INECO

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INECO

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Institutional and Economic Instruments for Sustainable Water Management in the Mediterranean Region

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PREFACE

This document is the Final Publishable Activity Report of the INECO Project, "Institutional and Economic Instruments for Sustainable Water Management in the Mediterranean Region", Contract No: INCO-CT-2006-517673. INECO was a Coordination Action Project, funded through the 6th Framework Programme, and addressing the Specific Measures in Support of International Cooperation (INCO) - Mediterranean Partner Countries (MPC) thematic priority. More specifically, the Project addressed "B.1.1 Comprehensive water policy and integrated planning" of the "Thematic Issue B.1 – Environment" of the work programme for Mediterranean Partner Countries.

INECO started officially on July 1st 2006 and was concluded on June 30th 2009, spanning a period of 3 years. It brought together 14 institutions from 10 countries of the Mediterranean Basin (Greece, France, Italy, Cyprus, Tunisia, Egypt, Lebanon, Syria, Algeria and Morocco), including six (6) public, seven (7) private and one (1) international organisations, with the main goal of introducing an interdisciplinary approach to water management, building upon the integration of three major aspects: environment, economics and society.

In the above context, INECO elaborated on shared problems in the decision-making process and the deficiencies of the current governance structures around the Mediterranean Basin. Activities focused primarily on identifying and evaluating policy instruments to promote equity, economic efficiency and environmental sustainability in the sharing and governing dimensions of water resources management. The project further emphasized on the dissemination of principles and lessons learnt from the implementation of the EC Water Framework Directive 2000/60, and taking into account the specific characteristics of local socio-political and economic contexts.

This document presents the overall approach, structure and achievements of INECO throughout its 3-year implementation period. It is structured in the following way: Section 1, Introduction, presents the background, context, and main aims of INECO. Section 2 details the methodology employed by the Project and its main activities; it further provides a summary of its main deliverables. Section 3 outlines the conclusions drawn from the project analyses, towards the development of more efficient and equitable policy instruments. It further includes general concluding remarks, particularly with regard to the participatory approach followed by the Project. Finally, Section 4 provides an overview of the main outputs of the project, to be further disseminated and used after its completion. The Annex lists the Project's participants.

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1 INTRODUCTION

1.1 Background

Water availability in Mediterranean Countries is unquestionably limited, due to the low rate of natural renewal of both surface and groundwater supplies, unwise sectoral water allocation and use and increasing pollution loads discharged to water bodies. The increasing disparity between supply and demand, the high vulnerability to drought events and frequent water scarcity resulting from the temporal and spatial variation of water availability, have motivated a supply-oriented approach, entailing the implementation of large-scale hydraulic projects to meet irrigation and potable water needs. As a result, water management plans are frequently defined at the national level, with river basin management approaches being secondary in importance; in this context, water policies are also centralized, in order to coordinate water transfers across regions and support the development of water-related infrastructure through general taxation and cross-subsidies.

Supply enhancement policies are still dominant in most countries of the Mediterranean Basin, as there are significant needs and further potential for expanding the infrastructure base; on the other hand, it is also gradually becoming evident that the enhancement of socio-economic development, the preservation of food security, of self-sufficiency, and of a healthy water environment cannot rely on the augmentation of water supply alone. In this regard, there is a shift, albeit slow, towards a new, integrated approach, which considers the entire water cycle in a holistic way. Policy instruments are gradually being introduced for allocating water according to the principles of economic efficiency, and emphasis is given to the development of schemes flexible in managing variations in supply and demand and in the preservation of water quality. Changes include planning that integrates water quality and quantity, promotion of demand management, and cost recovery towards more financially sustainable water services. The effort also addresses the institutional environment, through the strengthening of governmental agencies, the decentralization of the responsibility for delivering water services to financially autonomous utilities, and the empowerment of institutions to achieve enforcement of environmental regulations.

This progress towards Integrated Water Resources Management in the area is also being supported through different EU and international initiatives, aimed at strengthening local capacity towards sound water management, mitigation of water stress and adaptation to climate change. Activities seek to foster the implementation of technical and policy tools, building on information exchange on improved practices and technologies. In this regard, several EC-funded research projects addressing Mediterranean countries have touched upon the development of policy recommendations and suggestions for the implementation of advanced water management options and demand management instruments, taking into account local specificities and socio-economic contexts.

Efforts of recent years have been increasingly motivated by the implementation of the EC Water Framework Directive 2000/60 in the EU Member States. The WFD implementation process, requiring the interlinkage of environmental concerns, economic reasoning and public

participation, has been a major challenge to the research community. Particularly, a lot of research has been developed to address aspects relating to the "full" water cost, the impact of cost recovery policies, but also on the effective contribution and implications of economic instruments and other policy tools in enhancing economic efficiency, environmental sustainability and equity in water allocation, infrastructure development and demand management.

In the above context, the INECO Coordination Action Project was launched with the strategic goal to promote capacity building towards constructively engaged Integrated Water Resources Management. The Project aimed to develop and strengthen of a network of research institutes, public authorities and stakeholders in countries of the Mediterranean Basin, focusing on alternative institutional and economic instruments towards sustainable water management. Through the development of seven (7) Case Studies, the Project analysed ways through which policy (including economic) instruments can embedded in current policies and frameworks, in order to address a broad range of locally important, water management issues and water stress factors. The followed approach emphasized on revealing the characteristics of socio-economic environments and governance settings affecting water policies, and at identifying important social, economic and environmental trade-offs according to the perceptions of local stakeholders and affected groups.

The subsequent section presents in more detail the specific objectives of the project, whereas Sections 2 and 3 outline respectively (a) the methodologies employed and main achievements and (b) the conclusions derived from the Project.

1.2 Summary of Project objectives

As presented above, and in response to challenges faced in countries of the Mediterranean Basin, INECO emphasized on instruments that can develop the "software" needed to enhance the sustainability of water systems (local adaptive capacity, long-term financial sustainability, social capital, public participation approaches for conflict resolution, etc.), rather than the traditional "hard-path" approach of large hydraulic infrastructure development.

The Project's strategic goal (i.e. to promote capacity building towards constructively engaged Integrated Water Resources Management) was pursued through the enhanced fostering of participatory processes and dialogue among policy makers, water management authorities, water user groups, civil associations and individual citizens on water management issues of local concern. These activities, backed up by analyses of institutional and governance frameworks and currently applied policies, were implemented in 7 countries of the Mediterranean Basin, Cyprus, Tunisia, Egypt, Lebanon, Syria, Algeria and Morocco.

Research focused primarily on policy instruments which can promote equity, economic efficiency and environmental sustainability in the sharing, valuing and governing dimensions of water management (Figure 1). The Project further outlined emerging policy needs and potential for the application of economic instruments through seven Case Studies. Each Case Study addressed a locally important water management issue, which is however of broader concern and relevance to water stress exacerbation and mitigation.

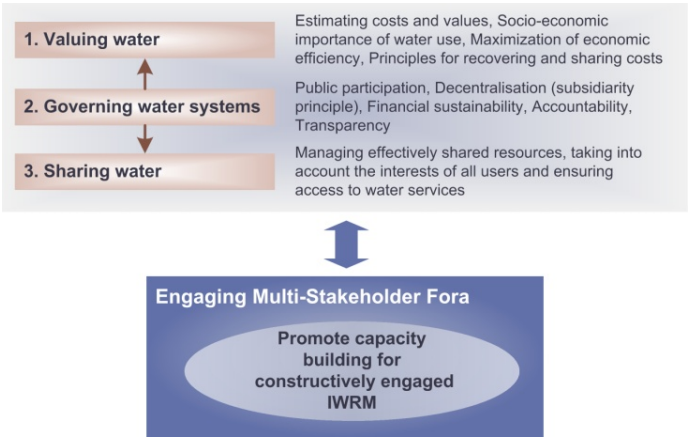


Figure 1: The INECO Framework and Goals

In the above context, employed methods and activities developed by INECO were designed to address the following specific objectives:

1. The widest possible dissemination and exchange of information regarding the application of institutional and economic instruments in the water sector, with particular emphasis on the harmonisation procedures of the Water Framework Directive, and existing and emerging water management practices in arid and semi-arid regions facing water stress.
2. The consistent and comprehensive analysis of governance structures and water allocation mechanisms in the participating Mediterranean regions, through the formulation of an adaptable set of indicators and active stakeholder participation.
3. The development of exemplary regionalised analyses on the efficiency and effectiveness of currently applied economic instruments, and the formulation of a proposal for alternative institutional and economic instruments, taking into account societal objectives.
4. The initiation of procedures, through extensive participatory workshops, with the purpose of discussing alternative institutional arrangements that could (a) promote efficient and transparent allocation of water and associated costs, and (b) provide incentives for efficient water usage.
5. The formulation of guidelines, adapted to the particularities of the Mediterranean regional context, for the application of alternative institutional and economic mechanisms, for improving transparency, accountability and inclusiveness, as well as for reinforcing the resolution of conflict in water resource planning and decision-making processes.

Of the objectives outlined above, Objectives 1, 3, and 4 were addressed horizontally, through various activities undertaken throughout the course of the project, and were achieved through the framework defined by the project's Case Studies, which had both a scientific and a strong social component. The final outputs of INECO, outlined in the formulated Guidelines, are thus the outcome of a stakeholder-driven approach, which enabled a two-way interaction between the research team, responsible for disseminating contexts, policy options and research, and the stakeholders that participated in the various project events and analyses, outlining their views and experience and helping to adapt recommendations to local specificities and constraints.

2 METHODOLOGY EMPLOYED, OVERVIEW OF ACHIEVEMENTS AND MAIN DELIVERABLES

2.1 Introduction

The implementation of INECO was divided into four closely interrelated phases, each grouping several work packages and individual tasks. Phase 0, "Horizontal activities", spanned the entire duration of the project. It involved the overall coordination and management of the project activities, as well as the development of web tools for supporting the development of external communication fora and web-based dissemination material. Information relating to these activities and outputs are presented in the Final Plan for the Dissemination and Use of the project.

The core of the Project's activities was formulated in three (3) main Phases, designed so as to: (a) allow wide dissemination of principles and approaches concerning the implementation of institutional and economic instruments in the water sector; (b) identify and evaluate potentially applicable water policy instruments, adapted to local specificities, addressing also constraints and opportunities of existing water governance frameworks; and (c) foster the development of participatory processes, through the organisation of local events and dissemination activities.

Phase 1, *"Establishment of a common background and institutional framework assessment"*, entailed the collection of background information on the range of water management issues encountered in the countries concerned and the identification of the current water governance setting in terms of water policy formulation and implementation, management of water resources, and the provision of water services. This "Situation Analysis" allowed the identification of one (focal) water management issue of concern to local societies, which constituted the focus of the corresponding Case Study (CS). In addition, this Phase involved the analysis of the problem at hand, through participatory workshops, depicting ways through which current water allocation policies, cost recovery frameworks, economic instruments and governance settings affect the local society and the environment. Additionally, this phase included literature review of practices adopted in the EC Member States and other regions facing water stress, in order to identify best practice examples in relation to the problems at hand.

Phase 2, *"Analysis of institutional and economic instruments with emphasis on effectiveness and equity"* had a two-fold objective. First, the Phase performed an in-depth analysis of currently applied instruments, outlining implementation details, functions (cost recovery, incentives), effectiveness and contribution to wider societal objectives and other (water-related) policy goals (e.g. agricultural policies). Subsequently, identified gaps and barriers to implementation, in combination with suggestions and comments raised by local stakeholders, were used to define a set of alternative economic and institutional interventions at the Case Study level. The developed set of options also addressed deficiencies in the procedures and practices in coordination, planning, decision-making, and policing of water uses and users, and outlined responsibilities and prerequisites to instrument implementation. Results were extensively discussed in a Joint Stakeholder Assembly Workshop (Tunis, 15-16/07/2008), bringing together decision-makers from the participating countries.

Phase 3, *"Synthesis and Dissemination of Guidelines"* included the synthesis of the above defined instruments, to formulate policy proposals on ways to achieve problem mitigation. The guidelines derived from the local CS analyses, along with background information on policy instruments, practice examples and previous project results were synthesized into one of the major outputs of the project, a report titled "Guidelines towards the application of institutional and economic instruments in countries of the Mediterranean Basin". Individual CS-relevant results are presented in a series of Regional Publishable Reports, also finalised during this phase. Furthermore, in this Phase, a Web Toolbox was developed, integrating background information and lessons of experience from the use of policy instruments, Case Study outputs and relevant information, as well as web-based tools to support participatory water planning processes. Final outputs were disseminated to local stakeholder audiences towards the end of the project, and through a Final Conference Event.

All deliverables produced from the above Phases are available at the "Publications" section of the INECO Web Site, http://environ.chemeng.ntua.gr/ineco/Default.aspx?t=483. Furthermore, the INECO Web Toolbox is available from: http://environ.chemeng.ntua.gr/toolbox.

The subsequent sections detail the individual achievements and outputs of each Phase.

2.2 Phase 1: Establishment of a common background and institutional framework assessment

Phase 1 of INECO was aimed at developing a common research and knowledge background among the participants of the Project, and at developing external linkages with main stakeholders affecting or affected by the development of water management policies in the countries concerned, namely Cyprus, Tunisia, Egypt, Lebanon, Syria, Algeria and Morocco.

The Phase involved the implementation of various tasks, addressing both extensive literature review on adopted practices, best practice examples and current frameworks for water management, but also field work to approach policy and decision makers, water managers and user groups, and collect data to complement, as far as possible, the analyses undertaken at national and regional level in the countries concerned. These activities were addressed through 5 work packages:

- **WP 2, Exchange and dissemination of best available practices for institutional and economic instruments in constructively engaged IWRM**, was aimed concerned the dissemination of: (a) experiences of EU Member States of the Mediterranean Basin on the implementation of the principles and processes of the EC Water Framework Directive, 2000/60, and (b) institutional and economic instruments adopted in other arid and semi-arid areas.
- **WP 3, "Identification of responsible WM authorities, institutional structures, policies and water allocation mechanisms"** was aimed at describing the current situation in water management and use and in outlining the current legislative and institutional framework in the countries that constitute the focus of project implementation. A further objective was to identify and approach key stakeholders and foster the establishment of local networks of water management authorities, decision-makers and user groups to collaborate in the development and consolidation of the project's Case Studies.

- **WP 4, "Adaptation of indicators for institutional assessment"**, was aimed at reviewing and adapting existing indicator frameworks for assessing the effectiveness of institutional frameworks, taking into account the principles and overriding criteria of Integrated Water Resources Management and the particularities of the Mediterranean regional context.
- **WP 5, "Stakeholder Workshops and Web Forum"** was primarily aimed at elaborating, through a participatory process and through the organisation of local stakeholder workshops, on the principles of Integrated Water Resources Management. Further objectives concerned: (a) the presentation of potential institutional and economic instruments to a wide audience of stakeholders and end-user associations; (b) the identification of potential conflicts and the fostering the exchange of opinions, in order to reach consensus on what the real problems are and how these could be addressed in a desired water resources management situation; and (c) the assessment, where possible, of the levels of information sharing and transparency regarding water and cost allocation mechanisms.
- **WP 6, "Typology Development"**, was aimed at developing a typology on the basis of data, indicators and stakeholder views on relevant institutional, social and economic conditions and their role in water allocation and water sharing.

The following paragraphs present in more detail the methods followed and the achievements of individual tasks. A short summary of main outputs is provided in Section 2.2.2.

2.2.1 Methodology and main achievements

Review of best available practices for institutional and economic instruments in constructively engaged IWRM

The review on the application of institutional and economic instruments in the water sector focused primarily on practices and methods adopted in arid and semi-arid regions, characterized as water stressed. Work focused on providing best-practice examples and insight on alternatives which could address both causes and impacts to water stress in an effective and equitable way, focusing primarily but not only on quantitative issues. The review addressed two spatial scales:

(a) Institutional and economic instruments adopted in EC Southern Mediterranean Countries, also within the framework of the EC Water Framework Directive 2000/60 and its daughter directives.

(b) Practices adopted in other arid and semi-arid regions, with the objective to assimilate and coherently outline a wider range of experiences, difficulties and problems faced in diverse water management contexts and socio-economic conditions.

Analyses for both geographical spectrums were framed according to the INECO Conceptual Scheme and in relation to the "Governing", "Sharing" and "Valuing" dimensions of water management.

With regard to point (a) emphasis was given to analysing the patterns of implementation of the WFD in EU Member States (Spain, Italy, Greece, Portugal) characterized by quantitative water stress. Emphasis was given on describing how water availability patterns influence water management systems and forms of institutional organization of the water sector, and in turn, what

are the critical issues that characterize water management, taking into account the principles, requirements and opportunities offered by the Water Framework Directive.

With regard to point (b), the analysis of practices adopted in other arid-and semi- arid regions (outside the EU and Mediterranean Partner Countries) focused on advantages and disadvantages of institutional and economic reforms in the water sector, giving also insight on the context (cultural and political) in which water policy is pursued and implemented. A broad range of countries were considered (Argentina, Australia, California, Canada, Chile, Israel and Japan), highlighting drawbacks and accomplishments in order to derive best practice examples and lessons from experience.

Analysis of current governance structures and capacity building mechanisms in the countries of the Mediterranean Basin

Within INECO, current governance structures, institutional frameworks and challenges facing the water sector were analysed for the countries of Cyprus, Tunisia, Egypt, Lebanon, Syria, Algeria and Morocco. The emphasis was placed on mapping the current legislative and institutional framework by coherently describing governance and management practices, as well as on analysing how institutional deficiencies affect significant water management issues at the national and/or local level. In more detail, the analysis addressed the following topics:

(a) The identification of the overall institutional, administrative and financial framework regarding water resource exploitation, management and use, and legislation, through the mapping of:
   - The administrative & institutional structure regarding water resource management. This task included the identification of main actors at the three functions (constitutional, organisational and operational), the analysis of responsibilities, overlaps and water-related conflicts.
   - Legislation related to water issues (management, pricing, emission limits, private sector involvement, abstraction permits, groundwater exploitation permits, water use rights).
   - The overall financial context regarding water resource exploitation, performing also a first identification of deficiencies in the recovery of water service costs and subsidies made available to the water sector.
   - The relative importance of private sector involvement in the implementation of water works and the provision of water services.

(b) The analysis of the current situation regarding water resource use and management and the identification of the natural, technical, financial, administrative and institutional constraints facing the water sector at the national and/or local level.

The information described above is available in dedicated web-based country profiles at INECO Web Site, and accessible to the general public.

Furthermore, task (b) led to the achievement of an important milestone of INECO, the definition of the scope of the INECO Case Studies, which is presented in the next paragraph.

The definition of the focus and scope of the INECO Case Studies

One of the key objectives of INECO was the *"development of exemplary regionalised analyses on the efficiency and effectiveness of currently applied economic instruments, and the formulation of a proposal for alternative institutional and economic instruments taking into account societal objectives"*. These Case Studies, as previously outlined, formed the backbone of INECO, for fostering participatory processes and the exchange of view among water management authorities, decision and policy makers and user groups, and for deriving policy recommendations towards the application of more equitable and efficient instruments for sustainable water management.

Their scope was based on the previously undertaken Situation Analysis on water management issues and constraints faced in each individual country, as well as consultation with key stakeholders identified through WP 3. Criteria used to that end include: (a) Importance and significance of implications and impacts to the local society and the environment; (b) Relevance to water management challenges and constraints facing the water sector at the national level; (c) Broader relevance to current water management challenges faced in Southern Mediterranean countries.

Their scope, including a brief description of the analysed focal water management issue and its main causes and effects is outlined below:

The Case Study of **Cyprus** focused on the *increasing vulnerability of the Pegeia Aquifer* (western part of Cyprus). Currently, the aquifer, which is the primary source of potable water supply, is exploited to meet the rapidly increasing residential and tourism demand; the lack of sewerage and wastewater treatment infrastructure in the area also raises concerns for groundwater contamination. It should be noted that groundwater resources are significantly degraded in several regions of Cyprus, as a result of many years of overabstraction, and are further associated with the limited ability of the current water management framework to promote the use of alternative supply sources, such as treated wastewater, institutional framework overlaps and inadequate legislation enforcement.

The Case Study of **Tunisia** dealt with *Aquifer depletion and sea intrusion*, which is mostly associated with uncontrolled abstractions for irrigation purposes and the inadequacy of the presently applied alternatives and disincentives to groundwater overexploitation. The problem is further exacerbated by the lack of technical capacity in the agricultural sector, the limited application of water saving methods in irrigation and the current water-intensive cropping patterns.

The Case Study of **Egypt** analysed *Water quality deterioration in the region of the Bahr Basandeila Canal of the Dakahlia Governorate*, where waste disposal, heavy use of pesticides, inadequate domestic wastewater treatment, and uncontrolled discharge of industrial effluents have transformed the open waterway to a repository and conveyor of liquid waste. The major water pollution issue, which is common in the entire Nile water distribution network, poses great risks for human health, agricultural production, and the river and coastal ecosystems.

The Case Study of **Lebanon** concerned *Increasing water stress for meeting domestic, agricultural and industrial water demands in the Damour River Basin*, further exacerbated by

upstream pollution, groundwater interbasin transfer, and lack of financial and technical capacity to address infrastructure requirements and enforce legislation.

The Case Study of **Syria** focused on *Water pollution in the Barada River Basin (Greater Damascus Area)*. The issue is associated with the discharge of high loads of industrial and domestic waste and wastewater, which exceed the river's self purification capacity, and the decrease of river flow, resulting from rainfall decrease and use of the Feige Spring for drinking water supply. Water pollution has significantly contributed to the collapse of the Barada river ecosystem, which also sustains the large forest of "Ghouta", a cultural heritage area and environmental hotspot in the region.

The Case Study of **Algeria** concerned the *Pollution of the Seybouse River*, which receives large volumes of untreated industrial and domestic effluents posing both direct and indirect risks on human health, agricultural production and the river ecosystem.

Finally, the Case Study of **Morocco** dealt with aspects of *Increasing water stress in the Oum Er Rbia Hydraulic Basin*. The Case Study focused on aspects relating to water use in the agricultural sector, where high losses in irrigation distribution networks combined with the currently adopted irrigation practices (inefficient irrigation methods and water intensive, economically unsustainable cropping patterns) contribute to what can be perceived as significant water waste.

The development of these Case Studies was fostered through all subsequent activities undertaken within the framework of INECO, with the overall aim to arrive to policy recommendations to address the issues at hand, articulated through stakeholder participation.

Adaptation and development of indicators for assessing institutional performance

The adaptation and development of indicators was primarily oriented towards the selection of relevant indicators and their elaboration into a coherent framework, to measure performance towards the mitigation of focal problems experienced in the project's Case Studies.

Main outcomes involved:

- A review of the pertinent literature, in terms of: (a) frameworks for structuring indicators, such as the P-S-R and the D-P-S-I-R approaches, and (b) specific indicator development efforts, by international organisations, which also address the themes of equitable and economically sustainable water use, delegation and decentralisation of authority, participation of stakeholders, integrated planning, private sector participation and involvement, and environmental protection and enforcement through laws, regulations and instruments.
- The selection and structuring of relevant indicators, following the Logical Framework Approach (i.e. the backbone of the method for the development of the project's Case Studies), so as to ensure that the proposed indicator frameworks adequately address critical variables relating to the issues at hand, particularly with regard to their "Sharing", "Valuing" and "Governing" dimensions.

The development of the CS relevant indicators, through data collection at the Case Study level, was used to showcase and discuss with stakeholders the relative importance of the problem at hand and its effects, by depicting the weight and significance of each of the contributing causes,

and thereby assisting in defining priority areas for action. Further to the above, it is considered that selected indicators can be a useful tool to map policy performance in terms of addressing the different contributing causes to the CS focal water management issues beyond the lifetime of INECO.

The INECO local Stakeholder Workshops

Participatory processes, already initiated in previous steps of Phase 1, were strengthened through a series of local workshops, held from July 2007 up to March 2008[1] in each of the regions that constituted the focus of the INECO Case Studies.

The workshops were aimed at strengthening the alliance between the INECO Research Team and the local stakeholder forum by: (a) discussing on the focal water management problem experienced in each region, through a structured method, based on the method of Objective Oriented Planning; (b) promoting the development of a process where each contributor gains both a better understanding of the problem and insight on how other participants see the problem; and (c) initiating the participatory involvement of stakeholders in determining, defining and evaluating alternative institutional and economic instruments towards problem mitigation. Furthermore, the workshops served as a discussion forum on the problems and challenges faced by stakeholders, and offered the opportunity for participants to share their experiences, knowledge, ideas, preferences, hopes, fears, opinions, and values.

The local INECO Stakeholder Workshops of INECO

Overall, the workshops managed to bring together a significant number of water management authorities, local governments and representatives of water users, who, in several cases, were not

[1] Basandeila, Egypt: 21-22/07/2007
Damascus, Syria, 10/09/2007
Meschref, Damour Basin, Lebanon, 12/09/2007
Pegeia, Cyprus, 26-27/10/2007
Nabeul, Tunisia, 6-7/12/2007
Annaba, Algeria, 19/01/2008
Afourer, Oum Er Rbia Basin, Morocco, 21/03/2008

accustomed to debate around the same table. In that sense, they can be considered as one of the "success stories" of the project, revealing conflicts had not been mapped before and issues that had not been previously discussed at the decision-making levels.

In addition to the consolidation of the INECO network, the individual workshops allowed the validation of the scope of the local Case Studies, as well as of the already identified underlying causes of the water management issues at hand. Discussions highlighted common principles and ways of thinking, but also differences in the way that water management policies should be pursued. Issues of concern in relation to the individual Case Studies can be summarised (but were not limited to): (a) legislation enforcement and the limitations of the "command-and-control" approach, (b) the enhancement of the technical, managerial and financial capacity of actors; (c) economic incentives and approaches to water pricing and sharing of water-related costs (tax fees, internalization of external costs, implications of pricing reforms, etc); (d) cost recovery in relation to the technical and financial sustainability of water services; (e) incentives towards the implementation of soft and technical solutions and (f) approaches to public participation, stronger collaboration and empowerment of local actors.

Suggestions, comments and proposals were taken on board in the next Phase of the project, which focused on identifying a set of potential options for problem mitigation.

Development of a typology on institutional frameworks

The "typology of institutional frameworks" developed by the Project was used as a tool for framing the (common or different) institutional, social and economic factors that affect the effectiveness and efficiency of current water management approaches, policies and plans. It was based on information collected and processed throughout the previous stages and analyses of INECO (mainly through WPs 3, 4 and 5), and primarily addressed two levels:

- The 1st level referred to the "Typology of water management problems", involving the classification of the type of water management issues analysed at their CS levels and their effects.
- The 2nd level corresponded to the "Typology of underlying institutional, economic and social causes to water management issues", describing common causes pertaining to the formulation of water-related policies, river basin and aquifer management, and water service provision.

Particularly with regard to the 2nd level, above, the analysis focused on highlighting commonalities and differences in relation to:

- The Sharing dimension, addressing issues relating to water allocation and use, mechanisms and decision-making practices for "water sharing", including information on gender equity where available, and access to basic water services.
- The Valuing or economic dimension, outlining commonalities and considerations regarding impact of policies and frameworks for cost recovery and cost sharing, forms of financial encouragement towards water resource protection, the actual implementation of the "polluter-pays" principle, and economic efficiency in water allocation.

- The Governing dimension, systematising commonalities and differences on how the overall organization of the water sector affects the selected water management issues, aspects relating to legislation, laws and enforcement, as well as frameworks for awareness, stakeholder involvement and public participation.

The comparative analysis was complemented with a broad assessment of institutional frameworks, as perceived through the spectrum of the INECO Case Studies, as outlined throughout Phase 1, and incorporating the views and considerations of local stakeholders.

2.2.2 Deliverables

Deliverable 1: WFD Harmonization procedures review - The WFD Implementation in arid and semi-arid countries: Institutional and Economic Issues

The Deliverable deals with institutional and economic issues relevant to the implementation of the Water Framework Directive in arid and semi-arid EC Member States. It addresses the following topics: (a) patterns of the WFD implementation in Mediterranean EU Member States (Spain, Italy, Greece, Portugal), characterized by quantitative water stress (arid and semi-arid countries), and (b) critical issues that characterize water management in these countries and development of a set of case studies aimed at enlightening more and less successful practice examples.

Deliverable 2: Synthesis report on the application of institutional and economic instruments in the water sector for arid and semi-arid regions

The Deliverable outlines problems and experiences drawn from institutional and economic interventions in the water sector in non EU world countries, focusing particularly in arid and semi-arid regions. It reviews practices and structures adopted in Argentina, Australia, California, Canada, Chile, Israel and Japan, as well as the context (cultural and political) in which water policy is pursued and implemented.

Deliverable 3: Governance and water management structures in the Mediterranean Basin

The Deliverable presents the work for the analysis of governance and water management structures in Cyprus, Tunisia, Egypt, Lebanon, Syria, Algeria and Morocco. It is structured in two parts.

Part I provides an overview of the INECO framework, approach and phases, and elaborates on the framework for institutional analysis presented in Part II. It further gives a brief overview of the current water governance challenges faced in the MENA region, and performs a preliminary comparative analysis.

Part II contains individual regional reports, containing information on (a) the current situation regarding water exploitation and use in the each country considered, (b) an analysis of the institutional framework governing the water sector, (c) a description of constraints and focal water management problems experienced at the national and/or regional levels, and (d) the outcomes of Stakeholder Analysis performed within the framework of the Project.

Deliverable 4: Adapted indicators for institutional framework assessment in an IWRM context

The Deliverable is structured in two main parts (chapters):

Part 1 provides a review of existing indicator frameworks, based on literature information on: (a) definition, purpose and use of indicators; (b) most commonly-used indicator development models, namely the bottom-up, the top-down, the systemic, and the cause-effect approaches; and (c) current indicator development efforts to specify, select, and systematise information so as to enable their use for describing the progress towards sustainable water management.

Part 2 presents the selection of appropriate indicators for assessing the impact of policies in relation to the individual focal water management problems of the INECO Case Studies. Indicators are elaborated into a framework based on the Logical Framework Approach, the analytical method selected by INECO to map causes (relating to the current water governance context) that impede effective policy implementation.

Deliverable 6: Regional Workshop Proceedings

The Deliverable presents the methodology, scope and outcomes of the series of the 7 Regional workshops organized by INECO, to strengthen the alliance among the members of the project team and local stakeholders, and foster constructive engagement for the exchange of knowledge and ideas on problems currently faced by local decision-makers and water users.

Deliverable 7: Publishable Regional Reports on institutional frameworks and decision-making practices

The Deliverable comprises 7 Regional Reports (1 for each country: Cyprus, Tunisia, Egypt, Lebanon, Syria, Algeria, and Morocco), elaborated in publishable format (i.e. ready for publication). Each report presents the outcomes of INECO at the local level and is structured in two parts:

- Part I includes: (a) a detailed description of the current framework for water management in each area, describing challenges and constraints facing the water sector; (b) a detailed presentation of the current legal and institutional framework and its role in water resource management on a regional scale.
- Part II details the outcomes of the corresponding INECO Case Study and Regional Analysis, including also a synthesis of policy recommendations, as articulated by local stakeholders throughout the implementation of the INECO participatory processes.

Details on the individual publishable reports are provided in the corresponding Section 4.2.

Deliverable 8: Typology of institutional frameworks

The Deliverable presents the typology developed by the project, synthesizing regional analyses outputs and identifying administrative, financial and governance constraints and contributing causes to the focal water management problems that define the scope of the INECO Case Studies.

2.3 Phase 2: Analysis of institutional and economic instruments with emphasis on effectiveness and equity

Following from the identification of focal water management issues, and the analysis of their main causes, Phase 2 of INECO had the objective of identifying a set of policy instruments that could effectively contribute to the mitigation of the issues at hand. Activities undertaken to that end evolved on two axes:

- First, an in-depth survey was undertaken for assessing the impact of (economic) instruments already in place, focusing primarily on aspects considered more fundamental in the local CS context (e.g. water tariffs and cost recovery patterns for water supply in Pegeia, to assess how new developments and tourist use are priced, legislation enforcement on industrial discharge in Syria, financial encouragement towards advanced irrigation methods implementation in the Oum Er Rbia Basin, Morocco etc.).
- Subsequently, a proposal was elaborated on a set of management options. The proposal was based on analysis findings and literature review, also incorporating the suggestions and comments raised by the stakeholder groups collaborating in the development of the CSs. Furthermore, and in order to better frame the outputs of this Phase, a fist evaluation step was implemented, aimed at prioritising broad categories of options on the basis of simple criteria, relating to effectiveness in addressing the issue at hand, feasibility and applicability.

The above activities were developed within the framework of two work packages:

- **WP 7**, *"Analysis of economic and institutional instruments with emphasis on effectiveness and equity"*, involved the implementation of two tasks. Task 7.1 was aimed at describing the socio-economic and financial environment regarding the provision of water services in the individual countries/regions, and evaluate the effects of currently applied instruments in main water use sectors. Task 7.2 was aimed at identifying analysing and discussing alternative institutional instruments and economic measures for cross-sectoral integration, emphasizing also on how transparency in the allocation of water and water service costs, and decision making processes can be improved.
- **WP 8**, *"Stakeholder Assembly Workshop and Web Forum on institutional and economic instruments"*, entailed the organisation of a workshop with the participation of stakeholders from all the countries concerned. The Workshop, organised at the end of the 2nd year of the project, was aimed at presenting and consolidating outcomes developed thus far, discuss on trade-offs entailed in the approaches considered, and further foster interaction, exchange of view and information on an inter-regional level, among stakeholders from different countries, regions and background.

Details on main methods and achievements are provided in the following paragraphs.

2.3.1 Methodology and main achievements

Evaluation of currently applied economic instruments

The evaluation of currently applied instruments in water management entailed the collection of information covering a broad spectrum of economic tools. Instruments detailed as to their current

application patterns and impact included (a) water pricing and cost recovery, addressing issues relating to the contribution of water uses to the recovery of water service costs, State subsidies towards water service provision and development of water-related infrastructure, tariff structures, patterns of water utility expenditure, (b) liability rules (penalties and sanctions for non compliance to standards, assurance regimes), (c) environmental charges and taxes, particularly those directly related to water abstraction and effluent discharge), (d) grants and financial incentives towards water conservation and (e) potential (prerequisites) for the application of market-based instruments, such as tradable pollution credits and tradable water quotas.

Collected data did not focus only on the implementation details (e.g. consumption blocks and applicable rates for tariff schemes), but also outlined barriers to effective implementation, transparency of procedures, effectiveness with regard to the design purposes of the instrument (e.g. cost recovery and/or water conservation). Particularly with regard to water pricing and cost recovery, which were the focus of the work, the analysis also addressed social issues and perceptions on equity and fairness of currently applied mechanisms for the sharing of water-related costs, and affordability of potential price increases particularly with regard to low-income groups.

Identification of alternative institutional and economic instruments for mitigating focal water management issues

As described in the introductory paragraph of this section, the identification of alternative instruments for mitigating the focal water management issues in the local CS context was based on (a) literature review, specifically focusing on instruments that could be most suitable to achieve the policy objectives defined for each Case Study; (b) suggestions, comments and perspectives of the stakeholders engaged in project processes; and (c) institutional deficiencies outlined in Task 7.1 and throughout the first Phase of the project.

Furthermore, and in order to assist the framing of outputs from this Phase, the Consortium undertook the development of a screening survey addressed to local stakeholders collaborating with the project. This first evaluation step, which was implemented through local events (workshops and discussion sessions), encompassed the ranking of broad categories of options, not focusing on specific measures (e.g. public participation instead of Advisory Councils or focus groups), to assist in the completion of the questionnaire by non-technical users. Criteria used to that end involved (a) individual stakeholder preference, on the basis of effectiveness and feasibility, (b) relevance to current water management problems, including the one under discussion; (c) need to prioritize in terms of actual implementation, and (d) relevance to future water management challenges that can be envisaged by stakeholders at national level.

Individual results, including a description of currently applied policies and instruments are included in the Publishable Reports that were developed for each Case Study.

The INECO Stakeholder Assembly Workshop

Phase 2 of the project was concluded with the implementation of a Stakeholder Assembly Workshop, bringing together stakeholders from all of the Project's Case Studies. In addition to the exchange of views and perspectives among the different actors and the consortium, the workshop discussed and evaluated the second year outcomes of the project concerning: (a)

deficiencies in the estimation and allocation of water service costs among water users and (b) factors that inhibit the effective implementation of innovative economic instruments and institutional arrangements that could improve current water management operations in the INECO Case Studies.

The INECO Tunisia Stakeholder Assembly Workshop, Tunis, July 15-16 2008

In addition to the consolidation of Case Study progress, the Workshop helped to streamline a set of policy-relevant questions, stemming from the individual Case Studies, which are summarised in Table 1. These questions, many of which fall beyond the scope of INECO, guided the process of deriving regional recommendations in the next Phase of the project.

Table 1: Policy-relevant questions stemming from the INECO Case Studies

	Policy-Relevant Questions
River Basin Management	➢ Supply enhancement ~ Demand management - Infrastructure financing & cost recovery - Efficiency improvements - In water use (subsidies for technology improvements) - In water allocation – phasing-out of low value uses ➢ Development of participatory processes - Conflict resolution - Allocation of water between competing uses/users - Public information organizations on local WM issues
Groundwater management	➢ Public subsidies vs. economic efficiency for low-value uses ➢ Enforcement of groundwater abstraction metering vs. user group opposition ➢ Community management (bottom-up) vs. centralized management (top-down) - Feasibility, capacity, financing
Water quality and urban water management	➢ Competitiveness vs. environmental protection - Incentives towards cleaner production in the industrial sector - Disincentives to excessive agrochemical use ➢ Strengthening the participation in voluntary programmes - Incentives, user awareness, consumer awareness ➢ Sustainability of urban water services - Funding, cost recovery, affordability and access - Community management in rural areas

2.3.2 Deliverables

Deliverable 9: The range of currently applied economic instruments

The Deliverable presents a comparative analysis of currently applied economic instruments in the residential, agricultural, tourism and recreational sectors, focusing mainly on long-term sustainability goals and considering implications and trade-offs with regard to potential environmental, economic and social implications.

Deliverable 10: Alternative institutional and economic instruments towards more equitable and efficient allocation and management

The Deliverable summarizes work undertaken within the framework of Work Package 7.2 of INECO. The first part presents a synthesis of findings on the identification of instruments that can improve water allocation and management operations in the Project's Case Studies. The second part (Appendix), comprises a Discussion Document on Alternative Instruments, which provides a detailed listing of options suggested for each Case Study.

Deliverable 11: Stakeholder Assembly Workshop Proceedings

The Deliverable is the proceedings of the Stakeholder Assembly Workshop, realised in Tunis, Tunisia on 15-16/07/2008.

2.4 Phase 3: Synthesis and Dissemination of Guidelines

The final Phase of the project addressed the synthesis of results, derived thus far, to formulate regional policy recommendations, and their production into final outputs, to facilitate wider dissemination and use beyond the Consortium and individual stakeholders that participated in the CS development processes.

Individual activities were undertaken through three work packages:

- **WP 9**, *Formulation of a framework of adaptable guidelines for institutional and economic instruments*, had the main objective of formalising the analyses undertaken within the INECO, in order to identify policy instruments and institutional framework prerequisites that could enable a more transparent, equitable, environmentally and economically sustainable allocation of water resources and relevant costs, integrating the particular socio-economic environment and traditional practices of water management in the Mediterranean Countries;
- **WP 10**, Web Toolbox for guideline dissemination, involved the development of a Web Toolbox, which would incorporate the synthesis and integration of all information and experiences gained throughout the project into a comprehensive framework that could aid future decision-making processes;
- Finally, **WP 11**, *Organisation of a conference for presenting Guidelines and Toolbox*, addressed the implementation of a Conference event, aimed at the dissemination of final project outputs, along with similar efforts for addressing the capacity-building and institutional aspects of water resources management in the Mediterranean Region.

The following paragraphs present in more detail the methods followed and the achievements of individual tasks. A short summary of main outputs is provided in Section 2.4.2, as more extensive information is also provided in Section 4.

2.4.1 Methodology and main achievements

The synthesis into policy recommendations at the Case Study level

The synthesis of results for arriving into policy recommendations, applicable to the Case Study context, was implemented through a third round of stakeholder consultation, aimed at examining the implications of alternative policy pathways to problem mitigation. The key criterion for the evaluation referred to acceptability, whereas stakeholders were asked to comment and assess on a number of issues, ranging from the capacity of the water sector to perceptions on public participation. Responses received were further processed and synthesized; results were included in the INECO Regional Publishable Reports, which provide a comprehensive description of the outcomes from each Case Study. Conclusions were further incorporated in the Project Guidelines, to facilitate cross-comparison.

The INECO Guidelines on the application of institutional and economic instruments for sustainable water management in the Mediterranean Basin

In accordance to the previously outlined objectives, the Guidelines developed by INECO bring together the experience gained by the Project, in a format that was considered suitable by the water management authorities that were involved directly in the project as participants, and by stakeholders who were involved in the project's participatory processes. The volume, which is a publishable report, uses as less technical language as possible, incorporating best-practice examples, but also the outcomes of the INECO Case Study experiment.

Its main aim is to disseminate experience on the use of different economic and regulatory tools and instruments for:

- Cost sharing and recovery for water service provision and infrastructure development, including issues relevant to charging for water services, transparency in financial management and tariff setting, ways of sharing costs (a) among different uses and (b) among different users;
- Institutional framework and acceptability of environmental taxation, disseminating also the European experience in the field;
- Incentives for water saving, including subsidies provided for the adoption of environmentally friendly practices, and the incentive function of water tariffs;
- Compensation in case that specific (usually low-value) uses should be phased out as they cannot be sustained due to environmental/socio-economic reasons;
- Public participation and stakeholder involvement (forms, institutional prerequisites, trust on the uptake of inputs);
- Regulation of abstractions/discharges (limitations of the command-and-control approach, empowerment of governmental authorities to enforce relevant legislation, technical and institutional constraints).

A summary of the report is provided in Section 4.2 which describes the Project's Publishable Results.

The development of the INECO Web Toolbox

The Web Toolbox of INECO is available from http://environ.chemeng.ntua.gr/toolbox. Its main aim is to be a source of information on policy instruments towards Integrated Water Resources Management, by providing the following functionalities:

- Access to a web-based knowledge base on the application of institutional and economic instruments for improved water management. The knowledge base currently includes descriptions of the main economic instruments as well as experiences and lessons learned with regard to their implementation, in the EU, other arid and semi-arid areas and in Mediterranean Countries.
- Tools aimed at Case Study definition and analysis, based on stakeholder involvement. Included tools comprise: (a) a web-based application of the Objective Oriented Planning approach which was followed in INECO and its steps (Problem Analysis, Objective Analysis and Option Analysis); (b) surveys aimed at mapping stakeholder views and (c) discussion web fora.

The web-based tools for participatory Case Study development are available to all registered groups of stakeholders, including those who collaborated with INECO during the implementation of the different Case Studies. Access rights are granted through a simple e-mail request. The web-based knowledge base is available to the general public, not requiring registration.

The INECO Final Conference Event

The INECO Conference Event, "Institutional and Economic Instruments towards Integrated Water Resources Management in the Mediterranean Region", was organized within the frame of the Cyprus Water Week, an important yearly initiative undertaken by the Water Development Department, and was attended by 60 participants. The event brought together stakeholders and researchers from Cyprus and Mediterranean Countries; focus was given on the presentation of empirical research on public participation methods, and on the dissemination of INECO findings from the different Case Studies and final project outputs.

2.4.2 Deliverables

Deliverable 13: Guideline framework for the application of institutional and economic instruments

The Deliverable is one of the major outputs of INECO, elaborated in publishable format. It integrates information derived throughout the project, outlining emerging policy needs and describing policy recommendations towards the mitigation of water management issues in the project's Case Studies, and broader considerations with regard to the implementation of institutional and economic instruments in countries of the Mediterranean Basin.

Deliverable 14: Web toolbox manual

The Deliverable is a technical manual describing the use of the different functionalities available in the INECO Web Toolbox, which is accessible from: http://environ.chemeng.ntua.gr/toolbox.

Deliverable 15: Conference proceedings

The Deliverable is the Proceedings of the INECO Final Conference Event, "Institutional and Economic Instruments towards Integrated Water Resources Management in the Mediterranean Region", which was held in Nicosia, Cyprus, on June 11th 2009. The Deliverable has been developed in publishable format and its content is further outlined in the corresponding Section 4.2.

3 CONCLUSIONS

3.1 Towards more efficient and equitable instruments in Mediterranean Countries – Case Study Evidence & Broader Perspectives

Evidence from the analyses undertaken within the context of the INECO Case Studies portrays that the wider implementation of economic instruments is constrained by affordability, political acceptability and technical capacity.

In all regions, affordability has been stressed as an important constraint or concern; an important distinction however needs to be made between individual and collective affordability: individual affordability (for low-income users or low-value uses) is indeed a major constraint in several of the countries analysed. Collective affordability (i.e. the capacity of the society or a given community to devote a share of its income on water) is a matter of gradual implementation, stepping with economic growth. Overall, affordability issues can be (and in fact are) addressed through the design of pricing policies aimed at what the local society perceives as "equitable cost sharing", even if this means lower incentive potential towards water conservation. Given the current trend of rising marginal costs for the development of additional water supply sources and increasing (external) costs of water quality degradation reported in national budgets, the investment in more efficient water management and the prevention of the overexploitation of water resources is feasible and could be well acceptable if societal awareness is developed; pricing policies designed to that end can be an effective instrument, provided that their principles are developed through transparent, participatory processes, backed up by information sharing and with due consideration of impacts on potentially affected groups. On the other hand, political acceptability and current levels of capacity (technical and managerial) emerge as far more critical issues.

Thus, it can be supported that two aspects emerge as priority for water policies in the countries considered. The first is how to address the still dominant self-supplied (or at least unregulated) model of using the resource, either concerning water use or discharge into water courses, which is leading to a generalised problem of resource depletion and overuse. Modernizing the water management system requires investing in water supply, treatment and wastewater reuse facilities. It further requires the empowerment of institutions to monitor and enforce legislation where appropriate; however, evidence also from the INECO Case Studies, demonstrates that control

through regulation is not enough. Policy objectives need to be supported through encouragement towards more efficient practices. Even in EU countries with highly developed water sectors (e.g. Cyprus), regulation of specific aspects of water use (extraction from private boreholes, application of agrochemicals, discharge of industrial effluents) has not been fully attained. This in turn implies that policies need to be directed towards incentives, and water pricing policies are only one instrument towards that end. Voluntary agreements, training and technical support, community education and empowerment, performance-based financial incentives, and the fostering of civic engagement in environmental protection can also be effective and possibly more socially acceptable.

Therefore, it can be argued that full cost recovery and economic marginal cost pricing is not necessarily the most effective solution. In turn, priority should be given to: (i) a sound infrastructural policy, for which debt can be repaid; in this phase, a recourse to fiscal or semi-fiscal approaches to water pricing seems more promising than full cost recovery based on volumetric pricing; (ii) discouraging overuse of resources, not only by introducing and enforcing taxation and economic instruments, but also by promoting cooperation among users and reinforcing institutions at the river basin scale, for fostering inter-use water sharing. Nevertheless, and despite the chosen path, transparency and openness of processes comprise main issues; users need to be informed on the impacts of the choices made and on the information used to support these. Transparency is further linked with civic engagement: water conservation strategies, requiring self-regulation, can only be successful when there is broad societal awareness and information-sharing on decisions taken.

In this perspective, economic instruments are indeed key instruments, and effective in practice, provided that: (i) they are designed in a way that is functional to priority targets, and (ii) they are accompanied by “political confidence”, transparency and disclosure of information on the true cost of water services and how its components are in fact shared among the society (i.e. including externalities associated with water quality degradation and resource depletion). Public participation, stakeholders’ involvement and more openly debated strategies for improving management of water services are considered fundamental tools in this respect.

3.2 Concluding remarks

In an Integrated Water Resources Management framework, integration does not occur only in terms of viewing the water cycle in a holistic way, but also lies in the integration of different sectoral policies (not restricted to water management alone), of institutional functions and of stakeholder interests and perspectives.

The INECO Case Studies highlighted exactly this integration challenge: in water management there is no universal agreement about the problem and the solution; water management issues affect and are affected by diverse interests that are often in conflict with each other. In this regard, technical solutions cannot solve problems alone, despite the innovation they may be offering.

"Socio-economic scarcity"[1] can only be addressed through broader changes aimed at developing adaptive capacity.

Evidence from the INECO Case Studies reveals that incentive-based policies have an important role to play in this effort; decision-makers, water users and citizens are becoming increasingly aware of their importance in encouraging behavioural change and technology uptake, and in raising the financial resources required to support water management operations. The key premise is however that these need to be embedded with traditional values and adapted to the local socio-economic reality.

Either as means of encouragement or as disincentives, economic instruments do not operate alone; they require a transparent framework and procedures to enable their successful implementation. Furthermore, as they often need to be integrated with other policies (for example, economic support for changing cropping patterns is intrinsically linked to agricultural policies), their implementation touches upon a wider set of policies, decision-makers and professionals. It thus requires a multi-disciplinary, multi-faceted and multi-sectoral approach, not restricted to water and authorities dealing with water alone.

In this regard, and as often outlined in numerous regional analyses available in the pertinent literature and from the INECO Case Studies, other enabling instruments are equally (and often more) important in supporting transition. Enhanced sustainability of water management systems can be supported by community action, engagement in voluntary programmes, environmental stewardship, enforcement of environmental regulations, institutional reform and enhanced transparency and accountability.

Sustainable water management (i.e. a way of managing water resources that does not entail the surpassing of a carrying capacity threshold – natural, technological, social, institutional or economic) implies giving answers to questions incorporating the multiple dimensions of water stress that arise both from economic and non-economic sphere, acknowledging that some demands or impacts are not to be evaluated in terms of economic efficiency, but rather in terms of social justice, ecological soundness, political and social acceptability, etc.

The potential policy pathways for transition towards more sustainable water management have been the subject of numerous guidance documents; many of these have addressed the water management challenges faced in countries of the Mediterranean Basin, by providing recommendations on how to build capacity, reform the water sector, introduce new instruments and technologies, etc. The significant resources invested in the field are helping towards the development of a new conceptual thinking for coping with water stress issues, which takes into account the social, environmental, economic and cultural value of water.

As demonstrated however through individual Case Study work, what is most needed towards sustainable water management is the enhancement of the capacity of institutions, authorities, groups and individuals to make informed choices and transform these choices into desired actions and outcomes, commonly referred to as empowerment. Towards this end, the social experiment of INECO attempted to enhance local capacity towards constructively engaged IWRM; through

[1] Socio-economic scarcity refers either to the economic inability of a society to develop water resources and infrastructure or to the lack of societal capacity to adapt to the conditions imposed by physical water scarcity and stress.

participatory processes and dialogue, the project brought different actors at the table to share their views and discuss alternative solutions and their implications.

While the mitigation of local problems is largely the job of the local society, INECO tried to reveal the value and significance of alternative ways of formulating and implementing action for problem mitigation. The success and impact of this experiment is to be judged by local stakeholders; however, it is our belief that the mutual learning process developed in the course of the project has managed to lead to a better understanding of the societal and institutional changes required for sustainable water management, of how these are currently perceived in each region, and of how future research could be better oriented to address local policy needs.

4 DISSEMINATION AND USE OF PROJECT RESULTS

As described throughout this report, INECO was built on a series of activities, which sought to develop win-win solutions, involving dissemination of application examples on policy instruments, and participatory tools and methods. Throughout the course of the project, the implementation of dedicated events, but also the sharing of information through various means (mass media, drafted material, fliers, the project web site and tools) have allowed the sharing of views, experience and perspectives, both in terms of actual research outcomes on water management issues, but also on implications and impact of potential options, as perceived both by decision-makers and water users. Details on the undertaken efforts are provided in the corresponding "Final Plan for the Use and Dissemination of Knowledge", which accompanies the Project's Final Activity Report.

This section is dedicated to presenting the main outputs of the project, to be further used beyond its completion, namely the Project Web Toolbox, and the INECO Publishable Reports.

4.1 The INECO Web Toolbox

One of the main outputs of INECO is the INECO Web Toolbox, developed during the 3rd project year. It has been designed with the aim to support the selection and evaluation of policy instruments at different water management functions, bringing together information, data and experience gathered throughout the implementation of the project. It includes:

- A web-based knowledge base on institutional and economic instruments for water management. In its current form, the knowledge base contains literature information on instruments and brings together 50 application examples, each analysed in terms of the problem addressed, the adopted (integrated) solution, the instrument(s) employed, implementation details, evaluation and link for further information. Information can be retrieved through search and keywords set for each instrument.
- Web-based tools able to support Case study development processes, following the Objective Oriented Planning Method, web discussion fora, and web-based surveys.
- Material and outputs from the Case Studies throughout their different development stages.

All information is readily available and can be accessed by the general public from http://environ.chemeng.ntua.gr/toolbox. The web-based tools that have been integrated in the toolbox to support participatory, stakeholder-driven processes for water management are subject

to authorization, from the toolbox web administrators, to ensure minimum control over the use of web tools.

4.2 The INECO Publishable Results

As final output, INECO produced nine (9) publishable reports, the content and scope of which was defined with the help of local policy makers, water managers and stakeholders that participated in the development of the Project's Case Studies. These are:

- A publishable report on **"Guidelines towards the application of institutional and economic instruments for water management in countries of the Mediterranean Basin"**. The report, which is one of the major outputs of INECO, is structured so as to provide information on incentive-based policies of value to water managers and decision-makers. In addition to background information, the report describes application examples for economic instruments towards sustainable water management; it further highlights emerging policy requirements, as derived from the Case Studies of the project, and concludes with general policy recommendations, addressing both the local context and wider perspectives.
- Seven (7) **Regional publishable reports**, each corresponding to one of the countries that were the focus of local activities implemented by INECO in the Mediterranean Basin. The first part of each report presents the analysis of the institutional framework and decision-making practices for water management in the respective country/area. It further highlights key current water management challenges facing the water sector, drawing attention to how these are affected by and in turn impact on current water governance frameworks, equitable water allocation and use and on the financial sustainability of water systems. The second part is devoted to the presentation of the corresponding Case Study for deriving policy recommendations towards the implementation of more equitable and efficient instruments to address a key water management issue of local concern. The Case Studies, the development of which was based on strong stakeholder involvement and participation, further aimed at fostering constructive engagement among local stakeholders to jointly develop solutions suited to the local context.
- The **Proceedings** of the INECO Conference on "Institutional and Economic Instruments towards Integrated Water Resources Management in the Mediterranean Region". The Conference was the final event of the Project, jointly organized by the INECO Consortium and the Water Development Department of the Ministry of Agriculture, Natural Resources and the Environment of Cyprus on June 11th 2009, in Nicosia. The Proceedings of the event include contributions from the INECO Case Studies and the Water Development Department, highlighting recent developments and challenges in policy framing, public participation and development of incentive-based approaches for addressing factors contributing to water stress.

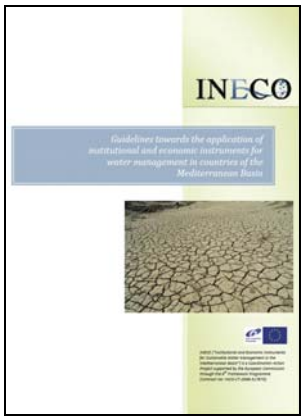
Further details on the project's publishable outputs are provided in the following paragraphs.

The INECO Guidelines towards the application of institutional and economic instruments for sustainable water management in countries of the Mediterranean Basin

Summary

The "Guidelines towards the application of institutional and economic instruments for sustainable water management in countries of the Mediterranean Basin" of the INECO project were designed as a comprehensive background document towards the implementation of more efficient and equitable instruments for sustainable water management in countries of the Mediterranean Basin.

The document, which is primarily addressed to water managers and decision makers, integrates and consolidates all outcomes of the project. It includes information on: (a) the application of policy instruments towards sustainable water management, also highlighting successes of similar policies in water-stressed areas; (b) the development of incentive-based policies in areas and countries of the Mediterranean Basin, focusing on Cyprus, Tunisia, Egypt, Lebanon, Syria, Algeria and Morocco; (c) an in-depth analysis of emerging policy needs in the above countries, focusing on key water management issues of local concern; and (d) policy recommendations towards more equitable and efficient instruments, as derived through a local stakeholder involvement and participatory processes, implemented throughout the course of the INECO Project.



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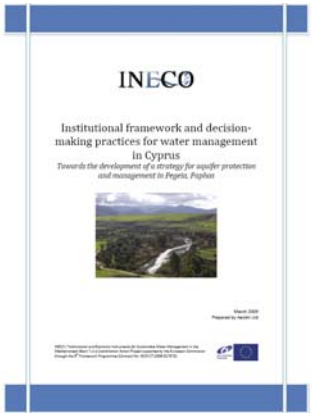
The INECO Regional Publishable Reports

Institutional framework and decision-making practices for water management in Cyprus

Towards the development of a strategy for aquifer protection and management in Pegeia, Paphos

Summary

This volume of the INECO publishable reports outlines the analysis of the institutional framework and decision-making practices for water management in Cyprus. It highlights the main water management challenges faced in the country today, and focuses on a water management issue of primary importance, groundwater overexploitation. Responding to this challenge, the INECO project implemented a participatory approach for achieving consensus on water management options for the management of the coastal aquifer of Pegeia. The aquifer, located west of Paphos town, is used for drinking and irrigation water supply. Although not yet subject to dramatic sea water intrusion, the aquifer is becoming increasingly vulnerable due to the rapidly increasing residential and tourism demand and the lack of infrastructure for sewage collection and treatment. The outcomes of this process, which are summarized in the second part of this volume, can provide valuable lessons on how citizen involvement in water management decisions can facilitate the protection of vulnerable water bodies.



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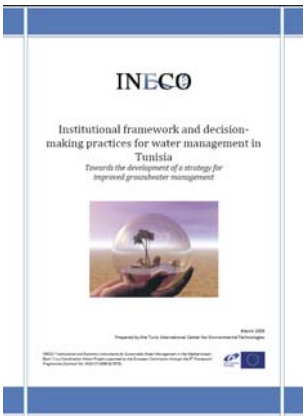
Institutional framework and decision-making practices for water management in Tunisia
Towards the development of a strategy for improved groundwater management

Summary
This volume outlines the analysis of the institutional framework and decision-making practices for water management in Tunisia, focusing on groundwater overexploitation issues. The preservation of groundwater resources, which are currently degraded after many years of overexploitation, is strongly linked to agricultural water use, as groundwater is a major water supply source in irrigated agriculture. Furthermore, the wider use of alternative water supply sources, such as treated wastewater for crop irrigation, has become one of the main priorities of the National Water Policy, in an effort to conserve freshwater resources and re-allocate these to other water use sectors. The second part of the volume describes the outcomes of the INECO Tunisia Case Study, which elaborated on alternative institutional and economic instruments for better managing groundwater resources through a participatory approach. Emphasis was placed on discussing recommendations for an enabling institutional environment towards the collective management of groundwater at the user level.



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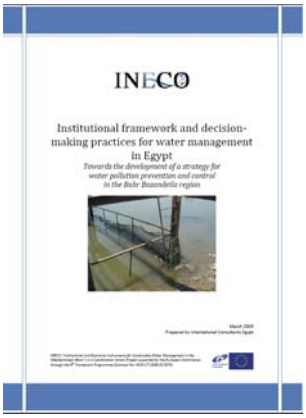
Institutional framework and decision-making practices for water management in Egypt
Towards the development of a strategy for water pollution prevention and control in the Bahr Basandeila region

Summary
The first part of the report outlines the analysis of the institutional framework and decision-making practices for water management in Egypt. It highlights the main water management challenges faced in the country today, and focuses on significant water management issues pertaining to the “sharing”, “valuing” and “governing” dimensions of water resources management. The second part of the report presents the results of the INECO Egypt Case Study on water quality deterioration in the Bahr Basandeila Region. The Basandeila Region is located in the Dakahlia Governorate; currently, the area faces serious problems affecting mostly the quality of drinking water supply and having impact on population health. Water pollution is primarily due to the discharge of industrial and municipal effluents without prior treatment. The problem is similar (in terms of causes and impact) to the overall water quality problems experienced in the River Nile and its distribution network. In this area, the INECO effort was primarily aimed at fostering discussions among citizens, stakeholders and local water management authorities, in order to identify deficiencies and suggest instruments that could assist in addressing the issues at hand.



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Institutional framework and decision-making practices for water management in the Damour River Basin, Lebanon

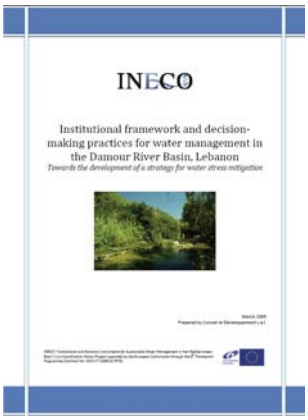
Towards the development of a strategy for water stress mitigation

Summary

The first part of the report entails an analysis of the institutional framework and decision-making practices for water management in Lebanon and in the Damour River Basin, located 20 km to the south of Beirut.

Currently the area is facing a considerable decrease in the total amount of surface and groundwater of adequate quality available to meet the local domestic, irrigation and industrial demands. The problem becomes particularly acute in the downstream irrigated coastal plains of the basin, where farmers complain about the lack of water during the peak summer period. Groundwater resources are also under stress, due to the increasing volumes of water extracted to meet demands inside and outside the River Basin.

In this context, the second part of the report concerns the presentation of the outcomes of the participatory approach implemented by INECO for developing options suitable for water stress mitigation and towards deriving policy recommendations towards the use of more equitable and efficient instruments towards sustainable water management.



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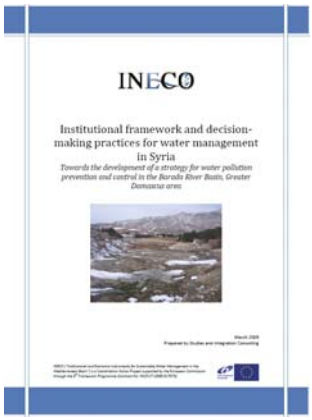
Institutional framework and decision-making practices for water management in Syria

Towards the development of a strategy for water pollution preven-tion and control in the Barada River Basin, Greater Damascus area

Summary

The first part of this report presents the analysis of the institutional framework and decision-making practices for water management in Syria. It further focuses on a water management issue that is currently perceived as extremely significant by water management authorities and citizens: the environmental degradation of the Barada River. Historically, the Barada River has been considered a vital socio-economic resource, sustaining the Ghouta oasis and agricultural activities in the area. The hyper-urbanisation of the greater Damascus area, coupled with the uncontrolled discharge of industrial effluents, has led to the significant degradation of the river and its tributaries, posing a significant threat for all local ecosystems, as well as surface and groundwater bodies. In the above context, the second part outlines the processes, methods and outcomes of the corresponding INECO Case Study, aimed at exploring alternative water management options for water pollution prevention and control through a participatory approach. Emphasis is placed on responses incorporating the application of economic and regulatory instruments to provide appropriate incentives for the development of industrial wastewater treatment facilities, regulating the use of agrochemicals in rural areas, and on the financial and technical sustainability of water services.



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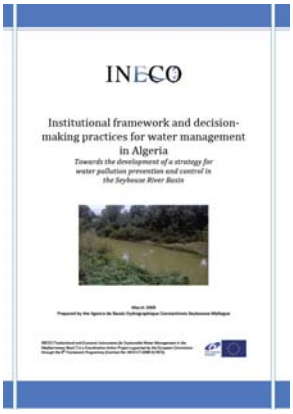
Institutional framework and decision-making practices for water management in Algeria

Towards the development of a strategy for water pollution prevention and control in the Seybouse River Basin

Summary

The first part of the publishable report presents an analysis of the institutional framework and decision-making practices for water management in Algeria. It outlines the main constraints faced in the water sector today and significant water management challenges that need to be addressed at the national level. On the regional level, this report presents a water management issue that is of alarming importance: the degradation of water quality in the Seybouse River Basin. Along the Seybouse river and its tributaries, pollution originates mostly from the discharge of untreated domestic and industrial effluents; recent efforts undertaken by the State aim primarily on building infrastructure for sewage collection and treatment. However, it has become evident that the minimization of industrial pollution should be based on a policy that encourages and provides appropriate incentives and disincentives rather than on the traditional command-and-control approach. In this regard, the second part of the report presents the outcomes of the INECO Case Study in terms of identifying potential policy options and developing recommendations for addressing water quality degradation in the River Basin.



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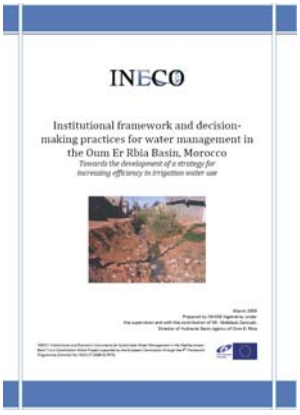
Institutional framework and decision-making practices for water management in the Oum Er Rbia Basin, Morocco

Towards the development of a strategy for increasing efficiency in irrigation water use

Summary

The Oum Er Rbia Hydraulic Basin, located in the mid-west part of Morocco is a River Basin of strategic importance for the country, which has already been the focus of important investments in hydraulic infrastructure. The Basin provides water to the strategic economic zone of Morocco, sustains important economic activities (industry and agriculture), and hosts a significant share of the country's population. The volume presents the analysis of the institutional framework and decision-making practices for water management in the Oum Er Rbia Basin and in Morocco, and further introduces the main water management challenges faced in the region today. Subsequently, the second part presents the outcomes of the INECO Case Study, which was aimed at developing, through a participatory approach, a policy proposal on enhancing efficiency in irrigation water use, an important aspect of current policies towards demand management.



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The INECO Conference Proceedings

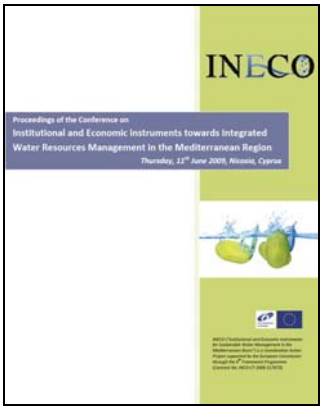
Proceedings of the Conference on "Institutional and Economic Instruments towards Integrated Water Resources Management in the Mediterranean Region"

Thursday, 11th June 2009, Nicosia, Cyprus

Summary

The Conference on "Institutional and Economic Instruments towards Integrated Water Resources Management in the Mediterranean Region" was the final event of the INECO Coordination Action EC-funded Project. It was jointly organized by the Water Development Department of the Ministry of Agriculture, Natural Resources and the Environment of Cyprus and the INECO Consortium, within the framework of the Cyprus Water Week, on June 11th 2009, in Nicosia. The main objective was to disseminate water policy-related recommendations, derived from an in-depth analysis of cross-cutting water management issues and institutional conditions, and the experiences of decision-makers and stakeholders in integrated water management and planning in the Mediterranean region.

The Proceedings of the event include contributions from the INECO Case Studies and the Water Development Department, highlighting recent developments and challenges in policy framing, public participation and development of incentive-based approaches for addressing factors contributing to water stress.



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