Diagnosis & Mitigation of Water Stress

Contributions of the AquaStress Project

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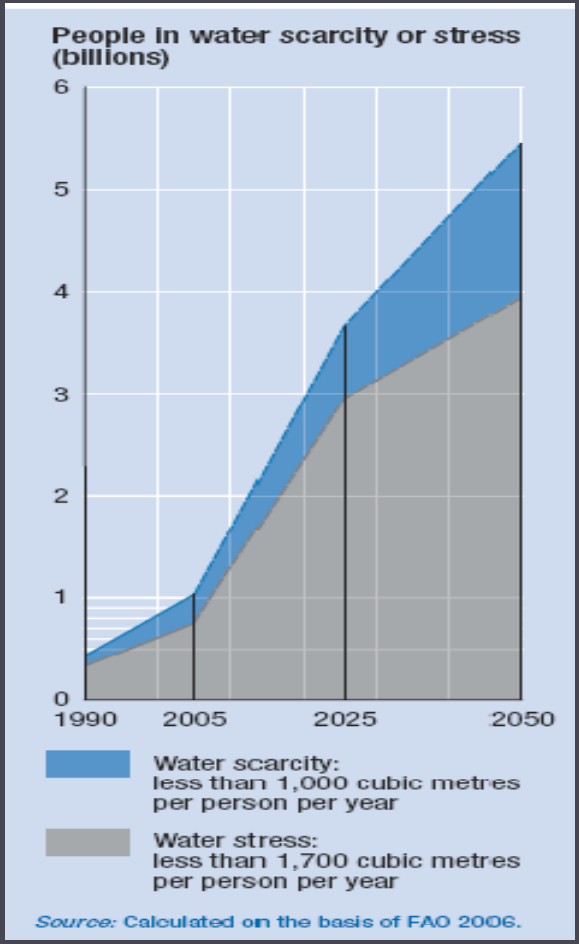
What is Water Stress?



- "Hydrological" definition
  - Water stress occurs when water availability drops below 1700 m^3/person/yr
- Broader definition (EEA)
  - Water stress occurs when the demand for water exceeds the available amount during a certain period or when poor quality restricts its use
  - Water stress causes deterioration of fresh water resources in terms of quantity and quality

The Wider Challenges to Consider

- Adaptation to change (climate, socio-economic conditions)
- Financing/rehabilitation/improvement of infrastructure, improvement of efficiency in end-use
- Intra- and inter-sectoral water allocation policies
- Ensuring equity in access to water and on the social impacts of water allocation policies
- Solving the dilemmas: energy production vs. agricultural production & food security
- Protection of ecosystems and biodiversity
- Shift from reactive, crisis-based to proactive, risk-based management
- Inclusive participatory decision-making

EU Policy for Water Scarcity & Drought

- Integration of supply-side and demand-side interventions
- Wider application of economic instruments and pricing - compulsory metering
- Promotion of efficient water allocation & use
- Risk and impact assessment of alternative options at the local level
- Research on the adaptation of economic activities, water efficiency and decision-making tools
- Support, coordination, networking and dissemination of research efforts at the EU and national levels
- Integration of water-related issues in EU policies
- Fostering the emergence of a water-saving culture in Europe

Source: EC Communication on "Addressing the challenge of water scarcity and droughts in the European Union", COM(2007) 414

Water Stress: The research challenges

- Definition, development and use of indicators and indices describing water stress
- Better use/adaptation of available tools and development of new ones for describing and mitigating water stress
- Evaluation of already applied mitigation options – Analysis of successes and shortcomings
- Promotion of interdisciplinary approaches
  - Integration of the social and ecological dimensions of water stress
  - Integration of actors and disciplines
  - Physical (hydrographical) vs. political boundaries
- Enhancement of information flow
  - Public understanding of water stress situations
  - Political agreement on mitigation
  - Link between research and decision-making
- Promotion of participative, inclusive decision-making

The AquaStress Project

Mitigation of Water Stress through new Approaches to Integrating Management, Technical, Economic and Institutional Instruments

AQUASTRESS *http://www.aquastress.net/*

Aim and Main Objectives

- Aim
  - Develop stakeholder-driven, European scale, comprehensive multi-sectoral, integrated approaches for the diagnosis and mitigation of water stress

- Main objectives
  - Deliver guidelines for implementing integrated water stress mitigation options at local, regional and European scale
  - Deliver a “culture change” in approaches to water stress through enhanced stakeholder involvement and education
  - Develop and deliver new knowledge management tools

The AQS Innovative Elements

- Stakeholder-driven analysis
- Case Study approach on case studies defined after a detailed problem analysis and SH involvement
- Training & Education (stakeholders and public)
- Multi-disciplinary integrative research approach

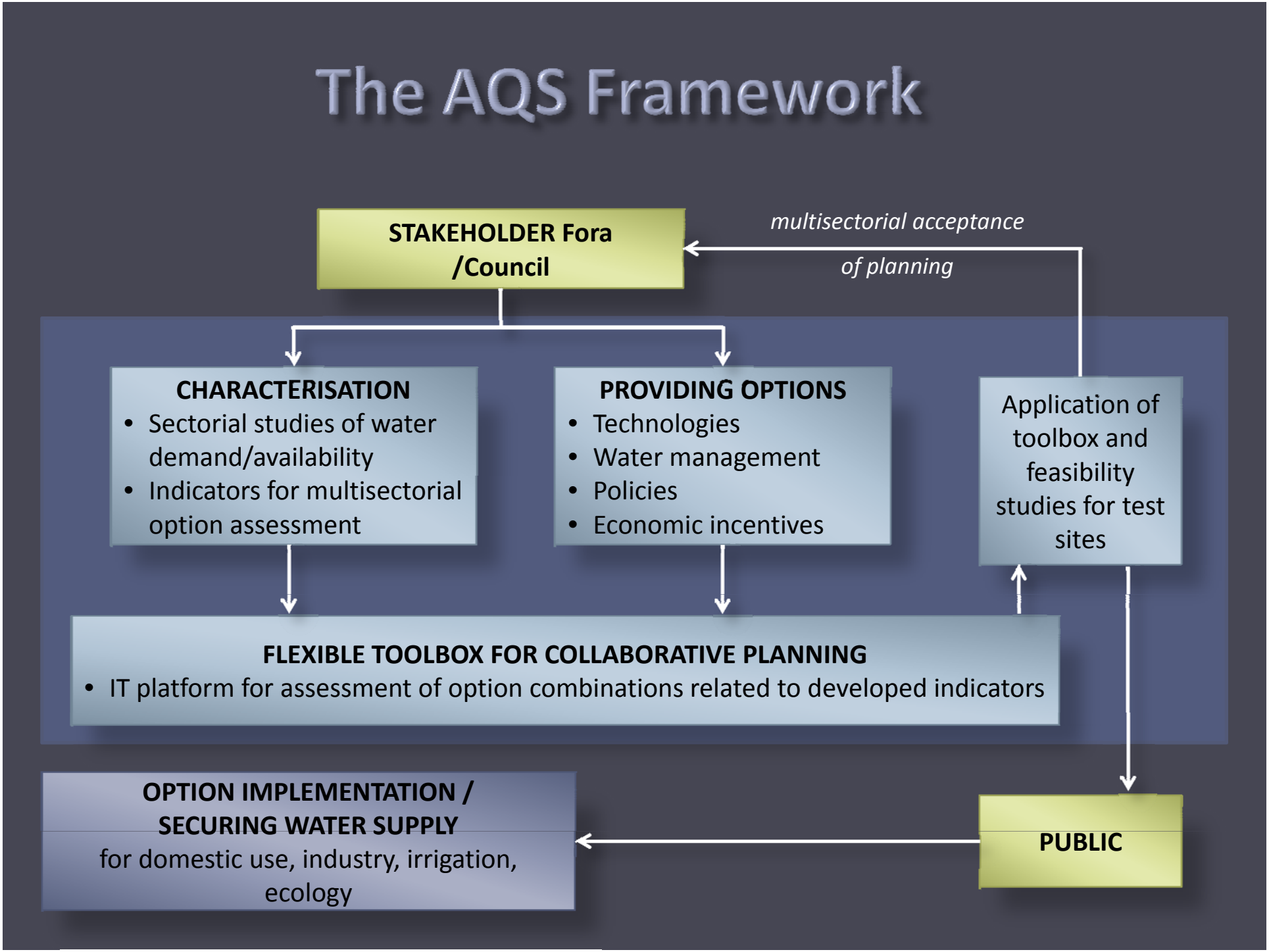
Implemented through

- Multi- disciplinary integrative framework
  - Stakeholder bodies
    - Stakeholder Council
    - Public Stakeholder Forum
    - Local Public Stakeholder Fora
  - Joint Assemblies
  - Joint Work Teams

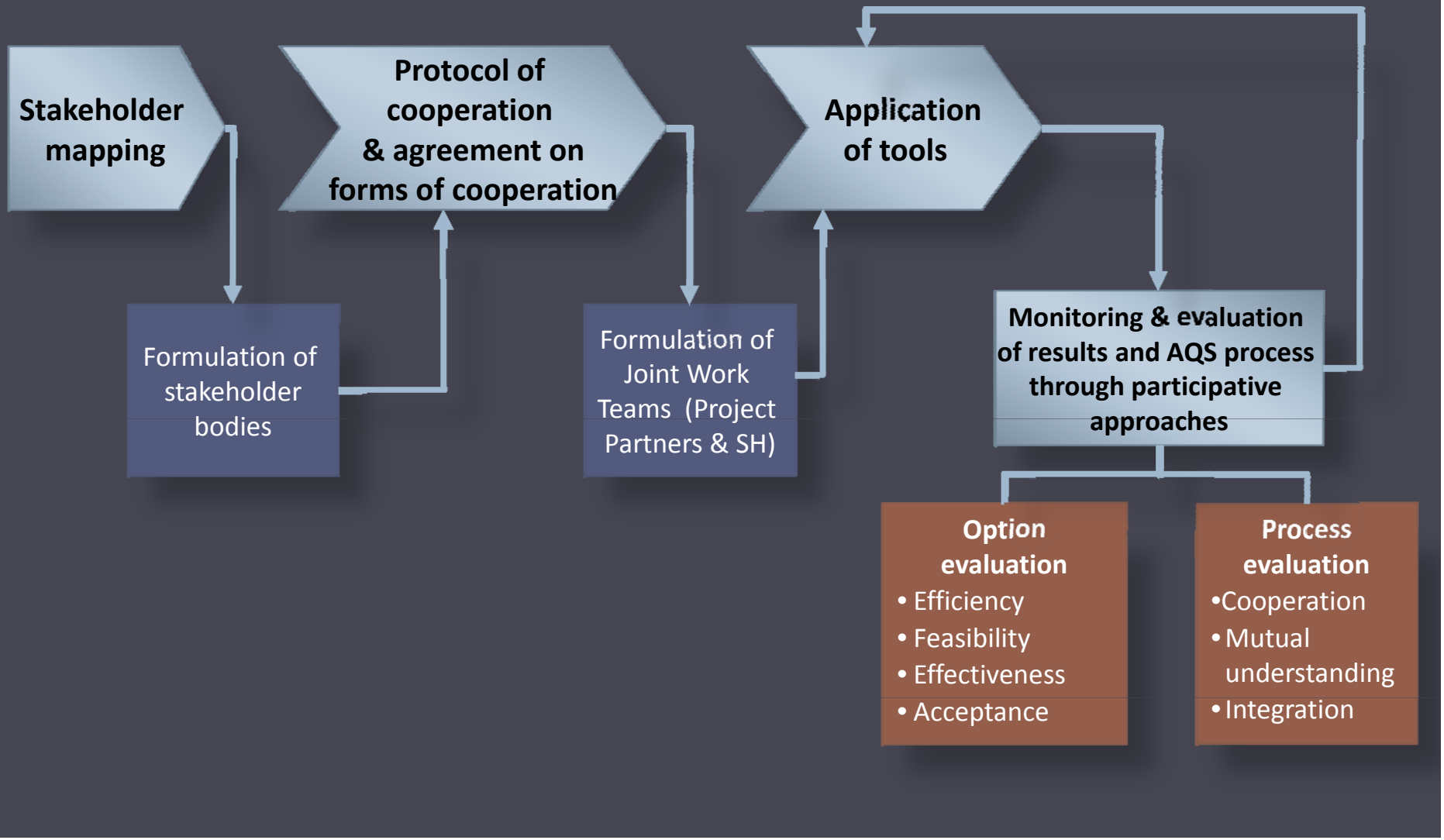
Contribution to Water Stress Research

- Diagnosis and characterization of water stress
  - Water Stress Matrix
- Development of methods and tools to evaluate mitigation options and their potential interactions
  - **Integrated Solution Support System (I3S):** Web-based comprehensive Knowledge Base with all information on the AQS test sites, options and indicators
  - Site-specific tools and models
- Assessment of the effectiveness of water stress management options
  - Development of a testing and evaluation protocol
  - Lessons from Case Studies – Regional recommendations
- Participatory decision making and planning
  - Stakeholder bodies to foster mutual learning
  - Joint Work Teams to allow continuous collaboration & response to local needs
- Investigation of linkages with existing policies (e.g. WFD, CAP, local/national development policies)
- Water (use) sector-specific recommendations for water stress mitigation

The AQS Framework



An Evolving Process of SH Involvement



The AquaStress definition of water stress

"Water stress occurs when the functions of water in the system do not reach the standards (of policies) and/or perceptions (of the population) on an appropriate quantity and quality, at an appropriate scale and the adaptability for reaching those is not given"

- Used in the development of a Water Stress Matrix for mapping water stress conditions
- The Water Stress Matrix combines quantitative information (indicators) and qualitative information (maps, administrative decisions etc.) in a way that can be visualized and easily understood by stakeholders

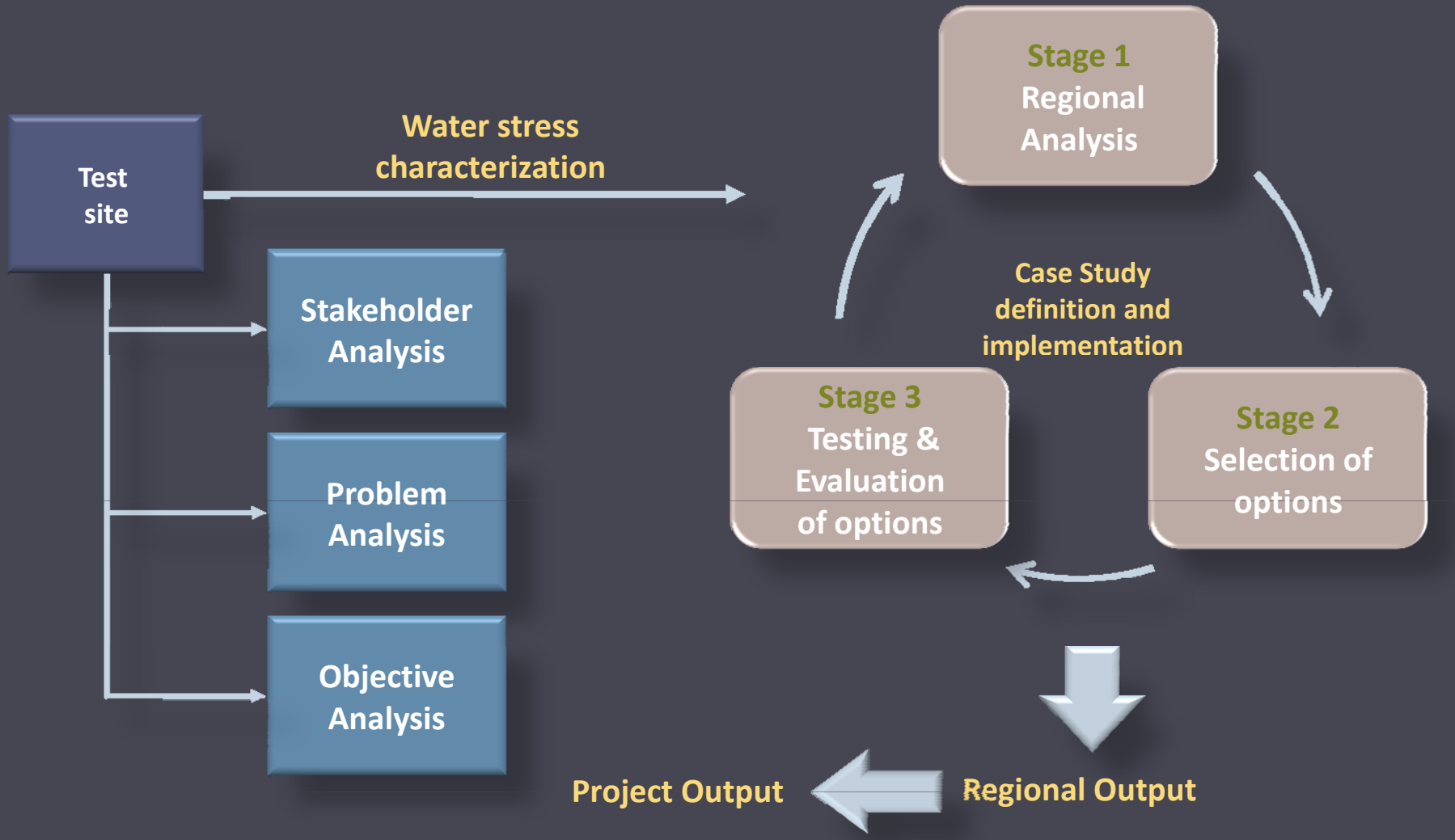
The AquaStress Case Studies on Water Stress

Key steps and expected outcomes

AQS as a Case Study-driven Project

- AquaStress Case Studies (CS)
  - Virtual implementation: Application of computer tools and simulation exercises
  - Field implementation: Small-scale field activities to test the applicability and effectiveness of proposed mitigation options
- "External" case studies to draw experience from actual implementation of mitigation options or from experiments
  - External CS are inputs to the AquaStress knowledge base

Methodology for CS development



Stage 1: Identification of Case Study Water Stress conditions

5 Case Studies on **Agriculture** (Guadiana, Tadla, Limassol, Flumendosa, Merguellil)

2 Case Studies on **Industrial & Domestic water use** (Iskar, Przesmza)

1 Case Study on **Participatory water management framework** (Vecht)

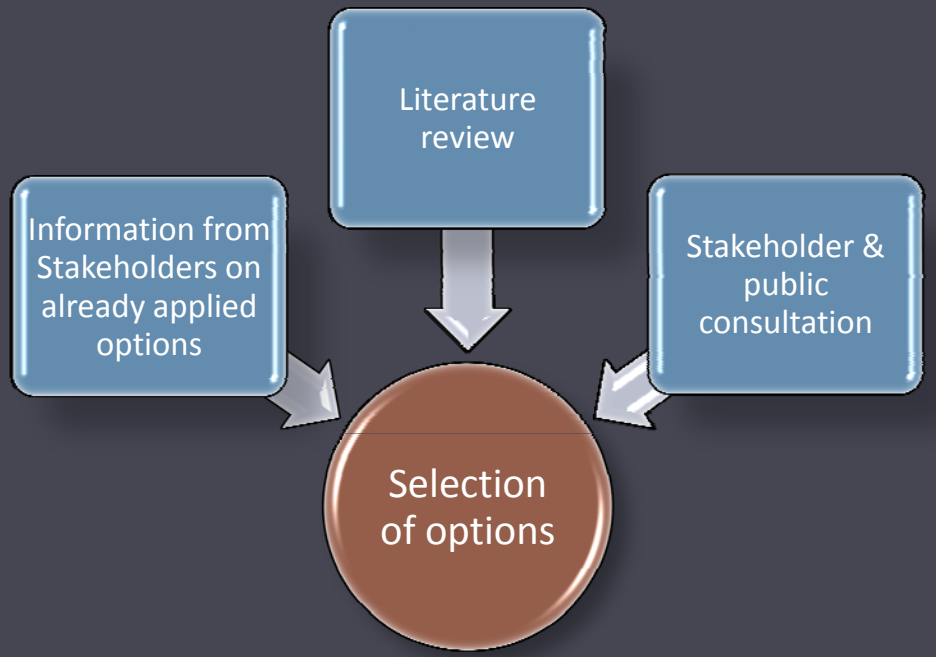
Upscaling of Case Study outcomes to prepare guidelines for water stress mitigation on the basis of combined experience

Stage 1: Identification of Water Stress Conditions in the AQS Test Sites and Case Study Objectives

Flumendosa, Italy	Integrated and sustainable water management
Guadiana, Portugal	Use and allocation of water resources among the agricultural, urban, and environmental sectors to maximize environmental, economic and social welfare in the Serpa-Mertola region
Merguellil, Tunisia	Improving water use efficiency in intensively irrigated areas of the Merguellil Valley
Tadla, Morocco	Integrated and sustainable water management
Limassol, Cyprus	Decreasing groundwater overexploitation through the rationalization of the irrigation practices employed, and promoting the use of reclaimed water
Przemsza, Poland	Adaptation of water management in the Przemsza catchment to meet the need of industrial transformation
Iskar, Bulgaria	Decrease of the Water Exploitation Index in the Sofia region through improved industrial and urban water management and flood/drought prevention
Vecht. The Netherlands	Improvement of water management by the Velt en Vecht Water Board through participatory approach and water system analysis

Stage 2: Selection of Water Stress Mitigation Options

- **Option:** Action or specific measure to mitigate water stress issues in a region
  - **Technical options**
    - Crop pattern selection
    - Improved irrigation practices
    - Reclaimed water use
    - Wastewater treatment
    - Best Management Practices
    - Reservoir management
    - Water saving
    - Water supply enhancement
  - **Non-technical options**
    - Economic instruments
    - Institutional instruments
    - Options for capacity building
    - Stakeholder engagement through the AQS monitoring and evaluation process

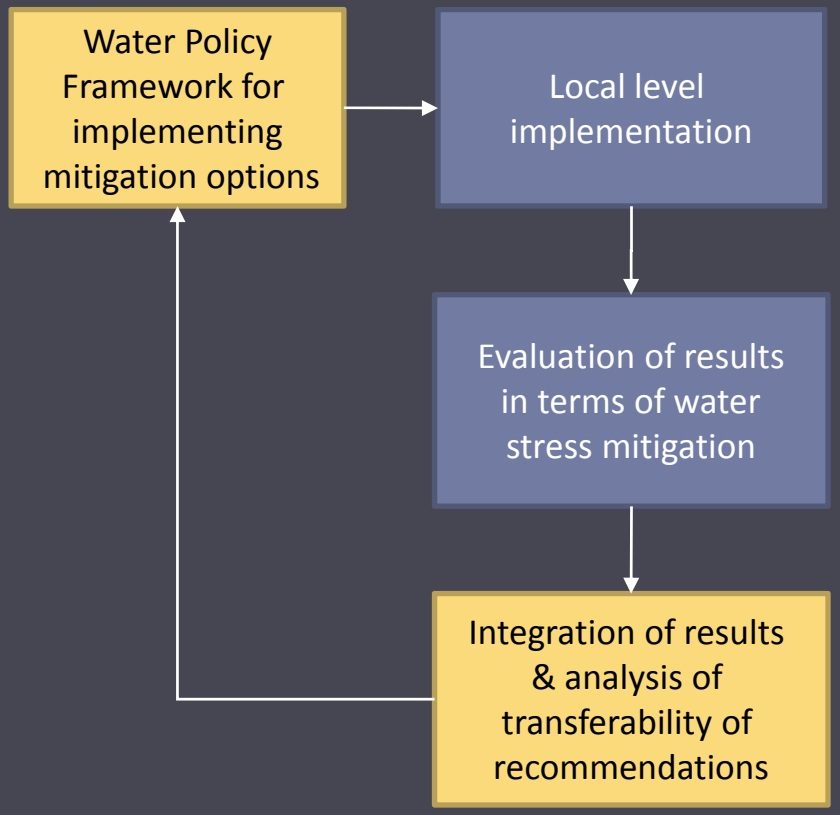


Stage 2: Selection of Water Stress Mitigation Options

Option type	Waste water reuse	Sustainable agriculture	Economic instruments	Public participation	Water governance, administration & management	Environmental considerations
Flumendosa		×	×	×		×
Guadiana	×	×	×	×		
Iskar				×	×	
Limassol	×	×	×	×		
Merguelil		×	×	×		
Przemsza			×	×	×	×
Tadla		×		×		
Vecht				×	×	×

Stage 3: Implementation and assessment of options

- Analysis of options using either field tests or modelling (or other) tools, such as:
  - Benchmarking activities for best olive irrigation practices
  - Water balance modelling of an industry
- Evaluation of options and AQS process
  - Stakeholder participation throughout the implementation process
  - Workshops for the presentation and discussion of results with stakeholders
- Integration of results towards Test Site specific recommendations
  - Sectoral recommendations (e.g. sustainable agriculture)
  - Recommendations on the process for water stress mitigation



The expected final AQS outputs

- Case Study outputs
  - Plans and guidelines for sustainable agriculture practices
  - Policy recommendations for sectoral water stress mitigation
  - Water saving plans in selected industries

- Project level outputs
  - Integrated Solution Support System (I3S)
  - Strategic guidance documents:
    - Thematic reports (Industrial water saving, Sustainable agriculture Economic instruments, Public participation …)
    - Integrated reports (Testing and evaluation of water stress mitigation options, Guidance on water stress mitigation options…)

What we have learnt so far (1/2)

- Case Study approaches can facilitate the integration of results in developing EU-relevant policy recommendations
- The formulation and operation of Stakeholder Bodies has enabled information exchange between the public, decision makers and water experts and can enable mutual understanding and the early identification of the true problems
- All the AQS Test Sites experience similar sectoral water stress issues
- Cooperation among different disciplines is not easy to achieve and takes time
  - Enhanced through the formulation of Joint Work Teams
  - AQS interdisciplinary approach has enhanced the insight of collaborating water experts

What we have learnt so far (2/2)

- Stakeholder acceptance should be a key criterion in selecting appropriate options
- Technical solutions are not the only way for coping with water stress
  - Non-technical options can also contribute significantly to water stress mitigation
- Option impact assessment is highly dependent on available data and information
  - Activities to enhance the knowledge base and collect appropriate data should become the first priority
- Evaluation is the key step in any planning effort
  - Option evaluation for supporting the development of policy recommendations
  - Process evaluation for identifying pitfalls and support improved, integrative planning
- Experience from the Case Studies in countries that are in a transition period has proven that transition is an opportunity for improvement, not a constraint