Water resources planning

Criteria, objectives and indicators

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Learning objectives

This courses will assist participants in:

- Understand the importance of a good definition of OBJECTIVES and CRITERIA/indicators, the different types and their selection
- Identify objectives and criteria for a planning exercise, linking to existing policies and issues raised in the situation analysis
- Familiarize with the participatory definition of CRITERIA/indicators

Contents

- Part 1 – Group discussion on criteria/objectives and indicators
- Part 2 – Linking objectives/criteria with policies and boundary conditions (example of EU WFD)
- Part 3 – A case study on participatory indicator selection + reflections

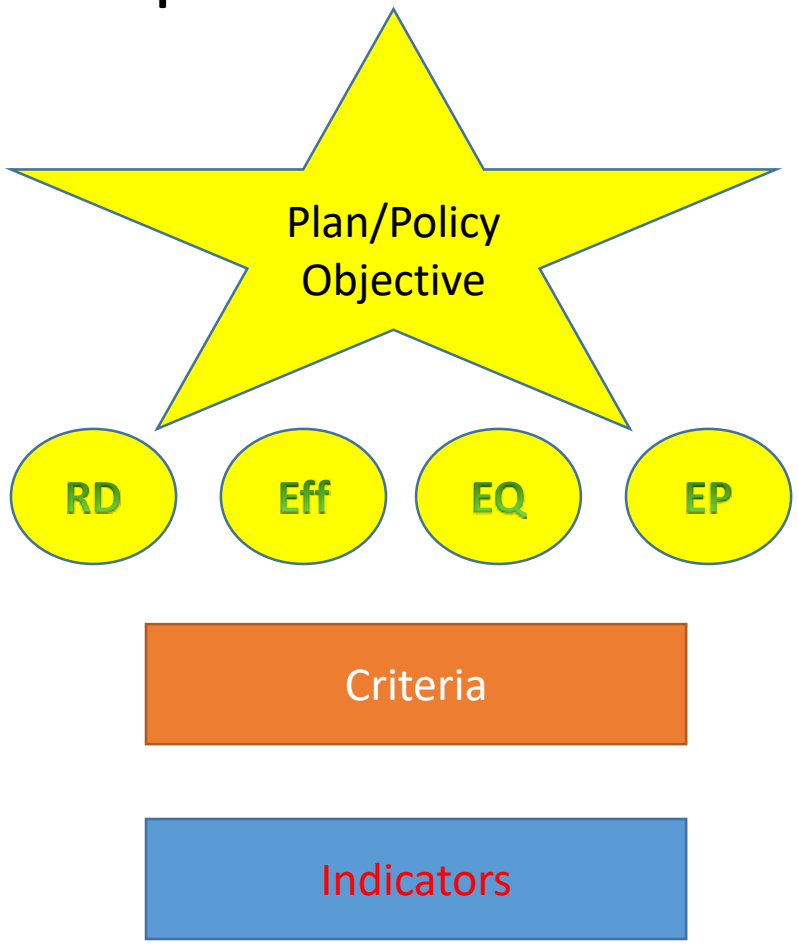
Part 1 - Theory

Brainstorming

- Objectives
- Criteria/Indicators
- Boundary conditions
- Different scopes of planning

Framing the problems and options

- Importance of priorization and structure
- Importance of boundaries (spatial, temporal and of competences)
- Objectives and criteria as guiding structure for creation of analysis and evaluation matrix



Planning goal, objectives and criteria

- GOAL = A policy level statement on the purpose of the management activities
- Objective: a very clear, focused statement on what is needed to accomplish the goal
- Need objectives/criteria to evaluate the actions plans, guidance for situation analysis, identification of interventions
- Criteria: yardsticks by which performance of plan with respect to objectives can be evaluated, relate to resulting state of system

Definition of criteria and objectives + link to indicators

- Methodology ~ policy formulation or analysis, top down once policy is formulated

- SMART objectives
  - Specific
  - Measurable
  - Agreed
  - Realistic
  - Time bound

Planning goal, objective and criteria - example

- GOAL = Good water status or Sustainable water use
- Objective: Efficiency of water use
- Criteria: reduce system losses or reduce per capita demand
- Indicator: % loss or m3/cap/year

Indicator as unit of measurement

- measure or objectivize changes that are related to different types of management (impacts) –> evaluate sustainability (economic, social, env)
- based on quantiative and qualitative parameters
- support political actions and evaluate advances and objectives.
- give objective information on a situation (state + evolution over time) + facilitate comparison

- Objectives such as resource development, economic efficiency, equity and environmental protection are translated into a set of indicators covering these aspects

Indicator as unit of measurement

- Characteristics: specific, measurable, usable, sensitive, available, cost-effective

- Participatory indicator selection
  - Draft set based on identified criteria
  - Linking to existing indicators
  - Extended list and selection of subset preferred by the stakeholders and adapted to the catchment problems
  - Importance of clear defintion of calculation/simulation methods

Part 2 – Policy context

Changing paradigms and policies - relation with planning processes and outcomes

Case study on policy changes and planning objectives

- Analysis of 80 years of water policy and planning objectives in Spain – water as politics

- How are planning objectives defined?
- Can this be done in a participatory way? Representative or deliberative democracy?
- How are institutions evolving? What does that mean for planning?

- → What is the influence of changing policies and changing planning objectives for the planning process and outcomes

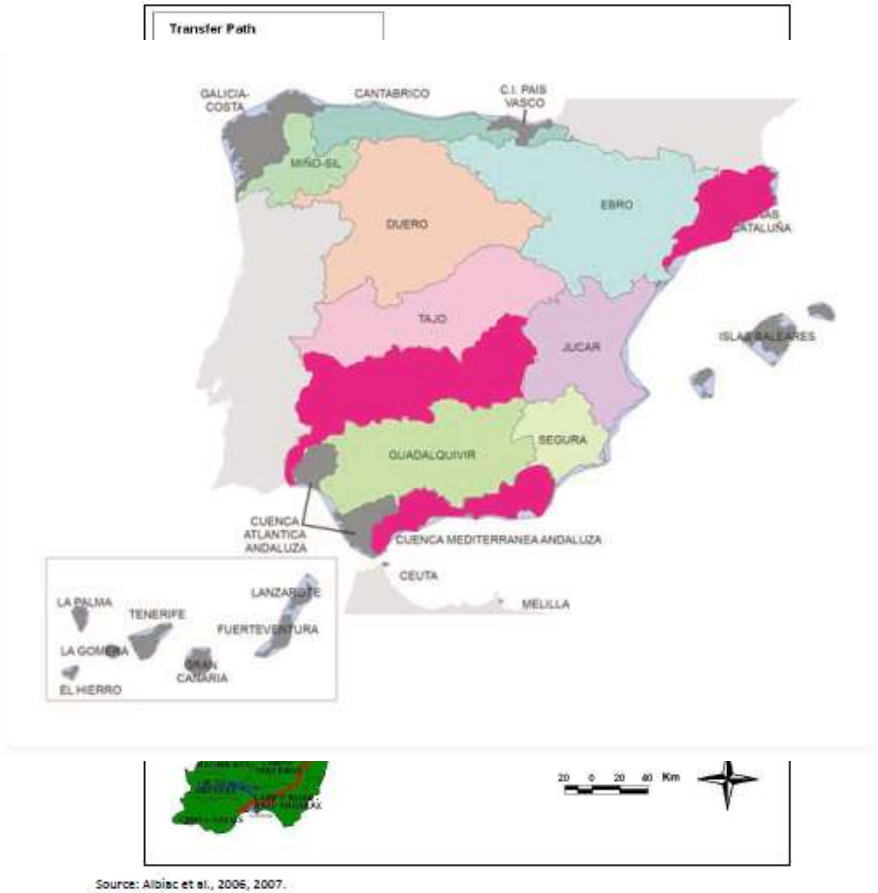
2001 National Hydrological plan (NHP) – enormous protest

Zaragoza 2002
CONTRA

Valencia 2003
PRO

Blue March
Brussels 2001
CONTRA

NHP 2001 in a nutshell

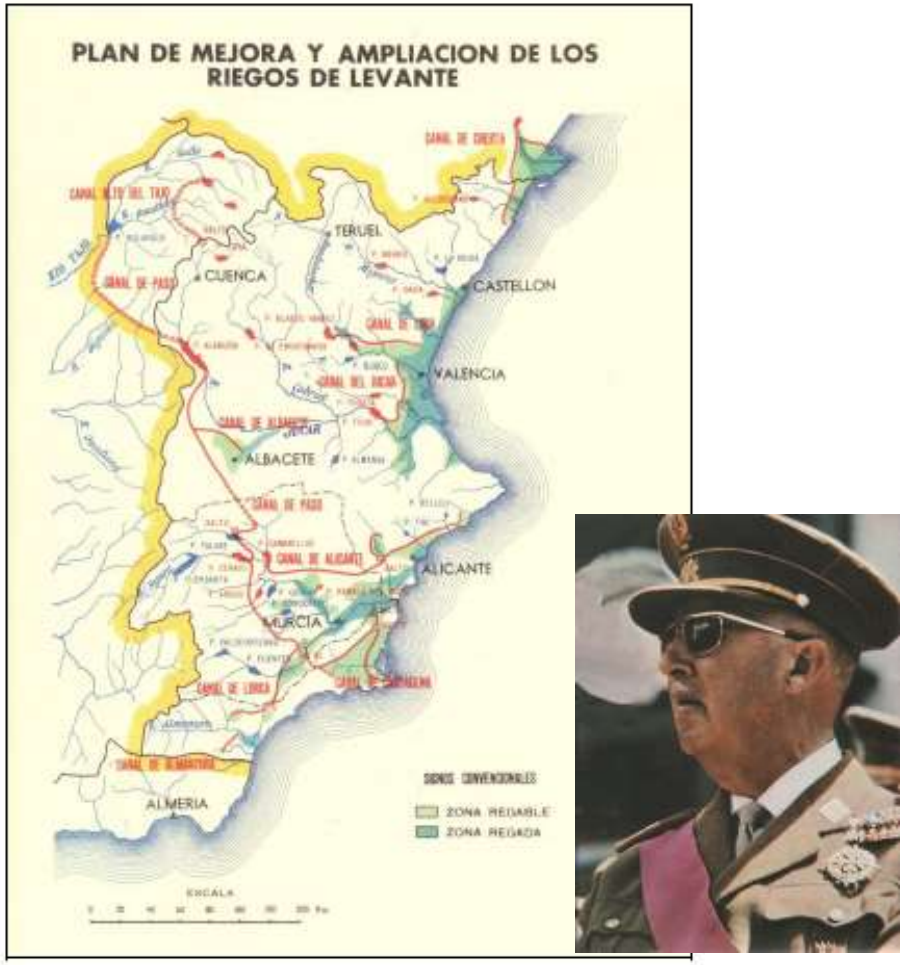


Source: Albiac et al., 2006, 2007.

- 484 Hm³ transfer from Ebro (north) to the « Levante » (south)
- 845 km
- 100 new dams

- Basis = national hydrosolidarity
- Protest ~ end of a hydraulic paradigm that lasted for almost a century

History



- Start = Irrigation Plan 1930
- Implemented by Dictator Franco (1939 - 1975) with the « Regeneracionista » movement
- State led modernisation project - Massive state funded water infrastructure renamed as public works

Hydraulic paradigm

- Modernist discourse, technocratic approaches through infrastructure supply water to privileged uses (agriculture, hydropower)

- Positivist-scientific rationale, technology could re-design nature

- Dams, dams and more dams (« Paco Rana » or « Frankie the Frog » Franco opens "Yesa" dam) → by 90s
  - 40% of renewable resources regulated
  - country with largest proportion of land under dams + highest number of dams per capita (29 per million)
  - Succeeded in mastering nature

- General Direction of Hydraulic Works populated with mainly civil engineers « Club of concrete » Steel and concrete Brotherhood

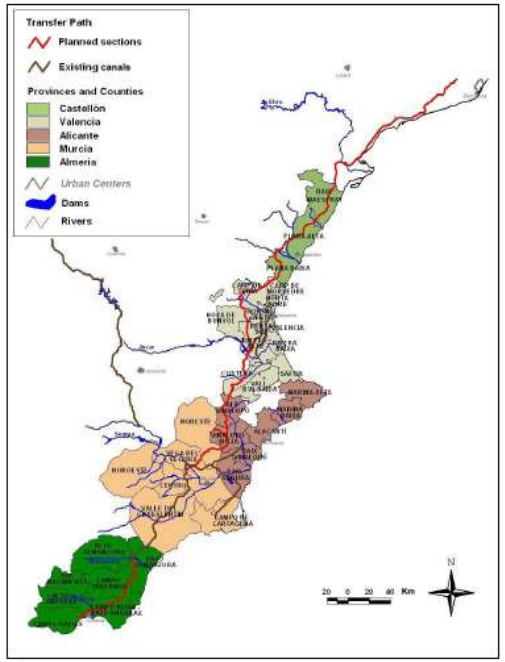
- Continued during early democracy in the 70s until the 90s (leading to NHP 1993)

NHP 1993 – continued strength of the “concrete club”

Implementing NHP 1993 – first cracks

- SIEHNA (National Water Balance Integrated System)
- 50 year old blueprint
- Transfer from north to south
- National water grid at a cost of €0.58 billion, building 150 reservoirs and redistributing 3768 Hm^3 through interbasin transfers, thus 'correcting' hydrological imbalances
- *"to establish the basis which will allow to correct the highly unbalanced distribution of water resources in Spain once and for all"*
- Based on 2 principles: Solidarity and cohesion
- More than 1000 complaints (national water council / Parliament / senate) + delay tactics
- Finally rejected and lead to 2001 PHN

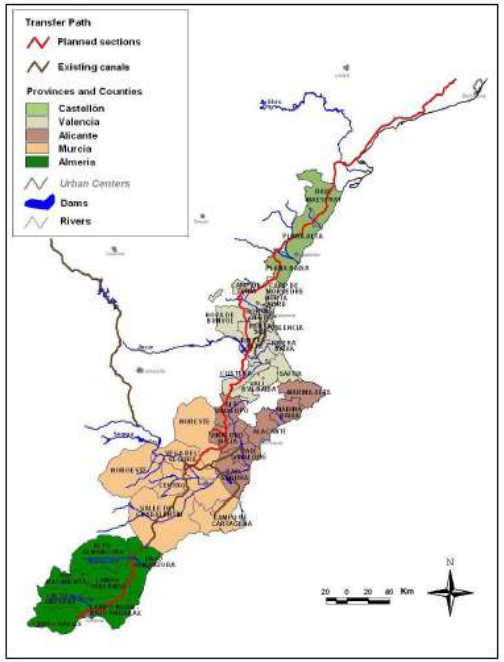
NHP 2001



Source: Albiac et al., 2006, 2007.

- Public protest started by association of Professors of different Universities
- Moved from Catalunya (north, active participative society) over Brussels to other parts of the country
- Publications of economic analysis reveiling highly questionable cost-efficiency

NHP 2001



Source: Albiac et al., 2006, 2007.

- Hydrosolidarity on the rebound
  - « Agua para todos si, pero NO Agua para todo»
  - ~uncontolled urban development in the Mediterranean provinces
  - Highly intensive irrigation based agriculture in a natural semi-arid
- Public evidence of closed, nepotistic relationships between the GDHW and the big construction companies, intersecting the interests of politicians in the electoral value of water projects.
- EU WFD and Brussels as external help

A changing water paradigm

- Protest against the national grid as sign of a changing hydraulic paradigm

- At the basis, 3 streams:
  - Stream 1 ~ Waterscapes : water as a key element in the landscape, fundamental in the maintenance of healthy ecosystems

  - Stream 2 ~ Water as an economic good : old paradigm of state intervention vs neoliberal discourse of state failure

  - Stream 3 ~ Deepening of democracy : nationalists and regionalist claims recognized through water, territory, identity

Decentralization - democratization

River Basin Organisations

Autonomous regions

Regionalisation = Fragmentation of *Dirección General De Obras Hidraulicas* (General Direction of Hydraulic Works)
Increased political and financial autonomy

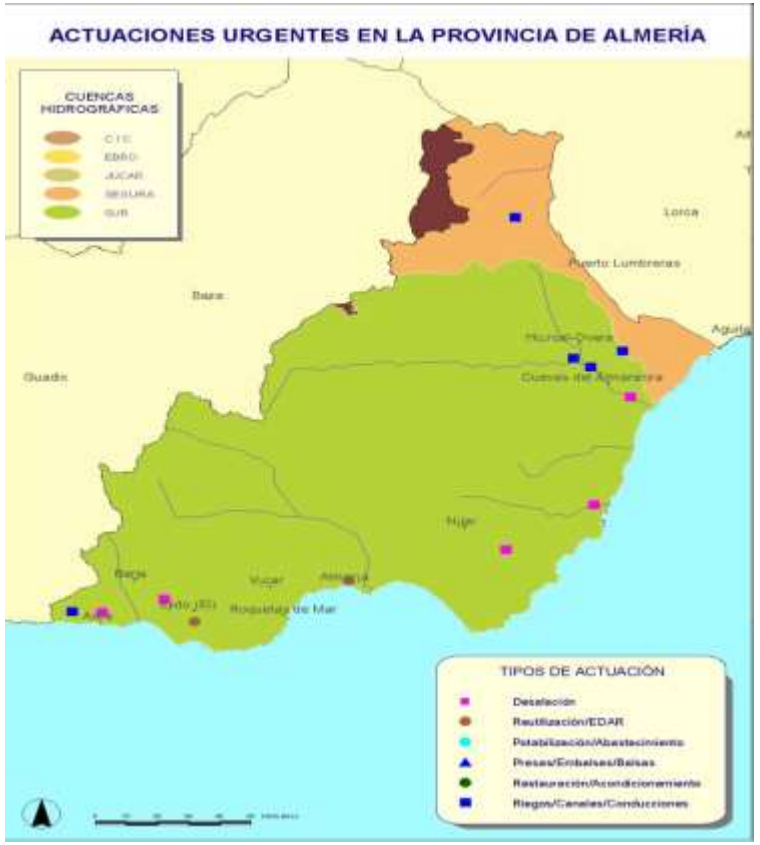
2005 AGUA Programme

- Introduced by PSOE (socialist party) in 2004 after canceling NHP 2001
- “Actuaciones para la Gestión y Utilizacion del Agua”
- Change in Hydraulic Paradigm
- OUT: Ebro transfer
- IN: Investment programme of €8 billion including establishing a desalination capacity of 600 Hm^3.
  - 34 new desalination plants over the period 2004-2008
  - increase in wastewater reuse from 450,000 m^3/yr to 1.1 Hm^3/yr by 2011 (Madrid and Barcelona)

- States compliance with EU WFD ~ aim of promoting water savings through full-cost recovery by 2010 ←→ emphasis on desalination to ‘better guarantee its availability and its quality’ (water savings not sufficient to meet changing demands in the Med)

A.G.U.A. Examples

ALMERIA
Desalination: 165 Hm3/y 226 million €
Improved management: 24 Hm3/y 126 million €



VALENCIA
Dam: 3 Hm3/y 6 million €
Improved management:
107 Hm3/y 216 million €

MURCIA
Desalination: 140 Hm3/y
402 million €
Improved management:
64 Hm3/y 449 million €
Flood management: 25
million €

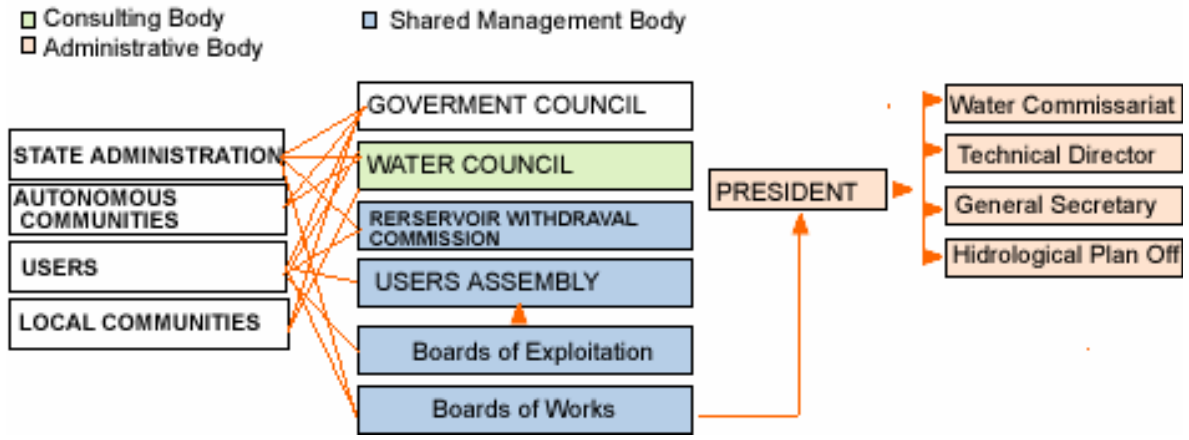
Water policy and planning

- WFD and changing hydraulic paradigm
- Changing planning strategies
- Changing institutions

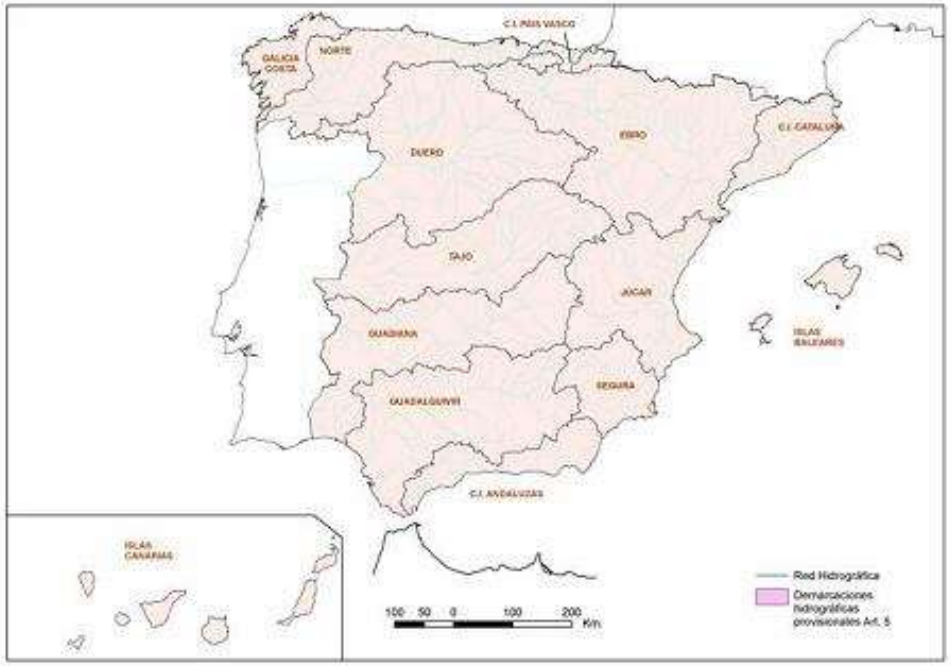
- Succes / Pitfalls and Issues of scale

Spanish hydrological planning before

- Demand based
- Infrastructure based
- Quantity oriented
- Board of Works central function



- River basin boundaries
- Confederaciones hidrograficas



Changing planning strategies and institutions

- Internal changes (part I) + EU WFD
  - Environmental uses and good status of water bodies
  - Public participation (article 14)
  - Principle of Cost recovery

→ Changes in planning process

→ Changing institutions and tasks

→ Water council now integrates different voices

→ Organization of « Jornadas de participación » - Different publications and sensibilization campaigns

→Environmental Impact Assessment, Economic Analysis, Action Plans

Changes in planning process

- Territory now includes coastal and transition waters (before a competence of national ministry of “Costas” Coasts)

- Broader content of plans, including:
  - Eco-regions, types and reference conditions, Control networks
  - Environmental flows, Natural fluvial reserves, Protected areas, EObj
  - Action plans, Economic Evaluation
  - Public information campaigns, Contact points and procedures consultation
  - Designation of competent authorities
  - Drought emergency plans, Flood protection plans

- As a result:
  - Effective integration of terrestrial and marine area in the basin
  - Competent Administrations elaborate Action Plans
  - Strategic Environmental Assessment, Public Participation

Scheme of Important Themes – basis new hydrological planning

- Start of elaboration Hydrological Plan
- Structuring situation analysis in themes
- Linked to strategies for actions (measures to mitigate problems)

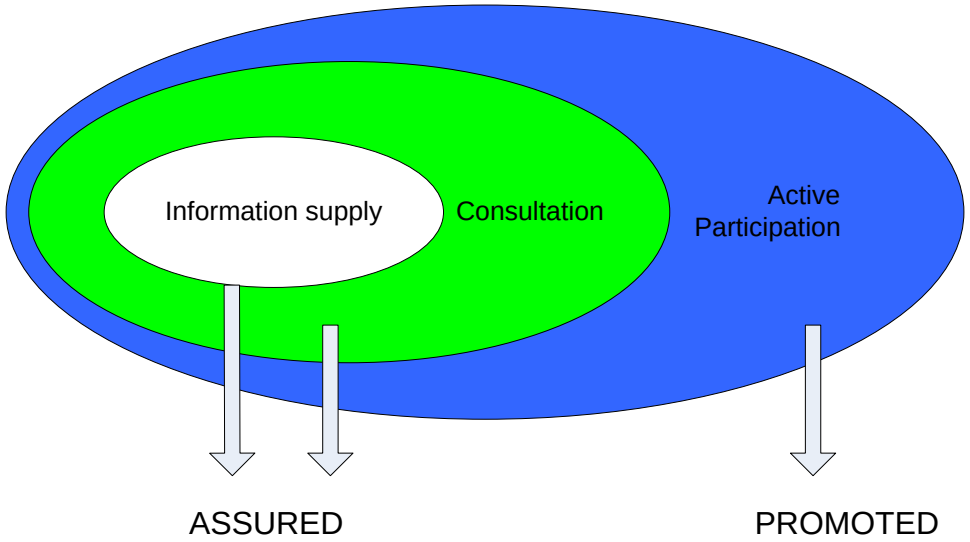
- Public consultation per sector + experts + web consult
- Upon approval, draft plan is translated into action plan + hydrological plan project + environmental assessment
- After next round of consultation approval of hydrological basin plan and inclusion in national hydrological plan

DEMAND SUPPLY AND RACIONALITY OF USE	
Problems of satisfying present and future demands	
NON-COMPLIANCE OF ENVIRONMENTAL OBJECTIVES	
Unsufficient superficial flows	
Agricultural nitrate pollution	
Pollution by phytosanitary products	
Pollution caused by urban waste water discharge	
Industrial or other pollution	
Degradation of biotic environment	
Morfological changes and riverbed instability	
Desertification processes and sediment depostion in the river network	
Overexploitation of aquifers, marine intrusion and other salinization processes	
Damage to habitats and species of interest	
EXTREME METEOROLOGICAL PHENOMENA	
Flood risk	
Vulnerability to drought	
KNOWLEDGE AND GOVERNANCE	
Administrative, organizational and management problems	

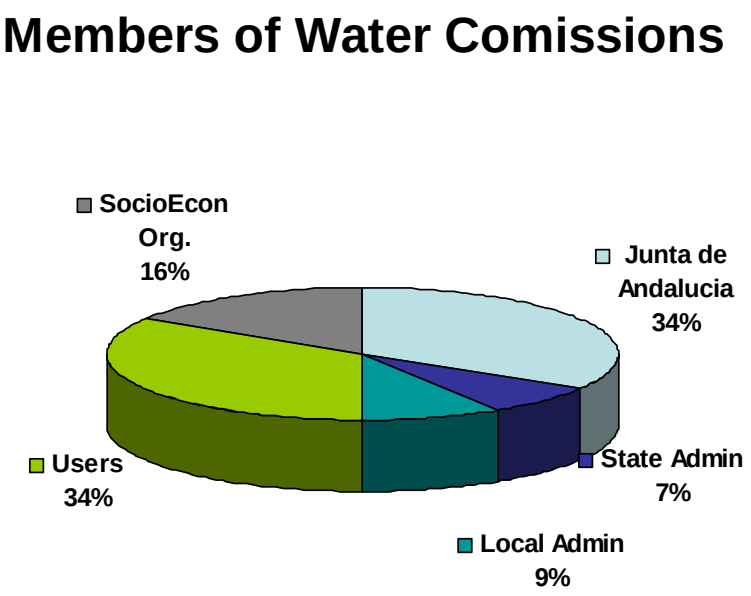
Public participation

- Aims to help the administration in designing a basin management plan that allows to comply with WFD objectives

- Public participation in the planning process according to Spanish Government



Water council and non-consumptive use



- Users
  - Agricultural
  - Urban
  - Other uses
  - Irrigation Associations and Farmers
  - Urban supply organizations
  - Consumer organizations

- Representants of socioeconomic interests
  - Syndicates
  - Enterprises
  - Neighbourhood organizations
  - Ecologist
  - Universities

Effect of policy changes on planning process

- Hydraulic paradigm: National → Regional

- Power fragmentation towards regions
  - Weakening concept of national solidarity
  - Construction interest moved to provincial level
  - Capital intesive projects remain (desalination, water treatment)
  - Neo-corporatism revival

- Water strategic importance in single-issue politics and territorial identity, 'political returns' on water (or 'political rent-seeking')

- BUT State remains main funding source for large infrastructural projets (water transfers / desalination plants) : subsidies vs full-cost recovery and Environmental Impact Assessments

Discussion – what does this mean for planning?

- How are planning objectives defined?
- Can this be done in a participatory way? Representative or deliberative democracy?
- How are institutions evolving? What does that mean for planning?

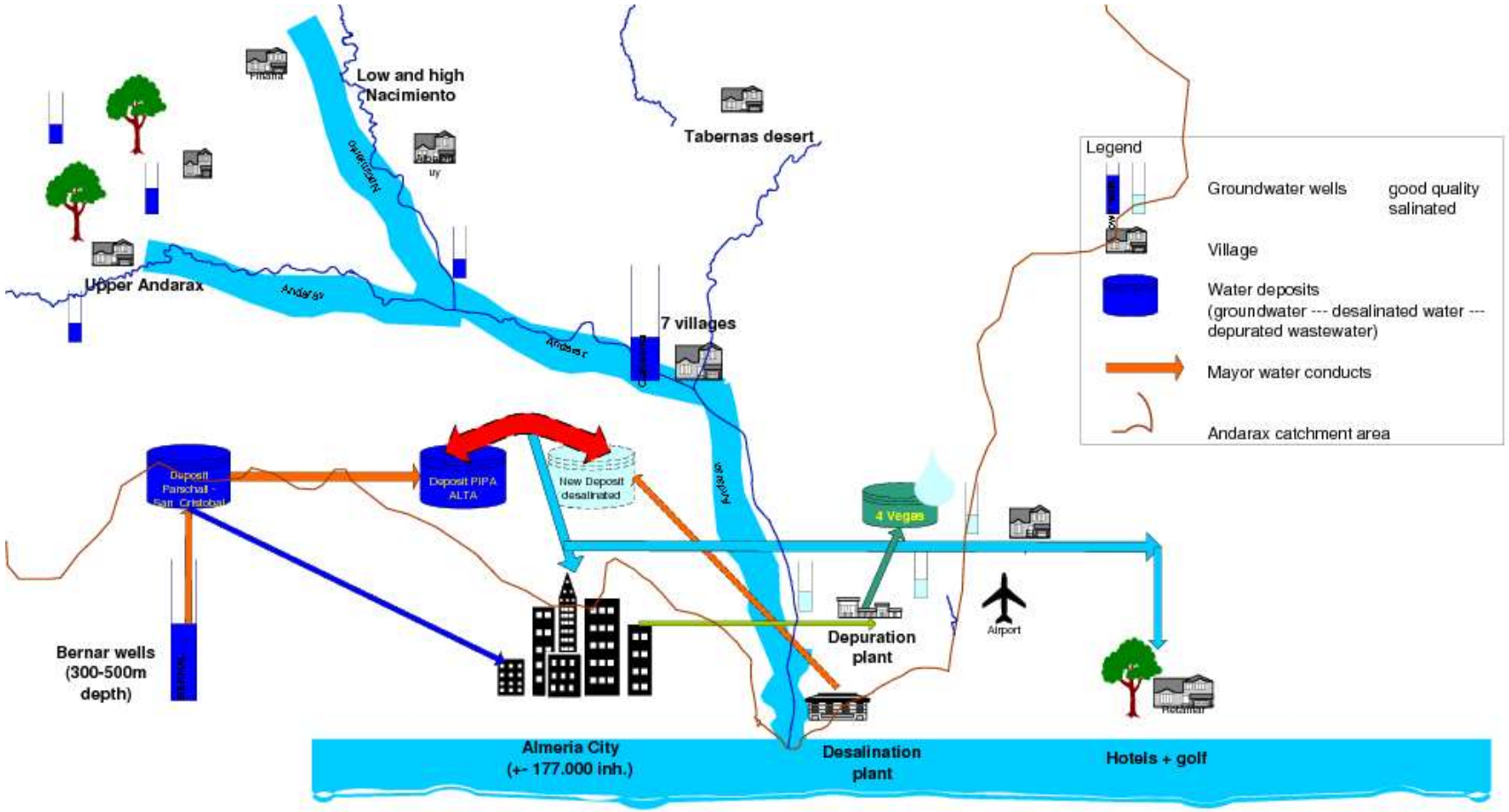
- → What is the influence of changing policies and changing planning objectives for the planning process and outcomes

Part 3 – Case study

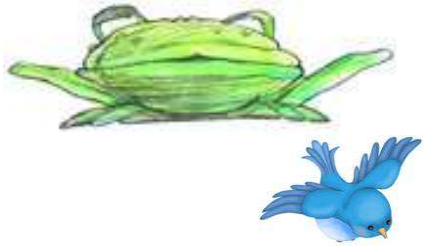
Participatory definition of criteria and indicators

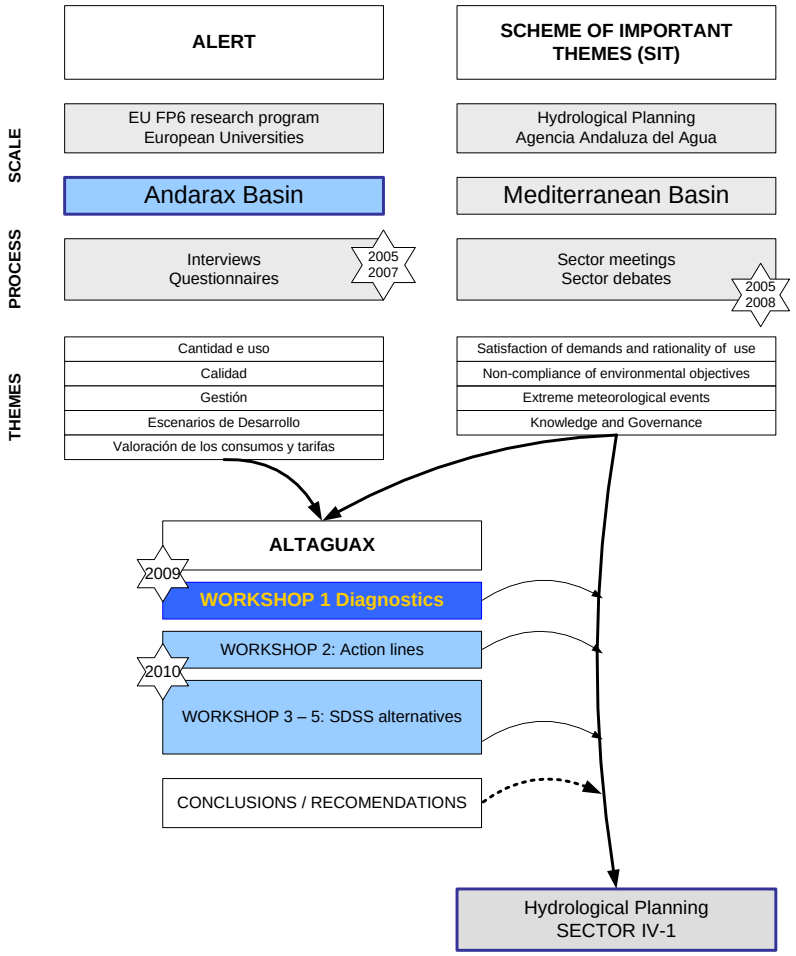

Sierra de Filabres
Sierra Nevada
Desierto de Tabernas
Sierra Alhamilla
Andarax river
Campo de Níjar
Sierra de Gádor
Almería
Cabo
de
Gata
Campo de Dalías

Case study – criteria and indicator for Andarax

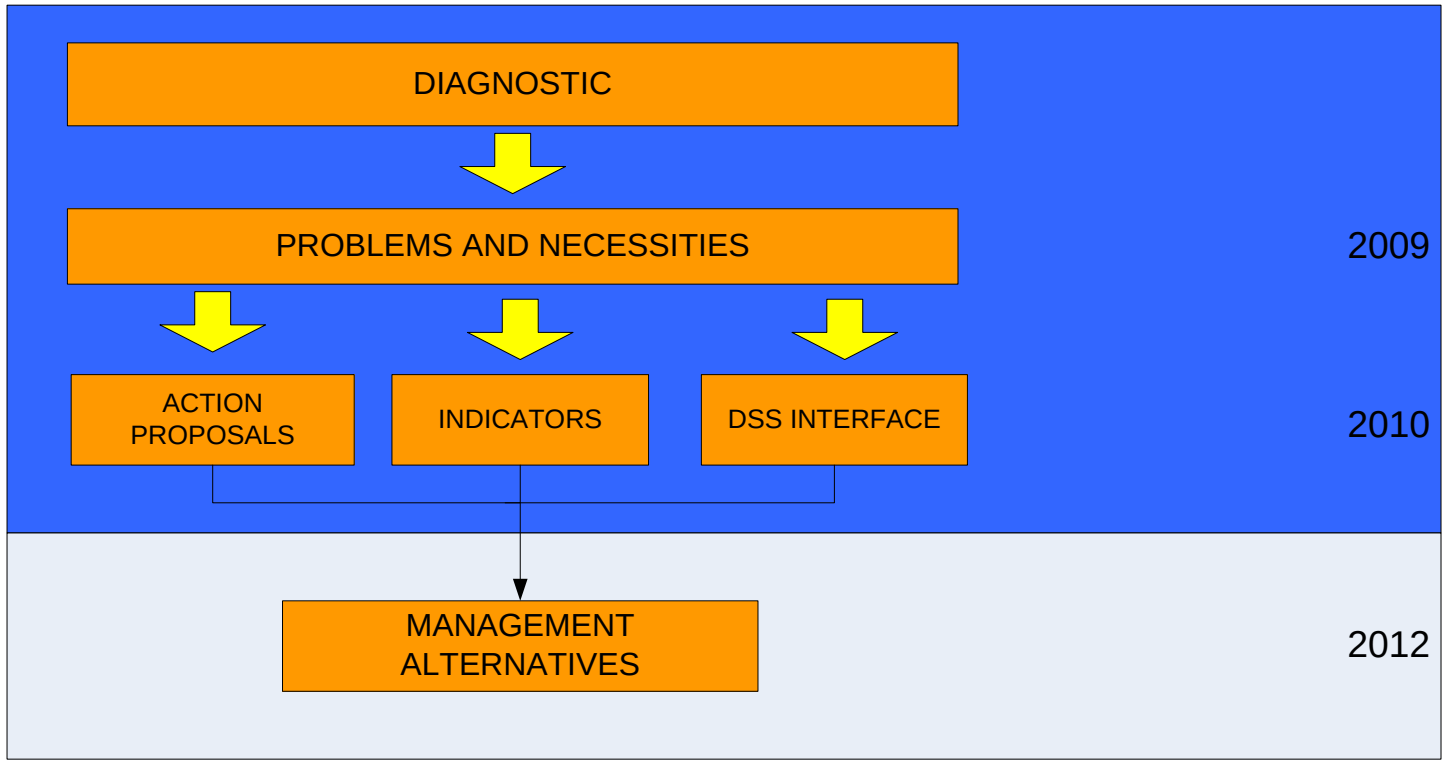


Developing common ground by matching top-down and bottom-up approaches

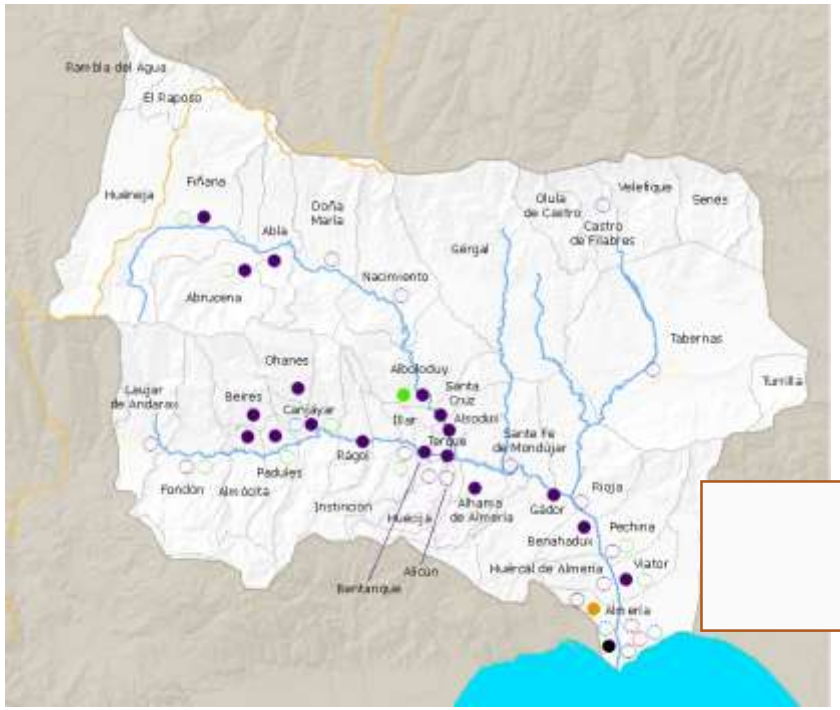




Multi-stakeholder platform in Andarax – work plan



Field methodology to define criteria and indicators



Literature / Preliminary Interviews

Expert evaluation (int + local) + design questionnaire

Extended list of 47 indicators

Dev projections WM and Gov

WQl, WQn, and LU

Questionnaires

(19municp, 1CDR, 4 other, 8 external experts)

Short list 15 indicators

(environmental, social, economic)

Alternatives/ Scenarios

Definition of issues

Extended list and 15 selected indicators

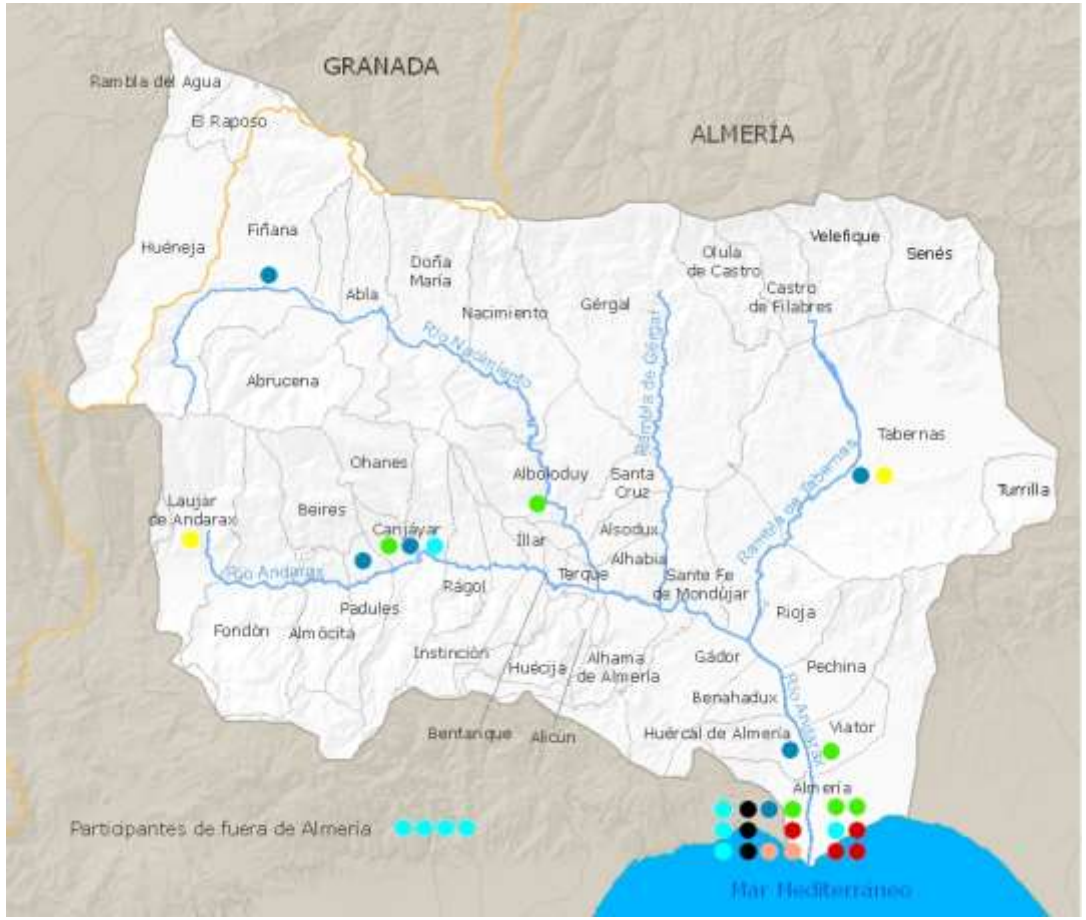
ENVIRONMENTAL
Groundwater quality (GQ)
Salinization of aquifer
Relative quantity of depurated wastewater
Treatment need for consumption of groundwater
Reuse of depurated wastewater (WR)
Groundwater depletion (GD)
Total extraction of aquifer in function of estimated recharge (TAR)
Quantity of groundwater resources available per user
Total exploitatoin of groundwater resources
Variation in surface water fluxes
Terrain value
Evolution of protected natural areas (%increase/ decrease)
Urban development increase
Quantity of internal renewable resources* in relation to groundwater
Volumen of groundwater pumped in relation to non-conventional resources*
Dependency of agricultural population on groundwater (DAG)
Dependency of tourism on groundwater
Groundwater pumped in function of total amount of water for human consumption

ECONOMIC
Distribution efficiency (DE)
Irrigation efficiency (IE)
Pumping costs (Kwh or /m³)
Transfer costs (Kwh or /m³) (CC)
Decontamination costs
Recharge costs for recuperaton of aquifer (Kwh/ m³)
Total energy consumption (Kwh/m³) (TEC)
Percentage of subsidies on water price
Price of water in relation to operation and maintenance costs (WPC)
Water productivity (/m³)
Water productivity (EAJ/m³)

SOCIAL
Income per capita
Income per sector
Consumption power in relation to water price
Risk of not being able to supply water for human consumption (RU)
Risk of not being able to supply water for irrigation (RA)
Rate of accesability to drinking water (AC)
Rate of human migration
Percentage of tourists
Employment created (EAJ/m³)
Employment rate
Implication of stakeholders (IS)
Private water uses in relation to uses with a public concession
Institutional transparency
Possibility to influence decision making
Information distributed by the administration competent in water issues
% private water enterprises in relation to public enterprises
Control performed by competent administration (quality and quantity) (IC)

* desalinated and depurated wastewater /
EAJ = Equivalent of 1 person labor day

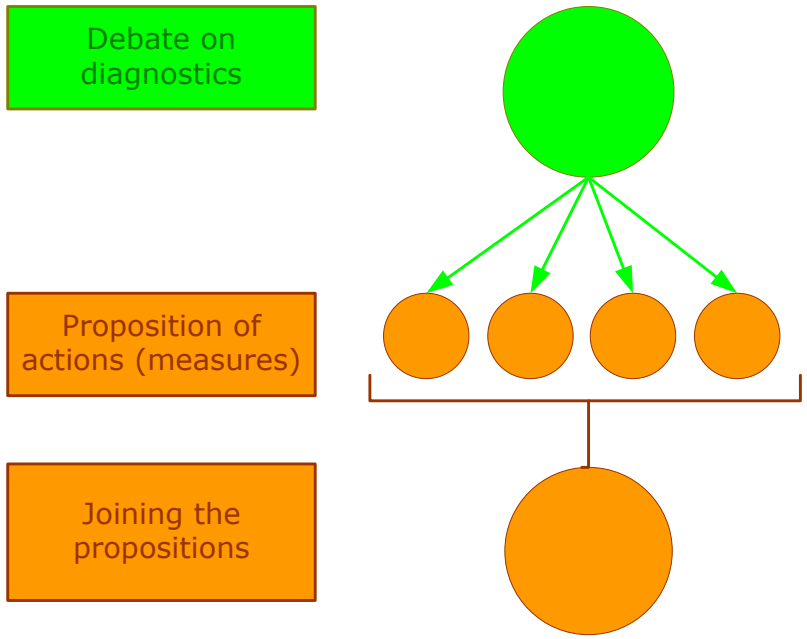
Validation of indicators in MSP



- Irrigation associations / Farmer organizations
- Municipalities
- Rural development agents
- Administration
- Other (private, neigbourhood)
- Experts (scientific, technical)
- Ecologists

→ covering different
- interests
- sectors
- locations

Validation of indicators in workshops



PLENARY: Debate on diagnostic (document contrasting ETI and ALERT project)
Principle problems in the Andarad River Basin — 60'

Explain scnenarios and actions defined in the ALERT project — 20'

WORK GROUP. Proposals on actions that allow to construct different water management alternatives — 40'

PLENARY: Joining the proposals and identification of action blocks (can relate to different tematic areas: quality, efficiency, quantity, etc.). — 75'

PLENARY: Explication and debate on indicators and SDSS — 1h 45'

Link to objectives and criteria

Scheme important themes
4 categories
- Demand supply and rationality of use
- Non-compliance environmental objectives
- Extreme meteorological phenomena
- Knowledge and governance

DEMAND SUPPLY AND RACIONALITY OF USE	
Problems of satisfying present and future demands	
NON-COMPLIANCE WITH ENVIRONMENTAL OBJECTIVES	
Insufficient superficial flows	
Agricultural nitrate pollution	
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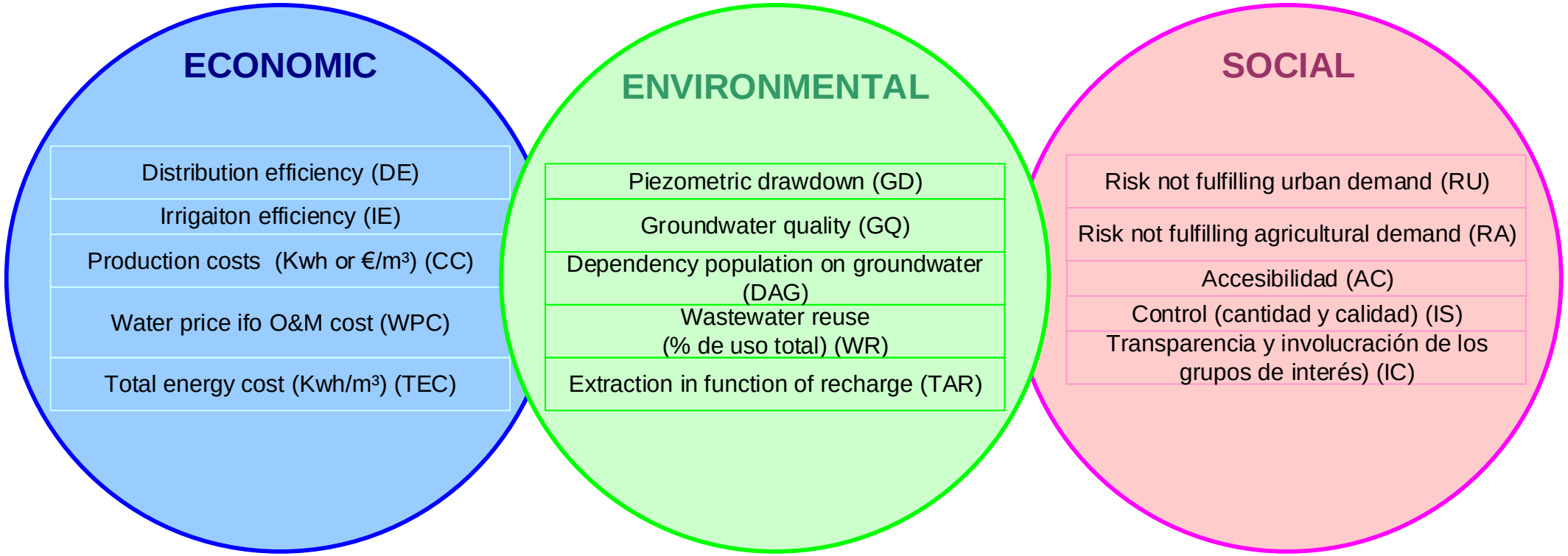
EXTREME METEOROLOGICAL PHENOMENA	
Flood risk	
Vulnerability to drought	
KNOWLEDGE AND GOVERNANCE	
Administrative, organisational and management problems	

Selected indicators



Observations

- Participatory indicator definition protocol tested, consultation on indicators perceived as important by all stakeholders

- Ex-post link to Scheme of Important themes (derived from transposed WFD) complicated process
- Difficulties to generate good ecological status indicator (availability of science and data for decisions)

- Different policies intertwining reality on the ground vs WFD driving planning process
- → complexity of adapting knowledge generation and model outputs to policy objectives and demand of decision context on the ground

Conclusions

- Importance of alignment of indicators and information with
  - policy objectives
  - decision making context on the ground

- Link to monitoring and evaluation

- Dynamic policy context and new knowledge needs to be reflected by evolution of indicators and calculation protocols

- Framework of policy/plan related indicators with possibility for adapting and updating to context-dependent issues

Checking the learning objectives

?? Did the lecture help you to:

- Identify objectives and criteria for the planning exercise linking to existing policies and issues raised in the situation analysis
- Understand the importance of indicators, the different types and their selection?
- Familiarize with the participatory definition of indicators, alternatives and scenario building?

Questions?

References/sources

On criteria/objectives/indicators

- Lecture note and Loucks and van Beek, 2017

Policy analysis in Spanish hydrological planning

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On participatory indicator definition

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