MEDITERRANEAN DIALOGUE ON INTEGRATED WATER MANAGEMENT MELIA PROJECT

FINAL ACTIVITY REPORT (Simplified version)
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1. INTRODUCTION

Water is life, and in this sense, the access and availability of drinkable water is as basic as human right as the life itself. Humans are 70% of water, some organic material and some minerals. Water is the basic food. Water is also a structuring part of nature, most natural cycles, from climate variability, biodiversity location, geochemical mobility of elements to erosion and sedimentation, are based in the water cycle. Water is a facilitator of transport. Water is the primary commodity of agriculture and almost all the industrial processes. Water is a valuable good whose possession guarantees economic prosperity. Water is also a waste once used in any activity.

So, water is a right but also an economic instrument. A Right is something that organized societies guarantee to their subjects; so the governments, at any level, have a primary duty to guarantee affordable good quality water to the citizens. But at the same time, water is a component of many economic transactions and its possession or access represents a strong position in many economic deals. It is a limiting factor in the social and economic developments of societies, so it is a subject or market and politics. Moreover, does the environment have rights, as the human do? The negative impact of water waste in the quality of the ecosystem, including underground, surface and marine waters, makes its treatment and minimization an urgent issue for the sustainability of the human society and other living species of the planet. So, we have a confrontation of interests: Rights against market, politics against markets, public good against efficiency of administration, prices against free access, regions against neighbor regions, quality against contamination, limits of use against economic development, economic demands against natural environment rights quality...

Water is a polyhedral matter perceived very differently depending of the point of view, with two common characteristics: it is needed and once used is a waste, except, perhaps, in the geochemical and geological cycles. How can all these demands, which produce a perception of scarcity in its availability, be fitted in a single management scheme? At the end of this contradictory balance it appears that water use has limits, beyond which the balance between the benefits of water and the burden of the social, economic and political costs becomes negative. Which and where are these limits? Certainly now we know the horrible consequences of leaving water to become polluted by infectious agents, biological or chemical: life is threatened and the social costs are enormous. Where is the money for secure drinkable waters? On the other hand in most of the countries most of the water is used in agriculture, which is not anymore an artisanal activity with little natural impact except in geological and geochemical transformations, but an industrial activity using fertilizers, insecticides and other artificial products with contaminates the underground and run-off waters. The increasing urbanization is also producing an increase in the water distribution networks with increasing demands for its maintenance to avoid leakages, together with increase and degradation of the
waste waters collection and treatments. Where are the money and the managerial competences to cope with these problems and guarantee a sustainable management of water? How all these problems are viewed in the Mediterranean Region?

Sustainability is a function of several goals with economic, environmental, ecological, social and physical aims. The main objective of this REPORT is to present the work done in the MELIA Project aiming at characterizing, through an open dialog between its partners and many external participants, the complex interlink between societal needs in the Mediterranean Region, water availability and its threats, and to extract concrete proposals for actions.

Several Mediterranean countries have to cope with aridity weather because there are arid areas inside their territory, or because they are connected with deserts for geographic or cultural reasons. Moreover Mediterranean islands and peninsulas are almost lacking underground or ground water. The social aspects related to water management are critical, as the technical proposals must be endorsed by the end users: the full society. Collaboration at different levels is crucial to achieve the mutually accepted goals of sustainable service delivery for all, targeting especially: education (water in the school), public participation, public-private partnership, water prizing, safe drinking water and adequate sanitation services for all.

Water is an essential issue for growth and prosperity in the Mediterranean Partners Countries (MPC), and knowledge and innovation in this area must be a priority to make the region a leader in research in water, energy, the environment and the biology and biotechnology of arid-zone plant-life.

Over 500 million people are presently living in 25 countries of the Mediterranean Region. The main features of the northern sub region are: urbanized and industrialized societies with high-medium income levels; low population growth, predominance of private and communal forests; abandoning of large agricultural lands as a result of increased agricultural production and decreased rural population (offering large potential for afforestation on one hand, and causing increased fire risk on the other); pressures and disturbances from expanding urban concentration and increased tourism in forest areas (Laureano et al., 2008).

Common features of the southern/eastern sub region are: low-medium income levels; high growth rates and population density in rural and forest areas; dominance of state ownership of forest resources; existence of rapid deforestation and natural resources degradation and their consequences (serious rates of soil erosion and desertification) due to destructive interventions of large rural populations (i.e. encroachment for croplands, over-grazing, over-cutting of timber and fuel wood); populations heavily dependent on forests and natural resources for their livelihood; silvopastoral activities vital for rural inhabitants; increasing urban expansion and tourism pressures especially in coastal zones (Laureano et al., 2008).
Although the Mediterranean has been a great trading region for centuries, at this moment it has only occasionally succeeded in being competitive on international markets. Despite the success of some dynamic growth poles and clusters, all too often its enterprises, which are mostly small and medium-sized, show lack of dynamism and competitiveness. They have not generally stood out in terms of innovation, as they were based for too long on a ‘rent economy’, fostered by a mining-like exploitation of the region’s geographical location and natural resources (Mediterranean Strategy for Sustainable Development, 2006).

Most countries in the Mediterranean region are experiencing difficult employment situations, with unemployment rates ranging generally between 8 and 25 per cent, and Europe is not able to absorb the considerable pressure for emigration from Mediterranean countries. Young labor market entrants face strong difficulties with accessing employment after leaving school. Lack of investment in skills and technology may explain why agriculture is still important in the area (nearly 70% of the available water resources are allocated to agriculture).

Poverty and education, especially in rural areas, are still dominant problems in many countries, although there is relatively little extreme poverty thanks to the area social cohesion fostered by religion or family values. Social policies for poverty reduction in rural areas need re-evaluation to respond to these new challenges. Effective programs of poverty reduction require integrated rural development programs to be designed to improve the competitive position of rural producers, diversify the sources of income for rural workers and expand the opportunities of rural residents with greater investment in social infrastructure, health and education.

Considering, for instance, the tourism industry, the situation with regard to their cultural capacity is very uneven in the Mediterranean area, the development of creative industries and cultural resources could be effectively accomplished if more entrepreneurship and cultural capacities are developed and cultural institutions, organizations and networks are strengthened, helping to reaffirm natural and societal diversity in a context of globalization, but promoting the unique Mediterranean culture as a basic economic and social asset.
Sustainable development is an essential reference of any analysis of water management. The social, economic, environmental and cultural dimensions are pillars of the sustainable development. Nowadays the concept of human security on a global scale may be extended from its traditional meaning of worldwide political and military security, to also embrace the idea that every citizen should be able to benefit from sustainable socio-economic development. Amongst different natural resources, water has been recognized as the key environmental resource for social and food security, economic growth and prosperity. Human security can therefore be seen related to environmental preservation (water, ecosystems and biodiversity) and to socio-economic stability and sustainable development. The concept of sustainable management of water resources was first mentioned in Stockholm in 1972, during the United Nations World Conference, and then at the Rio summit in 1992 with Agenda 21.
2. CONSORTIUM OF MELIA AND PROJECT STRUCTURE

The MELIA Consortium is composed by 45 partners representing 16 countries from both the EU (Italy, Spain, Cyprus, Greece, Belgium, Malta, Austria, Netherlands) and the Mediterranean (Turkey, Morocco, Algeria, Tunisia, Egypt, Syria, Lebanon, Jordan, Palestine) and different categories: Research Institutions, Decision-Policy Makers, Users, International or Intergovernmental Organizations, NGOs. In many south Mediterranean countries the water issue is dealt by the Ministry of Agriculture that is why these Ministries are involved. Moreover, it is worth of mention the participation of river basin authorities, water providers for different users and private companies. An Italian Water Company (P.14) close its participation in the Project due to internal reasons.

2.1. PARTNERS OF THE CONSORTIUM

P1 – Consejo Superior de Investigaciones Científicas – CSIC – Spain (Coordinator)

P2– Centre International des Hautes Etudes Agronomiques Méditerranéennes - Istituto Agronomico Mediterraneo of Bari (CIHEAM-IAMB) – Italy. (Deputy Coordinator)

P3 – National High School of Hydraulic Studies – ENHS – Algeria

P4 – Lebanese Agriculture Research Institute – LARI – Lebanon

P5 – The National Authority for Remote Sensing and Space Sciences – NARSS – Egypt

P6 – The Faculty of Agriculture, University of Jordan – UOJ - Jordan

P7 – Office Internationale de l’Eau - France

P8 – Water Service Corporation – WSC – Malta

P9 – Institut National de Recherches en Génie Rural et Forets – INGREF -Tunisia

P10 – Sustainable Europe Research Institute – SERI - Austria

P11 – Institut des Régions Arides, Laboratoire Erémologie & Lutte Contre la Désertification. Médenine – IRA - Tunisia

P12 – Bureau d’Ingenieurs Conseils en Hydraulique- BICHE – Tunisia

P13 – Palestinian Hydrology Group for Water and Environmental Resources Development, Center for Water and Environmental Research and Policy – PHG - Palestine

P15 – University Cadi Ayyad, Faculty of Sciences Semlalia – FSSM - Morocco

P16 – Institut Agronomique et Vétérinaire Hassan II of Rabat and Agadir – IAV - Morocco
P17 – Agricultural structures and irrigation department, Faculty of Agriculture, Cukurova University – CU – Turkey

P18 – Middle East Technical University-Water Resources Centre – METU-WRC - Turkey

P19 - Agricultural Research Institute – ARI - Cyprus

P20 - University of Cordoba – UCO - Spain

P21 - University of Barcelona, Department of Vegetal Biology, – UB - Spain

P22 - Museu d’Arqueologia de Catalunya - MAC - Spain

P23 - Universitat Politecnica de Catalunya – UPC - Spain

P24 - Piccola Società Cooperativa a.r.l. Ipogea - IPOGEA – Italy

P26 - Agricultural University of Athens – A.U .A. - Greece

P27 - National Agriculture Research Foundation, Institute Environment – N.AG.RE.F. – Greece

P28– Litani River Authority – LRA – Lebanon

P29– Alice Production – ALICE – Belgium

P30– The Institute for Agriculture, University of Malta – IOA - Malta


P32– Ministry of Water Resources and Irrigation, Strategic Research Unit – MWRI - Egypt

P33 – Ministry of Agriculture National Centre for Agriculture Research and Technology Transfer – NCARTT – Jordan

P34 - Centre for New Water Technologies - CENTA, Seville, Spain

P35 – Istituto Sperimentale Agronomico (Agronomical Research Institute) – ISA - Italy

P36 – Malta Resources Authority – MRA – Malta

P37 – Land Research Centre – LRC – Palestine

P38 – Ministry of Agriculture – MoA – Palestine

P39 – Directorate of Irrigation and Water Uses – Ministry of Agriculture and Agrarian Reform – DIWU - Syria

P40 – Office de Mise en Valeur Agricole of Souss Massa, Ministry of Agriculture – ORMVA - Morocco

P41 – Centre de Développement de la Région de Tensift – CDRT – Morocco
**Structure of participation by different countries and categories**

<table>
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<tr>
<th>Country</th>
<th>RES</th>
<th>D-PM</th>
<th>USER</th>
<th>SME</th>
<th>NGO</th>
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Legend:
- **RES**: research Institution
- **D-PM**: Decision-Policy Maker Institution
- **USER**: water user, water services, boat
- **Int.Org**: International or Intergovernmental Organisation
- **NGO**: non-governmental organisation

* Int. Org: International or Intergovernmental Organisation
The project breakdown into 12 Work Packages (WP0 to WP11). Co-ordination activities and management activities are distributed through the Work Packages, even though the Work Package N.0 includes most of the significant management activities at network level, like:

- Co-ordination of the network (P1)
- Contract management and liaising with the EC (P1)
- Maintain internet based Forum and Intranet (eGroupware tools,...) (P1)
- Co-ordinate ISM at network level (P1)
- Co-ordinate knowledge system management at network level (P1, P2)
- Management of the Steering Committee and manage official external links with European and Mediterranean institutions on Integrated Water Management: participation of the chairman to International Conference, debate, seminars, relevant meetings at Euro-Mediterranean level (P2)
- Manage Steering Meetings (P2)
- Co-ordinate management Board Meetings (P1)

Among the Work Packages (1 to 11), it is possible to distinguish Thematic Work Packages (WP1to WP6) and Horizontal (or transversal) Work Packages (WP7 to WP11) (Fig. 3). The 6 Thematic Work Packages are dedicated respectively to selected relevant thematic aspects of water: water culture, water technology, use of water resources, water value, water policy, water conflicts. Throughout WPs 1-6, the following transversal physical-non physical relationships are focused: water related cultural heritage, culture heritage influencing technology, performance in urban-industrial networks and perspectives of new technologies (withdrawal, distribution, treatment and reuse); use of water resources – ecosystem (soil/land degradation, health, eco-hydrology, sustainable hydrological regulation in river basin); water saving in agriculture: irrigation system performance, water use efficiency (crop, plant), recycling and re-use; re-appraisal and new appreciation of Mediterranean coastal aquifers and rain-fed resources; emerging socio-economic-political frame linked with water-poor society; the political agenda and the water governance for the Mediterranean; use vs. use, intra-basin scale conflict, international / trans-boundary conflict. The 5 Horizontal Work Packages operate transversally through the thematic Work Packages and address water governance and participatory management, knowledgebase, knowledge share, integration and sustainability, citizen dialogue, indicators, benchmarking.

In the Thematic Work Packages 1, 2, 3, 4, 5 and 6 the main co-ordination actions address: retrieval of information, research, review, debate in working group and workshop, establishment of a common conceptual frame. In Horizontal Work Packages 7, 8, 9, 10, 11 the main co-ordination actions include: analysis, seminars for transfer, adapting and sharing knowledge, assessment of Water Governance and IWPA models. In particular, the Work Package 7 addresses actions like the identification of Water Governance and the Participatory Management through each Thematic Aspects (WP1-6). The Work Packages N. 8 and 9 addresses respectively actions like the build-up of the integrated-common knowledgebase (in relation to WPs 1 to 6) and the consequent share of knowledge through the implementation of
one Capacity Building Seminar on IWM. Finally Work Packages 10 and 11 address respectively actions like statistical analysis, assessment and formulation of recommendation.

**Intersection between Thematic Work Packages 1-6 and Horizontal Work Packages 7-11.**

<table>
<thead>
<tr>
<th>WP1 Water culture</th>
<th>WP2 Assessment of Technological perspectives in Water Management</th>
<th>WP3 Rational use of water resources</th>
<th>WP4 Water value</th>
<th>WP5 Water policy</th>
<th>WP6 Prevention and mitigation of Water Conflicts</th>
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<td>WP7 Water Participatory Management and Water Governance</td>
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<td>WP8 Building Knowledge</td>
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*Integrated Participatory Approach throughout WPs 1-6 and Gender participation.*

*Construction of the integrated knowledgebase through WPs’ 1 to 6, including also knowledge related to WPs 7, 10, 11.*
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<th>WP9</th>
<th>Knowledge share</th>
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<td>Activate and manage seminars for knowledge share and transfer on thematic aspects of WPs 1 to 6</td>
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<th>WP10</th>
<th>Performance, social and sustainability indicators</th>
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<td>Analysis of dialogue with citizens on issues related to WPs’ 1 to 6</td>
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<tr>
<td></td>
<td>Re-frame water scarcity indicators.</td>
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<td>Create a frame of sustainability indicators for water management</td>
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<tr>
<th>WP11</th>
<th>Exploratory benchmarking exercise – Recommendations on the application of the WFD</th>
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<td>Benchmarking perspectives in the Mediterranean considering the control and marking of parameters/indicators of WPs 1 to 6.</td>
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<td></td>
<td>Formulation of 1st draft of recommendation to policy-decision makers on integrated water management considering knowledge of WP1 to 6, including outcomes of WPs 7 and 10.</td>
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</table>
The MELIA project logical frame
3. **THE WATER MANAGEMENT ISSUE IN THE MEDITERRANEAN**

Despite differences between Mediterranean countries in their societies, political systems, cultures, and economies, there are similarities in many aspects that influence the water situation (Hamdy, A.; Lacirignola, C. 1999):

- Poor management practices, inefficient water use, and failure to place a high economic value on water, which result in resource degradation from water logging, soil and water salination, and pollution of aquifers;
- Few incentives for water conservation in agriculture and numerous disincentives;
- Irrigation developing faster than water-source mobilization (population growth and increasing demand for water for other uses are leading to rapid mining of aquifers, water shortages, competition, and conflict);
- An inadequate knowledge of the resources and the demand for water. It is thus essential to know not only the average values but also the spatial and temporal distributions of stochastic variables controlling the supply of water in the regions.
- Questionable outlook for developing new water supplies to meet increasing demands, given limited financial resources, escalating construction costs, and rising environmental opposition.

On the other hand, the policy and decision makers make policies or take decisions on water management that imply enormous investment without considering the long-term effects from technical, system maintenance and socio-environmental point of view. In most of the cases, the decisions related to water management ignores the opinion of the end users and do not call for their commitment and participation.

Another general perception in the Mediterranean area is the lack of visibility of the important role that Science and Technology play in the sustainable development of the region. Parts of these problems are due to communication gaps between political bodies, administrative institutions, scientists, sociologists, lawyers, economists, end-users and citizens.

Water management approaches in the countries of the region are physically, socio-economically, or environmentally unsuitable due to:

- Lack of public participation. Inefficiency and misallocation of water use. Low-value uses consuming a significant share of the resource and high-value uses suffering shortages;
- Unmonitored water quality, and inappropriate use of low-quality water, without protection of the human health and the environment.
- Poor Access to Water and Sanitation due to l inadequate investment in safe water and sewerage services, especially for the poor;
Cities are faced with mounting cost of new water sources development and water treatment.

A garden in the desert

The European Neighborhood Policy (ENP), launched by the EU in 2003/4 seeks to deepen political cooperation and economic integration between the EU and its immediate neighbors and to promote and support better governance and reform in Mediterranean countries. The identification of water-related problems, and the development of specific long-term visions for water resource development in the area, determine the strategies and plans to attain that vision.

The decision to prepare a Water Strategy for the Mediterranean (SWM) was among the key outcomes of the Euro-Mediterranean Ministerial Conference on Water (22 December 2008, Dead Sea, Jordan). The Strategy for Water in the Mediterranean (SWM) aims at providing a guiding document with orientations and objectives on water resources management and protection agreed by all Countries in the Union for the Mediterranean (UfM), supported and enriched through inputs from stakeholder groups including civil society. The SWM was intended to be approved at the Euro-Mediterranean Ministerial Conference on Water (Barcelona, Spain, 13th April 2010), but it failed.
4. ACTIVITIES OF MELIA

4.1 The MELIA Project Life

The main objective of the Co-ordination Action (CA) “MELIA” is to contribute to the improvement of effective regional water management to promote sustainable development in the Mediterranean region. In particular, the most important issue addressed by this project is to build and share a common knowledge and awareness (at different level of players) that would contribute to the sustainable management of water in the Mediterranean region. MELIA has produced new common knowledgebase, conceptual frames and recommendations through the co-ordination and harmonization of inputs from other relevant project actions in which most of the partners were involved. Moreover, MELIA has promoted Mediterranean water actions and suggest policies with the three main dimensions of sustainable development (natural, social and economic dimensions).

Along its life MELIA has worked at:

- Establish a Euro-Mediterranean-wide structure to enable communication and dialogue between Researchers, Policy and Decision Makers (governmental institutions such Ministries), water users, basins managers, associations, non-profit organizations aiming at finding the common grounds based on a sound knowledge management for a sustainable development, and the correct and effective management of water resources,
- Promote and facilitate continuous Internet, media and other means, based dialogue with citizens, through project partners acting as national focal points.
- Link activities to the real needs and concerns of the Mediterranean countries.
- Disseminate and ease the access to the relevant common knowledge and preparing IWRM related dissemination material.
- Discuss and prepare a comprehensive conceptual framework to plan regional sustainable water management based on an efficient system and policy setting.
- Create a gateway for the introduction of the criteria and tools of the “Water Directive” in the Mediterranean countries.

MELIA has opened a debate of the possible application of the Water Framework Directive principles in the Mediterranean Partners Countries (MPC), started an exploratory benchmarking exercise and has organized an effective sharing and transfer of knowledge built and organized during the project in a Seminar organized at the end of the Project.

All these activities are reflected in the Deliverables of the projects.

Project MELIA ended in August 2011 after 5 years of activity having fulfilled the targeted objectives and creating new no-planned activities such as an itinerant Exhibition “Water, Domination and Myth”, that started in Agadir (Morocco) and will move during 2011 and 2012 for many Mediterranean en European countries. The closing Conference represented
a milestone where the recommendations produced by the work done along 5 years of dialogue, marks the rationale of possible new activities based in a better mutual understanding and a pragmatic approach for cooperation between the EU and the MPC.

MELIA passed along its 5 years of activity by the different phases that almost all the EU-MPC Projects experience: it started with the usual enthusiasm provoked by the success of an ambitious and complex proposal (45 partners...) prepared after a very long discussion period. The development of the Project has been a very difficult task, where practically all the inconveniences related to International Scientific Cooperation between the European Union Countries and the Mediterranean Partners Countries, and those provoked by the heterogeneity of the partners, which range from Ministries of Water and Research Institutions to Farmer’s Associations, appeared making the implementing the project a hurdles run in a long part of the period of implementation that, finally, arrived to a maturity stage where most of the partners get actively involved in the targets of the Project that, finally, arrived to a satisfactory end.

MELIA has been an school and a laboratory, not only for the mutual learning on integrated water management between experienced partners coming from most of the countries bordering the Mediterranean and beyond, but also and, perhaps more important, because the MELIA project has showed us which are the common interests in the water issues in the whole Mediterranean area, besides being a bench for a new methodology of ICT supported management and participation. The presentations and results of the three Workshops and the Final Conference covered many aspects dealing with water, its culture, its perception, and the complex challenge of water management. The published results provided an excellent material to facilitate open discussion and agree consensual proposals and recommendations that will be listed in the following. On the other hand, MELIA has also been a very clear showcase of the difficulties of organizing the scientific cooperation between the EU and the MPC, and the enormous difficulties that our colleagues from the MPC have in handling the European funding and in understanding and correctly interpreting the terms of management and reporting in the European-funded project. If we want to construct a Euro-Mediterranean Research Area, many things must change, from the administrative culture of the MPC countries, to the heavy administration rules that the EC imposes in the programs of International Cooperation. We must all work for a sense of co-ownership from both sides of the Mediterranean avoiding the perception of a European lead engagement on dealing with common challenges.

4.2 The MELIA Knowledge Management (KM) tool

The need to guarantee an effective communication and interaction among partners, and the limited budget of the projects, forced the limitation of the face-to-face activities to 4 Workshops and a Final Conference and obliged to construct an internet-based integrated-dynamic knowledgebase and communication and participation tool; whose design, realization and maintenance of comprehensive internet-based Information and Knowledge Systems
Management (ISM and KSM) (Intranet, e-GroupWare: on-line Community of Practice) was done using the state of the art facilities in this kind of systems. This KM system has been the object of several scientific publications and it is currently used in other Projects and application. Its full description is incorporated in ANNEX...

4.3 Workshops and other face-to-face activities

MELIA organized a Kick-Off Meeting, 5 Management Boards Meetings, 3 Workshops, and a Final Conference, as face-to-face events. The Workshops and the Final Conference resulted in the publication of 4 books with a peer-reviewed selection of contributions. These workshops address issues, methodologies and debate linked to different water issues including:

1. Water Culture (WC) (WP1)
2. Assessment of Technological Perspectives in Water Management in the Mediterranean (WTECH) (WP2)
3. Rational use of water resources (RUW) (WP3)
4. Water Value (WPRICE) (WP4)
5. Water Policy (WLP) (WP5)
6. Prevention and Mitigation of Water Conflicts (WCF) (WP6)

4.4 Technical results of MELIA: Books, articles, videos, expositions

Perhaps the main results of MELIA have been the four published books, with the following content:

Besides these collective publications, some partners publish other technical articles in peer-review journals:

- Two Dissemination Videos on “Water Conflicts” and “Women and Water”, the last one in collaboration with the INCO Project GEWAMED.
- Brochures, leaflets, CD-ROMs, newsletters for dissemination, in both English and Arabic, and establishment of contacts in each of the participating countries and with regular media interaction and educational structures.


4.5 The MELIA Conceptual Frames

Specific milestones of the Project have been a number of Conceptual Frames on issues related to the Integrated Water Resources Management (IWRM) in the Mediterranean Area on:

- Water Culture,
- Technological Perspectives in Water Management in the Mediterranean, taking into account historical experiences under different social and economic conditions,
- Rational Use of Water Resources, taking into account historical traditions,
- Water Value
- Water Policy
- Prevention and Mitigation of Water Conflicts
- Water Participatory Management, Water Law and Water Governance

All the texts of the Conceptual Frames are presented in the ANNEX
5. REFLEXIONS ON WATER ISSUES

5.1 Background

Water management issues are continuously present in the international agenda. Since the 1970s the international community has started important and far reaching policies. These include tackling desertification, controlling water pollution, developing conflict prevention measures in the light of ongoing and potential water conflicts, monitoring and preventing water-related threats and hazards, to overcoming the deficiencies and inequalities in the allocation and distribution of water for essential human use in developing countries. An overview and synthesis of the international activities “MILESTONES 1972-2006: from Stockholm to Mexico” can be found at the UNESCO Water Portal: http://www.unesco.org/water/wwap/milestones/index.shtml).

However, as Castro (2007) points out very clearly, the international political efforts have not been successful yet. The contrary is the case, as can be shown by the goal on guaranteeing universal access to essential water and sanitation services which was restated in the late 1970s by the United Nations endorsing the provision of essential volumes of safe water to every human being on earth by 1990. Unfortunately, this goal has not been achieved. Moreover, the current targets as expressed in the UN Millennium Development Goals (MDGs) adopted in 2000-2002 are limited to halving the proportion of the world population without access to these services by 2015. In this connection, a recent evaluation of the progress made in relation to the MDGs shows that even these limited objectives will not be achieved in many of the countries, which are characterized by “fragile states [...] with weak governance and institutions” (WHO, 2005).

5.2 The Mediterranean water problem

The following section builds on the Blue Plan's report: "A sustainable future for the Mediterranean" and the Blue Plan "Cradle of Mediterranean futures. Intervention Framework 2007-2015". In the Mediterranean, water resources are limited, fragile and very unevenly distributed over space and time. During the second half of the 20th century, water demand has increased twofold, reaching 280 km3/year in all rim countries in 2005. Agriculture is the main water-consuming sector and accounts for 64 % of total water demand: 45 % in the North and 82 % in the South and East. In numerous Mediterranean countries water use is reaching the limit level of available resources. Temporary or structural water shortages have been observed. The number of water poor Mediterranean populations living in countries with less than 1000 m3/capita/year, reaches 180 million inhabitants, 60 million of whom face shortage conditions with less than 500 m3/capita/year. Twenty million Mediterranean people are still deprived of access to drinking water, particularly in the South and East. Water supply in several Mediterranean countries is endangered by both the overexploitation of a part of the
renewable groundwater (generating salt-water intrusion, which makes the water unusable) and the exploitation of non-renewable resources (e.g. fossil groundwater).

Thus, “unsustainable” water production is estimated at 16 km3/year of which 66 % come from fossil water withdrawals and 34 % from over-exploitation of renewable water. In addition to the stress on natural water resources, man-induced degradations and pollution also impact the water regime and quality, thus further limiting the possibilities of use. The consequence is an increase in:

- the vulnerability of supply due to rising costs (notably for water treatment),
- health risks,
- and conflicts of use between users, major sectors, regions or countries

Pressures on water resources will thus increase significantly in the South and East, and it is expected that, by 2025, 80 million Mediterranean people will face shortage conditions (with less than 500 m3/capita/year). The increase in water demand for agriculture and for urban use and the scarcity of resources signify that one out of every three Mediterranean countries will withdraw over 50 % of the annual volume of its renewable natural resources. The changes in temperature and rainfall described by the climatic models will further aggravate these trends, and the Mediterranean regions will find themselves particularly exposed to a reduction in their water resources. Development along these lines could give rise to acute crisis situations in some countries. In the southern and eastern Mediterranean, given the demographic growth, the population of the countries which would face water shortage in 2050 has been estimated at 290 million people.

The percentage of unsustainable water supplies derived from fossil sources or from over-exploitation will grow. The rise in the demand for water will be steepest in the least water-rich countries, which will then be exposed to structural shortages. Under these circumstances, some fossil resources will rapidly be depleted and coastal aquifers further destroyed by salt-water intrusion. Moreover the silting up of water retained in dams limits their lifespan (e.g. dams in Algeria have lost a quarter of their original capacity), and there are fewer and fewer sites on which to build new dams. Growing quantities of industrial and urban waste and reduced run-off resulting from increased extractions will also affect the quality of water and aquatic systems. It is likely that wetlands will continue to retract. These elements further aggravate the factors leading to increasing water vulnerability (costs, health and conflicts).

An alternative may be the management of water demand, and not only the supply. Observations have shown that increasing the supply, which has been the traditional response in Mediterranean water policies, is now reaching its limits. In response to this situation, water-demand management can lead to major progress by limiting losses and inappropriate use (waste, leaks exceeding 50 % in some towns, etc) and by ensuring more efficient use of the resource. There is considerable room for progress since improved water demand management
would allow saving up to 25% of water demand, i.e. approximately 85 km\(^3\)/year in 2025. Irrigated agriculture represents the largest potential for volume savings, with nearly 65% of total water potential savings identified in the Mediterranean (transport losses reduced by 50%, down to 10%, irrigation water efficiency increased from 60% to 80%). A further 22% in water savings potential can be expected from industry (recycling rate up to 50%), and another 13% from drinking water supply (transport losses and household leaks reduced by 50%, respectively down to 15% and 10%). According to this optimistic view, assumed to be generalised throughout the Mediterranean countries, total water demand would level off at 102 km\(^3\)/year in the North and at 144 km\(^3\)/year in the South and Middle East, globally equivalent to the drop in total current demand of approximately 40 km\(^3\)/year. The benefits could also be seen in energy savings. These objectives are “win-win”, when compared with traditional supply side approaches. They limit environmental impacts, risks of conflicts and the costs of access to water, and generate regional potential for economic growth and stability.

### 5.3 Integrated Water Resource Management

Integrated Water Resource Management (IWRM) and Development is defined by the Global Water Partnership as a “process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (TAC background papers 2000). The principle of IWRM was formed with the objectives of co-ordinating policymaking, planning and implementation in an integrated manner across sectors, institutions and professions to take into account the complex co-ordination issues arising over the management of international watercourses. It explicitly challenges conventional, fractional water development and management systems and puts emphasis on an integrated approach with more coordinated decision making across sectors and scales. Thus, it stands for creating new approaches to tackle the water crises through common principles (see for example the definition given by the Global Water Partnership Forum, www.gwforum.org). These are:

- water as a finite and vulnerable resource,
- the importance of a participatory approach involving users, planners and policymakers,
- recognition of the special role of women as water users, and
- water as an economic good with economic value in competing uses and as having key social and environmental roles.

The potential for IWRM to help overcome the problems and inefficiencies inherent in uncoordinated, sector-dominated and competitive water management approaches was clearly recognised at the World Summit on Sustainable Development 2002 in Johannesburg. All countries were called upon to develop IWRM and water efficiency plans by 2005 which inter alia should:
• Employ the full range of policy instruments to improve the efficient use of water resources and promote their allocation among competing uses in ways that give priority to basic human needs and balances human development requirements with the need to preserve or restore ecosystems and their functions.
• Include actions at all levels and adopt an integrated water basin approach.
• Support the diffusion of technology and capacity building for non-conventional water resources development and conservation approaches.
• Facilitate the establishment of partnerships, the involvement of all concerned stakeholders and, while respecting local conditions, provide stable and transparent regulatory frameworks, monitoring systems and measures to improve public accountability (Rees 2006).

Although the principles on IWRM are generally agreed upon in the international arena, there is a rising warning too, when only the normative way of thinking is taking into account. Saravana (2006) thus calls for enlightening and strengthening also the informal way of interaction and thus allowing for ends, not yet defined by international principles. He argues that water resources are integrated at various levels by diverse actors in space and time. In a diagnosis of its integration he reveals various problem areas (Saravana 2006):

1. There is no linear relation between policy-implementation, rather they are in ebb and flow, with policies contested, multiple and overlaid;
2. The management region is socially constructed and dynamic; the river basin is not necessarily the appropriate scale for management (Lane et al 2006);
3. Participation of actors is diverse, not necessarily communicative and collective;
4. Knowledge of water resource management emerges through constant interaction among actors as part of their daily struggle with the environment and the prevailing rules;
5. Functional attributes that determine integration are diverse in the social realm of resource management.

In this complexity, the normative and idealistic concept of “IWRM package” that focuses on promoting collective and consensual management of In this complexity, the normative and idealistic concept of “IWRM package” that focuses on promoting collective and consensual management of natural resources by bringing stakeholders to participate within a watershed are prone to potential pitfalls. One way to move forward is to understand the process of integration of both formal and informal mechanisms of the water economy.

IWRM is not only an approach that promotes the coordination of the main users but seeks the participation of all the main stakeholders in all the decision making processes. In this sense, the Participatory Irrigation Management (PIM) approach is also an integral part of IWRM as any other approach that promotes the participation of the interested parties. The
The framework proposed by the IWRM initiated a bottom-up approach in the discourse around water but which remained top-down in content (Jansky, 2006). Various devolution strategies saw the target group (farmers, the poor, women), mainly as beneficiaries and less as participants. Secondly, since water was seen as a basic human necessity, the issue of its sustainability was not harmonized with the demand structure of the resource. Public participation involves the rights of persons to take part in decision-making that affects them, and gives concrete benefits to decision-making. It does so through the guarantee of rights on access to information, public participation in decision-making and access to justice in environmental matters. This improves decision-making through greater information and enhances respect for decisions, and assists in the development of democracy, civil society, and the rule of law.

Public participation contributes to the endeavours of public authorities to protect the environment, to learn about the concerns of the public, including the various users of the water resources, and to take due account of such concerns. Public participation in the field of water management should lead to an improvement in the quality and implementation of, and commitment to, decisions, as well as increased accountability, transparency and public awareness of water management issues. This in turn will help to achieve water management goals and improve the environment. Principle 10 of the Rio Declaration on Environment and Development (United Nations Conference on Environment and Development, Rio de Janeiro, 1992) emphasises that environmental issues are best handled with the participation of all concerned citizens, at the relevant level.

5.4 Management and Governance

Water resources in the countries around the Mediterranean are limited and unequally distributed in both space and time - the countries of the South account for about 13% of the total. The Mediterranean is home to 60% of the world’s ‘water poor’, and today 20 million Mediterranean have no access to drinking water, particularly in the countries to the South and East of the region (Blue Plan, 2008). The World Bank was the first international organisation which used the term governance and defined it as follows (Singh et al, 2009): ‘The manner in which power is exercised in the management of a country’s economic and social resources by government’.

With water crises recognised primarily as a crisis of governance, effective water governance in an IWRM context, is a critically important prerequisite for meeting current and future water challenges. The idea of water governance was put forth in the World Water Vision (2002), which argued for a holistic approach that linked socio-economic development and environmental protection. The Global Water Partnership (2002) defines Water Governance as: Water governance refers to the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society. Governance, in general, has three distinct aspects (Singh et al, 2009):
1. The form of a political regime (parliamentary or presidential, military or civilian, and authoritarian or democratic);
2. The processes by which authority is exercised in the management of a country’s economic and social resources; and
3. The capacity of governments to design, formulate, and implement policies, and, in general, to discharge governmental functions. The terms usually describe conditions in a country as a whole Different initiatives have been taken by various countries to model the national policies on this framework but given the prescriptive nature of the IWRM, which fell short of evolving a robust implementation technique, there is a need to move away from the normative framework to a substantive framework, from management orientation to a substantive idea of governance (Singh et al, 2009).

### 5.5 The political challenges

Water is a common issue in all the countries surrounding our “Mare Nostrum”, and this is being recognized in the Ministerial Declarations issues either in the Barcelona Process or under the umbrella of the Union for the Mediterranean. A proper handling of water is fundamental to avoid conflicts between neighbor countries and between different economic and social sectors within a country. It is the basic resource to promote agriculture, industry, tourism and urban development, as water is scarce and most of the countries suffer an enormous hydric stress. Tight political decision must be taken to avoid an improper use of the scarce resource, promote a fair share of water for the concerned stakeholders, avoid contamination of water and promote the use of recovered waters.

The ENPI Program Horizon2020 offers a unique opportunity to join efforts of all riparian countries to recover our seriously wounded common Mediterranean sea. Actions must be taken to treat waters before they reach the sea and to find uses and/or markets for the treated waters. This is not only an economic issue but a cultural one. The MELIA project has analyzed these problems and proposes actions to recover a sustainable water culture. An important outcome of MELIA has been the interaction with the Steering Group of Horizon 2020, and the project MIRA of political dialogue between EU and the MPC on scientific cooperation, to define a research agenda to support the Horizon 2020 objectives. MELIA definitively, has been a project with a tough development but where we have learned a lot from each other, and we have planted the seed for future cooperation in a frame of mutual personal and scientific respect and shared compromises.

Mediterranean Countries are facing acute water challenges due to the high demographic growth, the displacement of populations to the urban areas, the un-sustainability of the traditional agricultural models, which consume most of the available water resources, and the threat for the region of the climate change. All these circumstances can have detrimental consequences on development and political stability on the region at large.
Therefore, the countries have no other choice than to embrace an integrated water management process that is economically sound, socially acceptable and environmentally viable. These unprecedented challenges in the Mediterranean compounded by climate change require unprecedented solutions as well as non conventional way of thinking.

The decision to prepare a Water Strategy for the Mediterranean (SWM) was among the key outcomes of the Euro-Mediterranean Ministerial Conference on Water (22 December 2008, Dead Sea, Jordan). A Euro-Mediterranean Water Expert Group (WEG), chaired by France and Egypt as UfM (Union for the Mediterranean) Co-Chairs, was entrusted to work on preparing the SWM, which has followed a structured, open and inclusive regional preparatory process involving national governments, local authorities and regional stakeholders. A reduced Technical Drafting Group (TDG), chaired by Spain, prepared the draft SWM texts through an elaboration process. The intensive SWM preparatory process was administratively and technically assisted by the Mediterranean Component of the EU Water Initiative (MED EUWI is led by Greece and is serviced by the Global Water Partnership-Mediterranean) with the financial support of the European Commission and other partners.

The Strategy for Water in the Mediterranean (SWM) aims at providing a guiding document with orientations and objectives on water resources management and protection agreed by all Countries in the Union for the Mediterranean (UfM), supported and enriched through inputs from stakeholder groups including civil society (see the box of the Euro-Mediterranean Ministerial Declaration of Jordan 2008). The SWM was intended to be approved at the Euro-Mediterranean Ministerial Conference on Water (Barcelona, Spain, 13th April 2010), but it failed to reach a consensus on the denomination of a country participant.

Strategy for Water in the Mediterranean Cross-cutting Objectives

The Key Proposals of the Euro-Mediterranean Ministerial Conference on Water (Dead Sea, Jordan, 22 December 2008) were the following:

1. Ensure the integration of policies, which properly take into consideration all the legitimate water uses and demands, including the environmental needs, as well as all categories of waters including groundwater, coastal and transboundary waters. Promote the establishment of management organizations at appropriate levels i.e. at catchment area.

2. Enhance and facilitate the participation of all stakeholders throughout the various levels and segments of society, with emphasis on gender-balanced and poverty alleviation considerations, by establishing mechanisms, which encourage broad-based involvement. Promote the establishment of active user associations.

3. Increase citizens’ awareness on the value of water and its culture, enhance education for environment and sustainable development and promote changing of consumption and production patterns. Support the media to play a more systematic and constructive communications role with regard to water issues.
4. Ensure the **capacity building** of water management and environmental protection administrations, technicians, farmers and all competent stakeholders to empower them to better fulfill their roles. Address training needs, including training of trainers, and facilitate **knowledge and expertise exchange** at national, local and transboundary levels to respond to current and future challenges.

5. Secure comparable water **data collection and monitoring** also employing appropriate indicators, through access to reliable information structured in improved national and regional data collection and information systems in coherence with international standards.

6. Support research in all water aspects as a way to achieve the necessary development and address challenges, such as desertification climate change and other emerging pressures. Make necessary investments in applied research, technological development, full use and rehabilitation of traditional knowledge and techniques, transfer of appropriate technology and political science i.e. management, law and economics. Link scientific research outcomes with policy development, application and monitoring.

7. Establish and support **fair and socially sensitive valuation and cost recovery**, including tariffs to support operation and maintenance costs and fees collection, aiming to contribute in securing provision of good water services to the people and protection of the environment.

8. Ensure the **integration of policies**, which properly take into consideration all the legitimate water uses and demands, including the environmental needs, as well as all categories of waters including groundwater, coastal and transboundary waters. Promote the establishment of management organizations at appropriate levels i.e. at catchment area.

9. Enhance and facilitate the **participation of all stakeholders** throughout the various levels and segments of society, with emphasis on gender-balanced and poverty alleviation considerations, by establishing mechanisms, which encourage broad-based involvement. Promote the establishment of active user associations.

10. Increase citizens’ **awareness** on the value of water and its culture, enhance education for environment and sustainable development and promote changing of consumption and production patterns. Support the media to play a more systematic and constructive communications role with regard to water issues.

11. Ensure the **capacity building** of water management and environmental protection administrations, technicians, farmers and all competent stakeholders to empower them to better fulfill their roles. Address training needs, including training of trainers, and facilitate **knowledge and expertise exchange** at national, local and transboundary levels to respond to current and future challenges.

12. Secure comparable water **data collection and monitoring** also employing appropriate indicators, through access to reliable information structured in improved national and regional data collection and information systems in coherence with international standards.
13. Support research in all water aspects as a way to achieve the necessary development and address challenges, such as desertification climate change and other emerging pressures. Make necessary investments in applied research, technological development, full use and rehabilitation of traditional knowledge and techniques, transfer of appropriate technology and political science i.e. management, law and economics. Link scientific research outcomes with policy development, application and monitoring.

14. Establish and support fair and socially sensitive valuation and cost recovery, including tariffs to support operation and maintenance costs and fees collection, aiming to contribute in securing provision of good water services to the people and protection of the environment.

15. Ensure optimal use of available instruments and tools e.g. Best Available Techniques (BATs) and Best Environmental Practices (BEPs) which are environmentally friendly as well as Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) as valuable mechanisms while developing plans, programmes and infrastructures.

5.6 Toward a communication strategy

Communicating the right message to the public is, perhaps, the most important issue in the impact that MELIA and other projects on actions dealing with water in the Mediterranean can search. A strategy for communication can be found in the interesting article “Conceptual Frame on Water Culture and its use to raise public awareness on sustainable water management in the Mediterranean Basin” elaborated as a cooperative work of participants in the First MELIA Workshop (Options Méditerranéennes, Serie A, N° 83, 2008, pp. 111-128) where some proposals of P. Laureano represent an invitation to the scientific community to collaborate in this common endeavor of raising public concerns about the water issues:

The success of the communication of the results of research projects depends on the following factors:

1. The scientific research project must be founded on a clear idea that must be communicable in an original way and have a direct implication in decision and concrete action making.
2. The project must not be limited to research but should also organize on the ground operations to show the public opinion what the practical effects on everyday life are.
3. Encourage the participation of partners who are already working with research projects and on the ground activities and implement their involvement in European projects.
4. Give the project other outcomes and a continuity that go beyond the research in itself by creating a solid relationship with the partners, networks and pilot actions. To
achieve this the three years term usually assigned to single projects are not sufficient. It would be convenient to extend the partnership to several related projects.

5. The project’s finality should not constitute for the partners, or at least for the scientific project coordinator, an occasional or marginal commitment, but should be the centre of his activities and be part of his individual mission. For this reason it is important that the partners were previously involved in the project’s finality and that they will carry on being concerned in it later on.

6. It is important to pursue not only the results of the specific project but also to prompt every possible related outcome.

7. Partners should develop a real collaboration and a sharing of intentions as well as the general view that must be directed, developed and communicated by the scientific coordinator, who will be entitled to.

8. The project must not be directed and monitored in a bureaucratic way through the inspection of the WP’s procedures, but it must be flexible and allow a certain degree of autonomy in order to achieve objective results and to be able to undertake new and unexpected directions.

9. The project must not be carried out in an isolated research context but within an issue that has been previously developed by other scientists and organisms at a national and international level. In this sense the greatest receptivity to the participation of international organisms and research groups is necessary together with the implementation of sharing and dissemination protocols with no copy right on results.”

MELIA has been a milestone in the water dialogue in the Mediterranean by proposing a different way of organizing the scientific cooperation in this fundamental area. The methodology and the cooperation networks are there, more social and political support is still needed to face the mounting challenges on water availability and management in the Mediterranean Area.

The social aspects related to water management are critical, as the technical proposals must be endorsed by the end users: the full society. Raising awareness about the importance of water issues is crucial to open a large societal debate. More emphasis should be put in engaging the media in this debate, up to now limited to some scientific and stakeholders groups protagonist. The lack of public perception of the importance of a proper water management, and the ignorance of impacts of political and economic decision on the long term guarantee of water supply are some of the biggest dangers of our current Mediterranean society. Collaboration at different levels is crucial to achieve the mutually accepted goals of sustainable service delivery for all. Education, outreach, and public awareness must all be a part of the water management strategies.

The purpose in preparing a Communication Program is to guide the stakeholders in overseeing public awareness activities and campaigns that promote more effective utilization and conservation of available water. The strategy would be structured as follows:
1. One of the most important initial steps in preparing a communication strategy is to identify a set of goals, objectives and updated knowledge material that should take into account an evaluation of communication gaps currently existing. This strategy should consider all the concurrent interests, nor only those of the lobbies directly interested in water as an economic asset, as they pertain to the topical issues at hand. The main goal of the strategy is: building human and institutional capacity, as these are the foundation of sustainable water resources management and service delivery,

The importance of capacity building was recognized during the Second World Water Forum and Ministerial Conference, The Hague, 17–22 March 2000. The Ministerial Declaration on Water Security in the twenty-first Century included the following statement:

“We will work together with other stakeholders to develop a stronger water culture through greater awareness. We will identify best practices based on enhanced research and knowledge generation capacities, knowledge dissemination through education and other channels and knowledge sharing between individuals, institutions and society at all appropriate levels. This will include co-ordination at regional and other levels, as appropriate, to promote arrangements for coping with water-related disasters and for sharing experience in water sector reform. It will also include international co-operation in technology transfers to, and capacity building in developing countries”.

2. Target groups to which the strategy is addressed:

- Policy makers, managers within and outside the water sector, professionals, technicians and service personnel, whose decisions prepare the framework for the future.
- Users.
- Educators and trainers that prepare people to adapt to and to shape the future.
- The young generation who will live in and ‘implement’ our future.

- The Strategy should reflect the whole scope of education, Education via distant learning, self-study, role-play and simulation techniques, internet knowledge transfer and other forms of computer-aided learning are examples of this process supplementing the traditional classroom-based methods.

In order to match the demand for education with the supply of educators and trainers, the target groups need to interact with each other through networking and other forms of communication.

As conclusion of the Communication Strategy we underline the importance of using the threats related to water scarcity, floods and droughts, as a driver to support IWRM strategies, as well as the need to promote water efficiency and water demand management
through a combination of different tools, such as: water pricing; better irrigation technologies and techniques; water efficiency in buildings, industry, tourism and distribution networks; waste water re-use; awareness-raising campaigns and educational measures. Sustainable and Integrated Water Management, on the other hand, is an school of participative democracy.
6. OUTOMES OF THE MELIA PROJECT: RECOMMENDATIONS

1. All Mediterranean Countries, north and south, should consider transforming their current socioeconomic model toward more socially equitable and more Environmentally Sustainable Economic Model. Mediterranean Countries, however, should be prepared for the transition period between the different models, especially they should strengthen the institutional setup and enhance the existing governance and provide for multi stakeholder dialogue.

2. There is a need to customize the adaptation of European Water Framework Directive (WFD) in the southern part of the Mediterranean Basin, taking into account their specific characteristic and challenges such as drought, water scarcity, etc. This, however, should be done in full participation of all the stakeholders.

3. Water authorities should be independent from politics to ensure more independent, sustainable and appropriate water management decisions.

4. A balanced approach in addressing water problems must considers both supply and demand management options.

5. It is imperative to develop the culture of living with less water and improve the resilience of systems and people toward the climate as well as global changes.

6. Public concern on water challenges in the Basin must be promoted at large and develop appropriate mechanism for stakeholder participation, consultation and collective reflection. In this regard, it is important to develop a clear communication strategy to address and involve media in this issue, particularly targeting the awareness of various groups (children, women, farmers, decision makers, etc.) on the water challenges in the Mediterranean Basin.

7. Appropriate technologies that meet the economic, social, environmental and cultural consideration in each country should be adapted. In this context, it is necessary to import/adapt innovative techniques and technologies on reducing losses and improving farm water management. Techniques should include the optimization of the use of green water within the overall management as well.

8. The Mediterranean Countries must implement policies for preserving ecosystem services as fundamental component in attaining their food and water securities.

9. Cooperation among the Mediterranean countries, especially in the South and East Mediterranean, is more needed than ever before to overcome the escalating water scarcity challenges, which is a regional problem that exceeds the capacities of the national strategies. In this regard, the countries should start identifying policy gaps and move toward harmonizing these policies.

10. The use of non conventional water resources (especially treated wastewater) as part of the water budget in the Basin must be a common target. This resource must no more be considering as a waste. Moreover, it is very crucial to promote the use of treated effluent through raising the awareness and providing various incentives and subsidies to users. Trust building of the public about the safety and usefulness of this resource must be supported by good practices and transparency.
11. All water polices and institutions in the Basin need to be directed to include social and gender perspective in their organizational culture and practice. At the same time, they need to address the strategic need to mainstream gender through capacity building and creating positive attitude and behavior within their structures.

12. Performance indicators that allow the comparison and identification of high performance and good water practices are needed. The good practice results can be considered as the bench marks for improved water management in the Basin.
7. CONCLUSIONS

The work performed by MELIA along these years teach us that follow up action-planning and concrete projects development with a focus on sustainability will be essential to the successful implementation of the Strategy for Water in the Mediterranean (SWM), addressing specific water challenges and helping to achieve solutions to problems of regional concern.

The objective of the SWM should be also the cooperation with the national and local authorities and institutions in strengthening the national and local capacities for planning and management of water. Concrete proposals extracted from the identification of risks in the area are:

- Use water issues as an opportunity to impulse democratic improvements by increasing public awareness and participation.
- Agriculture is at the heart of culture and society in SEMCs and is heavily interlinked with food and energy production, but is competing nowadays with other water demanding activities. One possible action could be moving agriculture into higher value added product with lower water consumption. The good climate conditions and soil diversity must be fully exploited using the biodiversity and biotechnology knowledge.
- This region has very good solar resources for producing solar energy; any mean to produce energy out of solar sources must be fully exploited for urban and agricultural use and, even, desalination of water from the sea. This action will be in line with the European prospect of zero-carbon energy consumption. In this sense, development of regionally focused infrastructures particularly for energy, water, agriculture and transport, and, if possible, their integration, could create economies of scale, investment and increase the region’s opportunities.
- Urban planning, securing water supply and recycling of water used in industry and cities, are critical issues and business opportunities in the coming years, as well as preservation of soil resources for addressing, among other environmental targets, the food supply security by 2050, when population is expected to reach the peak of 600 millions. Domestic supply of water in areas of water scarcity depends mainly on groundwater aquifers; however rainwater and groundwater are rarely integrated into water management strategies, which usually focus exclusively on surface water. Countries need to integrate rainwater, groundwater and reclaimed waters fully into their strategies to tackle water scarcity.
- A more sustainable decentralized water infrastructure could be developed instead of the current, highly centralized network of water, sewer lines and treatment plants. Scattered communities facing water shortages, and escalating costs of repairing the aging centralized infrastructure with water losses, could use decentralized systems to
reduce flows and thereby avoid big new water supply or wastewater treatment system costs.

- A broad challenge consists in the set up of common standards for all the Mediterranean countries and the harmonization of norms (equipments; prevention, information and intervention systems...); as well as more efficient monitoring of maritime pollution, which is a common issue that needs a common approach and join strategies and actions.
- In short, proposals for implementing IWRM in the MED countries taking into account the risks faced must, at least focus in a political target, such as the increase of public participative mechanism and its comparison and mutual learning in the whole area, and at least, the following three critical technologies:
  - Water-efficient technology.
  - Rainwater storage, distribution and use.
  - Decentralized wastewater treatment, reuse, and resource recovery.

IWRM is the instrument that could balance water demand and water supply in a sustainable way.
8. REFERENCES


LITERATURE


