



# Conservation of Wetlands on Tunisian Islands: Kerkennah and Kuriat Islands as a Case Study

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## Abstract

Mediterranean islands' wetlands have a crucial role in protecting not only the islands of the region from the effects of climate change and natural hazards, but also a wide range of endangered and endemic wildlife species, including a significant number of migratory birds. Islands' wetlands have highly dynamic changing ecosystems due to the effects of isolation and the anthropogenic perturbations that put these natural systems in a major distress and threaten their well-functioning and existence. Thus, these areas are one of the world's most threatened ones. Therefore, it is important to know, understand and monitor the changes within them to better understand the ecosystem and habitats dynamics. Through the Mediterranean Islands' Wetlands project, a methodology has been developed by the WWF Greece and disseminated to 9 Mediterranean countries in order to inventory more than 14,000 Mediterranean islands' wetlands located on 160 islands. In this project, Google earth's satellite images, national land use geo-databases with previous inventories' output were combined to identify, delineate and document possible wetlands. Together with in situ field inventory, these findings were used to better understand the evolution and changes in the systems and create a scientific database for all islands' wetlands. The aim of this study was to apply this methodology to the Tunisian islands' wetlands focusing on the significant number of wetlands that were identified in Kerkennah and Kuriat islands. This study showed the importance of building a

scientific database to better understand the identified areas, and monitor their evolution in order to set up restoration and conservation strategies.

## Keywords

Kerkennah archipelago • Kuriat islands  
Wetlands • Salt marsh • Sebkhas • Inventory  
Satellite images • Degradation

## 1 Introduction

The Mediterranean Basin is considered as a hotspot for islands' biodiversity; it is also rich in wetlands of both natural and artificial origins such as lagoons, ponds, salt marshes, sebkhas and salines. However, due to human activities such as the expansion of urban development, waste dumping and pollution, the wetlands of the Mediterranean islands are increasingly facing serious dangers. These activities are threatening to undermine the ecological character of the wetlands and accelerate the degradation and the ecosystem's fragmentation, which makes them extremely fragile and easily destroyed. In addition, many wetlands in the Mediterranean islands are increasingly subjected to hydrological stress, while at the same time the demand for fresh water in these areas continues to increase with the growth of both agriculture and tourism sectors.

In Tunisia, like the rest of the Mediterranean countries, environmental organizations, governments, associations or research centers are focusing on continental wetlands with important surfaces; however the islands' wetlands, with smaller surfaces, were neglected. So currently, there is a lack of information on islands' wetlands and the majority of these areas are still unidentified and undocumented, making their conservation and protection more difficult. In fact, out of 41 classified Ramsar sites in Tunisia, only 5 are located in islands (Djerba Bin El Ouedian, Djerba Guellala, Djerba Ras Rmel, Kerkennah Islands and the Kneiss Islands with their

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intertidal zones) and from 256 wetlands documented during the national wetlands inventory in 1997, only 4 islands' wetlands were included (Kerkennah documented as a whole island, Kneiss, Sebkha El Quastil and sebkha of Houmt Essouk in Djerba) (Hughes 1994).

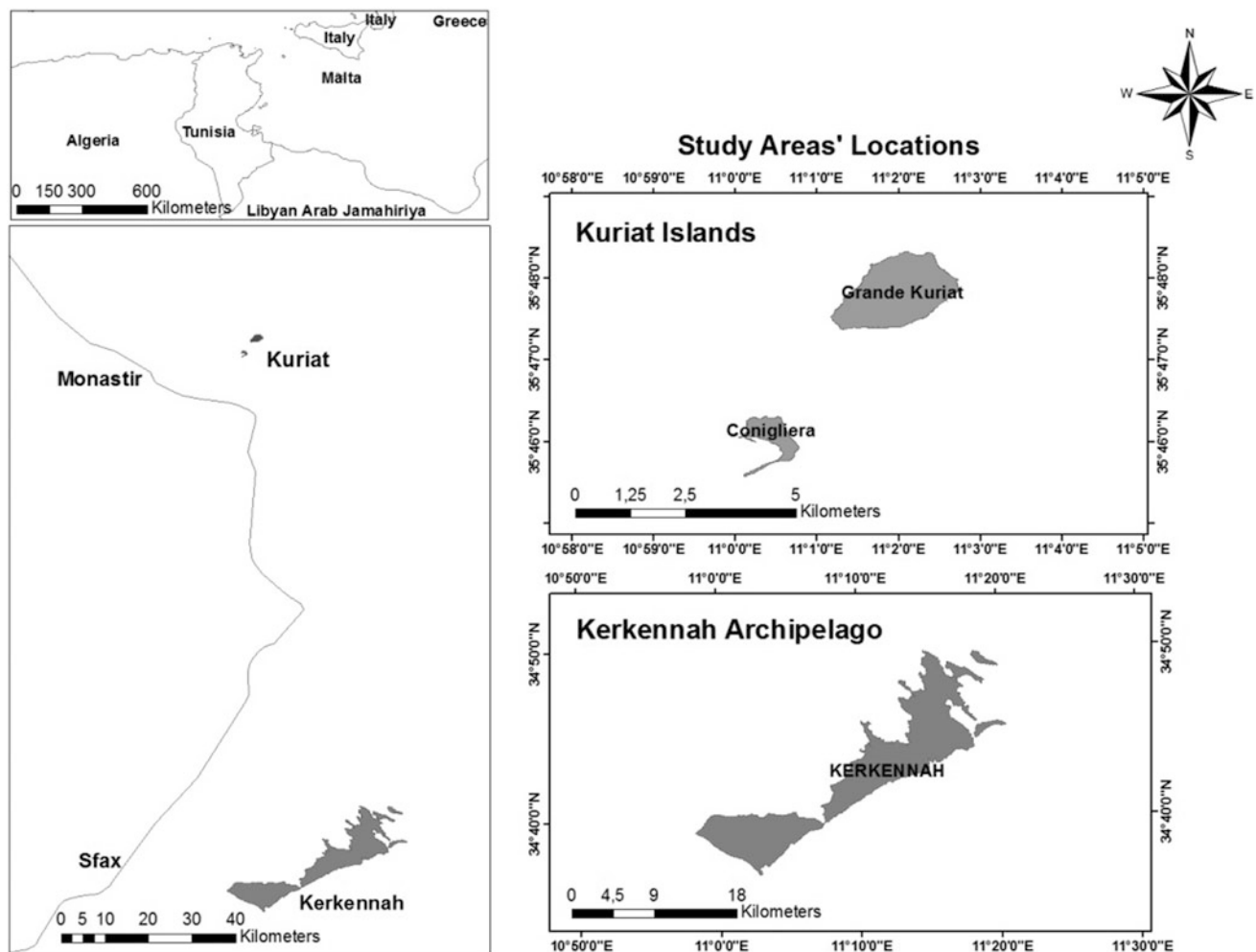
In 2004, WWF Greece launched the initiative "Conservation of the Islands Wetlands of Greece" to document and inventory the islands' wetlands of Greece, to raise awareness regarding their value and promote their conservation and protection. And in 2017, the Mediterranean Islands' Wetlands project, which is a replication of the Greek island wetland project to all the islands of the Mediterranean Basin, was set up. It includes actions for the completion of the inventories of all Mediterranean islands' wetlands, dissemination of knowledge to the public, promotion of conservation measures in local, national and Mediterranean scale and the implementation of Ramsar Resolution XII.14 "Conservation of Mediterranean Basin island wetlands".

This study, as a part of the Mediterranean Islands' Wetlands project, presented the outputs of Kerkennah and Kuriat islands' inventory.

## 2 Study Areas and Methods

Kuriat are two uninhabited islands, located in the Gulf of Hammamet, ca 16 km far from the coast of Monastir Bay, Tunisia. They include two main islands, the big Kuriat with a total shoreline of about 8.37 km and the small Kuriat or Conigliera with a total shoreline of 6.3 km. The distance between them is 2.3 km (Source: Satellite images, Google Earth, 2018). Characterized by terrestrial, coastal and marine ecosystems important for maintaining the biological balance of the area, and by the sheltering of some species threatened by distinction (the loggerhead turtle *Caretta caretta*, *Pinna nobilis* and the plant *Caulerpa racemosa*), has earned them the status of a sensitive coastal zone (following the census of biological diversity in Tunisia conducted by the Ministry of Environment and Regional Planning in 2005) and are currently part of the program of creation of Marine Protected Areas in Tunisia (APAL/SCET-TUNISIE 1999, 2000; Langar et al. 2011; CAR/ASP-PNUE-PAM 2014, 2015; Mbarek 2016).

The Kerkennah archipelago is located in the Gulf of Gabes, ca 17.9 km from Sfax, Tunisia. It includes 14



**Fig. 1** Kerkennah archipelago and Kuriat islands locations

islands with a total shoreline length of 182.4 km (APAL 2015) (Fig. 1). The islands of the Kerkennah Archipelago are an important wintering site for wading seabirds and other waterbirds, as well as an important crossing site for passerines during their migrations. Plus, the satellite islets located in the northeast of the archipelago have a remarkable biological richness, with many endemic, rare or endangered animal or plant species (APAL 2001). This vulnerability, together with the significant ecological characteristics of the Kerkennah Islands, has earned them the designation of a Ramsar site and a Nature Reserve (UN-List of protected areas 2014).

The inventory strategy, developed within the framework of the conservation of Greek Wetlands' project, is based on several approaches. For the identification and the delimitation; Google Earth images, soil occupation maps and national land use geo-databases were consulted and used. Each island was thoroughly scanned and potential wetlands were marked. All wetlands, natural and artificial, were taken into account and two main criteria were set for them; non-linear Systems having a total area superior to 0.1 ha. As for the in situ approach, field visits were conducted in the spring of 2018 at a low tide period in order to find the systems not fully covered by water and be able to have a better assessment and identification of the flora species. The final mapping of the wetlands was achieved in the field and an in situ questionnaire with the locals was carried out to

fully understand the history, the values and the human activities done in the area.

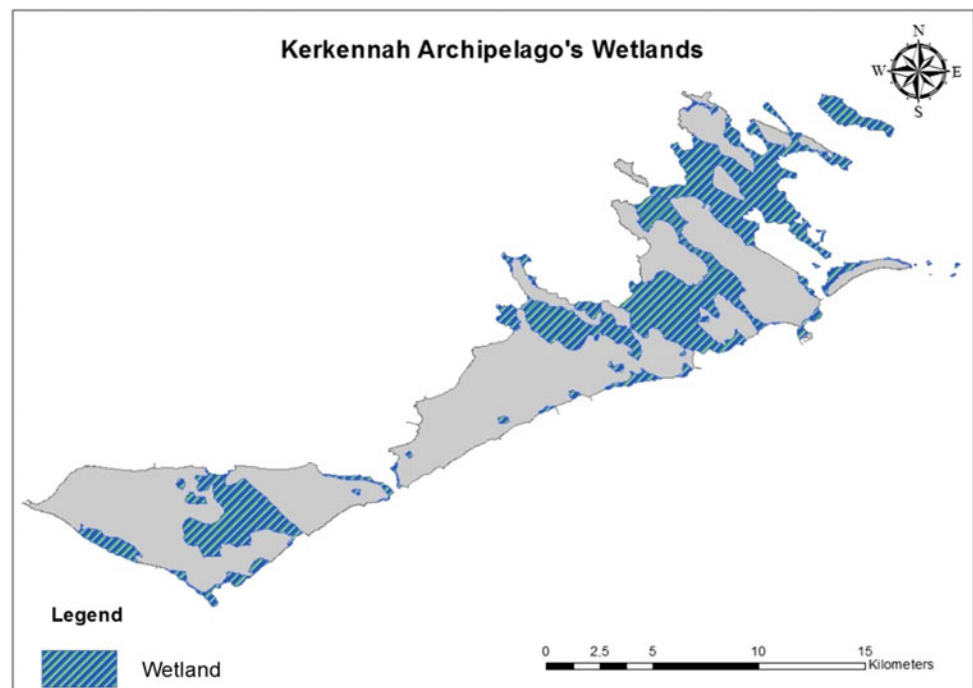
### 3 Results

A total number of 50 nonlinear wetlands larger than 0.1 ha on 14 islands were primarily identified (41 in 12 islands in Kerkennah Archipelago, 5 in big Kuriat, and 4 in Coniglieria). From these wetlands, 49 were natural, only one was artificial (Salines of El Abbassia) and 29 of them were visited and inventoried.

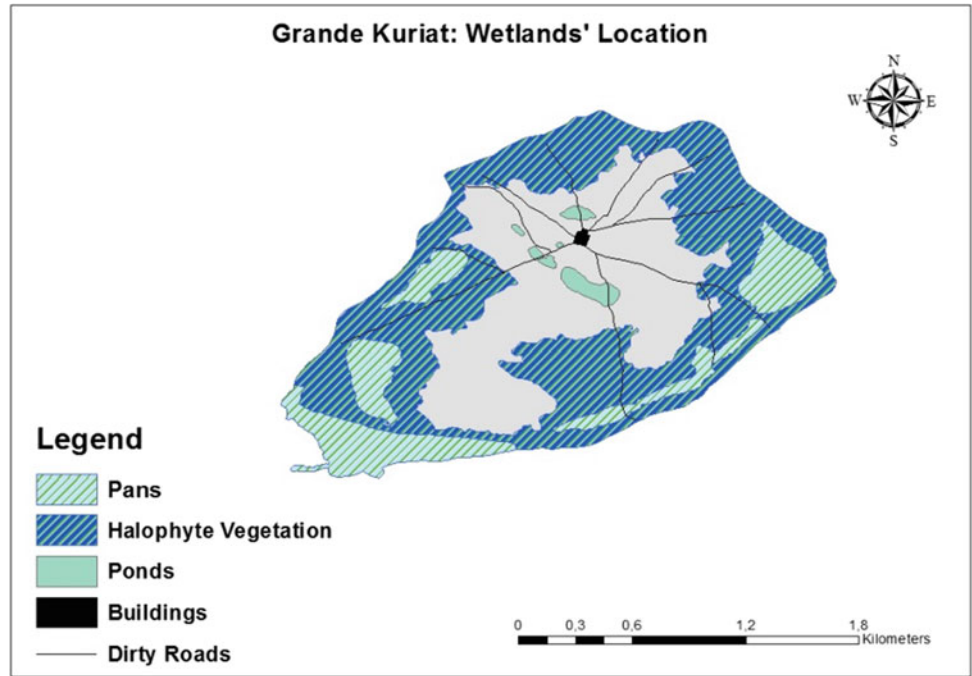
After the field visits, 3 wetlands in Kerkennah were excluded and 9 others (5 in big Kuriat and 4 in Coniglieria) were merged into 2 multi-component systems. 15.5% of the natural wetlands were highly modified or totally changed, 15.5% are partially modified, 27% are still dominated by their original habitats, and 42% are still untouched.

For the human actions, dumping of municipal waste and debris, buildings, and road construction, dikes and over-pumping, are the main noticed signs of degradation. Only one wetland, located in Kerkennah Archipelago, is under protection (designated as a Ramsar site) and no other wetland is properly managed, protected or has any kind of conservation plan. And for the last two years, 3 wetlands have been devised by the construction of dikes and are currently heavily degraded (Figs. 2, 3 and 4).

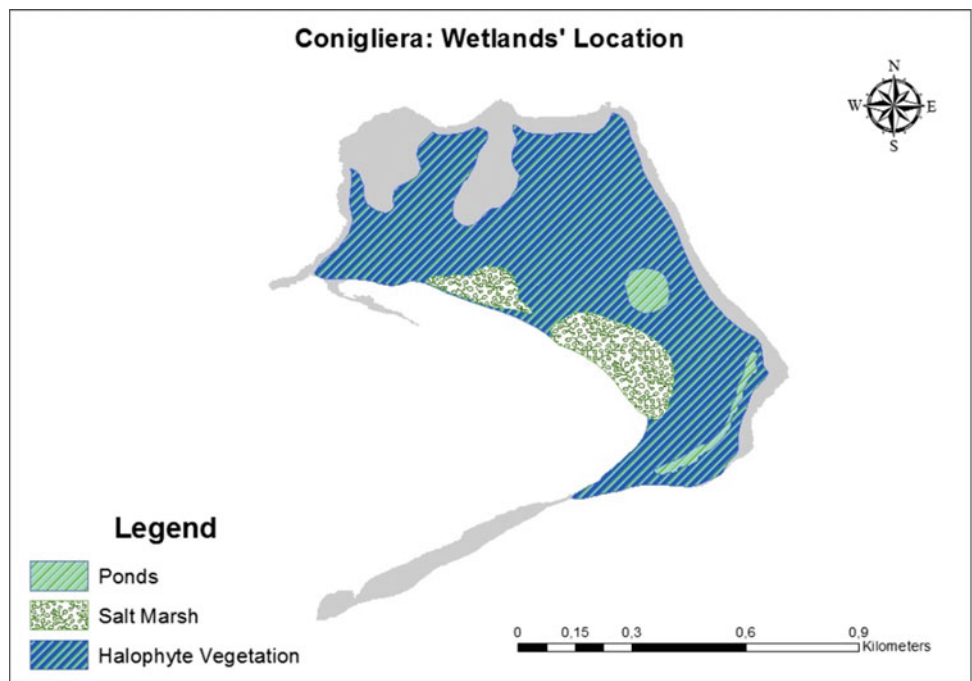
**Fig. 2** Kerkennah Archipelago's wetlands



**Fig. 3** Grande Kuriat's wetlands



**Fig. 4** Conigliera's wetlands



## 4 Discussion and Conclusion

The Mediterranean island wetlands are one of the most endangered ecosystems in the region. And currently, we are facing a huge gap in the documentation level of these areas which makes their conservation and protection more challenging. In this study, and through a combination of methods, we identified 50 wetlands on 14 different islands.

In Kerkennah Archipelago, two main types of wetlands were presented, coastal salt marshes and sebkhas (temporary pans). Both types are covered in halophyte vegetation and human impact on them was greatly noticed. In fact, the majority of the coastal salt marshes were used by fishermen for cabanas' building and waste dumping. As for the inland wetlands, the most noticed actions were chaotic household waste disposal and roads and building construction.

As for the Kuriat islands, three types were presented, coastal salt marshes, pans (salt pans and temporary pans) and ponds. Some systems are covered in halophyte vegetation and others are not. The anthropogenic impact on its wetlands, especially for big Kuriat, is limited due to their uninhabitable status.

This study shows that analyzing the status of different wetlands and establishing records of loss and degradation are fundamental for setting up management and conservation plans.

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