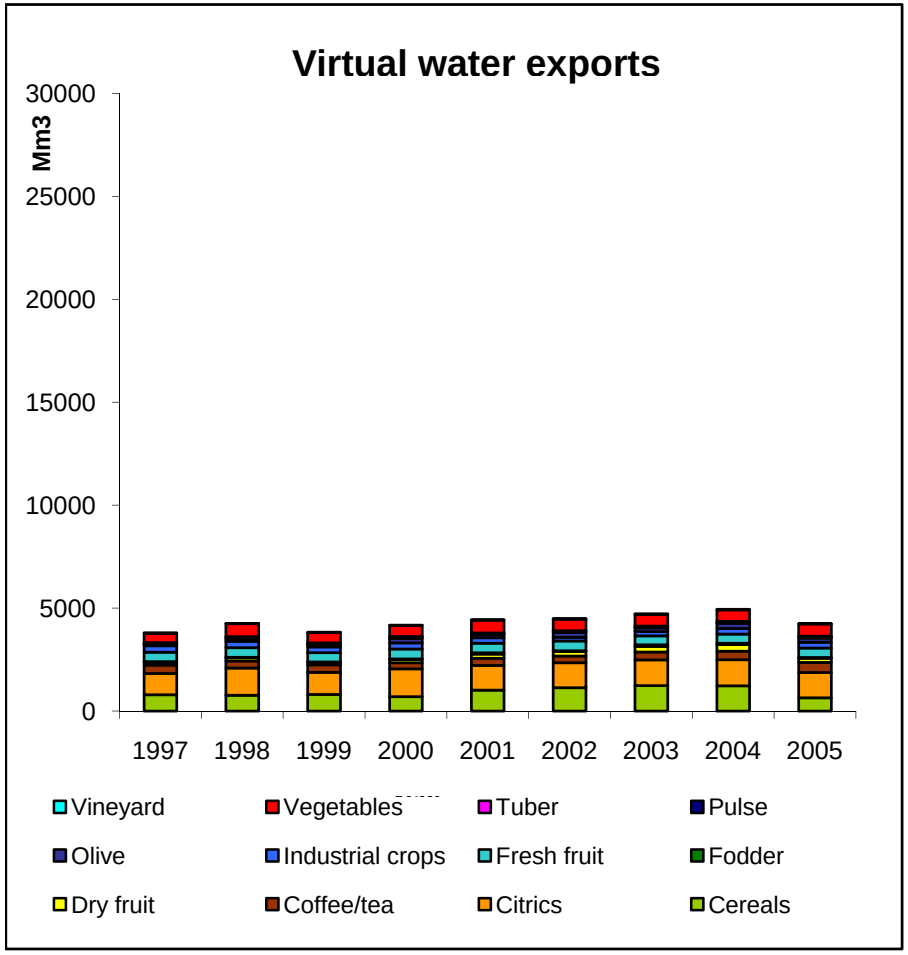


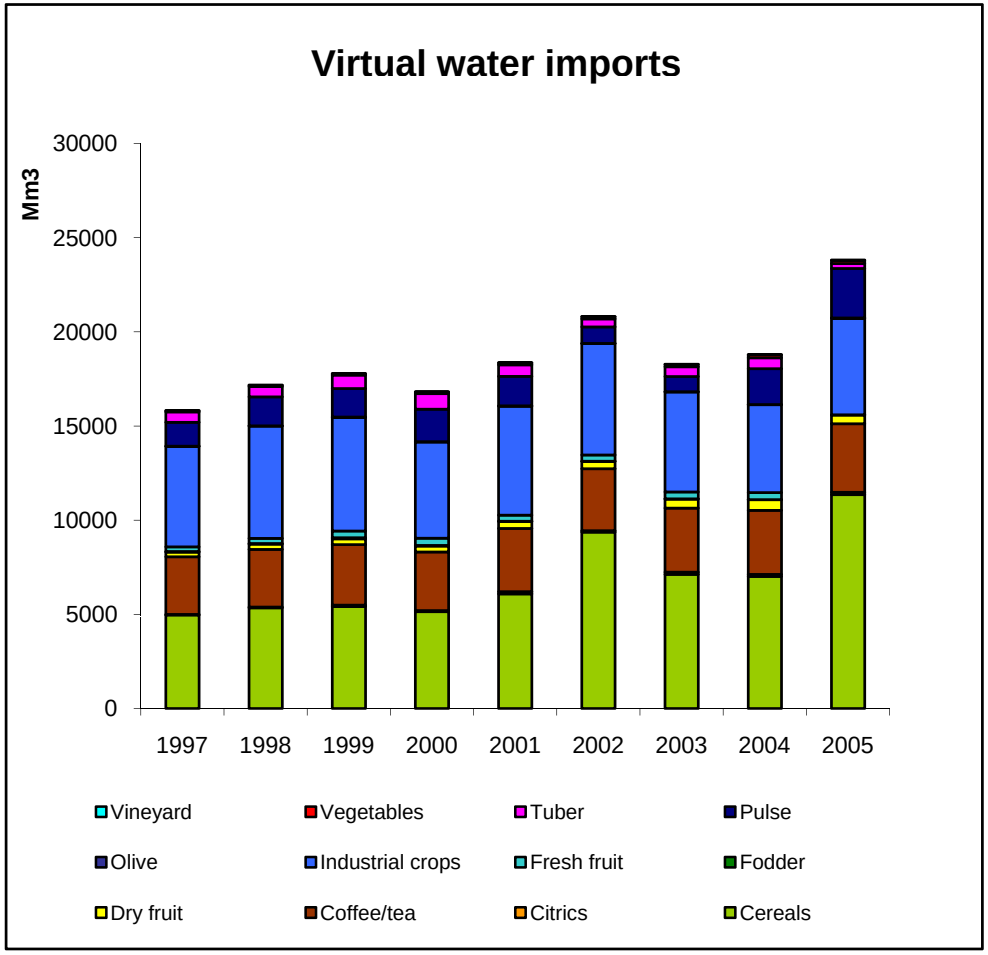
3. Agricultural Virtual Water trade



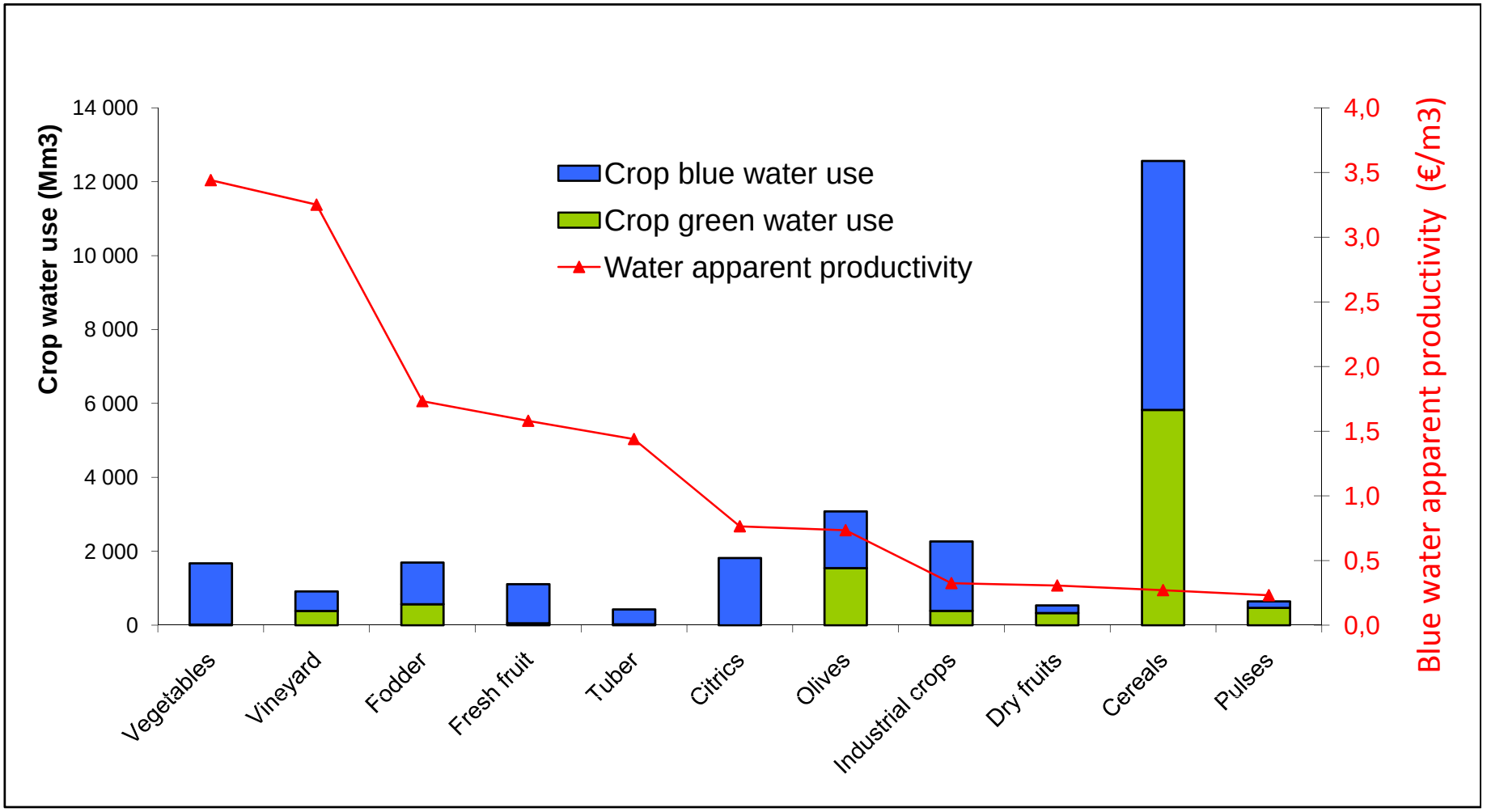


3. Agricultural Virtual Water trade

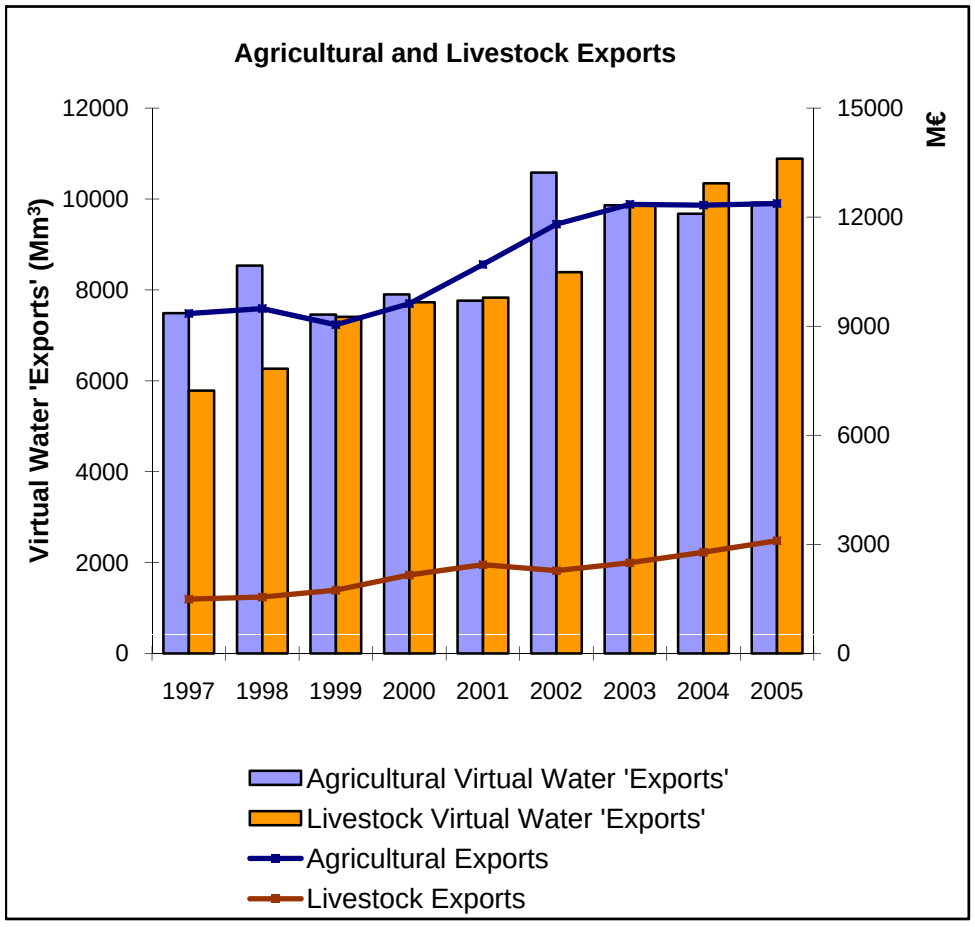


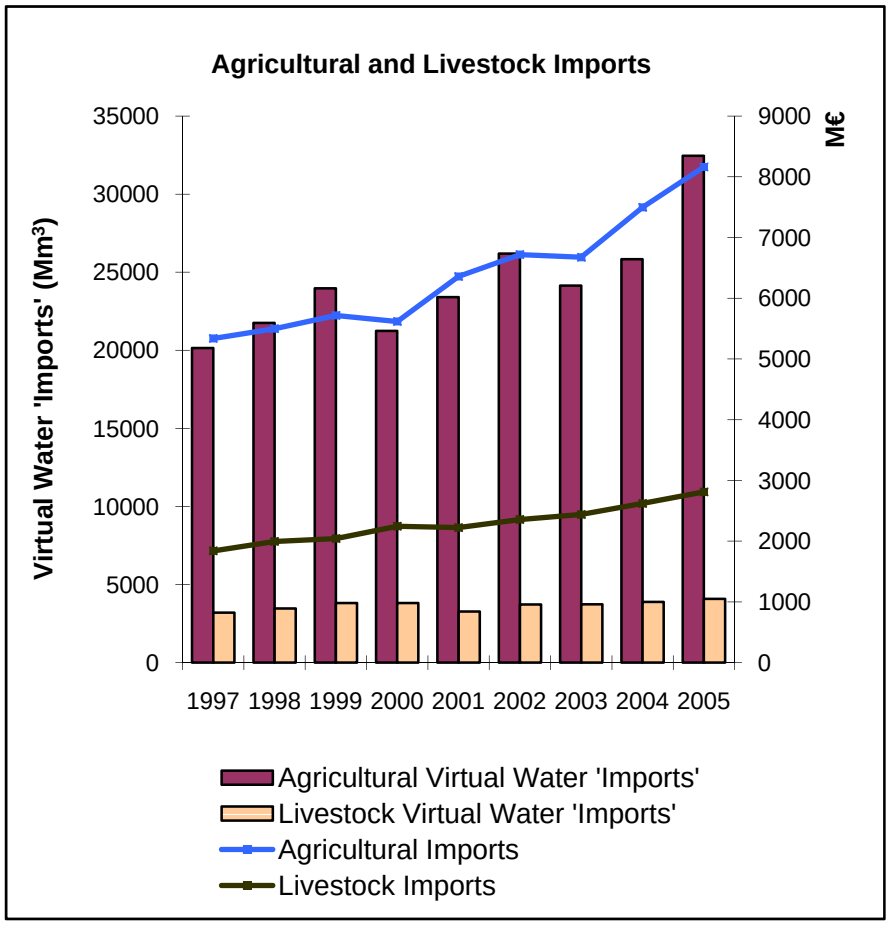


4. Water productivity and blue-green water use



5. Does international agricultural trade increase water use in Spain?



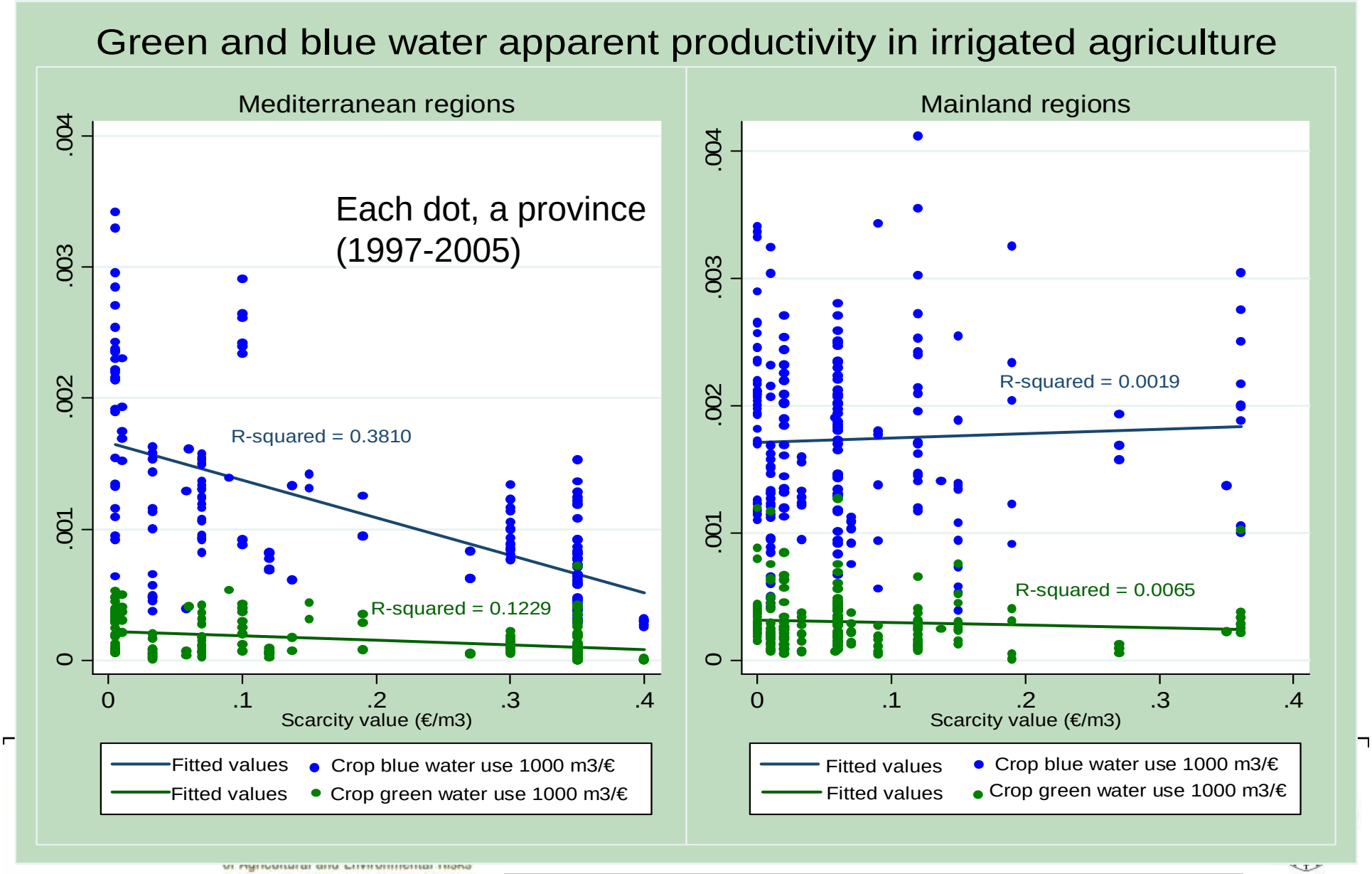


ceigram Research Centre for the Management of Agricultural and Environmental Risks

NeWater

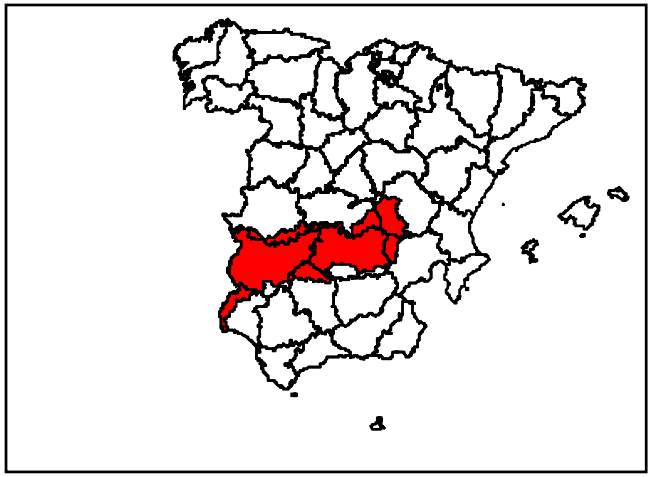
Fundación Marcelino Botín

6. Is agricultural footprint dependent on water scarcity?



7. Regional analysis: the Guadiana Basin

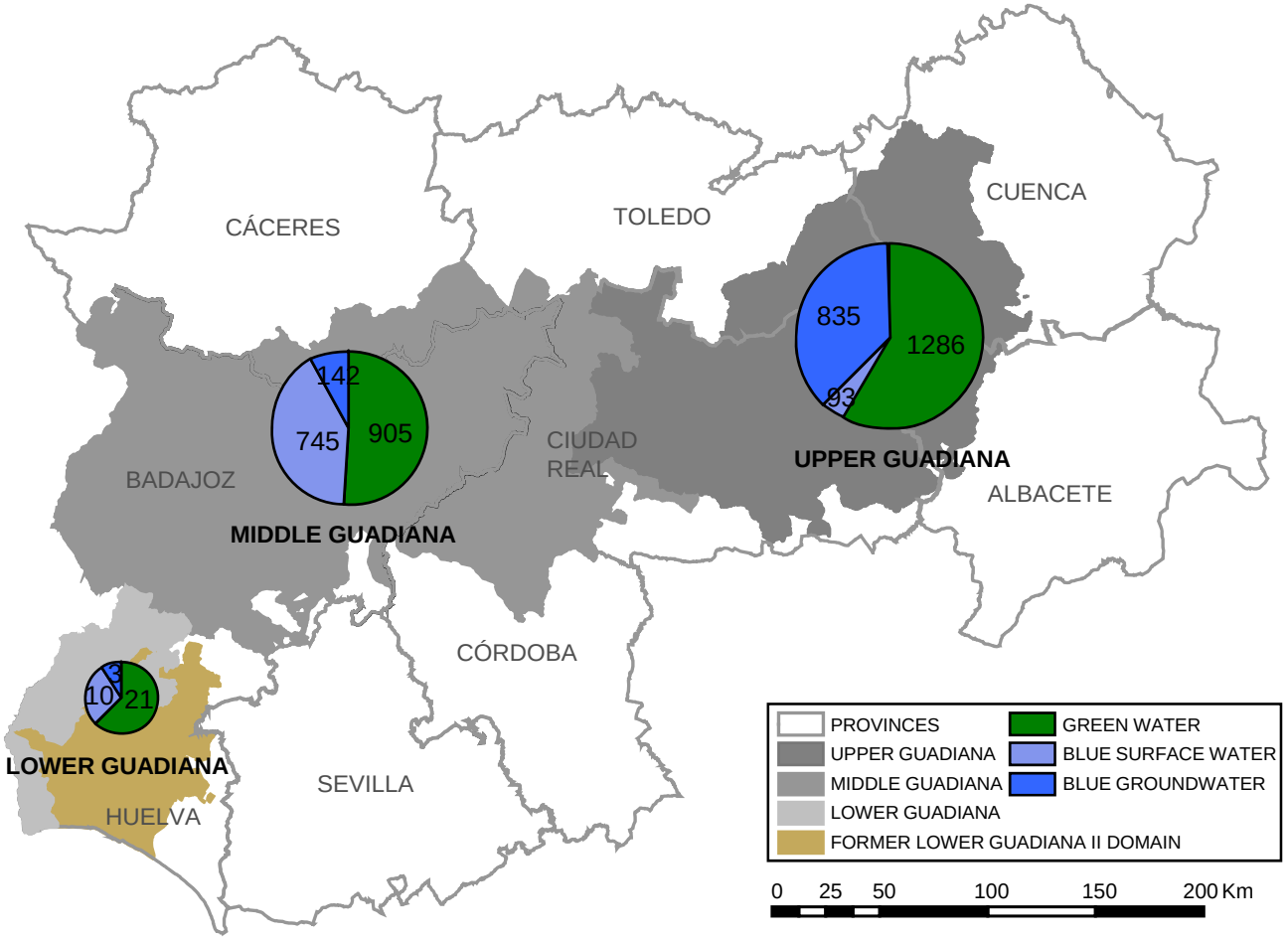
Water Footprint analysis (green and blue), both from a hydrological and economic perspective, for the whole Guadiana basin in collaboration with the Portuguese Water Institute (INAG) within the NeWater project.



Source: CHG (2008)

7. Regional analysis: the Guadiana Basin

Agricultural use of water resources in the Guadiana (10^6 m^3/year) (2001)



Source: Aldaya and Llamas (2007)

7. Regional analysis: the Guadiana Basin

Water consumption and economic value in the Guadiana Basin (2001)

GUADIANA RIVER BASIN*						
Human population		Green Water $10^6 m^3$/year	Blue Water $10^6 m^3$/year	Per capita m^3/cap/year	GVA million €	Blue water economic productivity €/m^3/year
1,417,810	Agricultural	2,212	1,827	2,849	1,096	0.6
	Livestock		22	16	286	12.7
	Urban		130	91	128	0.9
	Industrial		20	14	1,557	77.9
	Total	2,212	1,999	2,970	3,068	1.53

**These data do not include trade.*

Source: Aldaya and Llamas, 2007

Conclusions

VW & WF inform water, trade & agricultural policies

1. VW alleviates and cushions drought cycles
2. Green vs. Blue water accounting is essential to evaluate VW+WF (composition varies with years and regions).
3. The 'water scarcity' paradigm should be revisited in light of water VW trade