



TWINBASIN MISSIONS: Reporting guidelines

Mission reference
2005 C2 T9 M3M4

Date: 30 May 2006
Number of pages: 10

Mission report

Expert name and function:	Ms. Paloma Moriano Mallo. Economist. General Secretary of the Segura River Basin Authority. (Spain) Mr. José Antonio Vera Gomis. Civil Engineer. Responsible of Information Systems in the Planning Office of the Segura River Basin Authority. (Spain)
----------------------------------	--

Wording of missions:	<p>In short, objective or content of mission</p> <p>The Segura-Crete project focuses on specific areas of interest, based on Integrated Water Resources Management (IWRM), that have been identified as:</p> <ul style="list-style-type: none"> • Implementation of the Water Framework Directive (WFD): the CIS, works developed, Article 5 requirements. • Draught and flood prevention: plans and programmes • Groundwater (exploitation and protection) • Automated Telemetric Network monitoring groundwater parameters • Monitoring networks • Administrative framework (organisation of the River basin authority) <p>There are specific goals and numerous expectations associated to the Segura-Crete project. Overall, from the twinning between the basin organisations, much is expected to be gained regarding the operation of each other's organisation, as well as the exchange of practices and knowledge on IWRM that will help improve their work. Based on the TWINBASINXN project, it is expected that BO's will:</p> <ul style="list-style-type: none"> • Promote a friendly cooperation between water managers. • Strengthen ties among basin organisations. • Improve contact between the basin management participating in the twinning project. • Encourage the exchange of expertise, knowledge and technical personnel. • Improve the effectiveness of integrated water resources management within organisations. • Improve the overall functional operation of these institutions.
-----------------------------	--

1. Context

Place, location:	Country visited, Basin Organisation concerned, other information about location.
	<p>Country visited: Greece. Crete island. Basin Organisation concerned: Crete Directorate of water. Other information about location: Crete is the biggest of the Greek Islands with an area of 8,336 km² and is located in the south of Greece. Its average altitude is 460 m and the total population is about 600.000 people. The Region of Crete consists of four prefectures: Iraklio prefecture whose capital is the city of Iraklion; Chania prefecture whose capital is the city of Chania; Rethimnon; and Lasithi prefecture whose capital is Aghios Nikolaos. The city of Iraklion is also the capital of the Island. The Island of Crete may be characterised as having enough resources, which, although still adequate at present, are supposed to decline by 2025. Irrigation and tourism create peak demands resulting in a seasonal pattern of water demand with an annual volume of water abstracted exceeding 50 % of the average annual runoff or 35 % of the groundwater potential. The climate is considered to be sub-humid Mediterranean with humid and relatively cold winters and dry and warm summers. The average annual precipitation is estimated to be 927 mm; the potential renewable water resources are 2.120 Hm³ and the real water used about 372 Hm³(Year 2002).</p>
Mission duration	21 – 27 May 2006

2. Objectives

Initial objectives		Results	Results indicators
1	Administrative framework (organisation of the Ministry of Environment and the Water Directorate of Crete)	Understanding the Greek water administration: Ministry of Environment. National Water Council. National Water Directorate. General Secretary of the Region. Regional Water Directorate.	This administrative organisation differs from the one in Segura River Basin: - The Regional Water Directorate of Crete is a new structure that has a direct dependence from the central Greek Government while the Segura RBA is an older and bigger structure with a higher degree of freedom in different

			<p>aspects and specifically in the application of the IWRM.</p> <ul style="list-style-type: none"> - The Greek local administrations (municipalities) play an important role in the creation and the management of water resources, more relevant than in Spain. - Also we obtained information about the characteristics of the budgets of the Region of Crete and the structure of the investment projects around the application of the WFD, water resources and agriculture.
2	Obtaining information on groundwater management systems used by the Crete River Basin Authority to solve problems related with the supply of urban water and irrigation resources, avoiding overexploitation of aquifers and salt intrusion.	<p>The application of the tools RIBASIM and HYMOS provided by Delft Hydraulics to perform an IWRM in the Crete Island was explained in detail.</p>	<p>The application of those advanced tools allows a detailed simulation of the RBD and several analysis of the different elements in the system to perform an IWRM in the Crete Island.</p> <p>These tools can show the degree of satisfaction of the different needs of water in the RBD and simulate the effects of changes.</p>
		<p>We met different solutions used to ensure a sufficient amount of water resources in Crete Island, a territory without permanent rivers.</p>	<p>During the visit we learned some solutions like the Malaura Brackish Spring and the Bramiana reservoir that allow the inter-annual groundwater resources management, in a territory without surface resources and a number of wells managed by local authorities and organisations.</p>
3	Obtaining knowledge about management systems used to store, analyse and share the hydrologic and other type of information required in the planning process.	<p>The technicians of the Crete Water Directorate showed us the tools and the Monitoring Network Systems that control the main parameters of the aquifers in the RBD. Also</p>	<p>The experts showed us the new on-line telemetric monitoring system which obtains meteorological information as well as quantitative and quality parameters of</p>

	Groundwater monitoring networks of Water Quality	we could see the structure of the databases and the GIS tools used.	<p>groundwater in Crete Island.</p> <p>The technologies of communication, the sensors and the parameters registered are similar than those in Spain.</p> <p>The data received by the system are finally stored in the same database (HYMOS) that is used by the simulation tools (RIBASIM) applied to the IWRM of the RBD of Crete.</p> <p>This concept could be applied also in the Segura RBD that uses special files prepared for the simulation tools.</p> <p>The integration of the data in unique structures is an important challenge which allows a correct use of IWRM tools.</p> <p>The GIS tools are similar to the ones used in the Segura RBD.</p>
4	Obtaining knowledge about the application of the WFD in different aspects as the development of a Greek Biotic Measure System based on macroinvertebrates.	The experts of the Crete Water Directorate showed us a progress in the works that will be finished at the end of the year 2006.	<p>This system is based on a specific Biotic Measure, based on macroinvertebrates and adapted to the Greek conditions (BMG), and a Nutrient Pollution Measure using PCA.</p> <p>This methodology is suitable for classifying rivers and ephemeral streams according to the WFD and can be adapted to other similar areas in EU as the south east RBD's in Spain.</p>

3. Activities developed.

Activity 1	Topic: Institutional framework
Description	<p>The knowledge of the structure and functions of the different departments of the Greek administration involved in the water management and the legal framework is one of the main outcomes of the visit to the Crete "River basin".</p> <p>During the first day we received information about the Greek legislation for water management and the structure of the water administration in Greece at national and regional levels before the changes introduced by the application of the WFD.</p> <p>Also we obtained information about the characteristics of the budgets for the Region of Crete and the structure of the investment projects around the water resources and agriculture.</p>

Activity 2	Topic: Water infrastructures used in the south area of Herakleion
Description	<p>Technical survey of the infrastructures of water supply in Herakleion municipality along the history.</p> <p>There was a visit to the Peza Union, composed of 19 first-degree farmers associations with 3000 members [almost all the farmers in the area (97%)] whose main products are wine, olive oil, green soap and other local products covered by a Iso9000 certification.</p>

Activity 3	Topic: Groundwater resources in the south east of Crete
Description	<p>Technical visit to the Bramiana reservoir: This is a reservoir used to regulate the different groundwater resources obtained in the south east area of Crete. We discussed with the experts about the origin of the economic resources used to obtain the water and the final quality of the irrigation water.</p> <p>Technical visit to the Malaura coastal brackish spring: This is a very interesting infrastructure to use the water of a coastal spring, based on a drainage channel down the sea level and a pumping station to elevate the water to the Bramiana reservoir.</p> <p>Visit to Ierapetra green-house area to know the technologies used to apply the groundwater to flowers and other crop production as hydroponics systems and refrigeration systems based on groundwater use.</p> <p>We also met the local agricultural organisation of Ierapetra to discuss about the management of similar organisations in Spain, the prices of water and the access to distribution networks.</p>

Activity 4	Topic: Water management in the western of Crete
Description	Visit to Chania wastewater treatment plant:

	<p>A modern installation for the treatment of the wastewater of the municipal area of Chania that has basically urban origin. We discussed with the experts about the costs of the wastewater treatment, the impacts over the nearby population, the effluent characteristics and the impacts over the marine environment.</p> <p>Visit to the Organisation for the Development of Western Crete (O.A.DY.K): That organisation is the responsible for developing public infrastructures, environmental protection actions and supporting the municipalities in sustainable development projects. We met the staff of the O.A.DY.K to discuss about the costs, the infrastructures financing and the administrative water framework in Crete and in Spain. Also we received an exhaustive description about the integrated water resource management of an area that includes 200.000 has. and more than 200.000 inhabitants.</p> <p>Technical visit to the control centre of the pumping and distribution network that provides irrigation and drinking water to learn the needs of the Prefects of Chania and Rethimnon. We had the chance to see how the centralised system operates.</p>
--	---

Activity 5	Topic: Implementation of the WFD in Greece. Ecological status
Description	<p>The experts of the Water Directorate explained the state of the works of implementing the WFD in Greece as well as the collaboration of the Crete Region with the Institute of Inland Waters of the Hellenic Center of Marine Research in the project of development of a Greek Biotic Measure based on macroinvertebrates.</p> <p>This project will be finished at the end of 2006 and will have application on the rest of the islands in the Mediterranean Sea.</p>

Activity 6	Topic: Groundwater monitoring networks
Description	<p>The experts of the Water Directorate showed us the On-line Telemetric Monitoring System which obtains meteorological information as well as quantitative and quality parameters of groundwater in Crete Island.</p> <p>This system receives information through a combination of sensors and GSM technology, that is stored in a database, and it has a pc-based software to manage all the data in a friendly environment.</p> <p>We discussed about the parameters obtained by the system and the possibilities of integrating this database with the rest of the hydrological data used in the Water Directorate.</p>

Activity 7	Topic: Tools used for an IWRM in Crete Island
Description	<p>The Water Directorate of Crete uses the tools RIBASIM and HYMOS provided by Delft Hydraulics to perform an IWRM in the Crete island.</p> <p>- RIBASIM (River Basin Simulation Model) is a generic model package to</p>

	<p>analyse the river basins behaviour under several hydrological conditions. The model package is a comprehensive and flexible tool which links the hydrological water inputs at various locations with the specific water-users in the basin. RIBASIM enables the user to evaluate a variety of measures related to infrastructure, operational and demand management and the results in terms of water quantity and quality.</p> <p>- HYMOS is an information system for water resources management that covers both data storage and processing requirements for analysing, planning, designing and operating water management systems.</p> <p>The responsible of the tools application showed us the different possibilities that they offer and the process of application of the models. We made some comparisons between those tools used in Crete and the ones used in the Segura River basin.</p>
--	--

Activity 8	Topic: Visit to the Hellenic Centre for marine Research
Description	<p>The Hellenic Centre for Marine Research (HCMR) is an institution created in order to integrate government-funded marine science research in Greece. During the visit we learned its structure that consists of five institutes, which carry out the research into specific thematic areas:</p> <p>Institute of Oceanography Institute of Aquaculture Institute of Marine Biological Resources Institute of Inland Waters Institute of Marine Biology and Genetics</p> <p>Also we received information about the projects developed to control the quality of coastal waters around the east of the Mediterranean.</p>

4. Lesson learnt during the mission

(what could be shared with other partners and/or introduced in guidelines, as far as IWRM is concerted)

- **About methodology:**

The technical methodologies derived from the development of a Greek Biotic Measure based on macroinvertebrates, included in the project “Sustainable water management in the Balkan and Southeast Mediterranean area”, that will be very interesting to compare with the ones used in the SRB to determine the ecological status of areas with agricultural and urban uses and the reference stations.

- **About practice:**

The tools RIBASIM and HYMOS provided by Delft Hydraulics used to perform an IWRM in the Island of Crete have very interesting capabilities for management of information and modelling of river basins, and could be very useful in RBD’s in Spain.

The integration of the data in unique structures is an important challenge which allows a correct use of IWRM tools.

The possibility of making the IWRM based mainly in groundwater resources, where the wells and the infrastructures are managed directly by the local and regional administrations, is very interesting to solve some of the problems derived of the farmers property of the systems.

5. Dissemination (opportunities and difficulties). In what measure these learnt lessons are applicable to:

a) The Basin Organisation the expert belongs to:

The learnt lessons are applicable in the Segura River Authority especially at the Segura Planning Office and the Public Domain Area. The dissemination of information could be performed through the site of Segura River Authority (www.chsegura.es), as well as directly by e-mailing information to the people involved in relevant issues.

b) National IWRM practice:

The learnt lessons are applicable to the Ministry of Environment, Direction of Water.

The dissemination of information could be done through the electronic site of the Ministry of Environment (www.mma.es) as well as directly by contacting people in relevant Sections of the Ministries.

c) Regional experiences:

The learnt lessons and obtained information are applicable to full members and observers at the International Network of Basin Organisations. In particular the Mediterranean Network of Basin Organisations and the one related to the implementation of the WFD, the EURO – INBO group. The information could be disseminated by Internet through the site of INBO (www.inbo.org).

d) Worldwide.

The learnt lessons as well as the obtained information are applicable to the International Network of Basin Organisations. Particularly, the Mediterranean Network of Basin Organisation and the one related to the implementation of the WFD the EURO – INBO group. Internet could disseminate the information, through the site of INBO (www.inbo.org).

Furthermore, the specific web site that has been designed for the TWINBASIN project (www.twinbasin.org), could facilitate the exchange of information on best water resources management practices for River Basin Organisations.

6. Identified tips (Identified tips which could be useful for colleagues):

It is important to reach an agreement on the agenda before starting the mission, in order to identify exactly the areas of interest.

A lodging place close to the area of work is always recommended, so less time is spent on travel to the interest points.

Also, it would be useful if all lectures on different topics are given in English as well as the PowerPoint presentations.

It is very interesting to visitors to receive the presentations directly from the experts involved in the themes analysed.

The preparation of a dossier including all relevant information, articles, maps etc.

7. Personal comments

(What does the missionary think about his mission)

The mission was very interesting and well organised. It should be mentioned that over 20 people were involved in the different activities developed (presentations, work field, programme organising etc). The people involved were experts in a specific field concerning the management of water resources. Furthermore, the hospitality and the warmth of all Greek people turned the business trip into a wonderful experience for all participants.

Visits to historical – archaeological, interesting sites (Knosos, Archeological Museum of Herakleio) focused also on ancient hydraulics systems, have contributed to a better understanding of the development of the area.

The common Mediterranean characteristics between the TWINBASIN Segura and Crete partners, regarding climate, hydrology, hydrogeology, water deficiency, water uses, even agricultural patterns and the related water issues, strengthen the need of development of a common methodology for Integrated Water Resources Management in Mediterranean areas.

We find these exchanges very useful and support the idea of organising a final conference of all involved TWINBASIN missions.

8. Contacts

Principal local contacts met.

DIRECTORY OF WATER		
PAPAMASTORAKIS DIMHTRIOS	WATER DIRECTOR	watermgn@otenet.gr
KRITSOTAKIS MARINOS	GEOLOGIST	marinos@crete-region.gr
KOKOLAKIS STERGIOS	GEOLOGIST	kokolakis@crete-region.gr
MARTINOU AGGELIKI	CHEMIST ENGEENEER	martinou@crete-region.gr
ANDROULAKI MARIA	ECONOMIST	m.androulaki@crete-region.gr
DIRECTORY OF PLANNING AND DEVELOPMENT		
AMARGIANITAKIS IOANNIS	MINOR ENGINEEER	jamargian@crete-region.gr
OADYK		
PARASKAKIS NIKOS	TECNICAL CONSALTANT	oadyk@oadyk.gr
	FORMER DIRECTOR OF OADYK	
XARITAKIS GIORGOS	RESPONSIBLE FOR WATER DISTRIBUTION FOR OADYK (GEO-AGRONOMIST)	oadyk@oadyk.gr
SPANOUDAKIS MANOLIS	GENERAL DIRECTOR-CIVIL ENGINEER	oadyk@oadyk.gr
VARDOULAKI JENNIE	GIS	jennie@oadyk.gr
XATZIDAKI MARIA	ECONOMIST	oadyk@oadyk.gr
D.E.Y.A.X		
XILAKIS JOHN	MECHANICAL ENGINEER	xilakis@deyax.org.gr
KOTSIFAKI CHRISTINA	CHEMICAL ENGINEER	xristina@deyax.org.gr
HELLENIC CENTRE FOR MARINE RESEARCH		
DOUNAS COSTAS		kdounas@her.hcmr.gr

9. Bibliography

Main documents, manuals or supports used during the mission which could be useful for colleagues

Name	Description / Notice
Directorate of water. Marinos Kritsotkis	Water resources in Crete island
Directorate of water. Aggeliki Martinou	Greek legislation for water management.
Directorate of water. Marinos Kritsotkis	Budget structure of investments in Crete island
Directorate of water. Marinos Kritsotkis	Decision support tools (RIBASIM) A real case of study
Directorate of water. Aggeliki Martinou	Implementation of the WFD in Greece for running waters.
Ministry of environment	Report on Crete
Directorate of water. Marinos Kritsotkis	Water resources management in Crete. Recent trends, issues and future prospects.
Municipal Enterprise for Water and Sewage of Chania (DEYACH)	Wastewater treatment plant of Chania
Hellenic Centre for Marine research	Analysis of factors driving stream water composition and synthesis of management tools.
Hellenic Centre for Marine research & IRSA-CNR	The development of an ecological quality assessment and classification system for Greek running waters based on benthic macroinvertebrates

Web sites	
Name	Reference
Hellenic Centre for Marine research	http://www.hcmr.gr/index.html
Municipal Enterprise for Water and Sewage of Chania (DEYACH)	http://www.deyax.org.gr/en/
Organisation for development of western Crete. (O.A.DY.K)	http://www.oadyk.gr
Region of Crete.	http://www.crete-region.gr

N.B. This framework provides necessary information for further capitalisation and dissemination, but should not prevent experts from making any other comments (as far as basins characterisation is concerned, for instance).