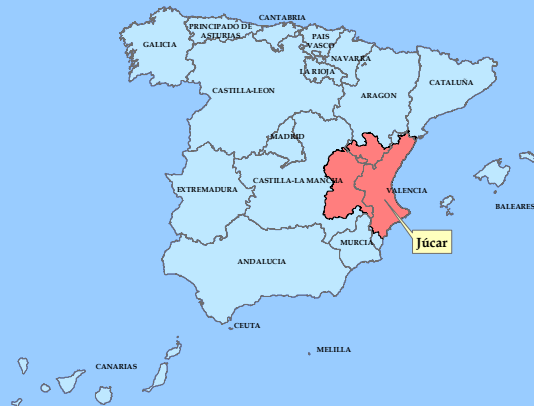




Programme of measures in the Júcar Hydrological District: case of Mancha Oriental groundwater body

Javier Ferrer Polo

Júcar River Basin Authority



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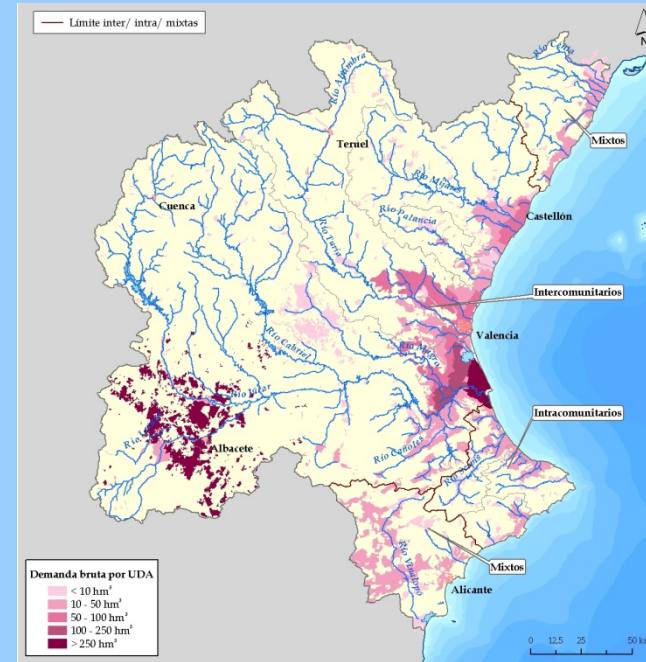
1. Júcar River Basin
2. Programme of Measures of WFD
3. The case of Mancha Oriental groundwater body
 - **current situation**
 - **cost - effectiveness analysis (cea)**
 - **objectives and time exemptions. technical viability**

JÚCAR RIVER BASIN



MINISTERIO
DE MEDIO AMBIENTE,
Y MEDIO RURAL Y MARINO

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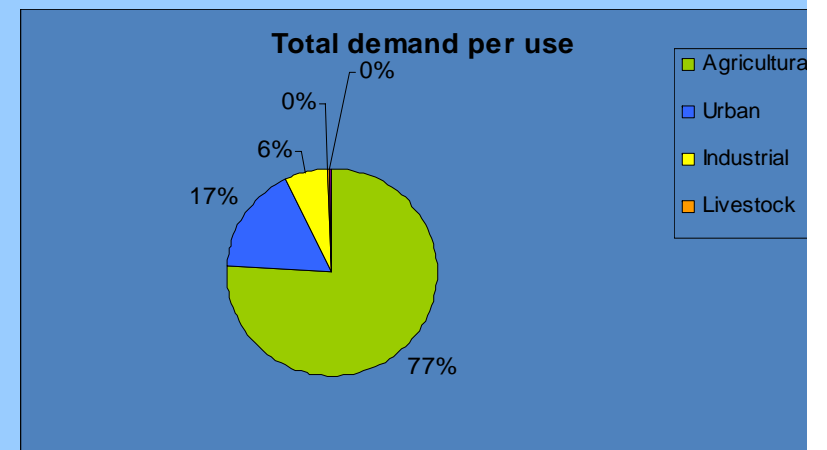
Surface (km²) **43.000**

Permanent Population (2005) **4.792.528**

Equivalent total population (2005) **5.153.288**

Irrigation surface 2005 (ha) **352.489**

Water demand 2005 (hm³/year) **3.290**



PROGRAMME of MEASURES WFD



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ENVIRONMENTAL OBJECTIVES (art.4)

(art. 4.1.)

WATER FRAMEWORK
DIRECTIVE

ENVIRONMENTAL OBJECTIVES

ELABORATION OF A PROGRAMME OF
MEASURES TO BE INCLUDED IN THE
RIVER BASIN MANAGEMENT PLANS

ACHIEVE THE GOOD STATUS OF SURFACE
AND GROUNDWATERS IN 2015

(art. 4.4.)

THE DEADLINES MAY BE
EXTENDED
(TIME EXEMPTIONS)

IMPROVEMENTS CAN ONLY BE ACHIEVED
IN PHASES EXCEEDING THE TIMESCALE,
FOR REASONS OF TECHNICAL FEASIBILITY

IMPROVEMENTS WITHIN THE TIMESCALE
WOULD BE DISPROPORTIONATELY
EXPENSIVE

NATURAL CONDITIONS DO NOT ALLOW
TIMELY IMPROVEMENT IN THE STATUS OF
THE BODY OF WATER

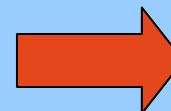
PROGRAMME of MEASURES WFD



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CLASSIFICATION OF MEASURES:

Basic Measures others directives:



**Programme of
Measures**

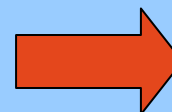
**Basic Measures Water Framework
Directive:**

WFD (Directive 2000/60/EC):

- Irrigation modernisation (art.47 RPH)

Supplementary Measures:

- Resources increase (art.60 RPH)



**Cost-effective
combination of
measures**



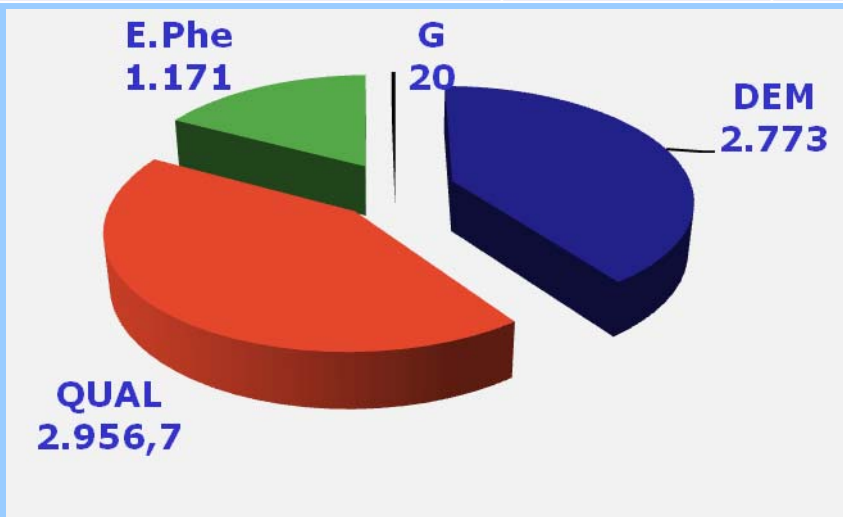
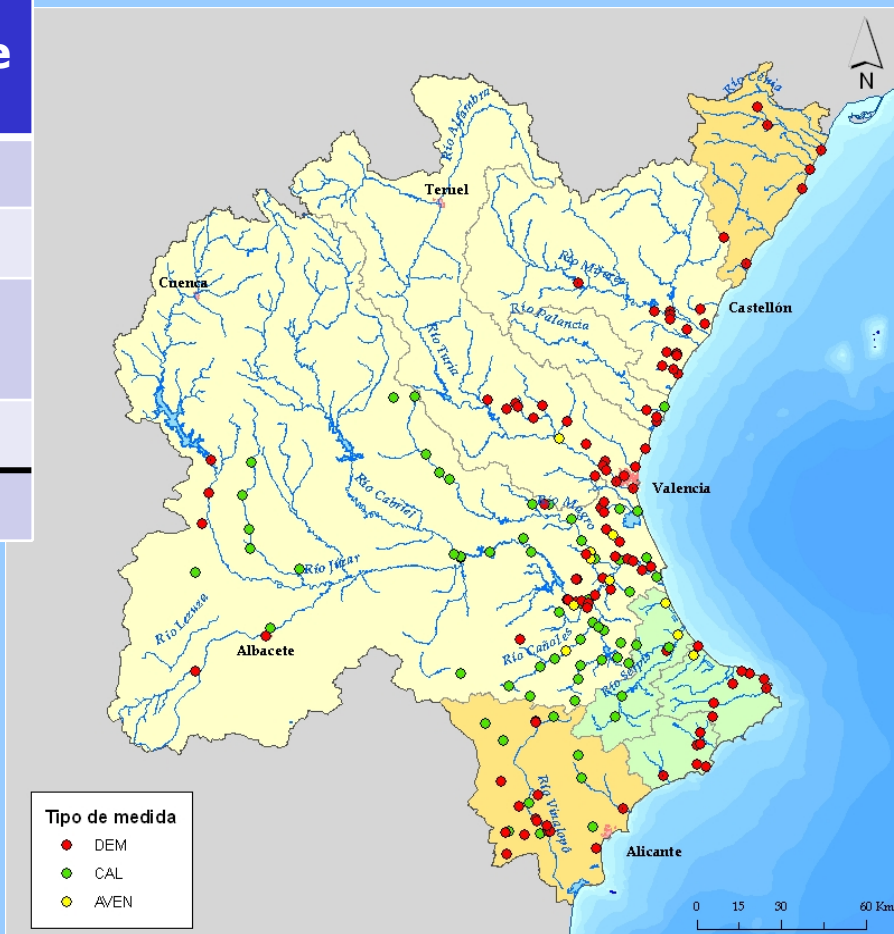
PROGRAMME of MEASURES WFD



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Description of the current draft of the PoM

Type of Measure	Investment Mill.€	Nº measures
Demands (DEM)	2.773	304
Quality (QUAL)	2.957	451
Extreme Phenomena(E.Phe)	1.171	40
Governance (G)	20	15
TOTAL	6.921	810



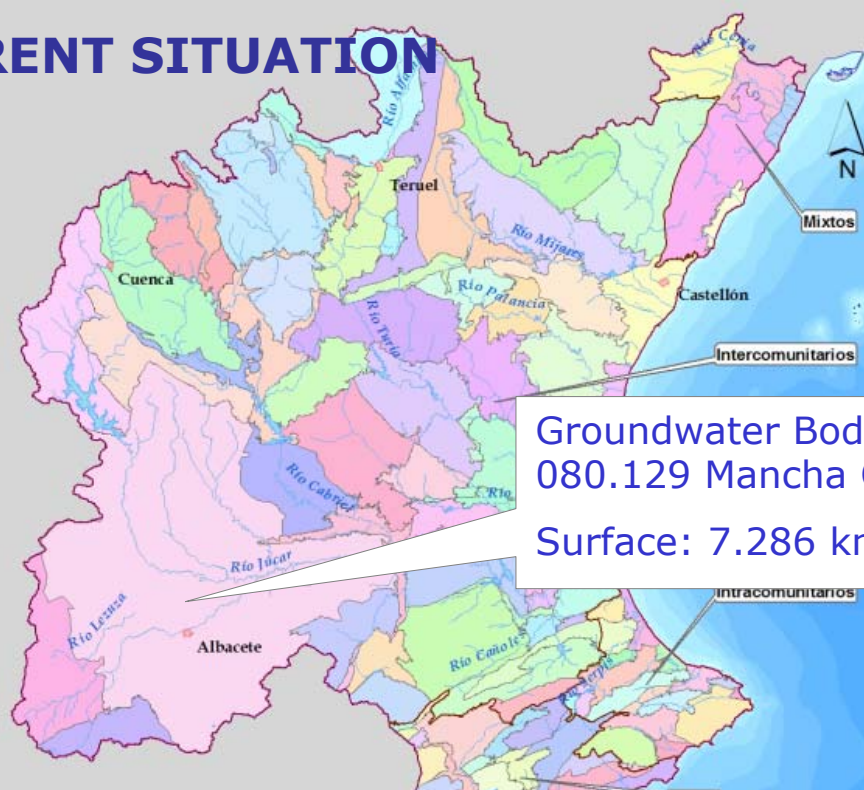
MANCHA ORIENTAL GROUNDWATER BODY



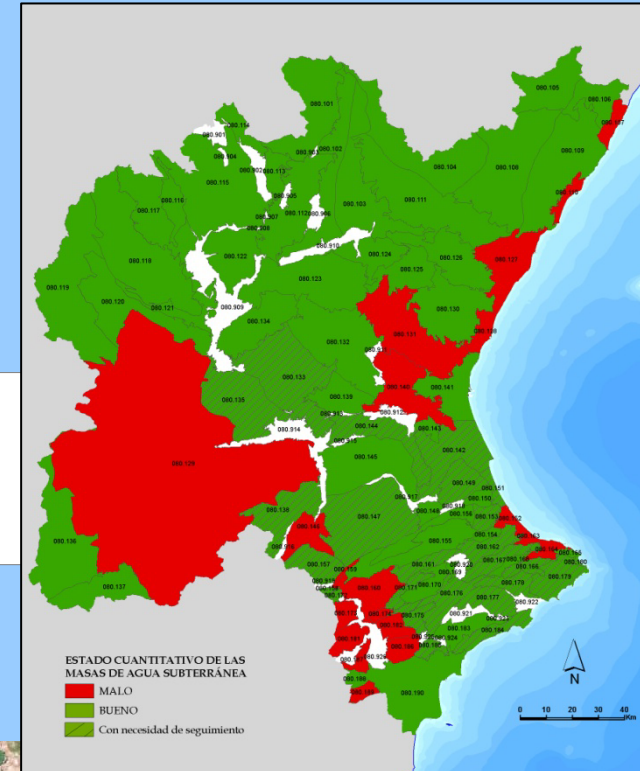
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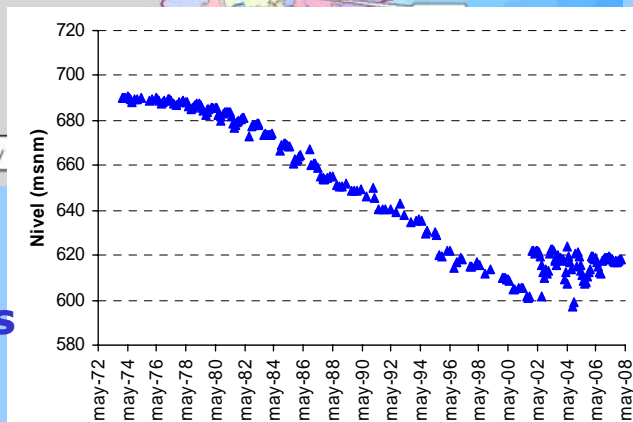
CURRENT SITUATION



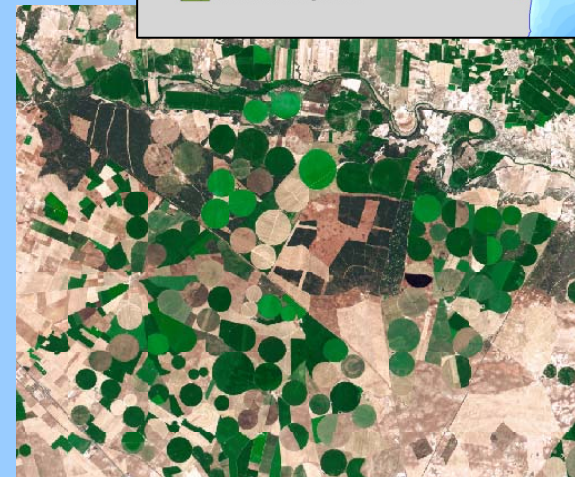
Groundwater Body
080.129 Mancha Oriental
Surface: 7.286 km²



Piezometric levels evolution



▲ 08.29.036 (T.M. Albacete)

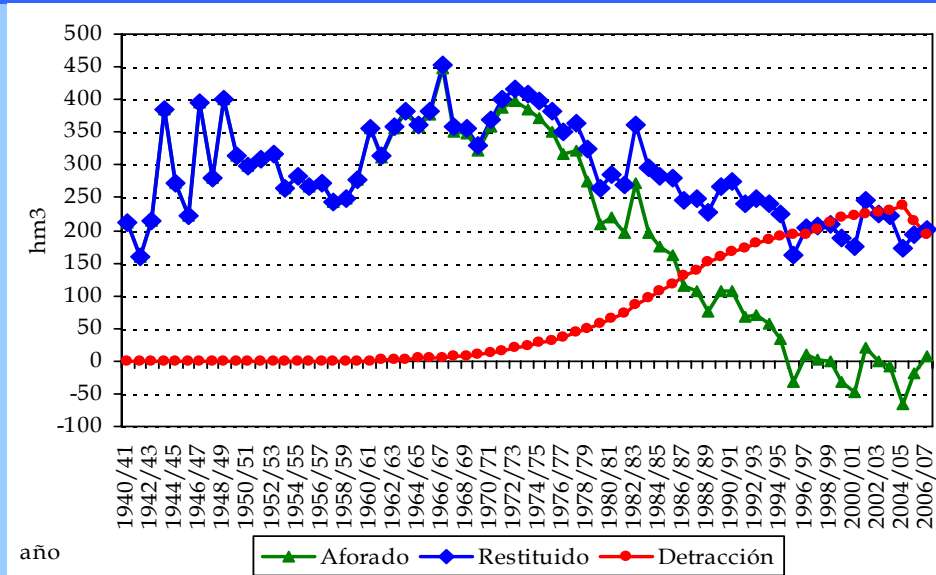


MANCHA ORIENTAL GROUNDWATER BODY

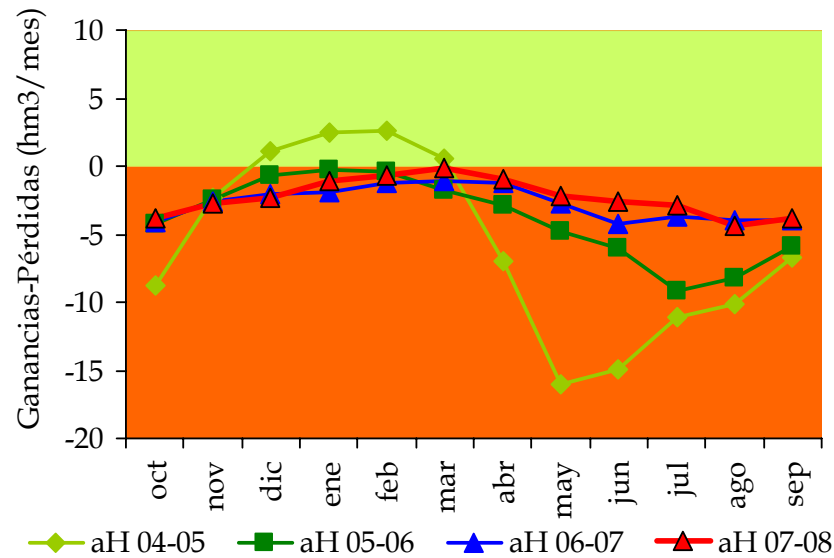


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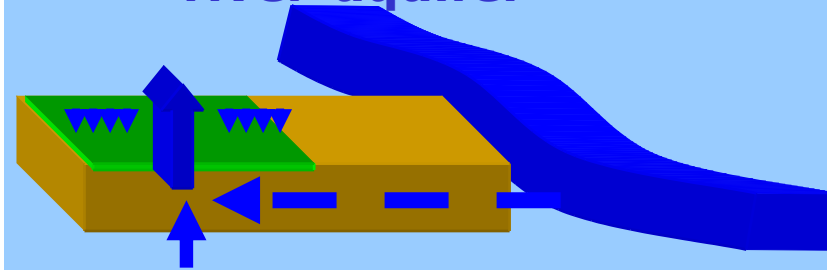


Picazo – Los Frailes



CURRENT SITUATION

Important relationship
river-aquifer



Los Frailes – El Molinar



MANCHA ORIENTAL GROUNDWATER BODY



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CURRENT SITUATION

Need to limit extractions and ensure sustainability to the aquifer and its exploitation

RESOURCES AND DEMAND ESTIMATION:

	MINIMUM Hm3/year	MAX. Hm3/year		Hm3/year
RENEWABLE RES.	286	330	AGRICULTURAL DEM.	392
AVAILABLE RES.	236	300	URBAN DEMAND	20
			TOTAL WATER DEMAND	412

Need to reduce the range of incertidumbre

GAP ESTIMATION:

	GAP Hm3/year	
	MIN	MAX
RENEWABLE	82	126
AVAILABLE	112	176

OBJECTIVE: EXPLOITATION INDEX ≤ 1
(EXTRACTIONS \leq AVAILABLE RESOURCE)

MANCHA ORIENTAL GROUNDWATER BODY



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CURRENT SITUATION

MEASURES CHARACTERISATION

Measure	Gap reduction (hm ³ /year)	Cost inv. * (Mill. €)	Cost O&M* (Mill. €/año)
Ongoing measures			
Supply Pumping Substitution PHASE I	Finalised	31,4	2,2
Irrigation modernisation and consolidation	7	28,8	2
Irrigation Pumping Substitution PHASE I	33	8,9	0,1
TOTAL ONGOING MEASURES	40	69,1	4,3
Foreseen measures			
Supply Pumping Substitution PHASE II	9	82,9	1,1
Irrigation Pumping Substitution PHASE II	47	103,6 2,21M€/((hm3/year)	1,2
Works on piezometry and hydrometry measures	Indirect effect	1,1	
TOTAL FORESEEN MEASURES	56	187,6	2,4
TOTAL ONGOING AND FORESEEN MEAS.	96	256,7	6,7

* Prices update 2008

CURRENT SITUATION

GAP tendency scenario WITH measures: 16-80 hm³/year

PROPOSED MEASURES

MEASURES ON DEMAND: WATER RIGHT ACQUISITION (WRA)

CROP TYPE	HERBACEOUS	WOODY	SOCIAL COST
WRA	TEMPORARY	PERMANENT	
SURFACE	WRA 2007	-	HIGH
VOLUME	WRA 2008	-	LOW

Cost WRA (2008): 0,25 €/m³

MEASURES ON OFFER: IRRIGATION PUMPING SUBSTITUTION PHASE III (PS III)

Cost PS: 2,21 million € / (hm³/year)

MANCHA ORIENTAL GROUNDWATER BODY

CURRENT SITUATION

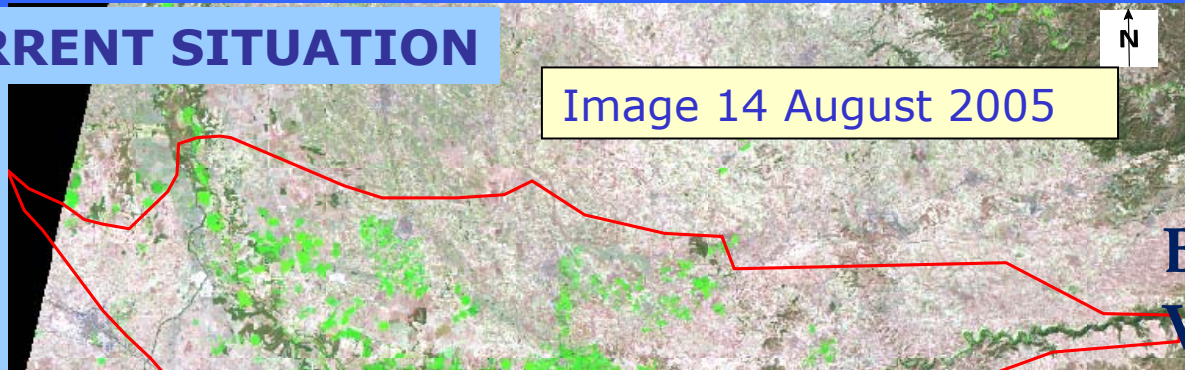


Image 14 August 2005

Effect of Water Rights
Acquisition in 2008
for summer crops

Budget: 12.7 million €

Volume: 50.6 hm³

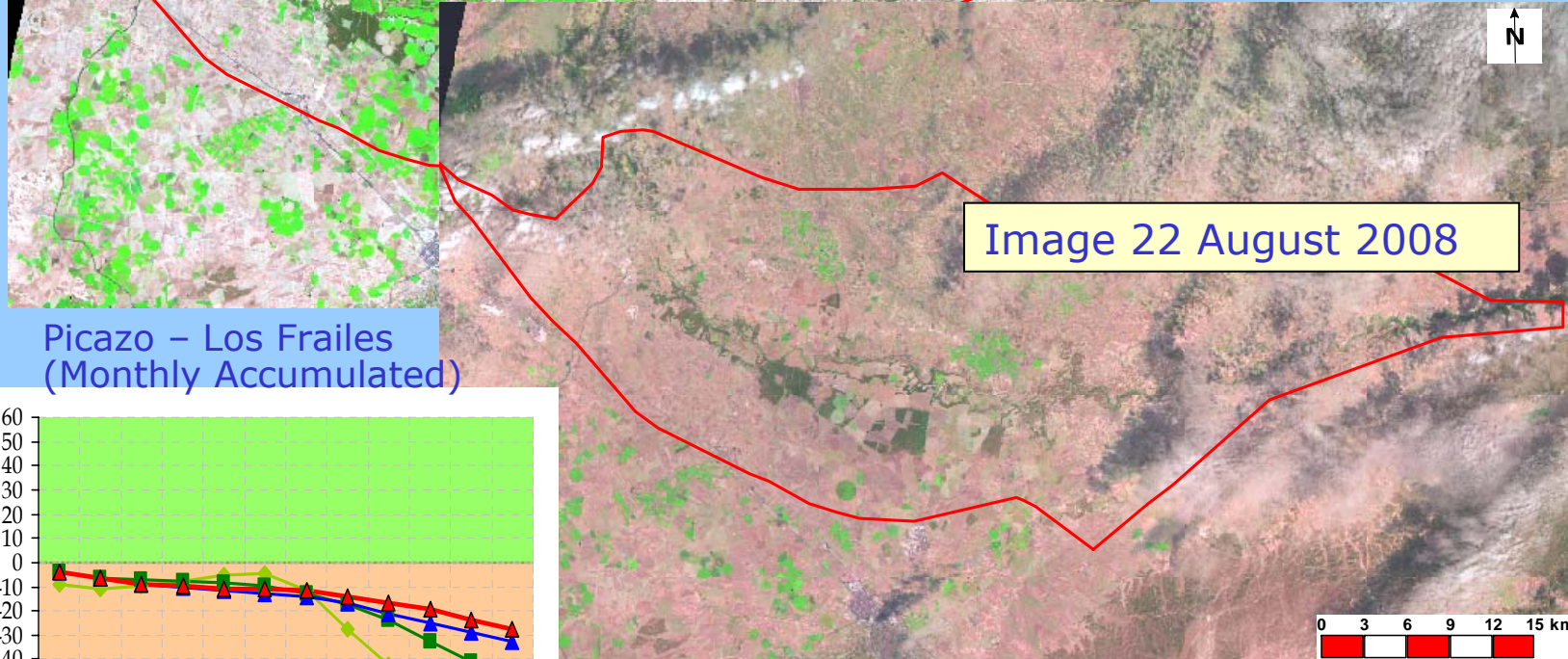
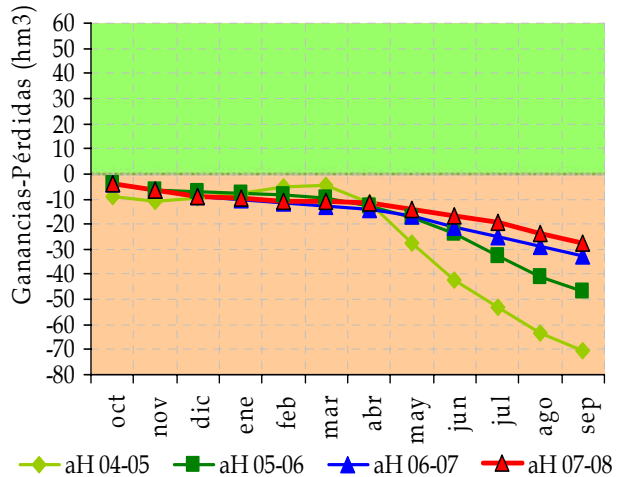


Image 22 August 2008

Picazo – Los Frailes
(Monthly Accumulated)

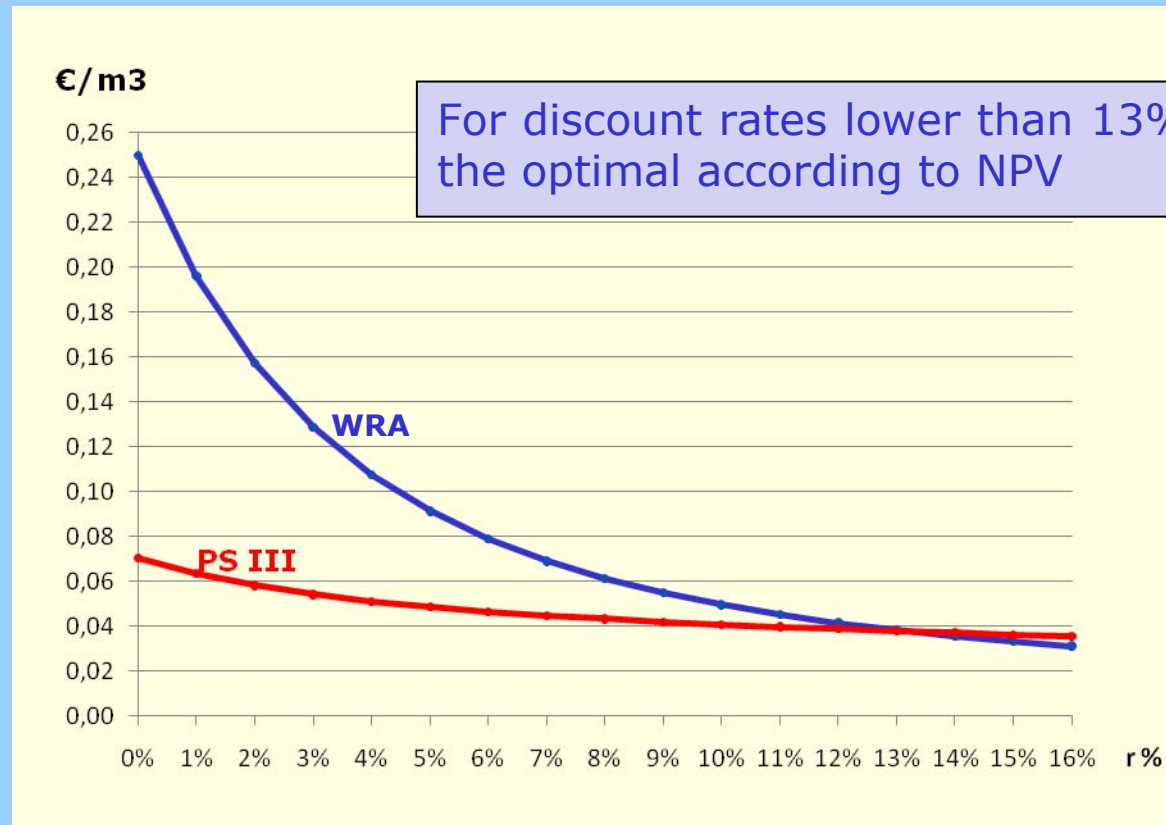


Better relationship river-aquifer

COST -EFFECTIVENESS ANALYSIS (CEA)

- NET PRESENT VALUE (NPV) AND DISCOUNT RATE (r)**

A lifespan of 50 years has been considered for PS III works



For discount rates lower than 13%, the measure on offer is the optimal according to NPV

The measure of pumping substitution Phase III is adopted as optimal from the Cost – Effectiveness point of view

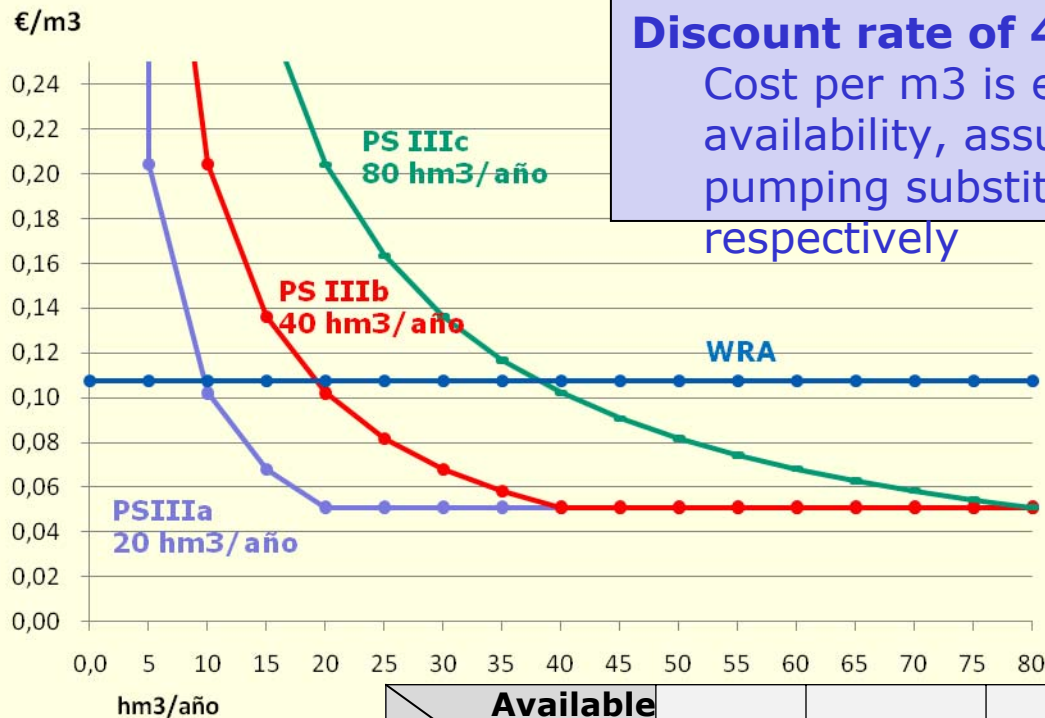
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OBJECTIVES AND TIME EXEMPTIONS. TECHNICAL VIABILITY



Discount rate of 4%

Cost per m3 is evaluated depending on resource availability, assuming a **design capacity** for pumping substitution of **20, 40 y 80 hm3/year** respectively

RESULTS MATRIX Water resources availability

Available Hm3/year GAP Hm3/year	5	10	15	20	30	40	60	80
20	WRA	WRA/PS IIIa	PS IIIa	PS IIIa				
40	WRA	WRA	WRA	WRA/PS IIIb	PS IIIb	PS IIIb		
80	WRA	ADC	WRA	WRA	WRA	WRA/PS IIIc	PS IIIc	PS IIIc

OBJECTIVES AND TIME EXEMPTIONS. TECHNICAL VIABILITY

From the technical point of view the following **are considered viable**:

- All ongoing and foreseen measures, the start date of which is before 2015
- Water rights acquisition measures

Nevertheless, **the development and start-up of the phase III pumping substitution works will be conditioned to surface hydrological resources availability.**

Surface hydrological resources availability depends, in time, of the implementation degree of measures of:

- New infrastructures management
- Reservoir system management improvement
- Irrigation modernisation

OBJECTIVES AND TIME EXEMPTIONS. TECHNICAL VIABILITY

GAP ESTIMATION FOR 2015 With ongoing and foreseen measures:

	GAP Hm ³ /year	
	MIN	MAX
RENEWABLE	-14	30
AVAILABLE	16	80

OBJECTIVES :

2015: Extractions \leq renewable resource
(Avoid additional deterioration of water body)

2021 (at least): Extractions \leq available
resource, (Piezometric levels recuperation)

New measures: PSIII

CONCLUSIONS



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- Mancha Oriental GWB is in bad quantitative status
- Measures currently ongoing by administrations will allow piezometric balance in 2015, adapting extractions to renewable resources
- Reaching environmental objectives requires additional measures: CEA selects offer management measures (PS) and regarding demand (WRA)
- The start-up of PS III obligates, due to technical viability, to postpone objectives compliance, at least, until 2021
- The decision of postponing the objectives compliance to 2021 or 2027 requires an additional analysis of Administrations budgetary capacity.



Thank you for your attention