

Wetland landscapes in the Mediterranean: current concerns for a sustainable future

Aphrodite Sorotou and Stefanos Dodouras

Abstract

The Mediterranean region is home to some of the world's most unique landscapes. Wetlands, in particular, have always been an important element of these landscapes, sustaining a rich biological diversity and providing valuable resources to the people living around them. The presence of humans has created rich landscape features, but it has also degraded many wetlands. To be effective, wetland landscape protection requires sustainable management and effective planning policies. Both should be based on giving opportunities and responsibilities to different activity centres and stakeholders, all of whom should have a say in the planning and decision-making processes. An accessible, participatory and informative approach is likely to improve communication and co-operation, allocate responsibilities effectively, utilise information and contribute to the sharing of experience and the transferral of knowledge for the upkeep and conservation of wetland landscapes in the Mediterranean.

Keywords: *Mediterranean, wetlands, landscape approach, sustainability, integration, European Landscape Convention objectives*

Introduction

The Mediterranean region is home to some of the oldest inhabited landscapes in the world, which are the result of continuous processes of interaction between humankind and nature. Evidently, wetlands and their surrounding landscapes are no exception. Wetlands, in particular, have always been an important element in the Mediterranean landscape, sustaining a rich biological diversity while also providing water, food, raw materials and transport for the people who live around them.

Even though wetland landscapes have played a fundamental role in contributing to the distinctive sense of Mediterranean identity, human craving for the profit that can be made through their abuse and overuse has greatly reduced their numbers; today, more than half of the Mediterranean's wetlands have disappeared; in some areas, the number of wetlands has fallen by 90% (Papayannis and Salathé, 1999), leaving the landscape profoundly changed. Reversing this trend will require a deep understanding of the characteristics and functions of these land-

scapes and the pressures they face, coupled with the promotion of a series of sustainable activities in which expert knowledge is combined with representative views from various sectors of society.

Mediterranean wetlands and their significance

Wetlands provide an astonishing setting teeming with countless forms of biological life and activity. The international Ramsar Convention on wetland conservation and wise use (1971) defines wetlands as 'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 metres'. Wetlands as defined by the Convention can include ponds, lakes, rivers, streams, bogs, marshes, fens, flood meadows and estuaries.

According to the Wildfowl and Wetlands Trust (2003), 3% of the earth's surface is covered by wetlands, while 75% of the human population lives in former wetlands and surrounding areas. Wetlands provide vital water resources for all types of human activity (domestic uses, agriculture, industry etc.). By absorbing heavy rainfall, they reduce the risk of flooding, and by stabilising soil and sediments they help to maintain the boundary defences of lakes, rivers and seas. They act as purifiers and maintain water quality.

Unfortunately, wetlands have not always been appreciated for their high hydrological importance; indeed, in many cases, they have been viewed as an obstacle to agricultural and economic development. In the Mediterranean, in particular, wetlands have been seen as a health risk (malaria), which led to their being drained, as in the case of Lake Karla in Greece in the 1960s (Sivignon, 2007) and, earlier, the Pontine Marshes in Italy. Their drainage was intended to create a large flat area for cultivation and/or grazing. For good or ill, the fate of Mediterranean wetlands has tended to be prescribed by central decision-making bodies with minimal knowledge of natural systems and of the implications of the unsustainable exploitation of their resources.

Seeing Mediterranean wetlands in their landscape context

Wetlands form an integral part of the repertoire of landscapes, environments and microregions in the Mediterranean area.

'Wherever a seasonal watercourse backs up behind beach deposits, wherever the accidents of topography render a valley floor less quick to drain, or wherever fault-lines have created intermountain basins, zones of inland drainage, there is a potential wetland, ranging in degree of saturation from perennial pool or lake to marsh which dries out in the summer'. (Horden and Purcell, 2000)

The variety of Mediterranean wetlands (from deltas, coastal lagoons, salt marshes, rivers and their associated floodplains to permanent and temporary marshes and lakes, salinas, oases, chotts and sebkhas) leads to a great variety of landscape forms. Yet what does the term 'landscape' mean, and what is so characteristic of wetland landscapes?



Fig 2.29 A small wetland created by mining on Milos, Greece.

Introducing the landscape approach

'Landscape', a difficult term with many meanings and numerous interpretations, 'is a human concept and as such encompasses how people view, hear, smell and feel the land and their surroundings [...] and the feelings, memories or associations that they evoke' (Natural England, 2006). The European Landscape Convention (ELC), the first international agreement focusing exclusively on this topic, defines landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2000).

Thus, the concept of landscape begins from an assumption that it is the result of an interaction between the environment and humans. The region is, after all, one which has been shaped as much by its long history of human habitation as by its continuously changing natural processes. Today's commonly employed environmental and/or spatial approaches do not necessarily share this holistic starting point. A landscape-based approach can provide a useful insight into the multi-functional character of wetlands, since it is a method which integrates ecological, economic and socio-cultural dimensions. Simultaneously, it provides a naturally meaningful scale on which to understand the forces of change and impact, and is an appropriate scale on which to explore the interactions between natural qualities and cultural values. Such an approach provides the tools for under-

standing the 'bigger picture' (Cassar, 2010). The landscape approach can therefore be an excellent framework for conservation decisions, whether they relate to intervention measures, improving planning processes or implementing conservation activities. The landscape approach can help our understanding of a whole range of ecological processes (in relation to human activities), and can enable the societal participation that is critical to achieving conservation objectives (WWF, 2002).

Forces of change in Mediterranean wetland landscapes

Considering Mediterranean wetland landscapes, one can refer to the floodplains of a perennial river like the Nile or the wet meadows of a lake like Prespa; both provide an extended chain of environmental opportunities for both flora and fauna. Other examples include the oases of Tamentit, the prehistoric remains of Kizören Obruk, the antiquities of Butrint and cases like the drained Lake Karla (Papayannis, 2008). The human/nature relationship has often determined the character and identity of Mediterranean wetland landscapes, resulting in a high degree of heterogeneity in space and time as well as a high degree of connectivity¹³ and permeability¹⁴ (García Mora and Montes, 2003).

A complex and interrelated range of environmental, economic and social 'forces of change' influence the function and character of continuously evolving wetland landscapes. Some changes are caused by natural forces, such as climate change, others by human development and the changing demands of society (Papayannis and Sorotou, 2007).

Water

Water characterises wetlands; it is their most vibrant and fundamental aspect. Water is subject to seasonal changes, turning into snow and ice in winter and impacting dramatically on the visual aspects of landscapes (Papayannis and Sorotou, *ibid.*). It also moves, as a result of flow or the action of wind, and this movement gives wetland landscapes a dynamic aesthetic.

It is impossible to speak about a wetland landscape without reflecting the presence of water in the landscape. The anaerobic conditions and soil changes caused by water when it floods areas of land leads to the development of plants that exhibit a variety of physical and physiological adaptations to growing in conditions of reduced oxygen availability (Lyon, 2001). Such wetland plants are not found in other conditions, and are therefore characteristic of these landscapes.

Undoubtedly, water is the primary element in a wetland landscape, and any change in its quantity, quality and distribution can dramatically alter its appearance.

¹³ 'The capability of the area to facilitate the flow of one species or a set of species' (García Mora and Montes, 2003).

¹⁴ 'The capability to maintain within the area the essential ecological wefts and flows' (*ibid.*).



Fig 2.30 Eutrophication is one of the main threats to insular wetland landscapes – Lemnos, Greece.

Biodiversity

An impressive diversity of species live in wetland ecosystems. These include microbes, plants, insects, amphibians, reptiles, birds, fish and mammals. Many species rely on wetlands for food, water and shelter, especially during migration and breeding. The variety of species and their number may have a significant impact on the formation of wetland landscapes¹⁵. The loss of an individual species may have irreversible consequences both for the 'life-chain' of the ecosystem and for the aesthetic values of the landscape. Humans, being a part of this biodiversity themselves, have the power to protect the landscape and its ecosystems or to destroy them.

Agriculture

Agriculture, whether extensive or intensive, is a key factor in shaping the visual and other features of rural areas, and is important in creating valuable habitats for wildlife. At the same time, habitats such as wetlands, particularly because of their hydrological connections with other part of the landscape, are susceptible to damage from a wide range of agricultural activities that take place both within wetlands themselves and in their surrounding catchments.

The causes of such damage may include any combination of the following: direct physical impact on habitats and species, introduction of new species or varieties, unsustainable water exploitation for irrigation (whether from rivers or aquifers), pesticide and fertiliser use and the dumping of waste.

Sustainably practised stock-breeding can 'contribute to the diversity of shoreline ecosystems and surrounding landscapes in many ways, with positive ecological

¹⁵ The variety of species, as well as a single species, can affect both the values and functions of a landscape. The variety of species also has a great visual impact, as it means more colours, sounds, smells etc. in the particular landscape.

and aesthetic results. Excessive grazing pressure can, however, deplete vegetation, impoverish ecosystems and cause trampling of waterfowl nests' (Kazoglou, 2004; Papayannis and Sorotou, 2007). There are also many cases where stock-breeding has been abandoned, leaving hundreds of hectares of eroded land along the edges of wetlands or on the mountain slopes around them.

Urbanisation

By definition, urbanisation involves the replacement of natural habitats with built-up areas that sustain human habitation and its related activities (Papayannis and Sorotou, 2010). It is a major cause of wetland loss around the Mediterranean, as the demand for land shows a continuous increase, both for building and for new transport and other auxiliary infrastructure.

Urbanisation (through, for example, the modification of hydrological and sedimentation regimes, or the dynamics of nutrients and chemical pollutants) influences both the structure and the functions of wetlands and the surrounding landscapes (Lee et al., 2006). It can also have a great impact on them visually. Natural wetlands are often characterised by a hydrological regime that encompasses concentrated flow during flood events and diffused discharge into groundwater and waterways during non-flood periods (*ibid.*). Any disruption of this can result in various –sometimes irrevocable– changes in the functioning of the hydrological cycle.

In addition to effects on the hydrological cycle, land use for urban and related infrastructures often has a high impact on the rest of the environment through the direct destruction of habitats and wildlife, as well as disturbances resulting from noise, resource use, waste dumping and pollution.

The spread of urbanisation, planned or unplanned, for permanent or resort housing and for tourism is also having a direct affect on wetland landscapes. In contrast to traditional small-scale construction, which uses local materials and is more harmonised with its surroundings, large-scale construction projects have a greater aesthetic and functional impact on the landscape. Extensive urbanisation may also result in the loss of large areas of wetland and the fragmentation of ecological connections within the landscape. Finally, the construction of large public works such as water and rail arteries, airports, harbours and energy networks can have a major impact on wetland landscapes, either directly or indirectly.

Mediterranean wetland landscapes: a sustainable future

A distinctive hallmark of landscape in general is the dimension of 'scale': 'landscapes display inherent patterns, closely related to underlying processes, permitting the identification of distinctive units within which environmental and socio-economic interactions can helpfully be framed' (Selman, 2006). 'Culture' is a

complex term, the interpretation of which evolves over time in order to take account of new socio-economic and environmental aspects. In 2002, the Ramsar Convention on Wetlands adopted Resolution VIII.19 on 'Guiding principles for taking into account the cultural values of wetlands for the effective management of sites', which includes under Guiding Principle 3 an objective 'to safeguard wetland-related cultural landscapes'¹⁶. The landscape scale can facilitate an appreciation not only of nature/culture relations, but can also serve as a holistic framework for responding to complex challenges (Selman, 2006; Cassar, 2010).



Fig 2.31 Lignite exploitation in the area brought several thermal power stations to Yellow Lake, which impacted powerfully on the landscape - Kozani, Greece.

The degradation of wetlands is a continuing reality, with severe damage affecting wetland landscapes and leading to a decline in functions, services and values. A widespread inability to appreciate wetland landscapes as a common good, as well as various local vested interests that neglect the values of wetland landscapes, can lead to uninformed planning and policy-making processes that favour unsustainable development schemes. The preamble to the European Landscape Convention, the first multilateral treaty exclusively concerned with all aspects of European landscape, gives prominence to sustainable development as one of its objectives through concern 'to achieve sustainable development based on a balanced and harmonious relationship between social needs, economic

¹⁶ Papayannis and Pritchard (2008) write: 'The protection of cultural landscapes, which have resulted from traditional human activities, should be a major component of policy and management objectives. Today, we lament the extent and depth of destruction caused by contemporary human activities, from urbanisation to forest clear-cutting, from transportation infrastructure to mining. Yet traditional activities created landscapes compatible with the natural environment, of considerable biodiversity and of a unique beauty. Many examples come to mind, such as the sculptural rice fields in many parts of Southeast Asia, the canals of the Neretva River in Croatia, or the land terracing in most Mediterranean islands. In numerous parts of the world, the traditional activities that have moulded the landscape for millennia are regressing or disappearing. As a result, the landscapes dependent on them are starting to erode and may also disappear with time, leading to the loss of their cultural values.'

activity and the environment' (Council of Europe, 2000). The successful management of wetland landscapes requires improved land use planning, sound conservation goals, efficient monitoring mechanisms and recognition of communal values. In this context, associated policies should be geared to sustainability: i.e. taking the appropriate measures to ensure compatibility between the managed evolution of wetlands and socio-economic development objectives which would otherwise tend to alter the landscape.

Until very recently, wetlands were studied mainly for their ecological values, while landscape researchers paid little attention to them as a separate landscape type. Given, however, that people value wetland landscapes for many different reasons, the cognitive dimension should be included among the dimensions recognised in the notion of wetland landscapes. Among the most important principles of the European Landscape Convention is the principle of integration. More specifically, Article 5.d places an obligation on Contracting Parties relating to integration: 'Each Party undertakes: to integrate landscape into its regional and town planning policies and in its cultural, environmental, agricultural, social and economic policies, as well as in any other policies with possible direct or indirect impact on landscape'. An integrated approach can be important for better understanding the links and different trade-offs involved in trying to reach desired target states (Dodouras, 2007), including the protection, management and planning of landscapes –in this case, wetland landscapes.

Mahatma Gandhi once said that '*the earth provides enough to satisfy every man's need but not every man's greed*' (Chowdhary, 1989). Bluntly, sustainability is about the future of the planet, and whether it has a future. However, it is difficult to measure the achievement of sustainable development as a target. It may be of more value as an 'umbrella' under which the integration of countless interrelated issues can occur. A key question, therefore, is how different individuals can communicate and understand each other more effectively so their decisions can have a better impact. In other words, the fundamental question that remains to be answered is how to integrate these issues into practical decision-making (Dodouras, 2007).

Contemporary society needs to take a long hard look at the current and long-standing issues that characterise its development processes, and come up with creative approaches to understanding and problem-solving. Integration may seem to be a *cul-de-sac*, since the aim of bringing various sustainability issues into the same framework seems unrealistic. Integrated approaches must therefore take a wide variety of factors into account, co-ordinate initiatives, resolve conflicts and incorporate diverse concerns into planning, policy and decision-making through the delegation of responsibilities, which may contribute to more participatory and democratic processes (Dodouras and James, 2005).

The natural environment is society's primary resource base, and neglect of its processes can have serious socio-cultural and economic repercussions. In comparison to much of the western world, awareness of sustainability concerns has been a long time coming to the Mediterranean Basin. Sustainability issues related to intensive agriculture, urbanisation, unemployment, transport, tourism etc. have only come to the fore recently, when they attracted the attention of scientists and organised social groups. Although national governments and regional and local authorities in the region have expressed their concern, little has been done to deal with issues such as deforestation, eutrophication and the commercialisation of natural resources despite their lofty talk and ambitious planning (UNESCO World Heritage Centre, 2003). The sustainable conservation and management of wetland landscapes cannot be governed solely by legislation and regulation. It must also extend to various sectors of the socio-economic and cultural life of human societies. In this respect, the upkeep and conservation of wetland landscapes in the Mediterranean should be a constant learning process through increasing participation and awareness of relevant issues.

The sustainable management of Mediterranean wetland landscapes should be based on opportunities and responsibilities being given to different activity centres and stakeholders who should all have a say in the planning and decision-making processes. The major challenge of managing knowledge is not so much its creation, but more its capture and integration. If current knowledge and the real concerns of all the parties concerned are not incorporated into the planning, impact appraisal and assessment, decision-making and monitoring processes, the inevitably narrower views on the directions to be taken in the future are unlikely to produce high-quality sustainable outcomes.



Fig. 2.32 Uncontrolled waste dumps next to mountain streams - Mount Pelion, Greece.

Conclusions

Wetland landscapes are among the most important and the most vulnerable types of landscape in the Mediterranean. Human activities have greatly reduced wetland resources in the region to the extent that remedial action is now imperative.

Indubitably, numerous initiatives and actions are currently seeking to promote and protect wetlands in the Mediterranean. A landscape-scale approach provides the most appropriate basis for assessing the impact of human activities (urbanisation, industrialisation, tourism etc.) on sites, while deepening our understanding of human/nature relations.

To be effective, wetland landscape protection requires sustainable management and effective planning policies. The European Landscape Convention, for example, considers landscapes to be an integral part of all environmental policies; yet, if landscapes are to be seen as a key piece in the sustainability jigsaw for the better management of wetlands, it remains to be considered what sort of conceptual framework would best pave the way. Perhaps future planning and policies should focus on people's growing need for high-quality wetland landscapes with natural, cultural, aesthetic and symbolic values.

Concrete proposals are now needed. An accessible, participatory and informative approach is likely to improve communication and co-operation, allocate responsibilities effectively, utilise information and contribute to the sharing of experience and the transfer of knowledge for the upkeep and conservation of wetland landscapes in the Mediterranean.

References

- Cassar, L. F. (2010), *Landscape Approach to Conservation; Integrating Ecological Sciences & Participatory Methods*, Msida: International Environmental Institute, University of Malta.
- Chowdhary, K. (1989), *Industrialisation, Survival and the Environment*, New Delhi: INTACH.
- Council of Europe (2000), *European Landscape Convention, CoE Treaty Series 176*, Strasbourg: Council of Europe.
- Dodouras, S. and James, P. (2005), *Participative and Integrative Techniques to Improve Multi-disciplinary Communication: A Precursor to Producing Sustainability Profile Indicators*, Prague: Jan Evangelista University, pp. 376-385.
- Dodouras, S. (2007), Fuzzy cognitive mapping to appraising complex situations: the case study of the region of West Makedonia, Greece, *International Journal of Environmental, Cultural, Economic & Social Sustainability*, 3 (5), 125-135.
- García, M. R. and Montes, C. (ed.), (2003), *Linkages in the Mediterranean landscape. The role of protected areas in the territorial context*, Consejería de Medio Ambiente, Junta de Andalucía.
- Horden, P. and Purcell, N. (2000), *The Corrupting Sea: a Study of Mediterranean History*, Oxford: Blackwell Publishing Inc.

- Kazoglou, Y. (2004), The importance of the wet meadows, *I Fysi*, 107, 4-7 (in Greek).
- Lee, S. Y., Dunn, R. J. K., Young, R. A., Connolly, R. M., Dale, P. E. R., Dehayr, R., Lemckert, C.J., Mckinnon, S., Powell, B., Teasdale, P. R., Welsh, D. T. (2006), Impact of urbanization on coastal wetland structure and function, *Austral Ecology*, 31 (2), 149-163, <http://onlinelibrary.wiley.com/doi/10.1111/j.1442-9993.2006.01581.x/full>, checked 8 April 2011.
- Lyon, J. G. (2001), *Wetland Landscape Characterisation: GIS, Remote Sensing and Image Analysis*, Chelsea: Sleeping Bear Press.
- Natural England (2006), *Landscape: beyond the view-part 1*, www.naturalengland.org.uk/Images/btvpart1_tcm6-7461.pdf, checked 8 April 2011.
- Papayannis, T. and Salathé, T. (1999), *Mediterranean Wetlands at the Dawn of the 21st century*, Arles: MedWet – Tour du Valat Publications.
- Papayannis, T. and Sorotou, A. (2007), Mediterranean wetland landscapes: the case of Prespa Lakes, in *European Landscapes and Lifestyles*, ed. Z. Roca, T. Spek, T. Terkenli, T. Plieninger and F. Höchtl, Lisbon: Edições Universitárias Lusófonas.
- Papayannis T. and D. E. Pritchard (2008), *Culture and Wetlands: a Ramsar Guidance Document*, Gland: Convention on Wetlands (Ramsar, 1971).
- Papayannis, T. and Sorotou, A. (ed.), (2010), *In Search of the Greek Landscape*, Athens: Med-INA.
- Papayannis, T. (2008), *Action for Culture in Mediterranean Wetlands*, Athens: Med-INA.
- Ramsar Convention (1971), *Convention on Wetlands of International Importance*, Ramsar: UN Treaty Series No. 14583.
- Selman, P. (2006), *Planning at the Landscape Scale*, London and New York: The RTP Library Series, Routledge.
- Sivignon, M. (2007), The Greek wetlands: from degradation to rehabilitation, in *European Landscapes and Lifestyles*, ed. Z. Roca, T. Spek, T. Terkenli, T. Plieninger and F. Höchtl, Lisbon: Edições Universitárias Lusófonas.
- Wildfowl and Wetlands Trust (2003) What's a wetland? - definition and types, http://www.wwt.org.uk/old_files/uploads/whats-a-wetland.pdf, checked 8 April 2011.
- WWF (2002), WWF position paper on the landscape approach, assets.panda.org/downloads/po11landscapeapproach.pdf, checked 8 April 2011.
- UNESCO World Heritage Centre (2003), *Cultural Landscapes: The Challenges of Conservation*, Paris: UNESCO World Heritage Centre.