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EMWIS

Euro-Mediterranean Information System on Know How in the Water Sector

Technical and financial feasibility studies of the National Water Information Systems in Mediterranean Countries

Executive summary

January 2006

MEDA Water

Funded by European Union

Prepared By

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Advanced Computer Services

TECHNICAL AND FINANCIAL FEASIBILITY STUDIES OF THE NATIONAL WATER INFORMATION SYSTEMS IN MEDITERRANEAN COUNTRIES

EXECUTIVE SUMMARY

In April of 2005, EMWIS awarded **EasyInfo**; "a Jordanian Consulting Company"; a contract to conduct a study to assess the current National Water Information System (NWIS) situation in 12 Mediterranean countries and recommend actions for enhancement. These countries are: Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Syria, Tunisia, Turkey and Palestine. The study commenced on 1/4/2005 and ended on 30/1/2006.

The main objectives of the study can be summarized as follows:-

- Conduct analyses of the water information systems (used or planned) in each country included in the study and assess national needs and requirements, including:
  - Identification of information providers and necessary collaborations.
  - Knowledge of end-users.
  - Organization of the EMWIS National Focal Point (NFP) and its information system as part of the NWIS.
- Defining a set of technical, financial and organizational recommendations and setting a roadmap towards the improvement or the implementation and operation of a NWIS.
- Compile all findings and recommend to EMWIS steps to enhance, smooth and harmonize data sharing between the NWIS and EMWIS.

A NWIS can be defined as a system that stores and processes information shared between the main national water stakeholders in a country. A NWIS is usually a computerized system and is considered as one of the main instruments of the national water policy. It includes institutional and legal information (agreements between stakeholders, ownership, copyright, legal data exchange, etc.), standardization and organizational information (formats, exchange and management procedures, etc.) and information technologies (hardware, software, network, security). Depending on the main purpose of establishing NWIS (defined by stakeholders in the country), the type of information managed could include quantitative information, maps, best practices, directories, water legislation information, and grey literature.

It is anticipated that improvement of NWIS systems in the countries:

- would improve and harmonize information exchange and sharing within the participating countries, thus allowing better water management at the national level and with their neighborhood countries
- will have a direct impact on the quality, availability and flow of information from the participating countries' NWIS to the EMWIS international system via their NFP.

The study was conducted for the following 10 Mediterranean countries who gave their approval to the EMWIS Technical Unit: Algeria, Cyprus, Israel, Jordan, Lebanon, Malta, Morocco, Tunisia, Turkey and Palestine. The EMWIS TU approached Egypt and Syria to include them under this study but both countries did not reply.

For each country visited the consultant prepared a country report which analyzed the current situation of NWIS in that country. Chapter four of this report summarizes the findings per country. Although this report was written as a stand alone document, the need to read every report is still important to understand all the details and get hold of the over all picture.

Synthesis of information gathered revealed that amongst all types of information assessed, the most frequently found literature in all countries under investigation is the quantitative, maps and grey literature.
Different countries use different systems to warehouse water data and information; some are manual while others are computerized. Most of the countries are also using Geographical Information Systems (GIS). Usage of computerized systems in some countries is simple and does not utilize all system features especially with GIS systems that are mainly used for producing maps.

In some countries, the main stakeholder of water information is managing a Water Information System (WIS). A WIS is an information system used by a group of actors that stores and processes water information using information technologies. In the context of this study, WIS identified were only accessed and used by one stakeholder to warehouse quantitative water data and information. Water Information Systems vary in the level of development in the countries visited. Some are simple spread sheets (e.g. MS-Excel) facilitating data entry and retrieval while others are fully developed web based database systems with GIS interface. All countries are using relational databases (either MS-Access or Oracle) and ESRI Arcview and ArcInfo products for their GIS systems. Countries were classified under five different levels with regards to WIS development:

- Advanced level (Algeria and Tunisia)
- High level (Cyprus and Morocco)
- Medium level (Jordan and Israel)
- Development level (Turkey and Malta)
- Pre-development level (Palestine and Lebanon)

While many of the countries visited had a WIS, Algeria is the only country that is developing a National Water Information System but has not yet institutionalized the system. Tunisia has started a project for the development of a NWIS; a feasibility study has been conducted and a detailed design phase for the targeted system should have started in August and finished by December 2005. Apart from Algeria and Tunisia, none of the other countries visited are developing a NWIS but, at the technical level, they are all convinced of the need of such system. Some countries, however, have started initiatives or developed systems that can serve as core components for developing a NWIS like Morocco and Cyprus. Others have systems that can be utilized as back end servers for a NWIS like Jordan and Israel. In Turkey, a new project for developing an internal WIS for the main provider of water information has been initiated. In Malta, the mandated agency for providing water information lacks a WIS for its internal use although the other stakeholders have developed internal systems. Palestine and Lebanon, on the other hand, have fragmented systems available at stakeholder agencies with little facilities for information exchange. In Lebanon, the existing systems hardly satisfy internal needs of stakeholders and major upgrades are required.

The main reasons for the unavailability of NWIS in countries were related to:-

- Lack of staff within the stakeholders met to develop and manage NWIS. Available staff are not enough and are overwhelmed with other responsibilities
- Lack of financial resources.
- Lack of awareness of NWIS benefits.
- Political situation.
- Absence of a political decision to establish such a system.
- Lack of the institutional structure and technical infrastructure to collect, store and share data; and unavailability of data.

All countries are facing problems in exchanging water information. Some of the problems are common among a number of countries while others are specific for certain countries. Common or shared problems need to be addressed for all countries because some of these problems can be obstacles that will hinder the development of NWIS in each and every country of those, while others are considered as threats to the institutionalization and sustainability of NWIS after its establishment.

The common problems found are related to:

- Data availability: some data are not measured or collected from field, not computerized, unreliable, contains errors, have a non-compatible formats, confidential or has commercial value (some stakeholders sell data)
- Resources availability: insufficient IT infrastructure, loss or Lack of NWIS-dedicated human resources, lack of financial resources to establish and operate the system
- Organisational framework: lack of NWIS Awareness, no high-level political decision, poor or non-existent relationships between stakeholders, unclear roles and responsibilities for data exchange, lack of data access policies and privileges, no SOPs for data exchange, data monopoly or hesitation to release information

Problems were prioritized based on a collective criterion utilizing the frequency of occurrence, severity, and solvability level.

Country visits have also identified opportunities to develop NWIS in countries. Opportunities include: availability of in-country IT know-how (although the IT know-how is available in the country but it is not available at the stakeholders or the number of staff available are not adequate and are overloaded with other responsibilities), acceptance of NWIS concept during consultation visits, willingness of stakeholders to share information under a NWIS, on-going donors projects in some countries, availability of utilizable IT infrastructure, legal obligation to share data in some countries, existing web-based applications, new organization restructuring allowing for developing new systems for data exchange, available funds in some countries (like Cyprus, Tunisia and Turkey) , in addition to the fact that countries joining the EU have new obligations to provide water information. These opportunities should be utilized when developing a NWIS.

Moreover, EMWIS NFPs capabilities for developing, supervising and hosting NWIS in countries were assessed, the results show that while some EMWIS NFPs have capabilities to develop, supervise and host a NWIS, other EMWIS/NFPs still need lots of support to enhance, consolidate and upgrade their capabilities in almost all categories assessed. Countries were categorized based on the level of their capabilities to coordinate and supervise the NWIS in their countries into three levels:

Level 1: Advanced; the NFP can act immediately as NWIS coordinator and host. Turkey, Morocco and Israel are in this level.

Level 2: Medium capabilities; the NFP needs further support to enhance their capabilities to be able to act as NWIS coordinator and host. Jordan, Malta, and Cyprus belong to this level.

Level 3: Needs major support to strengthen their capabilities to be able to act as a NWIS NFP Palestine and Lebanon are in this level. Algeria's EMWIS/NFP also was categorized in this level as the NWIS NFP has already been chosen in Algeria and is the Ministry of Water Resources and not the EMWIS NFP.

Stakeholder's relationships within the countries under investigation were also assessed. .Results show that these relationships range from "very strong" -where data exchange takes place on regular basis- to nearly non-existent where data is not exchanged at all between stakeholders . Venn diagrams were produced to show different levels of relationships between stakeholders in countries under investigation in this study.

NWIS readiness among countries was also assessed and was categorized in four groups:

- Most NWIS-Ready Group (Algeria, Tunisia, Morocco)
- Medium to high NWIS-Ready Group (Cyprus, Israel, Jordan)
- Medium to Low NWIS-Ready Group (Turkey and Malta)
- Still-to-be developed NWIS Group (Palestine, Lebanon)

An ideal system for NWIS was then proposed in the form of a web based distributed database system with a GIS interface. NWIS would not store data but serves as a dynamic link between all stakeholders. All stakeholders will manage and update their own database. Each stakeholder will decide on the type of information to share and on access privileges. Stakeholders would still be responsible for all their data collection, entry, verification and maintenance but will have dynamic links to the NWIS. Stakeholders will have three database areas: the first is a public-designated area where public domain data is dynamically linked to EMWIS website and can be shared by any web navigator. The second area will be allocated as a secure area and can only be accessed by privileged users. The third area will also be a secure internal area that will be dedicated for the internal use of a stakeholder. In order to provide extra assurance for countries, the public area and secure area can be physically separated in two servers.

Implementing proposed NWIS in countries must come in two phases:

- **The pre-NWIS development phase**. This can be identified as the preliminary phase for countries to become eligible for NWIS development. The tasks to be implemented in this phase can be summarized in the following: survey of all water data sources, monitoring of water resources, development of standard operating procedures (SOP) for monitoring and data collection, usage of computers and availability of network infrastructure, provision of qualified IT staff, institutionalization of monitoring of water resources, Internet connection availability; and web sites available- at least -for the majority of stakeholders.
- **The NWIS development phase.** This phase includes implementing the following tasks: awareness campaign, obtain political decision to implement NWIS, establish a coordination committee, select host/coordinator; IT staff capacity building, data classification/sharing policy, data collection roles & responsibilities, secure funds, feasibility study; detailed technical

design study; write the terms of reference; develop NWIS, validation and test, institutionalization and implementation.

The synthesis revealed that nearly half of the countries visited have already completed the pre-NWIS development stage. Only two countries -Lebanon and Palestine -are still in the pre-development phase and need considerable assistance. Most of the countries have varying levels of progress in the NWIS development phase. Algeria is at the top of the list with its NWIS ready for implantation if not already implemented by now.

Potential actions were identified for EMWIS and donor agencies to help the different countries in implementing a NWIS.

Potential actions where EMWIS can add value are:

1. Development of SOPs for monitoring, data collection and exchange.
2. Conduct awareness raising campaigns.
3. Exchange of experiences between countries
4. Setting up data classification and roles and responsibilities for data exchange.
5. Assist countries in the NWIS administrative preparations such as obtaining a political decision to implement NWIS and formation of coordination committees.
6. Help qualified countries secure funds to implement NWIS.

Donor agencies can provide support to:

1. Conduct detailed studies for NWIS implementation in countries.
2. Develop and design technical specifications for NWIS in countries.
3. Develop, build and institutionalise NWIS
4. Strengthen the capacity of countries to monitor their water resources.

The study has also found out that the main reasons behind the sometimes unreliability and intermittent provision of information to EMWIS by the countries visited can be attributed to one or more of the following;

1. Most of the types of information required by EMWIS e.g. best practices, water legislation information, grey literature, etc. are either not readily available or need time to transfer them into digital format. The only type of information usually available in digital format is the quantitative information but considered as confidential in most of the cases.
2. Unsatisfactory relationships between stakeholders within the country.
3. Overloaded staffs that is busy with other responsibilities.
4. Lack of WIS within some countries.
5. Confidentiality of data and the political situation.

Compiling all the above, a road map was recommended to enhance NWIS in countries. The road map was based on minimizing and solving problems that hinder the development of NWIS, making use of in-country on going opportunities and overcoming weakness points in the NWIS development in all countries covered by this study. The road map steps are:

1. Conduct an NWIS awareness campaign.
2. Obtain a country high-level political decision to establish NWIS.
3. Develop standard operating procedures for data collection and exchange through NWIS.
4. Hire more IT staff in stakeholder organizations and strengthen their capacity.
5. Help establish a NWIS coordination committee in countries under investigation.
6. Coordinate with other donors on-going similar projects.
7. Setting data classification/sharing policy and data collection roles & responsibilities.
8. Secure or help secure funds.
9. Conduct a full feasibility and design study.
10. Conduct a detailed technical design study.
11. Develop and institutionalize NWIS.

The overall rough cost for developing NWIS in 7 countries (Israel, Jordan, Lebanon, Malta, Morocco, Turkey and Palestine) was estimated to be approximately two million Euro. A separate complementary detailed study is required in each country in order to define the detailed technical specifications of each system and hence the exact cost for implementing or enhancing NWIS. Budgets have already been secured for Algeria, Tunisia and Cyprus, but additional funding might be necessary to extend the systems and put in coherence the SOPs and data format with common standards to be defined at the regional level by EMWIS.