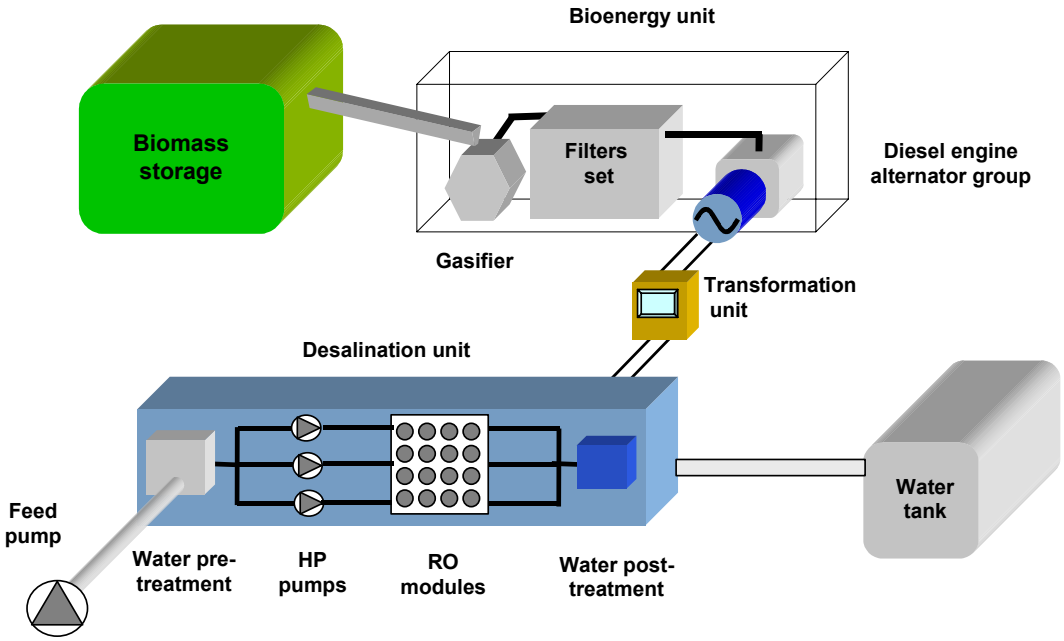
MedWater Policy

Policy Initiative to Overcome Water Competition between the Vital Economic Sectors of Agriculture and Tourism in the Mediterranean

EC Contract No. ICA3 – CT2000 – 30002



Deliverable for WP3

Evaluation of Available Water Saving, Reuse, Desalination and Renewable Energy Supply Options

July 2002

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Introduction

The project “MedWater Policy” (Contract No ICA3 – CT2000 – 30002) will elaborate a transboundary water policy initiative for overcoming water competition between the vital economic sectors of agricultural and tourism in the countries of the Eastern Mediterranean Basin.
The relevant data is compiled in four working phases:

- The concrete water supply situation and water infrastructure in five target regions in Working Phase 1[1]
- The concrete water demand situation and water competition in five target regions in Working Phase 2[2]
- **The technical options of sustainable water management in Working Phase 3**
- The political dimension of sustainable water management plans in Working Phase 4.

The results of these work packages are summarised and evaluated in the formulation of an “integrated water model” for sustainable water management in WP 5. On the basis of this model a transboundary water policy initiative is elaborated in WP 6. It will be an instrument, which is useful for administrative and political decision makers on local, regional and national level all over the Eastern Mediterranean Basin.

Major objective of WP3 is to provide a comprehensive overview on all technical options for sustainable water management in the agricultural and tourist sector in the target region of the project, which are the countries of the Middle East and Northern Africa (MENA). WP 3 will give assessments on the technical prerequisites, the socio-economic framework conditions and on the suitability of the technologies for the region of the Middle East and Northern Africa (MENA). Case studies will be included giving detailed view on the situation in the target region.

WP3 was elaborated by

- *Agence de l’Environnement et de la Mâitrise de l’Energie (ADEME) in France*
- *Agricultural University of Athens (AUA) in Greece*
- *The Joint Research Centre (JRC) in Italy*
- *Energia, Trasporti i Agricoltura (ETA) in Italy*
- *Wirtschafts- und Infrastruktur GmbH & Co Planungs KG (WIP) in Germany*

The findings of the work have been screened and case studies have been contributed by:

- *Consolidated Consultants (CC) in Jordan*
- *Institut National de Recherche en Génie Rural, Eaux et Forêts in Tunisia*
- *Palestinian Hydrology Group in the Palestinian West Bank*
- *SEYAS International in Turkey.*
- *Royal Scientific Society (RSS) in Jordan*

[1] The results are summarised in Report 1

[2] The results are summarised in Report 2

The co-ordination of this process was done by WIP, Germany, who defined and facilitated the work. The research work was finalised by June 2002

The structure of the report closely follows the work – program in WP 3:

Chapter 1: Water Saving Technologies on Supply and Demand Side in Agriculture and Tourism (WP 3.1)

Chapter 2: Treatment and Reuse Technologies and their Potential to Cover Part of the Water Needs in Agriculture and Tourism (WP 3.2)

Chapter 3: Sea and Brackish Water Desalination Technologies (WP 3.3)

Chapter 4: Renewable Energy Sources for the Energy Supply of Desalination Units for Water Supply (WP 3.4)

Chapter 5: PV based Pumping Systems (WP 3.4)

The report ends with a comprehensive conclusion which is an important milestone for the further project work.

Complementary information for the items of this report can be found in Report 1 of the project “Medwater Policy”, namely

- On the cultural, geographic and climate peculiarities of the target regions,
- On the water infrastructure in the target regions,
- On water prices and wastewater tariffs.

Additional information can be found in Report 2 of the project “MedWater Policy” namely

- On the water demand in the agriculture and tourism sector,
- On water competition between these two vital economic sectors.

Executive Summary

The survey of the technical options for sustainable water supply in the MENA region shows that there are well proven technologies available which could foster an efficiency revolution in the agriculture and tourism sector. Both sectors suffer from high losses in the distribution systems that at average are around 35 %, in some regions they mount up to 50 %. The losses could be easily cut in half by an overall refurbishment action, which entails the implementation of low-cost technologies like the lining of the earth channels and the reduction of water pressure in the pipelines.

The agricultural sector, which consumes in total 87 % of the regions water supply, uses its irrigation water with an efficiency of less than 60 %. Innovative irrigation techniques like drip and furrow irrigation can bring up the efficiency to more than 90 %. Moreover, the cultivation of water modest plants promise huge potentials to reduce the agricultural water demand. Water consume of banana plantations require six to ten times more irrigation water than traditional wheat or vegetable cultivations. Some plants like olive trees do not need any irrigation at all. These traditional crops however often generate less economic yield.

In the tourist sector measures like installing toilet flush reducers, special showerheads and advanced spray aerators, generate reductions up to 200 litres per day per tourist apartment without diminishing the leisure quality of the tourists.

Wastewater treatment technologies ensure the management of water in water cascades. It is assessed that approximately 5 % of the agricultural water demand in MENA can be met by reusing treated wastewater. Moreover, wastewater treatment technologies play an increasingly important role in exploiting contaminated natural water resources. The treatment technologies of the industrialised countries have to be adapted to the peculiarities and necessities of the MENA region. The region needs low-tech, decentralised applications which require little maintenance and are modest in their consume of land and energy. The design of these plants has to directly address a certain wastewater source and orientate on the quality requirements of the intended water use. The climatic and socio-economic conditions of MENA favour the implementation of biological water treatment systems. The bioreactor in most cases has to be combined with additional physical and chemical treatment e.g. for disinfecting the effluents.

The MENA region has abundant seawater and brackish water resources, which can be exploited with desalination technologies. Desalination technologies are also requires for using those groundwater aquifers which have turned to brackish water due to sea water intrusion. There are various thermal and membrane desalination technologies, which are mature and have been implemented in many large desalination plants. Thermal processes deliver fresh water (distillate) with salt concentrations as low as 10 ppm. Membrane processes produce deliverables in a concentration between 350 to 500 ppm. Due to the reuse of the water pressure RO technologies in large applications are able to produce fresh water with less than 4 kWh/m3. Recent research brought important progress for decentralised units, which however still demand more than 12 kWh/m3. Decentralised desalination on the other side do not need long distance water transport which in the MENA region often is more energy intensive than the desalination itself. In the MENA region, oil producing countries like Saudi-Arabia have considerable shares of desalination in their water supply. This will change when countries like Tunisia or Jordan will implement their planned projects for large – scale exploitation of brackish water and seawater sources.

There are various possibilities to supply desalination sites with renewable energy sources. These combined applications have already been tested in research and demonstration units. The most promising combinations are wind energy or PV systems combined with Reverse Osmosis. A suitable set-up also is a solar still which is used for

irrigating greenhouse plantations. Future research has to focus on creating successful interfaces of the various components particularly on the coupling of energy generation unit and the desalination site. Mature and cost-effective solutions have to be defined for energy storage and for operating the desalination site in different modules. Another major option for making use of renewable energy systems in the MENA water supply is solar pumping.

All technical options for exploiting the large water efficiency potentials and non-conventional water sources in the MENA region are connected to additional financial efforts of the stakeholders with long payback times. Therefore, sustainable water management can only be accomplished by a policy initiative that bundles various socio-economic measures: As a first step the awareness of stakeholders for the necessity and advantages of sustainable water management has to be raised. The awareness raising work has to be combined with water pricing schemes that subsidise water saving measures and punishes water waste. Additionally, the setting of the legislative frame has to promote sustainable water management. These socio-economic actions have to be bundled and optimised carefully to prevent illegal water supply practices, which can be observed already in some MENA regions.

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