

# EMWIS - A TOOL FOR EXCHANGING KNOW-HOW IN AND BETWEEN EURO-MED COUNTRIES

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## **Keywords**

Water portal, National water information systems, know-how, research and development, Watermed project.

## **Abstract**

Building a decentralised water information portal is a promising solution in terms of commitment of developing countries, system sustainability and better knowledge of end-users needs. In this context, the experience of the Euro-Mediterranean Information System on Know-How in the Water Sector –EMWIS– is significant in terms of organisation and technical architecture. International efforts should concentrate on protocols and water information structures to efficiently use and share information and knowledge. The EMWIS has been initiated during the Marseilles Euro-Mediterranean Ministerial Conference on Water Management (November 1996). After a feasibility study and the creation of a European Economic Interest Group for operating the EMWIS Technical Unit, the implementation phase started in late 1999. EMWIS aims to:

- Facilitate access to existing information on know-how in the water sector;
- Develop the sharing of information while permitting everyone to make known its responsibilities, activities, concerns and topics of interest, etc.;
- Elaborate common outputs and cooperation programs to develop available information and promote the collection of missing information.

EMWIS is concerned with the information available in the 35 countries of the Euro-Mediterranean Partnership: the 25 member states of the European Union and the 10 Mediterranean Partner Countries. EMWIS is giving access to information on "know-how" in the five priority topics: Institutions and experts that intervene in the water sector; Documentation in the water sector; Research and development programs; Training opportunities and Methods and techniques used for water resources management.

On the other hand, EMWIS is open to all the initiatives and projects to foster the circulation of information and knowledge at Euro-Med level. In this sense, WATERMED project (Water use efficiency in natural vegetation and agricultural areas by Remote Sensing in the Mediterranean basin) is one of the projects which is included in our forthcoming water project database -to be launched online soon- aiming to develop a comprehensive method for the study of water use and the resistance to the drought of the natural and irrigated vegetation in the Mediterranean Basin, by means of a combined historical and current space-based remote sensing database, vegetation models and field measurements. This project has been concluded recently with many interesting and useful results for the Euro Mediterranean countries.

## **1 Introduction**

To be effective any new initiative in the field of water management requires very good knowledge on the institutional framework, the stakeholders, existing programs, techniques and methods used, available tools and documentation, results of research, training opportunities, etc ...

In most of the cases, the information is only available, at either international or national level, in a fragmented, dispersed and heterogeneous way. Therefore it is necessary to make an effort to rationalize and make this information readable, easily accessible and available.

To tackle this issue and to strengthen the Euro-Mediterranean dialogue, the EMWIS (Euro-Mediterranean Information System on Know-How in the Water Sector) has been initiated during the Marseilles Euro-Mediterranean Ministerial Conference on Water Management (November 1996). After a feasibility study and the creation of a European Economic Interest Group for operating the EMWIS Technical Unit, the implementation phase started in late 1999. EMWIS aims to:

- Facilitate access to existing information on know-how in the water sector;
- Develop the sharing of information while permitting everyone to make known its responsibilities, activities, concerns and topics of interest, etc.;
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Having complete and good quality information available for the officers in charge of water policy and the water professionals requires the use of a homogeneous and efficient institutional system: this is the purpose of EMWIS. Its setting up implies an active participation and the sharing of information and experiences of all the partner countries involved in the system.

After a short description of the system characteristics, we will review the favourable context that made possible the quick development of the EMWIS, describe the main difficulties faced, how most of them have been overcome and outline the future development strategy. A brief description of WATERMED project has been given too.

## **2 EMWIS description**

### ***2.1 Characteristics***

First of all, EMWIS is concerned with the information available in the 27 countries, signatories of the Barcelona Convention in 1995: the 15 member states of the European Union and the 12 Mediterranean Partner Countries.

The term "know-how in the water sector" is the main characteristic of the EMWIS content. Indeed, EMWIS is only giving access to information on "know-how" in the five priority topics: Institutions and experts that intervene in the water sector; Documentation in the water sector; Research and development programs; Training opportunities and Methods and techniques used for water resources management.

The information is made available by "**a National Focal Point**" (NFP) in each country and by a central "**Technical Unit**" acting as an International Focal Point. EMWIS existence thus implies participation, to which all partner countries committed themselves.

The **National Focal Points** (NFPs) are small teams working in a public or semi-public organisation responsible for water related documentation and information. Their tasks consist in creating and developing a national water portal, organising communication processes and access to vetted information, ensuring information availability in the country language plus in the chosen 'international' languages (English or French), developing access to the information and maintaining relations with the users in their country.

EMWIS National Focal Points have already been created in each Mediterranean Partner Country plus in eight countries of the European Union. The table below lists the organisations in charge of the NFP in each country:

| Country                              | Organisations                                                         |
|--------------------------------------|-----------------------------------------------------------------------|
| <b>Mediterranean Partner Country</b> |                                                                       |
| <b>Algeria</b>                       | Agence de Bassin Hydrographique Constantinois -Seybousse - Mellegue   |
| <b>Cyprus</b>                        | Water Development Department (W.D.D.)                                 |
| <b>Egypt</b>                         | Ministry of Public Works and Water Resources                          |
| <b>Israel</b>                        | The Hydrological Service of Israel (HSI)                              |
| <b>Jordan</b>                        | Ministry of Water and Irrigation                                      |
| <b>Lebanon</b>                       | Ministère de l'Énergie et de l'Eau                                    |
| <b>Malta</b>                         | Water Services Corporation (WSC)                                      |
| <b>Morocco</b>                       | Ministère de l'Équipement - Direction Générale de l'Hydraulique       |
| <b>Palestine</b>                     | Palestinian Water Authority (PWA)                                     |
| <b>Syria</b>                         | Ministry of Irrigation - International Water Bureau                   |
| <b>Tunisia</b>                       | Ministère de l'Agriculture - Direction Générale des Ressources en Eau |
| <b>Turkey</b>                        | General Directorate of State Hydraulic Works (D.S.I)                  |
| <b>European Union Country</b>        |                                                                       |
| <b>Austria</b>                       | Austrian Water                                                        |
| <b>Belgium</b>                       | Aminal - Afdeling Europa en Milieu                                    |
| <b>France</b>                        | Service National d'Information et de Documentation sur l'Eau (SNIDE)  |
| <b>Greece</b>                        | Ministry of Environment Physical Planning and Public Works            |
| <b>Italy</b>                         | Ministry of Environment                                               |
| <b>Luxemburg</b>                     | Ministère de l'Environnement                                          |
| <b>Portugal</b>                      | Instituto de Agua (INAG)                                              |
| <b>Spain</b>                         | Centro de Estudios y Experimentacion de Obras Publicas (CEDEX)        |

#### List of EMWIS National Focal Points

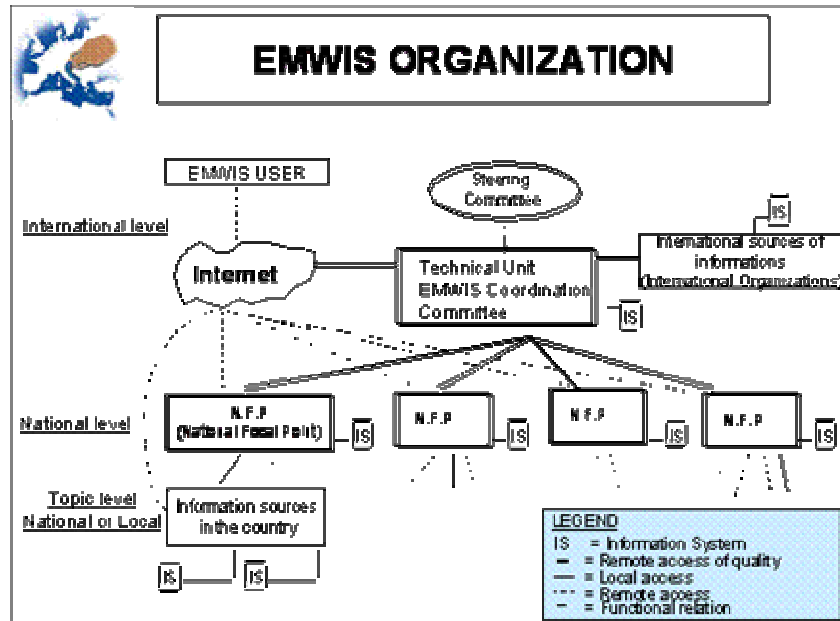
The **Technical Unit** is a permanent body which executes the yearly action plan with the National Focal Points. Its assignments consist in: i) proposing strategic orientations, action plans and yearly budgets to the Steering Committee, ii) co-ordinating and providing technical assistance to the National Focal Points, iii) being the International Focal Point, iv) developing and managing the EMWIS information portal in English and French (Arabic in near future).

The "**Steering Committee**" involving 9 countries, designated for a 3-year period, formulates the main strategic orientations and validates the yearly budgets and progress reports. Under a Spanish Presidency and a Cypriot Vice-Presidency, it is made up of the Technical Unit's donors (Spain, France and Italy), of the European Commission and of Algeria, Cyprus, Jordan, Malta, Morocco and the Palestinian Authority.

The "**Co-ordination Committee**" is responsible for supervising the system development in the countries, formulating the yearly action plan and proposing the yearly budget. It is made up of representatives of the Technical Unit and of all the National Focal Points. Morocco assumes the Presidency and Malta the Vice-Presidency.

## **2.2 Technical approach**

The figure below shows the technical structure of EMWIS. Without going into details, this figure illustrates the concept of distributed computing and management used by EMWIS. From a user point of view, the system allows a seamless access to the different servers.



In order to facilitate access to the national sites, uniform domain names have been registered for the 27 countries of the Euro-Med Partnership. Thus the home page of each NFP server can be reached by 2 URLs: <http://www.semide-xy.org> and <http://www.emwis-xy.org>, where “xy” letters correspond to the country code on the Internet (ISO 3166). Of course each country can also have its own domain name that will point to the same resources.

### 2.3 Services offered

Each national EMWIS website represents the water information portal of the related country. The international server provides international information (e.g. programmes from the European Union, the World Bank, UNESCO, etc.) and an aggregation of the content from the National EMWIS websites.

As, usually the end users are browsing different national websites, a minimum set of common requirements have been defined:

- Common look and feel to indicate that the user is on the same integrated system even if he is consulting different servers
- Similar structure and sections to help the users to easily find their way on each server: e.g. “water context”, “water news”, “institutions”, “documentation”, etc.
- Quality and legal issues: date of the last update on each web page, contact details of the NFP, disclaimer, use of international standards to present the information

In addition to the national information portals, more advanced tools have been set-up and are available online:

- A thematic water directory allowing searching « who does what » per topic and per country. This tool is based on a common conceptual model jointly defined with the NFP that can operate in a central or distributed way. In all the cases, each NFP is responsible for the information related to its own country
- A dedicated search engine through all National EMWIS websites
- A Multilingual search tool on distributed bibliographical or full-text databases: based on a multilingual water thesaurus (English, French, Spanish, Portuguese and Italian) and a standardised access protocol for Information Retrieval (ANSI/NISO Z39.50) used in the Library sector
- Private electronic forum for collaborative work among the EMWIS community
- Public electronic forum dedicated to various topics and moderated by the Technical Unit or external experts following their request.

- Euro-Med water news broadcast lists (electronic flash) edited by the Technical Unit in English (about 5900 subscribers), French (about 2300 subscribers) and the recent Arabic version (about 40 subscribers); all based on information provided by the NFP or collected by the Technical Unit.

### **3 Favourable context**

To well understand the rapid growth of EMWIS in the Mediterranean Countries, we must keep in mind a number of key issues related to the environment on which EMWIS has been developed.

#### ***3.1 A strong political framework***

EMWIS is a result of the Euro-Med Partnership (known as the Barcelona Process). It has received a strong political support at the highest level since its creation. The Ministers in charge of water management in the 27 Partner countries have reasserted, more than once, their commitment to the system. Indeed, it is the only multilateral initiative of the Partnership in the water sector. During the Euro-Mediterranean Ministerial Conference of Stuttgart (April 1999) water management was declared one of the six priority sectors for the future of Mediterranean co-operation.

The declaration of the Turin Ministerial Conference on Local Water Management (October 1999) underlined once more the importance of EMWIS, especially for the implementation of the Water-related Action Plan. In this declaration, the participants agreed to:

*Entrust the Euro-Mediterranean Water Directors and the Commission, owing to its co-ordination role, with the orientation, follow-up and evaluation of the action plan implementation. For this purpose, they will rely on the Mediterranean Water Network, on the Euro-Mediterranean Information System on the know how in the Water Sector (EMWIS) and on other relevant bodies, etc.*

#### ***3.2 Information Society developments***

With the initiative eEurope 2005, the European Union has ambitious goals. Even if experts recognised that the transition phase from a post-industrial to a globally networked knowledge society is likely to take 20 or 30 years, this plan is stimulating the development of secure services, applications and content based on existing and emerging broadband communication networks.

In the context of the Euro-Mediterranean Partnership, a programme (called EUMEDIS), specifically designed to reduce the region's informational and technological gap vis-à-vis the neighbouring countries, has been initiated in 1999. It aims at developing regional applications with user communities in the largest number of Mediterranean Partners. This programme is also fostering the development of suitable telecom infrastructure with specific actions on 'New Approaches to Telecom Policy' or the interconnection of research networks (EUMEDCONNECT).

These regional initiatives together with the global trends towards the digital economy and priorities on public electronic services (e.g. electronic government) have created a favourable environment (awareness, growing number of online services and better access) for the development of systems based on the Internet to provide water information to a broad audience.

#### ***3.3 A tool necessary for the Euro-Med water cooperation***

EMWIS has been the first operational initiative of the Euro-Med partnership in the water sector at the regional level. In spite of the many difficulties encountered, the Mediterranean Partner Countries have all expressed, at different levels, their will to make EMWIS progress as the main tool for regional co-operation in the water sector.

When new regional water initiatives have been launched, they enlarged the users/producers community and expressed specific needs and requirements, thus:

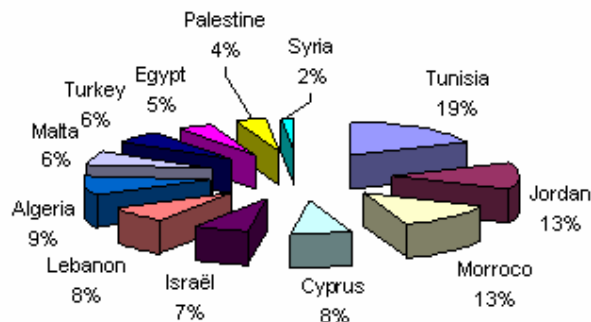
- The Mediterranean Component of the International Network of Basin Organisation (Med-INBO) is collaborating with EMWIS for publishing and disseminating its information.
- In the framework of the Euro-Mediterranean Regional Programme for Local Water Management (MEDA-Water), EWMIS provided information to the organisations preparing proposals (water context in the various countries, partner search, information on the call for proposals, etc.) and will publish regular news about the programme and related projects.

Such synergies, allowed getting a better idea of users needs in the context of international cooperation in the water sector: national water institutional structure, water context, contacts in relevant organisations, water legislation, existing programmes.

### ***3.4 Existing information resources***

In each country, the coordination of the so-called National Focal Point (NFP) is undertaken by a public institution (see list above) having responsibilities in the provision of water information or the operation of a National Water Information System. With the support of the NFP, some 124 “information sources” have been identified in the Mediterranean Partner Countries (MPC) (including Malta & Cyprus):

***Breakdown of identified information sources  
in the Mediterranean Partner Countries + Malta & Cyprus***



These resources are mainly providing documentation and data on water resources while very few information is provided on awareness campaigns or non conventional resources. In 75% of the cases the information is provided by government bodies. So EMWIS NFPs, who are also public agencies, have an easy access to this information. However, in some cases, the administrative process to get the authorisations for publication remains quite long.

### ***3.5 Information clearing house for International actions***

Part of EMWIS trends in its second phase is disseminating information about international actions, such as MEDA – Water programme, MED component of the EU water initiative, and others also like LIFE, SMAP & INCO-MED. One of the last one programme projects is **WATERMED**, to which the next paragraph is dedicated.

#### ***WATERMED project (WATER use Efficiency in natural vegetation and agricultural areas by Remote sensing in the MEDiterranean basin)***

The WATERMED project (2000-2004) is funded by the European Union (INCO-med project) and contributes to the international efforts in analysing efficiency in water use, in particular for the Mediterranean Basin countries. As water consumption increases and water

reserves fall dramatically, Mediterranean countries (European and non-European) have to re-evaluate their assets and future development in terms of their reserves. In this context the research on water use efficiency and water management focuses on water saving, particularly in agriculture recently becoming a European priority. The WATERMED project has this concern as the main objective; approaching the problem from a new point of view namely based on combined use of historical and current space-based remote sensing databases, vegetation models and field measurements. In this sense, the major results of the WATERMED project that contribute to the study of water use efficiency are:

(i) the development of new operative algorithms for estimating physical and biophysical parameters (surface temperature, emissivity, total atmospheric water vapour, albedo) from remote sensing data,

(ii) the elaboration of a new physical upscaling method which is necessary to improve surface flux estimation in heterogeneous terrain widespread in Europe and North Africa,

(iii) the establishment of new methodologies for estimating evapotranspiration model input parameters with the required accuracy, which will improve the retrieval of daily evapotranspiration. It is an important factor for monitoring water requirements of crops and water consumption at a regional scale, and for integrating evapotranspiration through the whole phenological cycle which is also closely related to the crop final productivity,

(iv) the development of a software package for processing high and low resolution remote sensing satellite data which has allowed the elaboration of maps of critical parameters,

(v) the building of local GIS for efficient water management strategy in the Marrakech region (Morocco) and in the northern Sinai Peninsula (Egypt),

(vi) the realization of field experiments in different test sites where ground and satellite data have been collected, to assess the accuracy and demonstrate the usefulness of combining ground and remote sensing data for estimating evapotranspiration at different space time scale, and

(vii) the elaboration of an intergrated database combining remote sensing, in-situ and GIS data with open access to scientists and local administration managers.

In addition the project has allowed the establishment of new scientific relationships within northern and southern countries in the Mediterranean Basin and the strengthening of research teams. Furthermore the project brings researchers together with managers and other stakeholders to jointly evaluate research results and user needs and to set research priorities. The project facilitates the rapid assimilation of new technologies, analytical tools, and modelling approaches for a more efficient management of water resources in water scare areas. Water managers are now testing a new management strategy where water allocation is decided based on the demand rather than the availability. This allowed setting priorities for water allocation in case of water shortages and crises. The latter is the current situation. Future actions should be directed toward the use of the actual project output to build a decision support system for integrated management of water resources. This will make possible to establish a sound scenario for the consequences of political actions on the sustainability of water resources.

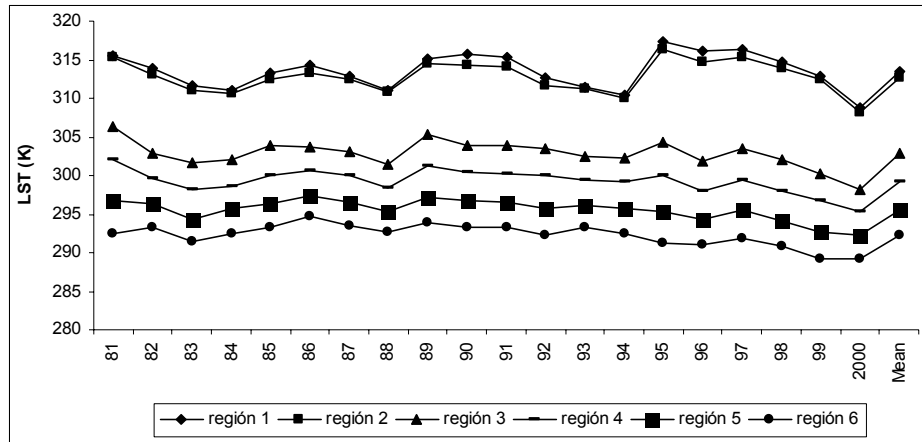
The Mediterranean basin was selected as the area of study thanks to its high environmental diversity. This area is clearly affected by the risk of the advance of the desert. Analysing multi-temporal data from the NOAA/NASA Pathfinder AVHRR land (PAL) dataset has taken place as part of the WATERMED project. The main objective of this study was to map, and monitor land-cover change in the Mediterranean basin between 1981 and 2001. The study consists in combining both the information in the visible/near-infrared bands in terms of Normalised Difference Vegetation Index (NDVI) and in the thermal-infrared bands in terms of Land Surface Temperature (LST). The space-temporal dynamics of these parameters have been sought by analysing seasonal and inter-annual variability. Finally, the evolution of LST and NDVI for the months of April and July has been analysed by the use of the Land Cover Dynamic (VCLD) method.

The Mediterranean climate of the area is characterized essentially by two seasons: a hot and dry summer and a short winter with concentrated precipitation. The climate is also variable according to region and marked by strong annual and inter-annual irregularity. The

area is also subjected to a significant problem with regard to desertification. The aim is to get an evolution overview on land cover during the period of study. The considered method is based on the analysis of the images that represent respectively the total average of NDVI and LST for the whole period (1981-2001). Comparing both images, a great correlation between has been observed between the two. The information provided by each one is complemented and it is inversely proportional to the other; the regions with high values of LST correspond to those of minimal NDVI, and conversely. In both images we see a clear and accused gradient in north-south direction in terms of NDVI (0.5) and south-north in terms of LST (45 K). Three differential regions were clearly distinguished. The first located along the north of the Mediterranean Basin (north of the Iberian Peninsula, Italy, Balkans and north of Turkey) with very high values of NDVI (>0.4) and LST between 285 and 300 K. An intermediate or transition zone located in the central part of the basin including northern Africa and the European part delimited on the north side by the first region. This region supports other type of vegetation that the previous showing values of NDVI between 0.2 and 0.4 and LST values relatively high between 300 and 310 K. Finally, the remaining zone is mainly located in the Sahara desert and bare soil zones located in the south-east of the Iberian Peninsula, the north-west of Morocco and the centre of Turkey. This zone shows to be the most affected by the aridity processes presenting very high values of LST (>310 K) and very low values of NDVI (<0.2).

Zones of interest of the Mediterranean Basin and their main characteristics.

| <i>TANDVI</i>   | <b>Characteristics</b>                                                                                                                                                                                             | <b>Name</b> |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>&lt; 0</b>   | Deserts. Limited opportunities for the development of the human activities. i.e., Sahara desert, Hejaz.                                                                                                            | zone 1      |
| <b>0 -0.1</b>   | Zones of desert influence in Africa, desert zones in Spain and centre Turkey. i.e., Pre-Sahara, Almería, centre Turkey, Syria and Nafūd deserts.                                                                   | zone 2      |
| <b>0.1 -0.2</b> | Dry lands. Low precipitation. High temperatures. Low level of water retention. Sensitive to the effects of the climatic change and the loss of the biodiversity. i.e., Plains of the Iberian Peninsula and Turkey. | zone 3      |
| <b>0.2 -0.3</b> | Low precipitation. Able to sustain vegetation. Sensitive to the effects of the climatic change and the loss of the biodiversity. i.e., Northern Africa coastal zones.                                              | zone 4      |
| <b>0.3 -0.4</b> | Medium precipitation. Area of vegetation. i.e., Nile delta, north Europe.                                                                                                                                          | zone 5      |
| <b>&gt; 0.4</b> | Areas of abundant vegetation. High mountains. High precipitation. i.e., Rif, Atlas, Pirineos and Cantabrian Mountains.                                                                                             | zone 6      |



Plot of the annual evolution of LST in each zone.

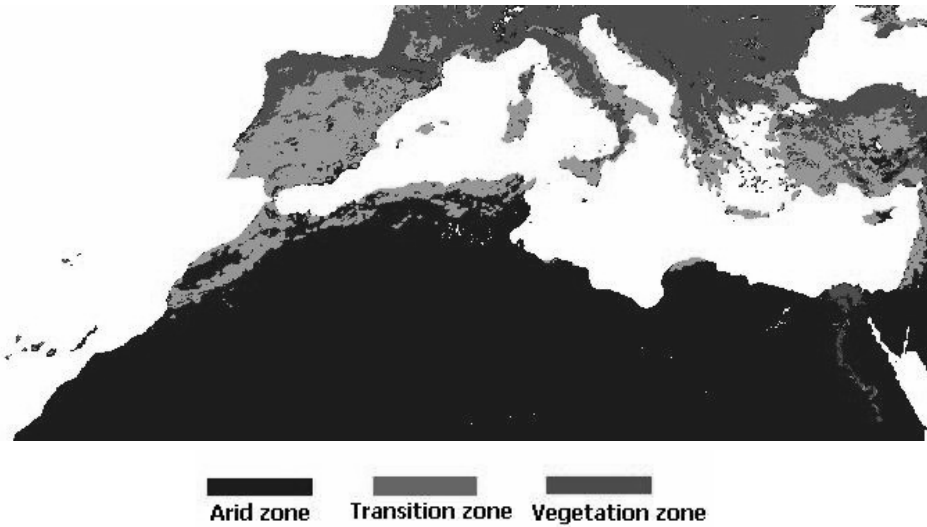


Image result of the application of the VLCD method to the study area.

This research demonstrates the consistency of PAL data for climate studies. The comparison between satellite data and climate data has permitted a major understanding of the land cover dynamics of the Mediterranean Basin. The information provided by climatic data is highly useful to check the reliability of the algorithms developed to use for satellite data. More analysis is being carried out in order to ascertain the tendency of the land cover changes in the Mediterranean basin, as twenty years of data is still insufficient to get a definitive conclusion.

#### 4 Main difficulties in setting up a decentralised system

During the setting up of this decentralised system, some difficulties have been identified. Most of them have been overcome but some improvements are still expected in a longer term.

##### 4.1 Understanding the Partnership approach

Most of the developing countries are used to bi-lateral cooperation programmes for which the common approach is based on “technical assistance”. In this case the beneficiary is

receiving either technical or financial support or both to achieve some objectives agreed with the donor.

The partnership approach involves a stronger commitment from the beneficiary to provide the necessary resources to achieve the goals defined. In the case of EMWIS, the concept of subsidiarity is also used, i.e. each country is responsible and must provide the adequate resources for the development of its national system. This national system being a part of an international one, the external support provided is “limited” to support the collaborative work, joint definition of common standards and capacity building to develop and operate the national systems.

Although the decision making process is longer for the partnership approach, it usually result in a better awareness of the benefits of the action and better sustainability.

#### **4.2 Language issues**

The system being fully decentralised using mainly national resources, the main target audience of individual systems is national. So most of the systems developed must provide information in their country language. At the same time to be useful at a regional level (i.e. Euro-Med), it has been decided to use one of the 2 international languages commonly used in the area: English or French. But this is not yet enough as, for example a web site only in French will not be useful for most of Egyptians or Jordanians.

In addition, when analysing the target audience of EMWIS as an international system, it appears clearly that the Arabic language should also be used to provide water information as this language is common to 8 countries of the Euro-Med partnership.

In addition to the translation problems, on the technical side, the requirements are very high as the architecture must support 4 alphabets: Arabic, Greek, Hebrew and Latin.

### **5 Strategies adopted**

The table below presents the strategy adopted to overcome most of the difficulties faced:

| <b>Difficulties</b>                                    | <b>Solutions adopted</b>                                                                                                                                                                                                                                    |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local involvement                                      | <ul style="list-style-type: none"> <li>• High level political commitment</li> <li>• Strengthening the partnership approach</li> <li>• Decentralised system with local management responsibilities</li> <li>• Joint design and modelling</li> </ul>          |
| Local use                                              | <ul style="list-style-type: none"> <li>• Information available in country languages</li> <li>• Local promotion seminars</li> </ul>                                                                                                                          |
| Lack of information sharing                            | <ul style="list-style-type: none"> <li>• Capacity building</li> <li>• Exchange of experience North-South and South-South</li> </ul>                                                                                                                         |
| Technical and organisational gaps                      | <ul style="list-style-type: none"> <li>• Dedicated training to NFP staff</li> </ul>                                                                                                                                                                         |
| Internet infrastructure                                | <ul style="list-style-type: none"> <li>• Synergy with Information Society programmes</li> <li>• Financial support to improve the connectivity of decentralised systems</li> </ul>                                                                           |
| Availability of local information in electronic format | <ul style="list-style-type: none"> <li>• Low level requirements for local content creation during the 1<sup>st</sup> phase</li> <li>• Flexible technical architecture based on open formats and protocols in order to integrate emerging systems</li> </ul> |
| Sustainability                                         | <ul style="list-style-type: none"> <li>• Raising local awareness on the benefits of such system</li> <li>• Building partnerships for information provision</li> <li>• Applying the subsidiarity principle</li> </ul>                                        |

### **6 Conclusions**

Implementing a decentralised water information portal requires more time and resources than developing a centralised system. Indeed, an important part of the time is dedicated to capacity building in the field of the water information management rather than on the

provision of the water information itself to the end-users. But in a longer term, it results in a more efficient and sustainable system.

At the international level, the interest of such system basically comes from the aggregation of individual pieces of national information. The production of national content is linked to the availability of National Water Information Systems offering interoperable services for real-time integration. Such developments will require a major effort among the international water information community to define common standard formats and agreement on services interoperability.

Today the Internet technology is mature for such developments. The eXtensible Mark-up Language –XML-, recognised as the new language of the web, could be applied to define a language dedicated to water information, a Water-ML (as already exists SensorML: mark-up language for sensors, or ESML: Earth Science Mark-up Language). The web services are also very promising for distributed applications and systems.

In order to re-enforce the sharing and re-use of the information/knowledge collected at various levels and to avoid duplication of efforts, it is of utmost importance to start joint work on these issues at the international level.

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