

## NETWORKING OF FIVE LIFE-NATURE PROJECTS IN GREEK RAMSAR WETLANDS: LESSONS LEARNT FROM VEGETATION MANAGEMENT AND MONITORING ACTIVITIES

Yannis Kazoglou<sup>1</sup> – Michael Vrahnakis<sup>2</sup>

<sup>1</sup> Society for the Protection of Prespa, Agios Germanos, 53077, Florina, Greece, yaniskaz@hol.gr

<sup>2</sup> Laboratory of Rangeland Science, Department of Forestry and Management of Natural Environment, Technological Educational Institute of Larisa, 43100, Karditsa, Greece

**Abstract:** Among various LIFE-Nature projects that were implemented in protected areas of Greece from 1999 to 2007, five of them were dedicated to the Ramsar wetlands of Strofylia-Kotychi, Amvrakikos, Lake Mikri Prespa, River Nestos Delta and Evros Delta – Drana Lagoon, located from the western to the northeastern parts of the country. Through these projects, important conservation measures targeting vegetation-, water- and bird-related threats were successfully put into practice. Additionally, each project included a public awareness and dissemination of results campaign, while a network of the five projects was also maintained from October 2002 to September 2006, for the first time in Greece, with meetings taking place rotationally at the five sites. This networking activity offered the ground for the projects' teams to learn lessons on both administrative and conservation management issues. The former included exchange of know how, establishment of working groups, interaction between conservationists, public authorities and local politicians from different parts of the country, better diffusion of the results of each project, and production of a common final technical report. The latter, with emphasis on Natura 2000 habitat types, included best practices applied in different wetland and forest types, such as tree plantations, restoration of wet meadows and sand dunes, earthworks to improve degraded habitats, implementation of experiments on specific habitat types and monitoring of vegetation at managed sites. It is recommended to perform such beneficial networking activities as a standard action for similar nature conservation projects being implemented within parallel time periods.

**Keywords:** brackish, freshwater and forest habitats, implementing appropriate conservation and restoration objectives, project networks, increasing public support and participation

### Introduction

LIFE-Nature projects offer the opportunity to apply conservation measures at sites of the European NATURA 2000 network hosting priority habitats and species. For the implementation of such European Commission co-funded projects various organisations co-operate from the project proposal development phase to the actual performance of recurrent, non-recurrent and, very often, pilot actions on the ground. Non-governmental organisations (NGOs), scientific institutions, representatives of local societies (politicians of various administration levels) and public services, as well as consulting agencies play particular roles to that process. Among recent LIFE-Nature projects carried out in Greece, five were dedicated to the Ramsar wetland sites of Strofylia-Kotychi, Amvrakikos, Lake Mikri Prespa, River Nestos Delta (and Gorge) and Evros Delta-Drana Lagoon. A great variety of habitat types, such as wooded dunes with *Pinus pinea* and alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*, and priority species (e.g. *Botaurus stellaris*, *Aythya nyroca*, *Aquila clanga*) is encountered at these sites. To promote awareness and disseminate the projects' achievements, a network of the project teams was created and operated from October 2002 to September 2006. The present paper aims at presenting the activities relevant to conservation management of wetland vegetation at these five sites and to point out the lessons learnt from this original (for Greece at least) networking activity.

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### Conservation actions on vegetation, lessons learnt and projects' networking

Vegetation management measures applied through the five LIFE-Nature projects were in some cases similar (and often combined with earthworks and water management actions), while all projects included simple or more complex monitoring activities. Lessons learnt from the implementation of conservation measures are presented in Table 1. At Strofylia-Kotychi, the project aimed at improving the conservation status of the most important ecological features of the site (Kardakari 2006). Habitat management interventions took place at four localities: a) at Lamia Marsh a 900 m long canal was opened in the reedbed (surface width 10 m, depth 2.5 m), six pools (80-400 m<sup>2</sup> and 2 m deep each) and seven islets (200 m<sup>2</sup> each) were created along the canal, and native *Fraxinus angustifolius* trees were planted on the embankment of the canal to create tree clusters for birds, b) at Kotychi Lagoon a similar canal was opened (length 2000 m, surface width 10 m, depth 1.5 m) and dredgings were deposited on Kotychi islet to improve bird nesting conditions, c) at Strofylia Umbrella Pine forest 5000 young native trees of *Pinus pinea* were planted and fenced, pilot management treatments were applied in experimental plots and measures were taken to exclude grazing and trespassing, d) at degraded coastal sand dunes special fences were successfully installed on a total length of 400 m and sensitive spots were delineated and protected to regulate recreational activities and avoid erosion caused by visitors.

The Amvrakikos Ramsar site consists of the shallow marine waters of Amvrakikos gulf (used by the priority species *Caretta caretta* for feeding), the deltas of Louros and Arachthos Rivers, extensive lagoon systems and the largest marsh in Greece (Rodia). Increased salinity, insufficient water circulation in the lagoons, disturbance and illegal hunting of birds and incidental catch of *C. caretta* are the main threats to important habitat types and species. The project aimed at: a) restoring the lagoons, b) conserving six priority bird species and their habitats, and c) protecting sea turtles (ETANAM & OIKOS 2003). Conservation actions included: a) tree plantings to restore sites of great importance for birds of prey (Fraxia-Lourou riverine area and Mavrovouni Hill, 26.2 ha in total) where 3500 saplings of *Fraxinus angustifolius*, *Populus alba*, *Salix* spp., *Quercus macrolepis*, *Q. pubescens*, *Ceratonia siliqua*, *Cercis siliquastrum* and *Olea oleaster* were planted with 70-90% success, b) maintenance and improvement of previous reforestation measures at Profitis Ilias Hill by irrigation and creation of water reservoir, c) opening of two channels in dense reedbed formations of Rodia Marsh (1000 m long each with basal width of 3 m, upper width of 6 m and depth of 1.5 m) to increase habitat heterogeneity and supply freshwater to the degraded brackish marsh (>100 ha) and lagoons, d) introduction of water buffalo grazing which created a wet grassland habitat type on a site previously dominated by dense reedbeds and tamarisk bushes (*Tamarix* spp. cover reduced by 70%), e) installation of experimental plots to monitor changes in vegetation composition and structure in the grazed site.

At Lake Mikri Prespa, measures were taken to improve the conservation status of *Pelecanus crispus* and *Phalacrocorax pygmaeus* by managing the water level of the lake and the littoral vegetation. The old sluice-gate-bridge system located between Lakes Mikri and Megali Prespawas re-constructed, wet meadows were restored at ten littoral sites (total area of 70 ha) with direct benefits for wetland birds and spawning fish, and a management plan for 2007-2012 was produced including guidelines on

water-, vegetation-, bird- and land use-related issues. Specific actions on vegetation management and monitoring were performed by re-introducing water buffalo grazing and summer cutting which controlled reedbeds formerly extending on seasonally flooded zones in the absence of management, and implementing a monitoring plan. The latter included transect measurements in spring and summer and setting up experimental plots to follow the evolution of floristic and structural characteristics of vegetation at the managed sites, compare the treatments practiced for wet meadow restoration and record the rate of growth of emergent helophytes (*Phragmites australis*, *Typha angustifolia*) above the water surface in spring-early summer, data correlated with the presence of aquatic birds at the managed sites (Malakou et al. 2007).

Table 1. Lessons learnt from vegetation management and monitoring actions at five Greek Ramsar wetlands

Conservation actions	Sites and localities	Lessons learnt
- Opening of canals, creation of pools and islets in very dense and homogeneous reedbeds to improve habitats - Earthworks in lagoons and river systems	Strofylia-Kotychi wetlands	- Collaboration of scientists from various disciplines (environment, engineering, etc) fruitful for conservation purposes
	Amvrakikos	- Use of special machinery (e.g. amphibious diggers) and ordinary excavators on wetland soils
	Drana Lagoon	- Restoration of riverine habitats and reduction of salinization possible by re-flooding of old disconnected branches
	Nestos River	
- Tree plantings - Partial fencing of forests and blocking of illegal forest roads	Lake Mikri Prespa	
	Strofylia-Kotychi	- Tree planting to be implemented with great caution as a series of sub-actions has to be fulfilled, such as studies, selection of locations, initial plantings and protection of saplings, monitoring and, often, additional plantings
	Amvrakikos	- Important to use native species in tree plantings
	Nestos River	- Collaboration with state forestry services ensures success
- Re-introduction of water buffalo grazing - Implementation of summer cutting with and without aftermath grazing	Evros Delta	- Important to communicate project actions at local level
	Amvrakikos wetlands	- Combination of conservation management and rangeland-stock breeding practices (e.g. implementation of rotational grazing, hay harvesting at managed sites)
- Installation of experimental plots and implementation of monitoring actions - Pilot forestry management (at Strofylia <i>Pinus pinea</i> forest)	Lake Mikri Prespa	- Grazing sites very attractive for visitors
	Lake Mikri Prespa	- Management actions can be the source of nature interpretation games
	Strofylia	- Knowledge of present status of habitats and vegetation dynamics
	Amvrakikos	- Monitoring necessary for adjustment and elaboration of monitoring and management plans
- Installation of special fences on sand dunes - Delimitation and fencing of sensitive spots	Nestos riverine forest	- Acquirement of important information on the regeneration and long term conservation of the <i>Pinus pinea</i> forest
	Drana Lagoon	
- Installation of special fences on sand dunes - Delimitation and fencing of sensitive spots	Strofylia-Kotychi wetlands (Kalogria beach)	- Regeneration of sand dunes on coast possible by sand aggregation within fences
		- Regulation of recreational activities to reduce dune erosion possible by simple means (e.g. signs for visitors and fencing)

At Nestos River, the project aimed at the conservation of raptors, terns and their habitats found along the river. Major restoration actions took place by tree plantings to restore nesting and wintering sites of large raptors and earth-hydraulic works to re-connect old river branches. The magnificent Nestos riverine forest was partially restored on previously cultivated land located within the river bed with 12,790 saplings of native

species (soft- and hard-wood trees, fruit-bearing, bushes and lianas) on a surface of 35 ha with 90% success. Additionally, 9.2 Km of river branches were re-connected and re-flooded to improve forest habitats, Mediterranean temporary ponds and wet grasslands, and confront salinization to freshwater habitats (HatziaPOSTOLIDIS et al. 2006). The restoration of the Drana Lagoon and adjacent sites of the wider Evros Delta Ramsar site mainly aimed at improving the habitats of geese, raptors and other birds. Tree plantings were carried out in three phases (2002-2005) to restore large riparian woodland habitats at Loutros and Sarantametros dike. In total more than 2100 saplings (*Fraxinus* sp., *Populus* spp., *Alnus glutinosa*) were planted on an area of 22 ha. The restoration of the Drana Lagoon (500 ha, 0.4 m average depth), its re-connection to the sea and the creation of an adjacent 30 ha wet grassland area were achieved by extensive earthworks. Monitoring before and after the re-flooding of the lagoon was applied to inventory habitats and correct the relevant map, record vegetation floristic and structural characteristics and measure soil and water physico-chemical parameters. By the end of the project the monitoring plan was re-adjusted and a management plan for the lagoon was produced (Efstathiou et al. 2005). The networking activity supported visits of the project teams at the five sites and meetings were devoted to specific conservation themes and on-site presentation of project actions with active participation by local politicians, and representatives from public authorities, NGOs, research and consulting organisations from many parts of the country. By the end of 2006, a joint technical report was produced to illustrate the networking activity and present case-studies from the five Ramsar sites.

### Conclusions

Important experiences were gained by the networking activity, which was organized for the first time in Greece. Its results can be of great significance for the recently staffed Management Bodies of protected areas of the country. Supporting such networks should be a standard action for similar conservation projects realized within parallel time periods for public awareness purposes and concrete conservation work.

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