

Regional wetland inventory approaches: The Mediterranean example

LT Costa¹, JC Farinha¹, P Tomàs Vives², N Hecker³ & EP Silva¹

¹Instituto da Conservação da Natureza, Rua Filipe Folque 46-3º, 1050 Lisboa, Portugal
(costal@icn.pt, farinhaj@icn.pt & silvae@icn.pt)

²Wetlands International, PO Box 7002, 6700 CA Wageningen, The Netherlands. Present
address: Av. del Cid 76-2, E-07198 Son Ferriol, Palma, Illes Balears, Spain
(pereto@oceas.es)

³Wetlands International, PO Box 7002, 6700 CA Wageningen, The Netherlands. Present
address: Station Biologique de la Tour du Valat, Le Sambuc, 13200 Arles, France
(hecker@tour-du-valat.com)

Abstract

The Mediterranean region is rich in wetlands of great ecological, social and economic value. Yet these important systems have been considerably degraded or destroyed, a fact that was recognised in a major wetland conference in Grado, Italy in 1991 and which led to the Mediterranean wetland initiative known as MedWet. As a first step in the MedWet initiative a three-year preparatory project was launched in late 1992. This included the development of methods that could potentially improve wetland conservation in the Mediterranean region, with an emphasis on ensuring the wise use of wetlands and stopping and reversing their loss and degradation. One of the actions within MedWet was the development of methods for inventory and monitoring of wetlands, undertaken by the *Instituto da Conservação da Natureza* (Portugal) and Wetlands International. The immediate aims of this program were to assess the status of existing wetland inventories in the Mediterranean region, in order to identify gaps and review the adequacy of the methods in use, and to prepare a standard methodology for future inventories of Mediterranean wetlands. Whilst developing the inventory methodology we recognised the extremely diverse nature of the region and the resources available. We therefore sought to present a methodology which was flexible in terms of the level of detail required and which could be used to address a broad array of needs and situations. The inventory tools developed under the MedWet initiative consist of a manual explaining the inventory process, a set of inventory datasheets, a habitat description system, mapping conventions and a database software. These tools have been applied in test sites in each of the five European Mediterranean countries and in Morocco and Tunisia. The Portuguese national inventory will use the tools made available and other countries, such as France and Algeria, are currently using or planning to use these tools.

Keywords: Wetland inventory, Mediterranean, MedWet

Introduction

The Mediterranean region is rich in wetlands of great ecological, social and economic value. Typical Mediterranean wetlands refer to coastal areas and wetlands at low altitude. The lack of tides along most of the coastline also produce river deltas, such as those of the rivers Ebro,

Po and Nile (Skinner & Zalewski 1995). Unfortunately these important systems have been considerably degraded or destroyed, a fact that was recognised in the Grado (Italy) Conference in 1991 (Finlayson et al 1992) that led to the Mediterranean wetland initiative known as MedWet. As a first step under this initiative a three-year preparatory project was launched in late 1992 by the European Commission, the Ramsar Convention, the governments of the five countries of European Union within the Mediterranean region and several NGOs (Wetlands International [then known as the International Waterfowl and Wetland Research Bureau], Station Biologique de la Tour du Valat, World Wide Fund for Nature and Greek Biotype/Wetland centre [EKBY]).

This project focused on that part of the Mediterranean region within the European Union (EU) and included the development of methods that could potentially improve wetland conservation in order to stop and reverse the loss of wetlands, as well as to ensure their wise use. Five actions were carried out with each being developed by cooperation between a government and an NGO. One of these was the development of methods for inventory and monitoring of Mediterranean wetlands, developed jointly by the Instituto da Conservação da Natureza (Portugal) and Wetlands International.

The inventory project

The immediate aims of the MedWet inventory program were: (1) to assess the status of existing wetland inventories in the Mediterranean region in order to identify gaps and review the adequacy of methods in use, and (2) to prepare a standard methodology for carrying out inventories of Mediterranean wetlands.

In a first step a review of all wetland inventories, both at national and international levels, was made (Hecker & Tomàs Vives 1995). The results of this review revealed that only a few countries had undertaken a national inventory (Spain, Italy, Tunisia and Greece) and a few had prepared a preliminary inventory, while most did not have an inventory of any sort. Also, the main methods used in each of the inventories was analysed in terms of their classification systems, site selection criteria, wetland delineation criteria, data collection schemes and mapping protocols.

From these conclusions, we recognised the extremely diverse nature of the region and the resources available — this was a major concern and was kept in mind when developing standard methodologies for wetland inventory in the region. Therefore, we have sought to present a methodology which is flexible in terms of the level of detail required, and which can be used to address a broad array of needs and situations. In order to prepare the methods, a coordination team was assisted by an advisory group comprising wetland experts from many countries in the region, as well as from other countries.

The methodology was based on four main features: it should be (a) standardised to allow consistent use throughout the region and to allow comparisons between inventories, (b) comprehensive, to include all relevant information, (c) flexible, to allow use by entities with diverse resources, and (d) compatible, to assure comparisons and exchange of information with ongoing programs, such as the Ramsar database, the CORINE biotopes and the EU's Natura 2000 network.

The inventory tools developed under the first stage of the MedWet initiative consist of a manual explaining the inventory process (Costa et al 1996), a set of inventory datasheets (Hecker et al 1996), a habitat description system (Farinha et al 1996), mapping conventions (Zalidis et al 1996), and database software (Tomàs Vives et al 1996).

The methodologies developed under the MedWet project are meant to be a set of tools that can be applied in the Mediterranean and contribute to wetland conservation in the region. Although there is the possibility of using these tools to develop and coordinate a regional inventory in the future, these tools have, to date been presented as a standard tool for undertaking wetland inventories at local or national level.

The inventory process

General description and procedures

The inventory is based on three levels of information: the catchment area, the wetland site and the habitat. Information collected at the catchment level avoids repetitive inputting of data common to every site within the catchment. The site level includes essential information to be collected at each wetland, while the habitat level entails recording detailed data and provides a baseline for site management and monitoring.

As mentioned above, a preliminary assumption in the preparation of the methodology was that the resources available vary from country to country and sometimes within each country. As such, the flexibility of the method relies on the definition of the different phases of information collection, as decided by the inventory coordinators.

A common set of procedures can be used at any level and these define the basis of the methodology used in the inventory. The five main components identified were: (1) site selection, (2) wetland identification, (3) classification system, (4) data collection and storage, and (5) the mapping procedure. After formulating the objectives of the inventory and identifying the available resources in terms of staff, expertise, equipment and information, decisions can be made on developing the three phases of wetland inventory. The process becomes more comprehensive and complex from phase 1 to phase 3 (table 1).

The first phase involves a *review of existing information*. Compilation of existing data on known sites, using all available sources of information (bibliography, maps, databases) is done. This does not require fieldwork and should be done before the collection of new data. At the end of this phase there will be a list of wetlands with available information, the location of those sites and some data on the biological, social, economic and legal status of the wetlands included. An example of this phase is the preliminary inventory of Portuguese wetlands (Farinha & Trindade 1994).

The second phase is called the *simple inventory*. Here a compilation of additional information about all the sites identified in phase 1 is done, with a higher level of detail, as well as the gathering of information on 'new' sites. This may require some fieldwork and moderate resources. This phase is essential as a minimum effort for recognising the wetlands within the area considered and their attributes. Further to the results from the first phase it identifies most wetland sites within the area considered, complete data at site level, wetland area identification for the sites included, compatibility of data with other international programs and assessment of the relative importance of the sites described.

The third and more complex phase, is called the *detailed inventory*. Here, detailed information about each site is compiled and detailed maps, ideally using a GIS are produced. In this phase, the importance of the sites for nature conservation and for local communities should be fully evaluated. Intensive fieldwork and wetland knowledge will be necessary, and more substantial resources are needed. This phase is particularly useful for local management, providing baseline information for planning and monitoring.

Table 1 Phases in the development of a wetland inventory using the MedWet methodology

| | Research of existing information | Simple inventory | Detailed inventory |
|-----------------------------|--|---|--|
| Site selection | Include all the sites for which there is some information | New sites must be located and recorded. Criteria for their inclusion must be set out. | A fully comprehensive inventory should be completed with all the wetlands within the area considered |
| Wetland identification | No effort is required for precise wetland identification | Wetland identification should be assessed at least for the less obvious boundaries | Precise identification should be undertaken, allowing ecological units to be delineated |
| Classification system | A detailed wetland classification is not needed, but some general categories or description should be used | A wetland type classification, such as Ramsar is sufficient | A detailed classification system of wetland habitats is required |
| Data collection and storage | It is important to assess the information existing and to identify the people with knowledge about each wetland site | Standard datasheets and database should be completed | Datasheets and database should be completed in order to allow a comprehensive coverage and output of the information |
| Mapping procedure | At least a national map with the location of the sites | A sketch map for each site should be included | Detailed habitat maps, ideally using GIS and photointerpretation devices should be produced |

Collection of information — datasheets

A set of datasheets were produced in order to provide basic concepts and procedures for the recording of data necessary for the inventory, having in mind three principles: compatibility, uniformity and flexibility.

The datasheets are based on experience and compatibility ensured by the inclusion of information fields required by existing international programs which include wetland inventory (eg Ramsar Convention, Natura 2000). They assure uniformity because the data categories presented in the datasheets (table 2) cover a broad array of information which can be described in a standard way. By flexibility we mean that a selection of fields can be made by the inventory coordinator taking into account the objectives and the resources available (technical, financial and human).

The MedWet methodology for data recording proposes three datasheets, each one corresponding to one level of information: catchment area, wetland site and habitat. These datasheets allow the recording of information at the level of detail required in each case and avoid duplication. To complement them, additional information can be collected in specific forms: flora, fauna, activities and impacts, meteorological data and references.

Table 2 Main data categories included in each of the datasheets for data collection

| Catchment area | Wetland site | Habitat |
|-----------------------------|------------------------|-------------------------------|
| Identification | Identification | Coding |
| Location | Location | Water permanency |
| Physiographical information | Description | Area |
| Population and landcover | Values | Maximum depth |
| Impacts and threats | Status | Condition of the habitat |
| | | Artificiality of water regime |
| | | pH range |
| | | Description |
| | Additional datasheets: | |
| | Flora | |
| | Fauna | |
| | Activities and impacts | |
| | Meteorological data | |
| | References | |

Characterisation of wetlands — classification system

Three classification systems are suggested for use with the inventory methods (Ramsar wetland types, CORINE Biotopes and MedWet Classification System). Although the Ramsar and CORINE systems can be used in a simple inventory, for detailed inventory and mapping it is strongly recommended that the MedWet system which is based on the US wetland classification system (Cowardin et al 1979) is used.

The MedWet classification consists of a hierarchical system for making detailed descriptions of wetland habitats and is intended to describe ecological units that have certain homogeneous natural attributes. The use of these units for mapping purposes, by drawing boundaries, not only provides data for inventory and analysis, but also provides information for monitoring and management.

The MedWet classification develops from systems (marine, estuarine, lacustrine, palustrine and riverine) at the top of the hierarchy, to subsystems (eg tidal, limnetic, littoral), classes (eg water surface, emergent, aquatic bed), and subclasses (eg persistent or non-persistent under class emergent). Furthermore, modifiers can be added, in order to describe the habitat in terms of water regime, salinity and artificiality.

Mapping the wetland sites — photointerpretation and cartography

A mapping procedure was developed in order to spatially identify wetland habitats. The identification and delineation of wetland habitats are based on the MedWet classification and detailed information for its application is available in the format of standard photointerpretation and cartographic conventions.

The method consists of four phases: (1) collection, screening and evaluation of existing data, (2) fieldwork, (3) photointerpretation and production of the final wetland habitat description map, and (4) digital map production using GIS. The work is based on information captured from aerial photographs combined with ground data and pre-existing data.

The production of maps using these methods is time-consuming and requires some investment and resources, but considered crucial for local wetland management.

Storing and analysing the inventory data — the MedWet Database (MWD)

All the information collected with the datasheets can be entered into the MedWet Database (MWD), which allows the storage, analysis and presentation of the inventory information and possible compilation of information at a Mediterranean level. The software mimics as closely as possible the datasheets used for recording the data in the inventory.

The first version of the MWD program was launched in late 1996 and has been produced in the programming language of FoxPro® 2.6 for DOS. This allows the storage of data in DBF files, so they can be easily imported/exported from and to other database software. A second version is being developed in Windows environment, improving data entry time and presentation capabilities.

Output procedures allow the user to produce reports from the MedWet Database, through a wide range of formats. These include outputs in the format designed under Ramsar Convention and Natura 2000 datasheets formats.

Use of the MedWet inventory tools

The methodologies delineated during the three years of the project were tested and refined in pilot studies in Portugal, Spain, France, Greece and Morocco. By the end of this first phase of the MedWet initiative, all the methods were tested in one pilot site in each of the European Union countries in the region (Papayannis & Montemaggiori 1996): Sado estuary (Portugal), Aiguamolls de l'Empordà (Spain), Étang de l'Or (France), Diaccia Botrona (Italy) and Lake Kerkini (Greece).

A second phase of the MedWet initiative took place in subsequent years, applying the MedWet tools in five other countries in the Mediterranean region: Morocco, Algeria, Tunisia, Croatia and Albania. This constituted another opportunity to test and validate the methodologies that had been developed. Other MedWet projects are planned for the near future, expanding the geographical range of the countries using these methods within the Mediterranean.

The methods are being used or are planned to be used in wetland inventories in Portugal, France, Slovenia, Albania, Greece, Algeria and Morocco. Other countries (eg Cambodia, Columbia and South Africa) have also referred to these methods to some extent when developing their own inventory programs.

References

- Costa LT, Farinha JC, Tomàs Vives P & Hecker N 1996. *Mediterranean wetland inventory: A reference manual*. MedWet Publication, Wetlands International, Slimbridge, UK, and Instituto da Conservacao da Naturez, Lisboa, Portugal.
- Cowardin LM, Carter V, Golet FC & LaRoe ET 1979. *Classification of wetlands and deepwater habitats of the United States*. US Department of the Interior, Washington DC.
- Farinha JC & Trindade A 1994. *Contribuição para o inventário e caracterização de zonas húmidas em Portugal Continental*. MedWet Publication. Instituto da Conservação da Natureza, Lisboa.

- Farinha JC, Costa LT, Mantzavelas A, Fitoka E, Hecker N & Tomàs Vives P 1996. *Mediterranean wetland inventory: Habitat Description System*. MedWet Publication, Instituto da Conservação da Natureza, Lisboa, Wetlands International, Slimbridge and EKBV, Thessaloniki.
- Finlayson M, Hollis T & Davis T (eds) 1992. *Managing Mediterranean wetlands and their birds*. Proceedings of an IWRB International Symposium, Grado, Italy, February 1991. IWRB Special Publication 20, Slimbridge.
- Hecker N & Tomàs Vives P (eds) 1995. *The status of wetland inventories in the Mediterranean region*. MedWet Publication, IWRB Publication 38, Slimbridge.
- Hecker N, Costa LT, Farinha JC & Tomàs Vives P 1996. *Mediterranean wetland inventory: Data recording*. MedWet Publication, Instituto da Conservação da Natureza, Lisboa and Wetlands International, Slimbridge.
- Papayannis T & Montemaggiore A 1996. *Five Mediterranean wetlands: Testing the MedWet approach*. MedWet Publication, Rome.
- Skinner J & Zalewski S 1995. *Fonctions et valeurs des zones humides méditerranéennes*. Publication MedWet. Tour du Valat, Arles.
- Tomàs Vives P (ed) 1996. *Monitoring Mediterranean wetlands. A methodological guide*. MedWet Publication, Wetlands International, Slimbridge, UK, and Instituto da Conservação da Natureza, Lisboa, Portugal.
- Zalidis GC, Mantzavelas AL & Fitoka EN 1996. *Mediterranean wetland inventory: Photointerpretation and cartographic conventions*. MedWet Publication. EKBV, Thessaloniki, Instituto da Conservação da Natureza, Lisboa and Wetlands International, Slimbridge.