INVENTORY, ASSESSMENT AND MONITORING OF MEDITERRANEAN WETLANDS

THE MEDWET WEB INFORMATION SYSTEM USER MANUAL

Panagiotis Katsaros, Yiannis Kapanidis and Anakreon Mentis

Nick J Riddiford *scientific reviewer*

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The current work is published in the MedWet series Inventory, assessment and monitoring of Mediterranean wetlands. This series is the outcome of the project "MedWet information and knowledge network for the sustainable development of wetland ecosystems (MedWet CODDE)". The project was launched under the INTERREG IIIC programme (to read more about the MedWet CODDE project visit the website www.medwet.org)

Inventory, assessment and monitoring of Mediterranean wetlands incorporates the following series of manuals:
• The Pan-Mediterranean Wetland Inventory Module (Tomàs-Vives, 2008)
• The Catchment Module & The Site Module (Farinha et al, 2008)
• The Water Framework Directive Module (Cenni & Tarsiero, 2008)
• The Surveillance Module (Farinha & Fonseca, 2008)
• The Indicators Module (Fitoka et al, 2008a)
• The MedWet Web Information System User Manual (Katsaros et al, 2008)
• The MedWet Inventory Data Sharing Protocol (Fitoka et al, 2008b)
• Mapping Wetlands Using Earth Observation Techniques (Fitoka & Keramitsoglou, 2008)

Technical Coordination: EKBY

Designed and published by Sympraxis Team www.sympraxis.gr

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ABOUT THIS MANUAL

The new MedWet series

The **MedWet Web Information System User Manual** is part of the new series *Inventory, assessment and monitoring of Mediterranean wetlands* published under the auspices of the "MedWet information and knowledge network for the sustainable development of wetland ecosystems (MedWet CODDE)" project. Undertaken between 2005-2007, the MedWet CODDE addresses the urgent need for policy makers, wetland managers and researchers to have easy access to up-to-date and standardized data in order to assess and monitor the current status and trends of Mediterranean wetlands and their surroundings. The project was launched through the INTERREG IIIC programme.

The purpose of the new MedWet publication *Inventory, assessment and monitoring of Mediterranean wetlands* is to assist wetland managers and scientists to inventory their wetland resources, to facilitate the monitoring and assessment of these resources and to promote data harmonization and compatibility among various inventory efforts in the Mediterranean and beyond. It has its roots in the original MedWet wetland inventory work (Costa et al, 1996; Hecker et al, 1996; Farinha et al, 1996; Zalidis et al, 1996) developed during the MedWet 1 (ACNAT) project and presented in 1996 at the Conference on Mediterranean Wetlands in Venice as a standard inventory methodology for the countries of the Mediterranean region. The publication also draws on the outputs of the first upgrading effort done under the SUDOE project (INTERREG IIB).

Inventory, assessment and monitoring of Mediterranean wetlands introduces a Mediterranean-wide system which is based on: a web database, the MedWet Web Information System (MedWet/WIS) which provides the tool for the creation of a Mediterranean wetland databank; a data sharing protocol which supports data exchange and sharing between wetland stakeholders; and the use of Earth Observation techniques (EO) as enhanced means of mapping wetland features. Inventory, assessment and monitoring of Mediterranean wetlands guides the reader through the upgraded MedWet system incorporating the socioeconomic and cultural aspects of wetlands, the Water Framework Directive requirements, inventory based indicators, the Pan-Mediterranean Wetland Inventory and EO techniques. Most importantly, it provides a full description of and guidance through the new online MedWet/WIS - a system which offers an advanced and flexible way to provide or restrict access to data, supported by a relevant protocol.

Inventory, assessment and monitoring of Mediterranean wetlands, incorporates the following series of manuals:
• The Pan-Mediterranean Wetland Inventory Module
• The Catchment Module & The Site Module
• The Water Framework Directive Module
• The Surveillance Module
• The Indicators Module
• The MedWet Web Information System User Manual
• The MedWet Inventory Data Sharing Protocol
• Mapping Wetlands Using Earth Observation Techniques

They set out to explain the background, the relevance and the benefits of the new MedWet system and to provide detailed guidance on how to apply it. Each manual can be used in two ways: as a stand-alone reference for its particular theme or subject; or as an integral part of a series of works which guide the reader through the entire process from the early pioneering work to joining, using and getting the best out of the system.

Purpose and aims of the manual

The purpose of this manual is to describe the functions delivered by the latest version of the MedWet Database, namely the MedWet Web Information System (MedWet/WIS), which is governed and administrated by the MedWet Initiative for the purpose of maintaining a Mediterranean wetland databank.

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This document serves as the sole reference for the use of the MedWet/WIS. In particular, it aims to:
- Describe its Access Control System, whose primary purpose is to implement the provisions of the MedWet Inventory Data Sharing Protocol regarding the use of the MedWet/WIS both by data holders and by various stakeholders such as policy makers, wetland managers, scientists and individuals.
- Describe the processes which allow potential users to exploit the system to the full by becoming data providers and creating new datasets, or by becoming registered users.
- Provide detailed instructions on using the MedWet/WIS as a tool for storing and uploading wetland data and for querying, searching and reporting on the wetlands of the Mediterranean region.

Structure of the manual

To achieve its purpose and aims, the manual is structured as follows:

Section 1, **Introduction**, presents a short description of the previous MedWet database versions to introduce users to the history of the MedWet database and the reasons that led to its successive improvements. It contains definitions of the basic terms and entities related to the use of the MedWet/WIS, the knowledge of which facilitates the clear understanding of this manual.

Section 2, **Access Control System**, describes the access control system which supports the use of the MedWet/WIS by a variety of users.

Section 3, **Explore the full functionability of MedWet/WIS**, explains the procedures required to become a Data Provider or a Registered User and those required to create a new Dataset.

Section 4, **Instructions for using the MedWet/WIS**, provides detailed instructions regarding the use of the MedWet/WIS functions and tools, including a description of the database structure, use of statistics, generation of reports, application of the wetland map viewer etc.

ANNEX: Technical information on the MedWet/WIS, describes details of the system, such as the MedWet/WIS control files, the web-page layout, installing, starting and stopping the system etc. These are of a technical nature and knowledge of them is not a prerequisite for the use of the MedWet/WIS.

Who should use this manual

This manual is intended for users with different degrees of knowledge and experience of the MedWet/WIS. MedWet/WIS users can learn how to create new datasets, record data or simply browse and query the data already stored.

This manual assumes that the reader has some knowledge of the new MedWet system entitled *Inventory, assessment and monitoring of Mediterranean wetlands* and in particular the following manuals:

The Pan-Mediterranean Wetland Inventory Module (Vives, 2008)

The Catchment Module & The Site Module (Farinha et al, 2008)

The Water Framework Directive Module (Cenni & Tarsiero, 2008)

The Surveillance Module (Farinha & Fonseca, 2008)

The Indicators Module (Fitoka et al, 2008)

The MedWet Inventory Data Sharing Protocol (Fitoka et al, 2008)

These manuals can be downloaded from the 'Downloads' section of the MedWet/WIS.

1. INTRODUCTION

1.1 Background

The MedWet Web Information System (MedWet/WIS) is the latest version of the MedWet Database. It is the result of a number of successive and gradually improving versions that have been developed since 1996, when the first MedWet Database was created. The MedWet/WIS was developed in order to adopt new database and web technologies, integrate GIS tools and web service facilities and address new demands in data access and reporting requirements.

From its inception, the MedWet Database was created to enter, store and analyse the data recorded by applying the MedWet inventory method. The MedWet Database is a mirror of the proposed MedWet Data Forms, which means that all data categories included in the Data Forms have corresponding fields in the Database.

The first version of the MedWet Database (Figure 1.1) was developed as part of the MedWet inventory toolkit during the MedWet 1 project which was funded by ACNAT, and took place during the period 1992-1996. It was produced with the cooperation of the Indonesian office of the Asian Wetland Bureau and presented in 1996. The database was developed in FoxPro and worked within the DOS environment. It offered browsing, editing (create, update, delete) and reporting facilities.
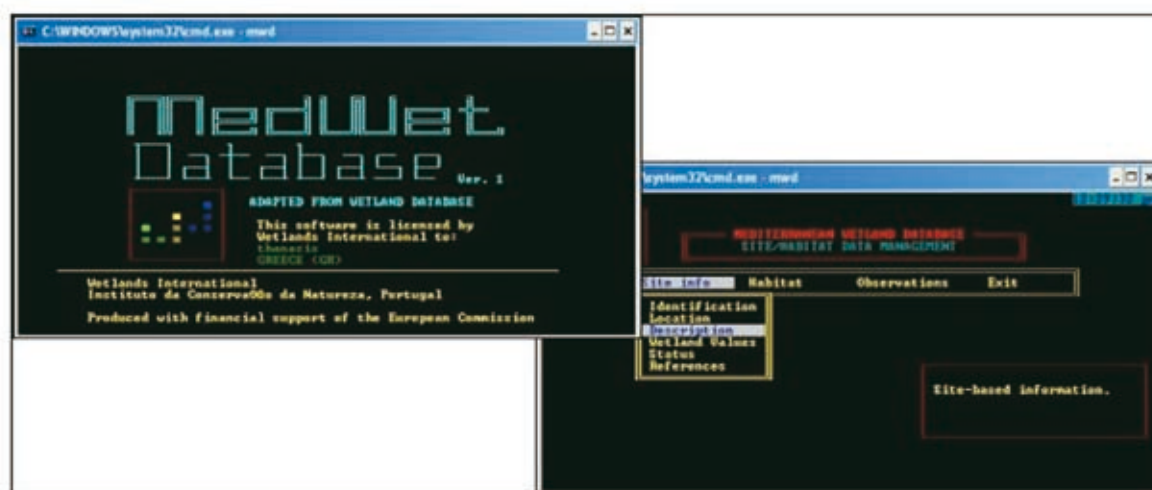
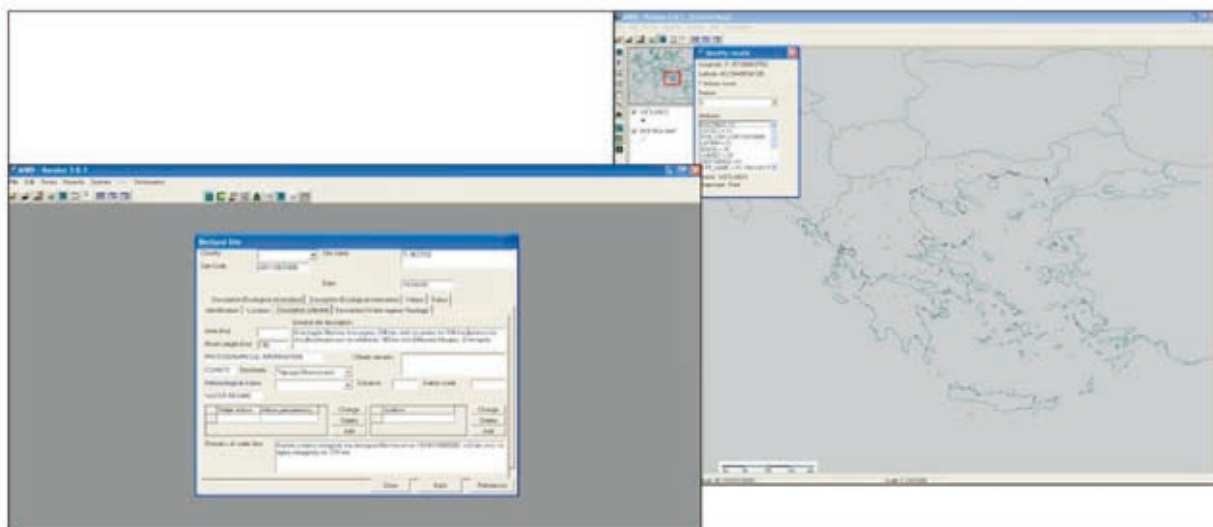**Figure 1.1.** *MedWet Database v.1.*

After a few years, it was considered necessary to update the program to enable it to run in the Windows environment, thereby making it more user friendly. In 2000, therefore, an ad hoc working group was assembled and two workshops were organized within the scope of the MedWet Initiative by ICN (Portugal), Station Biologique de la Tour du Valat (France), EKBY (Greece) and Wetlands International. The MedWet Database 2000 was developed by ICN with financial support from Tour du Valat (Figure 1.2). The Database was developed in MS Access and worked in the Windows environment. It offered all the functions of the previous version, plus a tool for importing data from the previous version of the MedWet Database.
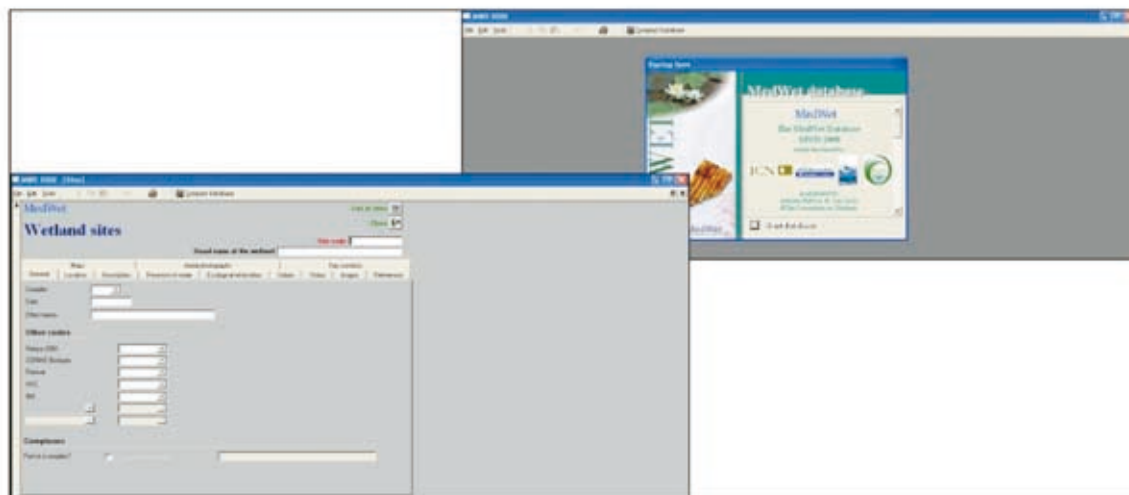
Figure 1.2. *MedWet Database 2000.*

At the 5th MedWet Team meeting, held in Thessaloniki, in December 2000, it was decided to further develop the MedWet Database in order to increase its functionability. The result was the production of two successive versions of the MedWet Database, which were developed by EKBY. These were the MedWet Database v.3.0 and the subsequent MedWet Database v.3.0.1 (Figure 1.3). These versions had the advantage of being developed as stand-alone applications with the use of Visual Basic and MS Access Database. They included the functions of the previous version, as well as multi-language support and a tool for importing data from the previous version. Version 3.0.1 also offered basic GIS functions, this being the main difference from version 3.0.

Figure 1.3. *MedWet Database v.3.0.1.*

The next step to be identified was its development as a web-based application. An internet database has the advantage of being quickly and easily accessible to anyone with an internet connection. The first step towards this end was made during the SUDOE project in 2003, which was led by ICN and was funded by INTEREG III B. This application was based on php, mySQL and ArcSDE (Figure 1.4) and offered the full functionality of the previous version on the internet in a password protected environment.

The move to the current MedWet/WIS version, developed under the MedWet/CODDE project (INTEREG III C), was prompted by the need to incorporate new database modules, additional functions and a more advanced and flexible way to provide or restrict access to data.
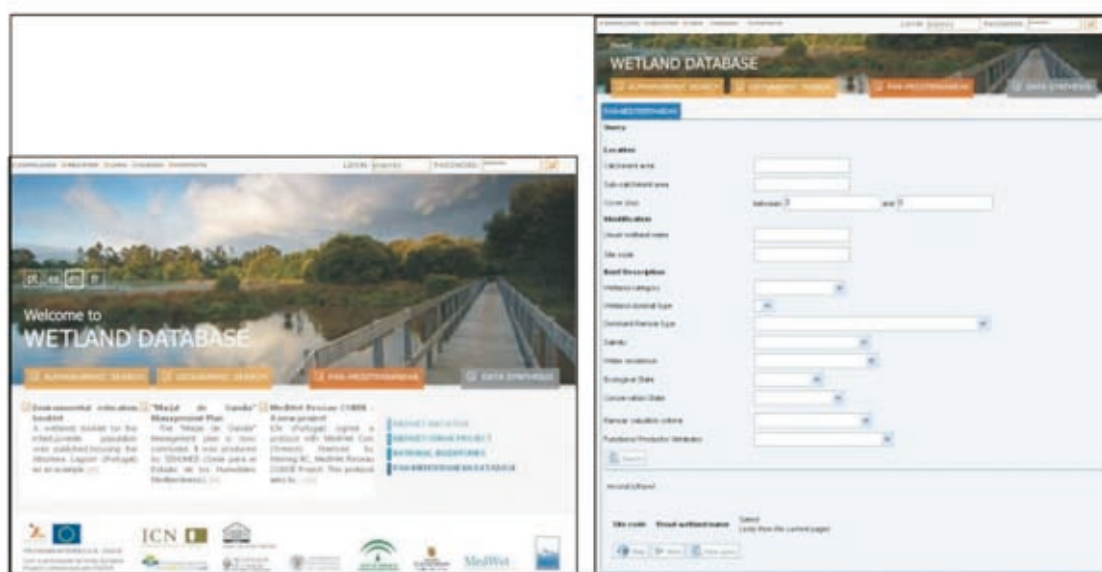
Figure 1.4. *MedWet SUDOE Database.*

1.2 Definitions

In order to understand the use of the MedWet Web Information System (MedWet/WIS), knowledge of the basic terms and entities is important. These are defined as follows.

The MedWet Web Information System (MedWet/WIS): This is the new MedWet web database. The MedWet/WIS is governed and administered by the MedWet Initiative with the purpose of maintaining a Mediterranean databank for wetland data storage, retrieval, processing and reporting.

The MedWet/WIS Modules: In accordance with the new MedWet method *Inventory, assessment and monitoring of Mediterranean wetlands*, wetland data are recorded in six separate modules. They are: i) Pan-Mediterranean, ii) Catchment, iii) Site, iv) Surveillance, v) Water Framework Directive and vi) Indicators.

Data Forms: Each of the above modules comprises one or more Data Forms. Wetland data are recorded in fields included in these Data Forms.

Dataset: The information inside the MedWet/WIS is organized in datasets. Datasets represent the core entity of the MedWet/WIS. They are recognized by a set of metadata such as title, year of compilation, name of owner (Data Provider), citation reference etc. A Dataset may include data in one or more modules, in one or more Data Forms in each module and may cover all or a proportion of the fields in each Data Form.

MedWet/WIS administrator: The MedWet/WIS administrator is a scientist with skills in managing web databases. He assists the MedWet Initiative in the technical governance of the sharing of wetland data through the MedWet/WIS. In particular, he has sole access to the MedWet/WIS Access Control interface to implement the Access Rights as they are specified by the Data Providers. He is the only one able to create user passwords. Subsequently, he has full access to all the data, tools and services available.

Data Provider: The Data Provider can be a governmental authority, a research or educational institute, an NGO or other entity that owns wetland data. The Data Provider has sole privilege in deciding who may use his/her data and what type of access (browse, update, create, delete) is permissible for specific parts of the data. By default, the Data Provider has full access to the tools and services of the MedWet/WIS for his/her own data.

Prior to the uploading of a Dataset to the MedWet/WIS, Access Rights are specified by the Data Provider and are implemented by the MedWet/WIS administrator through the MedWet/WIS Access Control interface.

Access Rights: The Access Rights are assigned per Data Form to limit the user's access to the data. The owner (Data Provider) determines the Access Rights for his/her Dataset. Users are not assigned Access Rights individually. Instead, the Data Provider creates several Access Groups (as many as he/she desires) with each group having a different level of access to his/her data.

Then the Data Provider assigns one or more Access Groups to the users of his/her choice. The Data Provider should also specify which Data Forms will be available for browsing by the anonymous user.

The Access Rights for each user are the sum of the rights given to him/her by each Data Provider.

Access Group: The different combinations of Access Rights for each Dataset are stored as Access Groups. An Access Group can be simple (eg *Browse* Access for one Data Form) or more complicated (eg *Browse* Access for all the Data Forms, *Update* Access for two of the Data Forms and *Delete* Access for one of the Data Forms). The Access Groups are established by the Data Provider by means of a user friendly interface.

Registered User: A Registered User is someone who has been given specific Access Rights by one or more Data Providers and holds a username and password. He/she may have access to more than one Dataset. The user identification is performed by means of the assigned username and password.

Anonymous User: Anonymous User is the term applied to any user who has not logged into the MedWet/WIS. Of the four different Access Rights described above, the Anonymous User is restricted to browse access. The Data Provider defines for his/her Dataset whether the Anonymous User can browse the sum of his/her data or, if not, which part of the data will be accessible for browsing.

2. ACCESS CONTROL SYSTEM OF THE MEDWET/WIS

To support the use of the MedWet/WIS for data storage, updating and processing by a variety of users, MedWet/WIS provides an advanced Access Control System. This system ensures data confidentiality and integrity by applying appropriate Access Rights to the wetland data of the different Data Providers.
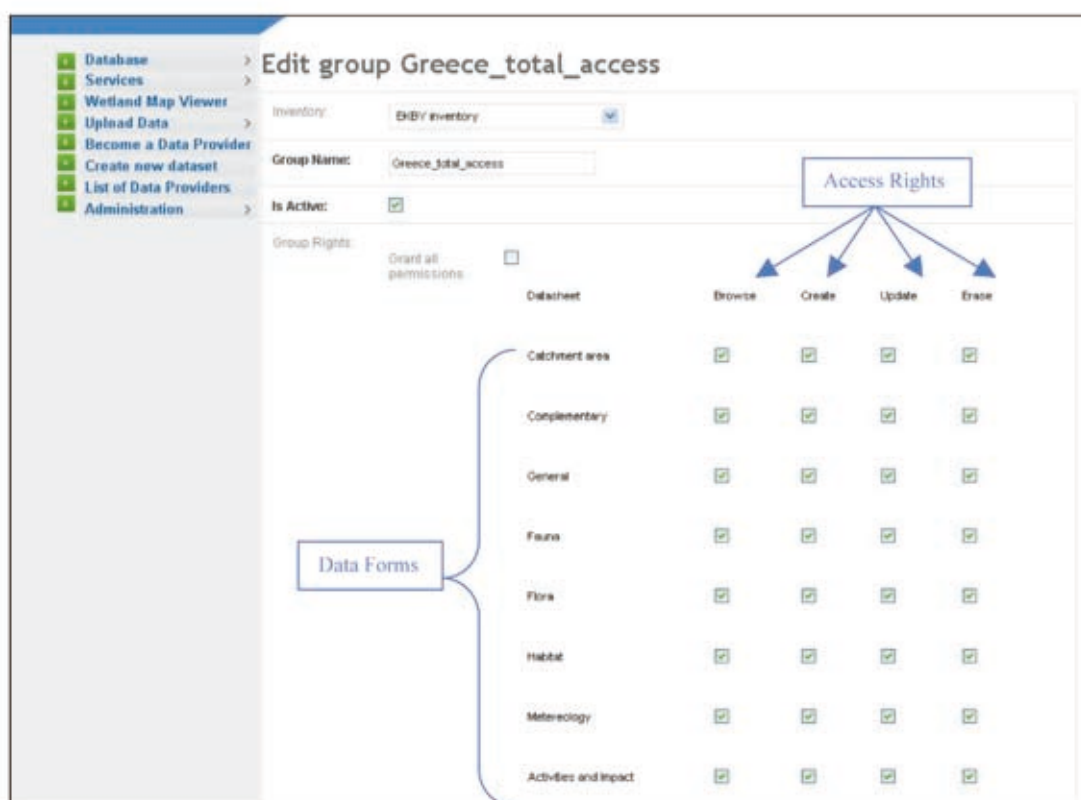
Figure 2.1. *MedWet/WIS Administrator Interface for creating Access Groups.*

The Access Rights are defined per Data Form for each Dataset by the owner of the Dataset (Data Provider) and they are applied to the MedWet/WIS system by the MedWet/WIS Administrator. The available Access Rights include the following categories (Figure 2.1):

Browse: If a user has been given the "browse" Access Right by a Data Provider for specific Data Forms of a Dataset, he/she will be able to navigate these Data Forms. Possession of the "browse" Access Right is a prerequisite for any of the three Access Rights described next.

Create: If a user has been given the "create" right by a Data Provider for specific Data Forms of a Dataset, he/she will be able to create new records for these Data Forms. By default, the user is allowed to update the data contained in the records he/she created.

Update: If a user has been given the "update" right by a Data Provider for specific Data Forms of a Dataset, he/she will be able to update/change the records for these Data Forms.

Delete: If a user has been given the "delete" right by a Data Provider for specific Data Forms of a Dataset, he/she will be able to delete one or more records for these Data Forms.

All Data Providers own a number of user accounts that authorize their employees to access one or more Datasets, providing Browse, Update, Create and/or Delete privileges. The Data Provider does not assign these Access Rights to each user separately. Instead, the Data Provider defines several Access Groups (as many as he/she desires) with each group having different level of access to his/her data (see section 3.3 below).

Figure 2.2. *Access Groups for the created Datasets.*

The Data Provider can assign one or more Access Groups to the users of his choice, who inherit all the rights of the group. Therefore, for each user, the possessed Access Rights are the sum of the rights that are provided to him/her by one or more Data Providers. Also, each Data Provider can allow browse access to anonymous users, who access the MedWet/WIS without having logged in, for one or more Data Forms of their choice.

The advantage of the group-based Access Rights over the user-based Access Rights, is that it is easier for the Data Provider to keep track of the access provided to his/her data. In addition, since several users may be given the same Access Rights, it is less time-consuming for the Data Provider to set up the Access Rights.

The Access Control System is the part of the MedWet/WIS which manages the Access Rights of each user for every Dataset and Data Form inside the MedWet/WIS. It plays an important role in the creation of new Datasets by the Data Providers (see section 3.3 below).

3. EXPLORE THE FULL FUNCTIONABILITY OF THE MedWet/WIS

The MedWet/WIS offers all users access to diverse data and several useful tools for the analysis of these data. However, users will only achieve full benefits from the system by registering or becoming a Data Provider and creating Datasets. In this way the user will be listed in the Access Control System of the MedWet/WIS, the system which controls the level of access to the data inside the MedWet/WIS.

3.1 Register/Login

Registered users are those who have been given a username and password for the MedWet/WIS. A registered user has additional access over the unregistered (anonymous) user for one or more Datasets. All Data Providers are, by default, registered users with full access to the Datasets they provided (see sections 3.2 and 3.3).

The registering procedure for the MedWet/WIS entails the following three steps.

(i)   First, the unregistered user has to contact the specific Data Provider(s) who owns the data for which the user wants additional access. The contact details of each Data Provider can be found under the "List of Data Providers" menu option of the MedWet/WIS.

(ii)   Then, the Data Provider who received the request, if he/she agrees to give additional access to his/her Dataset(s), has to contact the administrator of the MedWet/WIS and provide the contact information of the requesting party, as well as details of the Access Rights that will be provided to the user. More information regarding Access Rights definitions can be found in section 2 above.

(iii) Finally, the administrator will apply the Access Rights requested by the Data Provider, create a username and password and send them directly to the user who has requested to register.

Additional Access Rights can also be requested by users who are already registered or by Data Providers who need additional access to Datasets owned by other Data Providers. In this case, the same procedure is followed and the Access Rights of the (already registered) users are modified by the administrator to meet the additional requirements.

There is a more brief procedure for a user to register, or to upgrade his/her current Access Rights. The first step in the above procedure is unnecessary when a Data Provider includes the user in a list of persons authorized to view his/her data during the creation of a new Dataset. If the Data provider provides the appropriate contact information, the user will be registered with the MedWet/WIS and obtain a username and password without previously requesting it from the Data Provider.

3.2 Become a Data Provider

An organization or researcher that owns wetland data can use the MedWet/WIS to: store the data in the MedWet format; use the tools offered by the system to analyse the data; view the geographical distribution of the wetland sites; and create reports. In addition, the organization or researcher is able to select which data will be visible to the public and which data will be visible and accessible to organizations and people of their choice.

In order to take advantage of these functions, the organization has to be enrolled in the MedWet/WIS as a Data Provider. The procedure for this is very simple. The interested party has to provide contact information and this is achieved by filling in a form which is opened from the "Become a Data Provider" menu option of the MedWet/WIS. The completed form is then sent to the MedWet/WIS administration. The application will be examined and a username and password sent to the email address provided.

After receiving the username and password, the Data Provider will be able to login to the MedWet/WIS, create a new Dataset (see section 3.3) and use the functions on offer - ie store, view, apply statistics and make reports (see section 4) relating to his/her data. There is no limit on the number of Datasets each Data Provider can create. Furthermore, the Data Provider is able to request additional usernames and passwords for different levels of access to his/her data (see section 3.3).

The Data Providers are the core of the MedWet/WIS. They are the ones providing the data and without them the MedWet/WIS would serve no purpose. Even though the MedWet/WIS can be used by the Data Providers solely as a replacement of desktop applications for storing and analysing data without giving data access to other users, it is highly recommended to allow 'browse' access of non-sensitive information to all users. In this way, the data develop into a powerful tool for enhanced wetland studies, benefitting from 'one-step' access to information from different countries and organizations in the same format. This is the main purpose of the MedWet/WIS.

3.3 Create new Dataset

The information inside the MedWet/WIS is held in a series of Datasets. Each Dataset contains data from the same inventory or study. In accordance with the MedWet methodology, wetland data are recorded in Data Forms organized as six separate Modules. A Dataset may include data from one or more Data Forms and may cover all or part of the fields of each Data Form.

The data typed in or uploaded to the MedWet/WIS (for more on the upload function, see section 4.5) have to be assigned to a particular Dataset. If this does not exist in the database, it has to be created. This function is accessed through the "Create new Dataset" menu option of the MedWet/WIS and is only accessible to registered users.

The creation of the new Dataset is made by the MedWet/WIS administrator, based on the information provided by the interested party. It is done in three steps, as follows:

1. Definition of the Metadata of the Dataset (made by the Data Provider)

The Metadata of the Dataset are a few basic pieces of information which describe the inventory or study. The Data Provider is requested to fill in a form with this information. The form, along with an example of how to fill in the required fields, is shown in Figure 3.1.

2. Definition of the Access Rights for the Dataset (made by the Data Provider)

The creation of the dataset can be done with or without definition of the Access Rights. However, if specific Access Rights are not defined, the data will be visible (*Browse* access) to everyone but no-one other than the Data Provider who requested the new Dataset will be able to create or change the data contained inside the dataset. The Data Provider who submits the Dataset has by definition full access to the data.

For reasons of simplicity, the Access Rights inside the "Create new Dataset" section are presented with less detail than the system allows (for more detail see section 2). They are divided here into Browse Access, Update Access and Full Access; and the Data Forms are grouped into four categories:

    (i)   Data Forms Group A: includes only the Pan-Mediterranean Wetland Inventory Data Form.

    (ii)   Data Forms Group B: includes the Catchment area, the General and the Complementary Data Forms.

    (iii) Data Forms Group C: includes all the Data Forms of the Surveillance Module.

    (iv) Data Forms Group D: includes all the Data Forms of all the Modules.

However, more elaborate Access Rights can be assigned by arrangement with the administrator, if this is necessary (see section 2).

The Access Rights for a Dataset are defined by the Data Provider as described below:

    (i)   First, the Data Provider creates one or more Access Groups from the Access Rights described above. This is accomplished by providing a name and the appropriate Access Rights information for each Access Group in Table 1. An example is shown in Figure 3.1.

    (ii)   Second, the Data Provider specifies the users who will have access, by filling in Table 2 with the name of an organization, the name and email of the contact person from this organization and by selecting the Access Group(s) this person will belong to. The selection of the Access Group(s) is made from a list, which is populated in real time as the Data Provider creates new Access Groups. An example is shown in Figure 3.1.

A specific type of user of the MedWet/WIS is the anonymous user. An anonymous user is anyone who has not logged into the system. The default option for the anonymous user is Browse Access to all the Modules (Data Forms group D), but it can

be changed if an Access Group with access to fewer Data Forms is assigned to the anonymous user by the Data Provider. In order to accomplish this, the Data Provider has to follow the same procedure as the one described above and create a new user, the only difference being that the term anonymous should be entered in the 'Contact person' field. The system does not permit Update Access or Full Access to be assigned to the anonymous user.

Data Providers may wish to give Access Rights to additional users at a later stage. In this case, the Data Provider can contact the Administrator of the MedWet/WIS and ask for implementation of the additional Access Rights.

3. Creation of the Dataset

This task is done by the administrator, based on the information provided by the Data Provider. Within a few days of the Dataset being submitted by the Data Provider, the administrator will send a confirmation of the creation of the Dataset, and email usernames and passwords to the persons nominated by the Data Provider to receive specific Access Rights.

Figure 3.1. *Definition of Access Rights for Dataset.*

4. INSTRUCTIONS FOR USING THE MedWet/WIS

The various functions of the MedWet/WIS are explained in this section. There is a comprehensive analysis of each tool, which will help the reader understand how to use them in order to achieve the required result. The tools which are described here include those related to the use of the database and its available services - such as searching, calculating statistics and making reports, using the wetland map viewer; and the mechanisms related to data uploading and to MedWet/WIS administration.

4.1 Overview of the MedWet/WIS working environment

The MedWet/WIS provides tools for storing, viewing and analysing wetland data. The part of the wetland data which is accessible by the user for using these tools is based on the Access Rights of the user (see section 2). The tools of the MedWet/WIS are depicted diagrammatically in Figure 4.1.

All available tools can be accessed through hierarchically organized menu options shown in the left-hand frame of the working environment (Figure 4.2). These are:
- Database, which allows browsing and editing of wetland data.
- Services:-
  ❍ Search Data, for isolating wetlands which fulfill certain criteria;
  ❍ Statistics, for performing basic statistics on a subset of wetlands;
  ❍ Reports, for viewing summarized results.
- Wetland map viewer, for locating, searching and selecting wetlands.
- Upload Data, for batch data input.
- MedWet/WIS administration for regulating access to the wetland data of the MedWet/WIS, available only to the administrator of the MedWet/WIS.

A comprehensive analysis of these tools is provided in the following sections.

Figure 4.1. *MedWet/WIS tools.*

Figure 4.2. *MedWet/WIS Working Environment.*

In addition to the above mentioned tools which are used for storing, viewing and analysing wetland data, the users of the MedWet/WIS have access to some useful information on wetlands and MedWet. The following options are available:
- **News** – News on seminars, workshops and scientific subjects concerning the MedWet Inventory Methodology.
- **MedWet Initiative** – Short description of the MedWet Initiative.
- **About** – History of the MedWet database and description of the current version.
- **MedWet Data Protocol** – The voluntary non-binding agreement between the MedWet Initiative and the Data Providers regarding the exchange and sharing of wetland data through the MedWet/WIS and the conditions incumbent on users of the MedWet/WIS. The document is available in *pdf* format.
- **Downloads** – Useful downloads, such as the manuals of the new MedWet methodology, Excel files for uploading batch data to the MedWet/WIS and an Excel file for the Water Framework Directive.
- **Contacts** – Contact information of organizations involved in the development of the MedWet/WIS.
- **Links** – This section contains useful links, such as the websites of the members of MedWet, the websites of MedWet member country Ministries relating to water and wetlands etc.
- **List of Data Providers** – A list of the Data Providers, including contact information and a list of the Datasets that have been created in the MedWet/WIS by each Data Provider.

4.2 Database
In accordance with the new MedWet method *Inventory, assessment and monitoring of Mediterranean wetlands*, wetland data are recorded in fields which are included in a number of standard Data Forms. These Data Forms are organized in 6 separate Modules as follows:

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- 3Pan-Mediterranean Wetland Inventory (PMWI) Module
  - ❍ PMWI Data Form

- Catchment area Module
  - ❍ Catchment area Data Form
  - ❍ References Data Form

- Site Module
  - ❍ General Data Form
  - ❍ Complementary Data Form
  - ❍ Habitat Data Form
  - ❍ Fauna Data Form
  - ❍ Flora Data Form
  - ❍ Activities and Impacts Data Form
  - ❍ Socioeconomics Data Form
  - ❍ Cultural values Data Form
  - ❍ Meteorology Data Form
  - ❍ References Data Form

- Water Framework Directive (WFD) Module
  - ❍ WFD Data Form

- Surveillance Module
  - ❍ Hydrochemistry Data Form
  - ❍ Soil Data Form
  - ❍ Aquatic birds Data Form

- Indicators Module
  - ❍ Status and trends in ecosystem extent Data Form
  - ❍ Trends in water quality Data Form
  - ❍ Trends in threats Data Form
  - ❍ Status and trends of wetland bird populations Data Form
  - ❍ Coverage of the wetland area by designated Ramsar sites Data Form

Information explaining the meaning of the fields included in each Data Form can be found in the following guides:
  - ❏ The Pan Mediterranean Wetland Inventory Module (Vives, 2008)
  - ❏ The Catchment Module & The Site Module (Farinha et al, 2008)
  - ❏ The Water Framework Directive Module (Cenni and Tarsiero, 2008)
  - ❏ The Surveillance Module (Farinha and Fonseca, 2008)
  - ❏ The Indicators Module (Fitoka et al, 2008)

The Database contains the above-mentioned Modules and Data Forms and provides an interface for viewing a list of the wetland sites available in each Data Form, for viewing the Data Forms of each wetland site and for creating new records. It also contains several types of fields which are described and defined in section 4.2.4.

4.2.1 List of wetland sites

The MedWet/WIS generates a 'quick-look' list of the available wetland sites for each Data Form (Figure 4.3). A few basic points of information are also provided for each site, along with functions to locate a specific site or sites of interest. Each list may run to several pages with no more than 20 sites per page. Information on the number of sites and access to other pages in the list is controlled by the navigation bar at the foot of the page, below the list. The left-hand side of the navigation bar shows a number. This is:

• The total number of sites recorded under the current Data Form.

The right-hand side of the navigation bar has a series of buttons and numbers:

• Click on the furthest left and the first 20 sites will be displayed.

• The next button displays the previous 20 sites, except of course if the screen is already displaying the first page.

• Navigation to the next five pages of lists can be achieved by clicking on the numbers. Thus, for instance, clicking on the number 5 will open the list five pages on from the current location.

• A click on the button immediately to the right of the numbers displays the next 20 sites.

• The button furthest right displays the final page of the list of sites.

Figure 4.3. *Wetland Sites List and Filtering Functions.*

From any list page, there are two mechanisms used to find specific wetland sites.

(i) Sorting functions are provided for the list entries by clicking on the field name of the column to be sorted. A click on the field name of the selected column will sort list entries in ascending order. A second click on the same field name sorts the list entries in descending order. Only one field at a time can be used for sorting.

(ii) Filtering functions are available on the right-hand side of the list page. They allow constraints to be defined for the selected list of sites. The types of constraint will vary from list to list because they are based on the value of one or more

fields and that depends on the selected Data Form. Only those sites that satisfy the specified constraints are shown. The filters accept values of the following data types:

Strings: Show only the entries for which the constrained field value is equal to the value inputted in the filter. The user can also use wildcard characters like the symbol '*'. This means 'any character'. Thus, for example, if the filter's value for the site code is 'GR*', all the sites whose code begins with the two letters GR are shown – but only those.

Date: If the list page includes a date field, the filtering interface uses an appropriate control which allows the user to select valid dates. Two entry boxes are provided which permit the user to define the lower and upper limits to the range of dates for the list entries of interest. In this way the user selects only the list entries with field value that fulfills the constraint low_date <= field_value <= high_date. Different outcomes are achieved if the user fills in only one of the two date range boxes. If only the upper limit (later date) is selected, it will show all entries up until the date specified. If only the lower limit (earlier date) is selected, it will show all entries from that date onwards. If the user wishes to see if there are entries for a specific day, and that day only, he/she should put the same date in both date range boxes.

Select: When the value of the field corresponds with a set of known values, a select list is shown that includes all values of this particular set. For example, in the Pan-Mediterranean module, the user can filter entries based on the site's country and this can be done by selecting from a specific list.

4.2.2 Create a new Data Form

At the foot of the list page a button with the label 'Create' will appear if the user has the 'create' Access Right for the specific Data Form. At the left-hand side of the button there will also be a select option. By default, the user must select one of the available choices in the select menu. Depending on the Data Form, the select menu will either offer a list of the Datasets available to the user or a list of the available site codes. The first list will appear for Data Forms which have a field for recording the site code (Pan-Mediterranean Wetland Inventory and General Data Forms) and for the Catchment area Data Form. The second list will appear for the remaining Data Forms (fauna, flora Data Forms etc).

A word of caution! For a given site, Data Forms without the field 'site code' cannot be created until one of the Pan-Mediterranean Wetland Inventory or General Data Forms are created first. After the user makes a selection from the list and clicks the 'Create' button, a Data Form with blank fields will open and the user will be able to fill in and save the Data Form as a new record. The user can fill in the fields for which he/she has data and leave the rest of them blank. However, there are three Data Forms that include obligatory fields. The three Data Forms as well as the obligatory fields included in each of them are as follows:

• Pan-Mediterranean Wetland Inventory: Site code, Usual name of the wetland, Country

• General: Site code, Usual name of the wetland, Country

• Catchment area: Catchment area code, Name of the Catchment area, Country

4.2.3 View a Data Form

From the page listing the sites, the user can select a specific wetland site from the list and the appropriate Data Form will be depicted for the selected site. Potentially, there are two ways a user can view the contents of a Data Form for a wetland site: in 'browse' mode and 'update' mode. However, these options depend on the Access Rights of the user. If the user does not have 'update' access for the specific Data Form, the Data Form will appear in 'browse' mode, which means that the values of the fields will be visible but cannot be changed. On the other hand, if the user has 'update' access, the Data Form will be depicted in 'update' mode and changes to the values of the fields will be possible (Figure 4.4).

When the user views the requested Data Form it is also possible to navigate to other Data Forms available for the same wetland site by selecting the one required from the drop-down list shown at the top of the page ('Go to form' arrow, Figure 4.5). This feature is available whether the user is in 'browse' mode or 'update' mode.

Figure 4.4. *Pan-Mediterranean Data Form.*

Figure 4.5. *Navigation between Data Forms of the same Wetland Site.*

4.2.4 Data Form fields

The fields used in the Data Forms are categorized, depending on the type of data required, as following:

1. *Strings*: These are free text fields whose only constraint is the maximum number of characters the field accepts. In the Pan-Mediterranean module, the site name accepts any string up to 30 characters.
2. *Text values*: Text values are inputted in free text fields and there is no constraint in the length of the inputted string.
3. *Select controls*: These are used when the data field takes a value that belongs to a set of known values.

4. *Date controls*: Date controls are used as a mechanism to limit the user to inputting valid date values.

5. *Boolean values*: a check-box control offering an 'either-or' option. When checked, the field value corresponds to 'true'; when not checked, the value is 'false'.

6. *Numeric values*: A text box with constraints that are determined by specific parameters dictated by the meaning of the data field (eg percentage numbers are allowed only in the range 0 to 100). If the user provides an invalid value, an error message is shown on the right side of the input field.

7. *Auto complete select fields*: They are used when the data field takes a value belonging to a set of known values but the number of possible values is so large that the use of a select box is impractical (eg the species available in the Fauna Data Form). In all these cases the user starts writing the intended value and this prompts a menu to open which includes all entries matching the prefix of the value entered so far. This makes it easy for the user to select the intended data value from the entries displayed in the menu.

8. *Fields with repetitive entries* (eg the fauna entries in the Pan-Mediterranean module): Since there can be multiple fauna entries for a given site, MedWet/WIS provides appropriate buttons for each line - eg the button 'Remove Fauna', used to remove the entry on that line; or the button 'Add Fauna', used to insert a new fauna entry.

The buttons displayed at the foot of the Data Form provide the following functions:

• The 'Delete' button at the left-hand side of the Data Form displays a warning message prompting the user to confirm his/her intent to erase the inputted data. If the user confirms this intent, the data displayed in the Data Form are erased.

• The 'List' button at the right-hand side of the form returns the user to the list page without saving any modifications the user may have made. These modifications are thus lost and cannot be recovered.

• The 'Save' button sends the data to the server. If there are no errors, the data become permanent in the server storage.

• The 'Save and Add' button, when clicked, makes all modifications permanent then opens an empty form to create a new entry.

4.3 Services

4.3.1 Search Data

The MedWet/WIS search engine helps to select wetlands that fulfill complex search criteria and supports statistics, export data and reports. Figure 4.6 presents the basic search engine interface that provides the functions used to build logic expressions playing the role of **search criteria**. Individual logic conditions included in composite search criteria refer to data fields that comply with **value** properties as specified by comparison, string matching and range matching **operators**.

Figure 4.6. *Search Engine Interface and Results.*

A composite search criterion is formed by means of the following steps:

(i). Specify a criterion by selecting data field, value and if necessary, the required operator.

(ii). Press the add criterion button.

(iii). Use one of the available logic operators (AND, OR) and proceed in specifying additional criteria within or without parentheses as in step 1. The correct use of parentheses is necessary in order to get the desired results. For instance the query:

(country = Greece or country = Albania) and area > 1000 will find all sites from Greece and Albania which have an area of more than 1000 hectares. On the other hand, the query: country = Greece or (country = Albania and area > 1000) will give as result all the sites from Greece irrespective of size but only those sites from Albania which have an area of more than 1000 ha.

(iv). Use the UNDO or RESET buttons if necessary and when the search criterion is complete submit it by pressing the SEND button.

The generated result is a list of sites that fulfill the search criteria. The site code and name are shown for each site on the list. The site code is a direct link and by clicking on it the user will be taken to the Pan-Mediterranean Data Form for the specific site. The resulting list can be exported in an Excel file or alternatively can be used to calculate a range of statistics (Figure 4.7), as described in the following section. Note: if the user does not have the appropriate Access Rights to browse the Pan-Mediterranean Data Form of the particular site, the Data Form will not be displayed.

4.3.2 Statistics
The MedWet WIS provides basic statistics functions for the fields shown in Figure 4.7, to which numeric values are assigned.
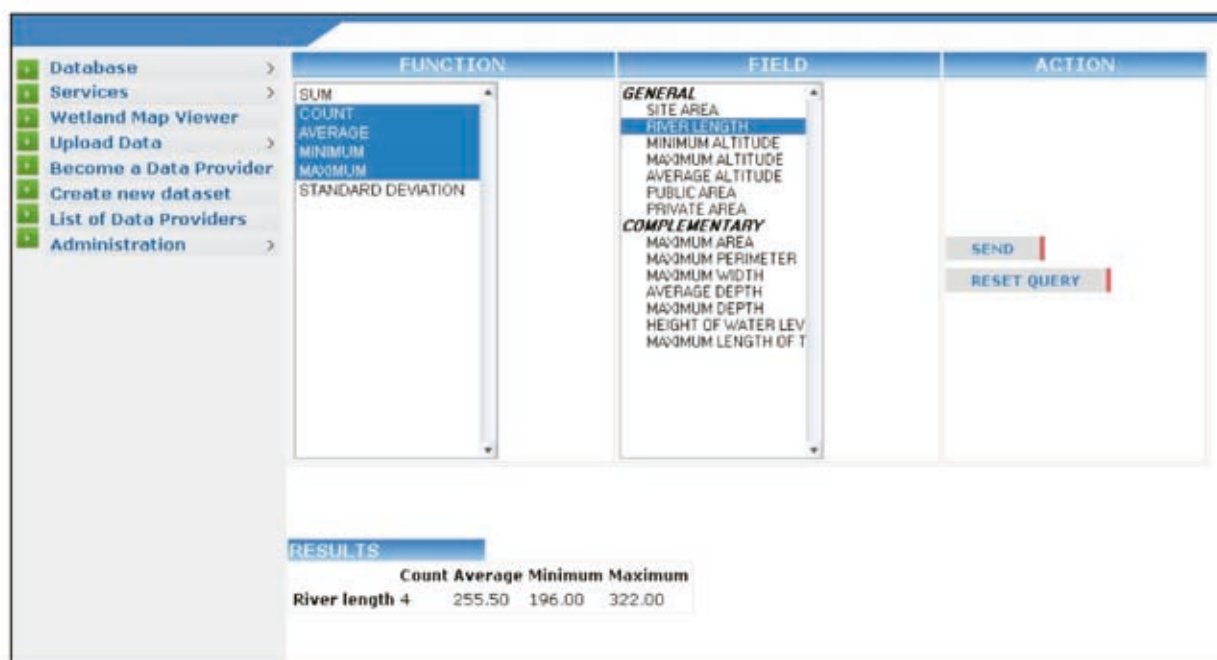
Figure 4.7. *Statistics obtained for the Wetlands Fulfilling the Search Criteria.*

These basic statistics functions are applied to a subset of the data, which is produced with the use of the search tool described in the previous section. The following statistics are available:

SUM   Computes the sum of values of the specified field, for the records selected with the given search criterion or criteria.

COUNT   Counts the number of values in the specified field, for the records selected with the given search criterion or criteria.

AVERAGE   Computes the average of all values in the specified field, for the records selected with the given search criterion or criteria.

MINIMUM   Computes the minimum or lowest of all values in the specified field, for the records selected with the given search criterion or criteria.

MAXIMUM   Computes the maximum or highest of all values in the specified field, for the records selected with the given search criterion or criteria.

STD DEV   Computes the standard deviation from the average of the values in the specified field, for the records selected with the given search criterion or criteria.

4.3.3 Reports

Reporting functions allow the generation of pre-designed summarized views (Figure 4.8) of a subset of the wetland data in printable format. The definition of the subset is made with use of the search tool, described in section 4.3.1. The supported report formats include:
- portable document files (pdf)
- rich text format files (Word)
- Excel files
- comma separated text files
- html files
- XML files
- Open Office files

Currently, the MedWet/WIS generates the following reports:

List of sites by Country

This report provides information for wetland sites that are grouped by the country to which they belong. The information given for each country includes the total number of sites for that country and the total area covered by those sites, plus information on each individual site consisting of the site code, site name, area, category, salinity, presence of water and source of data (Figure 4.8).

List of sites by Region

This report provides information for wetland sites that are grouped by the country region to which they belong. The information given for each site consists of the same fields as for the *List of sites* by Country above.

List of sites by Province/Department

This report provides information for wetland sites that are grouped by Province/Department. The information given for each site consists of the same fields as for the *List of sites by Country* above.

Figure 4.8. *PDF Report for the Wetlands Fulfilling the Search Criteria.*

List of sites by Catchment

This report provides information for wetland sites that are grouped by Catchment (Figure 4.9). The information given for each site consists of the same fields as for the *List of sites by Country* above.

Figure 4.9. *List of Wetland Sites Grouped by Catchment.*

MedWet Report

This report provides information for a wetland site including site identification, location, description, Ramsar information, wetland information, activity information, conservation status, habitat, flora, fauna and references (Figure 4.10).

Ramsar Report

This report provides detailed Ramsar information for a wetland site including site identification, location, description, Ramsar information, impact etc.

Figure 4.10. *The MedWet Report for the Greek Wetland Site NYMFON LAKE.*

4.4 Wetland Map Viewer

The Wetland Map Viewer is a graphical user interface (GUI) that provides functions for displaying, searching, selecting and accessing wetland sites on the basis of their geographic location. Wetland sites are displayed on the map as points that represent the stored site coordinates. The GUI (Figure 4.11) consists of the tool bar, the status bar and a number of tabs which include functions for viewing, searching and selecting wetland sites.

The **tool bar** accesses operations that are performed with the screen cursor. Each tool defines a unique action for the cursor to perform.

- Zooming & Panning: Use the Pan and Zoom tools and buttons to change the size and position of the map display. Zooming in (or out) decreases (or increases) the scale of the display as it focuses on different areas. Panning re-positions the focus of display without changing its scale.
- Selecting Wetland sites: The Select tool selects one or more wetlands directly by clicking and dragging a rectangular area around the desired points.
- Reset Map clears the Viewer area, deleting all the themes and zooming to the default extent (as per Figure 4.11).
- Get previous or next extent buttons are used to recover the previous map view.
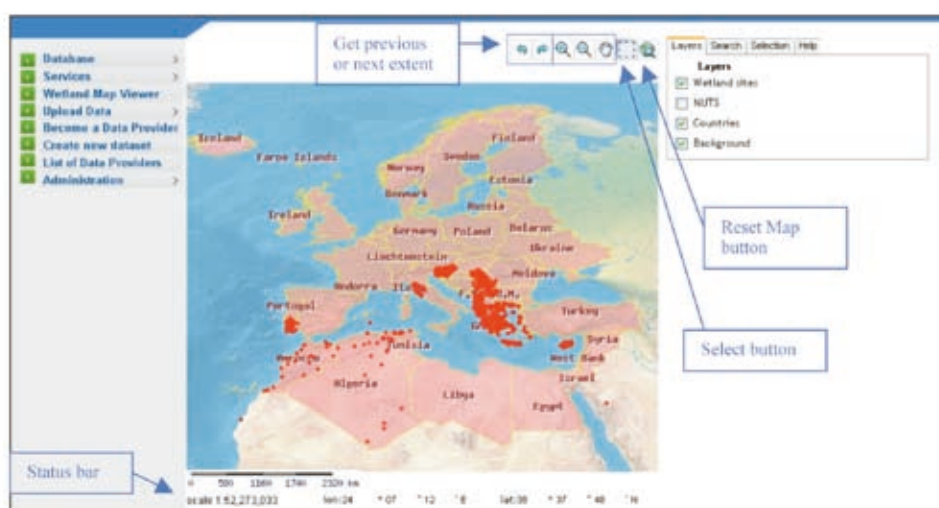
Figure 4.11. *The Wetland Map Viewer.*

The **status bar** displays the coordinates of the pointer in real time, as well as the current scale of the map, based on the extent of the map depicted in the viewer.

The user has the option to turn off certain layers by unchecking them in the **Layers tab**. If many layers are added to a view covering a large extent, whenever the view changes the time for the view to re-draw can become long. Zooming in first will minimize this time. It is advisable to turn off any layers that are not needed.

The **Search tab** makes it possible to select wetlands with descriptive criteria (country, catchment code, catchment name, site code, site name). Selected wetlands are displayed in the **Selection tab** (Figure 4.12). Here the user is prompted to choose between zooming in the wetland's extent view or retrieving the wetland's descriptive information (Pan-Mediterranean Module) if allowed - access to this module is subject to the user having the relevant Access Rights.
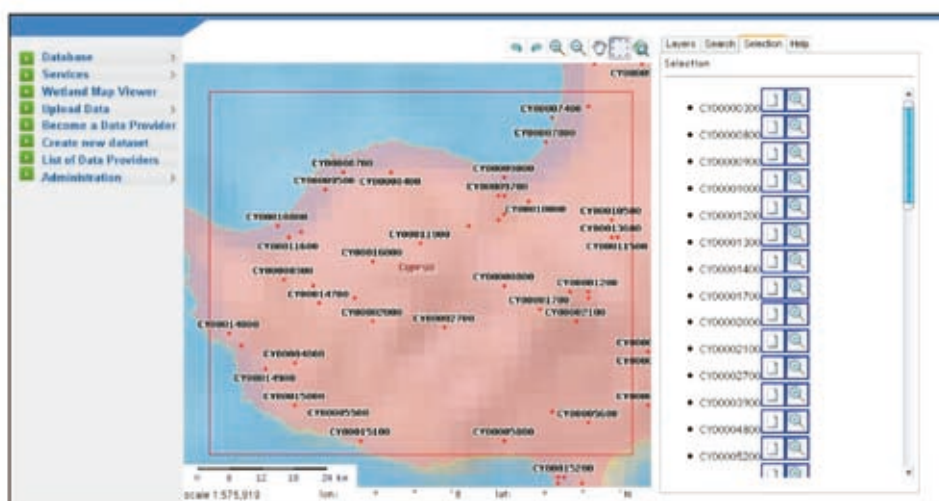
Figure 4.12. *Wetland Search and Select Functions.*

4.5 Upload Data

MedWet/WIS allows users to input multiple records of wetland data with a single operation called batch data input. The user can exploit the batch data input function in a three-step procedure:

(i) The user provides the data in the format required, which comprises Excel files downloadable from the download section of the MedWet/WIS. There are several Excel files, representing different Data Forms. Each Excel file contains the same fields as the Data Form it represents.

(ii) The user accesses the Upload Data tool through the respective menu option, declares the Dataset for which he/she wants to create new records and uploads the Excel file. The MedWet/WIS performs the requested operation only when the user possesses the Access Rights required for creating new records in the selected Dataset.

(iii) The Excel file is parsed by the MedWet/WIS server and the system responds in the following manner:

      a. Checks the Access Rights possessed by the user.

      b. Checks if the structure of the uploaded Excel file is compliant with the expected worksheet template.

      c. Performs the necessary input value validation for the submitted data.

      d. Reports the number of records that were successfully created in the MedWet/WIS database, the number of records that were not stored because they already exist, plus the line numbers with records that were rejected and the reason(s) for rejection.

4.6 MedWet/WIS Administration

The MedWet/WIS administration is undertaken by a scientist with skills in managing web databases and assigned to assist the MedWet Initiative in the technical management of the sharing of wetland data through the MedWet/WIS. This scientist, referred to in this manual as the MedWet/WIS administrator, is the person responsible for the smooth operation of the MedWet/WIS and the implementation of the requests of the Data Providers regarding the creation of new Datasets and the corresponding Access Rights. The administrator has sole access to the MedWet/WIS Access Control interface to implement these requests. He/she is the only one able to create user passwords. Subsequently, he/she has full access to all the data, tools and services available. The Administrator's interface is divided into four compartments:

1. Data Providers. This is the compartment where the Administrator creates and stores data records with contact information and Access Rights for the Data Providers.

2. Datasets. This is where the Administrator creates and stores records with information for the Datasets, based on the requests of the Data Providers. Each Dataset is associated with one Data Provider and one or more Access Groups.

3. Access Groups. This is where the Access Groups are created for each Dataset, based on the requests of the Data Providers.

4. Users. This is where the Administrator creates and stores records for the authorized users of the MedWet/WIS. Usernames and passwords, along with contact details and Access Rights are stored here. One or more Access Groups are assigned to each user, which provide different levels of access to one or more Datasets. The Access Groups assigned to each user are determined by the requests of the Data Providers.

ANNEX: TECHNICAL INFORMATION ON THE MEDWET/WIS

MedWet/WIS Control files

The following table provides a complete list of folders and files that control the MedWet/WIS appearance and behaviour.

Folder or file name	Role in the MedWet/WIS
apps/usrmngr	The root folder of the application
apps/usrmngr/config	Root of global configuration files
app.yml	Application configuration
filters.yml	Global filters that control the application behaviour
i18n.yml	Internationalization configuration (default language, available languages etc)
view.yml	Global settings for the view layer (headers, javascript files, stylesheets and default page title)
apps/usrmngr/i18n	Internationalization files
apps/usrmngr/lib	Libraries
CodeContainer.class.php	Contains dictionaries of control terms
QueryParamParser.class.php	Used for parsing complex queries
apps/usrmngr/modules	Root of modules. Each module is a form. The structure of each module is:
	actions

Folder or file name	Role in the MedWet/WIS
	The controller layer. Provides the logic of how data are collected from the user and inserted in the database and how data are collected from the db for presentation.
	templates
	The View layer. Displays to the user the data the controller has collected
	config
	Module specific configuration files
	validate
	Defines what values are acceptable for various form fields.
activity	Activities and Impacts
batch	Excel batch import
catchinf	Catchment area
complementar	Site complementary module
cultural	Cultural Values
dataprovider	Data Provider administration (admin)
ereport	Invokes the report generator and uploads the report to the user
fauna	Fauna

Folder or file name	Role in the MedWet/WIS
flora	Flora
front	The front page
general	General information for a site
gis	The GIS (map)
groups	Group management (admin)
habitat	Habitat
hydrochem	Hydrochemistry
inventory	Inventories (admin)
loadstatic	Displays a static page within the site template
meteorology	Meteorology
panmediteranean	Pan-Mediterranean
reference	References
sitesearch	Search site with complex queries
socio	Socioeconomics
soil	Soil
Folder or file name	Role in the MedWet/WIS

Folder or file name	Role in the MedWet/WIS
specie	Species. The user has not direct access to this module. It is an auxiliary module for fauna, flora and other modules.
stats	Statistics
users	User management (admin)
wbirds	Waterbirds
wfd	Water Framework Directive
apps/usrmngr/templates	Application level templates
error.php	The error page
layout.php	Defines the layout of the site
/config	Site-wide configuration
/java	Files needed for the report generator
libs.jar	All libraries required are stored in a jar file
ReportGenerator.class	A class which generates the report
ReportGenerator.java	The source code of the report generator
/lib	Site-wide libraries
Excel	Excel reader
Folder or file name	Role in the MedWet/WIS

| Folder or file name	Role in the MedWet/WIS
model	Contains the files of the third layer of the application, the model.
PHPExcel	Libraries for reading Excel files
plugins/sfPokaYokePlugin	Client side form validation plugin
lib	The php files implementing the plugin
web	Stylesheets and javascript files
plugins/sfUserCheck	Validates user rights
/reports	Contains the various reports
catchment	The catchment report
country	Sites by country
province	Sites by province
region	Sites by region
temp	A temporary directory needed during report generation
/web	Static files, stylesheets and javascript
excel	Excel files generated from site_search module
excel_templates	Excel files available for download

Folder or file name	Role in the MedWet/WIS
gis_files	Files needed for the GIS modules
images	Images
logos	Logos
js	Javascript files. For each module, a sub-directory with the same name contains the javascript file
mapbuilder	Client side map display
reports	Reports generated based on a user's query
uploads	Directory where user uploaded files are temporarily stored

Environment

The MedWet/WIS consists of several software layers that group the system's functions and determine the system's architecture. Summarized, the MedWet/WIS functions are:

• Storing Wetland Data
• Processing Wetland Data
• Presenting and picking up Wetland Data

These three functions are handled in loosely dependent system layers (Figure 1), meaning that a software module which implements one layer can be replaced by another module which offers the same operations without corrupting the system's stability. The data storage layer is responsible for storing the wetland data. The MedWet WIS uses a relational database called MySQL (http://www.mysql.com/). The application layer reflects the logic associated with the wetland inventory functions and the representation layer is the web browser that interacts directly with the user.
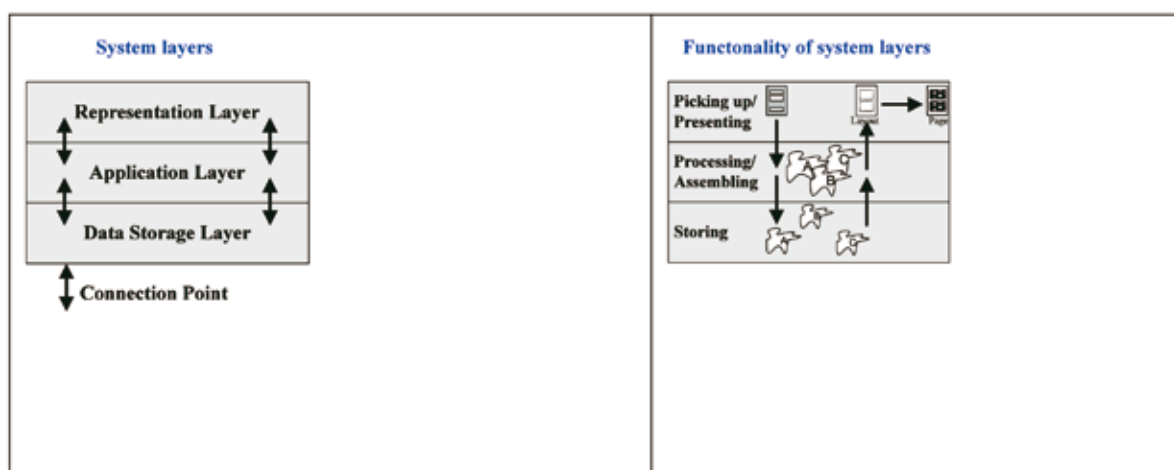
Figure 1. *The MedWet/WIS Architecture.*

Figure 2 shows the interaction of the MedWet/WIS infrastructure components. Currently, the MedWet/WIS is installed on an Apache web server (http://httpd.apache.org/), but it is also possible to install the software on any web server that supports the "PHP: Hypertext Preprocessor" version 5. Additional software required in the server side of the MedWet/WIS includes:

- The Open-Source PHP Web Framework called Symfony (http://www.symfony-project.org/)

- The MapServer software (http://mapserver.gis.umn.edu/) for rendering the spatial data.

- The Community Mapbuilder 1.5 (http://communitymapbuilder.org/) geographic mapping client.

- The Java Runtime Environment (http://java.com/en/).

- The JasperReports library (http://jasperforge.org/sf/projects/jasperreports).
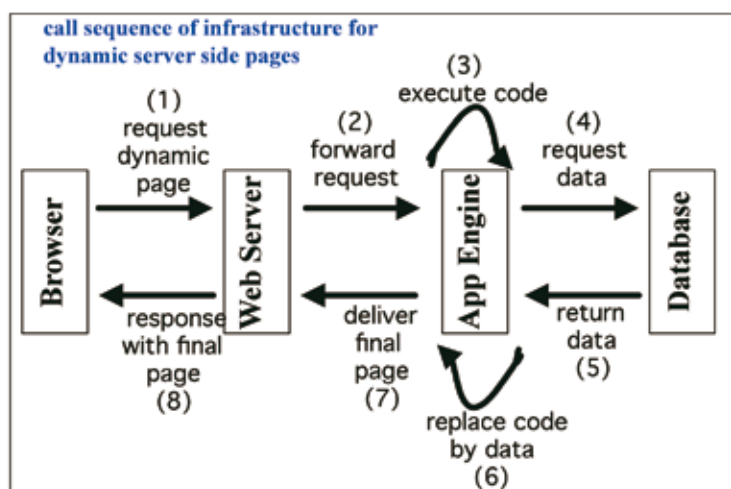
Figure 2. *Call Sequence of the MedWet/WIS Infrastructure Components.*

Recommended minimum hardware and connectivity requirements for the MedWet/WIS infrastructure:
- CPU: Dual core Intel(R) Pentium(R) 4 3.20GHZ or equivalent
- RAM: 2 GB
- Internet connection: 4Mbps or higher
- Client connection: ADSL

Installing, Starting and Stopping the system

We assume that mysql and apache are already installed. It is also possible to use a different Database Management System and a web server other than apache. However the development team has used and has tested the application with the software mentioned here.

Install symfony (Detailed documentation on this topic can be found at: http://www.symfony-project.org/installation/1_0).
Install a java virtual machine for the report generation.
Install mapserver (http://mapserver.gis.umn.edu/).
Place the software in a directory where the web server has access.
Remove the contents of the cache directory in case it is not empty.

There is no separate procedure for disabling the application. MedWet/WIS can be suspended if the administrator stops the web server. In a Linux system this can be done with the command
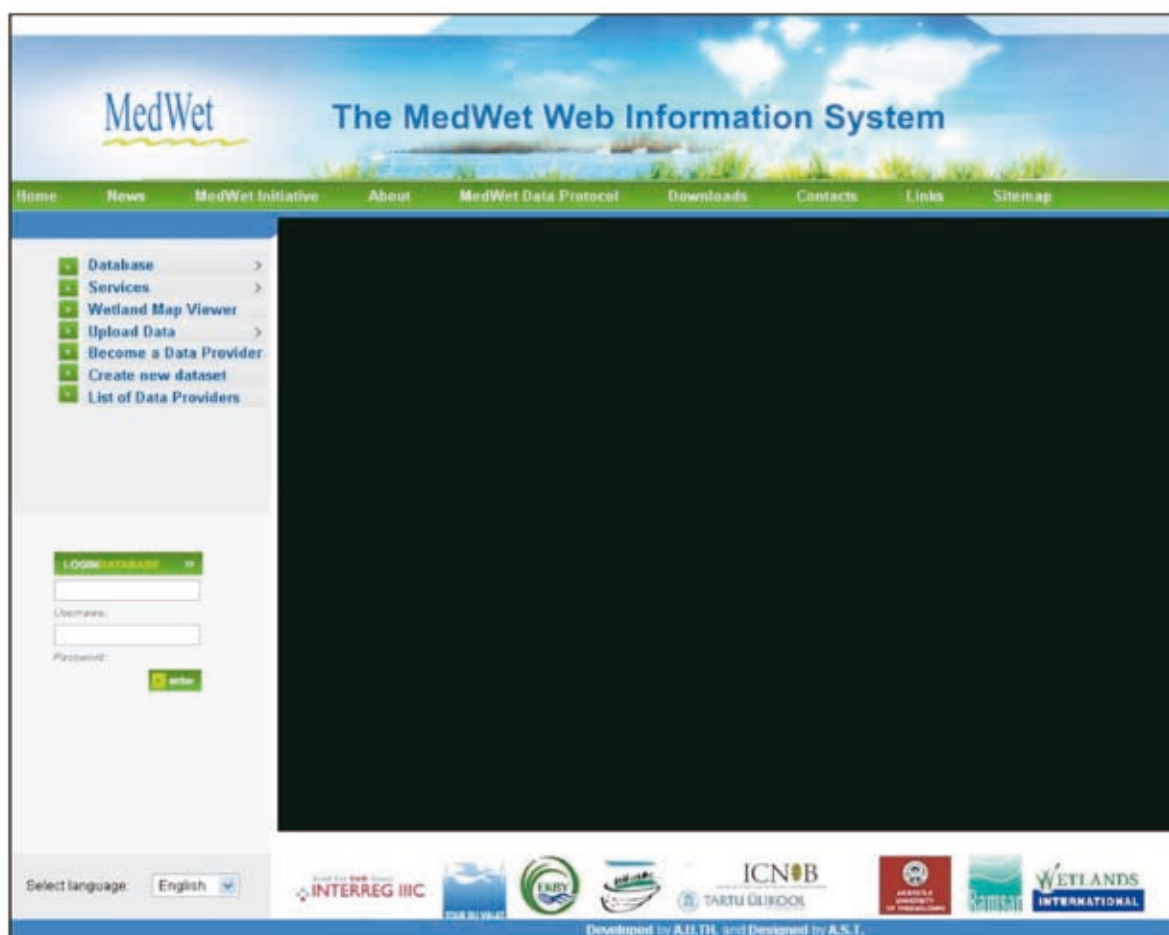/etc/init.d/apache stop
Respectively, the web server can start its function with the command
/etc/init.d/apache start

The MedWet/WIS page layout

For modifying the MedWet/WIS page layout the user must change the layout.php file in apps/usrmngr/templates.

Figure 3. *The MedWet/WIS Page Layout.*

Figure 3 shows the layout of the current version of layout.php. The layout of the blacked out part of the screen depends on the function of the MedWet/WIS the user is utilizing and is not affected by the layout.php file. However, it is also possible to introduce plain static html within the current layout. In this case the static html files will have to provide only the content of the page without headers. As an example, if we have the source

```
<html>
<head>....</head>
<body>
<p>
    content
</p>
</body>
</html>
```

this will be changed to

```
<p>
content
</p>
```

The module used to load a static web page is called loadstatic. This module accepts one parameter called 'page' that indicates the static page to load. Two examples of the described use are the following:

http://mathind.csd.auth.gr:7777/loadstatic/page/downloads.html

and

http://mathind.csd.auth.gr:7777/loadstatic?page=downloads.html

Errors, Malfunctions and Emergencies

If the system configuration file is altered or the application is otherwise modified, the server may fail to deliver pages and show a blank page instead. In this case, the administrator has to invoke from the application's root directory the command:

symfony cc

If this is not possible, the administrator has to erase all files under the cache directory.

e.g 'rm -rf cache/*'

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