



THE GOULANDRIS
NATURAL HISTORY MUSEUM

GREEK BIOTOPE~ WETLAND CENTRE



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THE NATURAL ENVIRONMENT OF GREECE



Geographically, Greece belongs to Southeastern Europe and to the Eastern Mediterranean region. It is the crossroad of three continents, namely, Europe, Asia, and Africa.

The geomorphology is diverse. Greece is primarily a mountainous country, with seventy per cent of its territory covered by mountains. It has a very long coastline, with a plethora of peninsulas and islands.

The climate is markedly influenced by the combination of geography and geomorphology. It is, broadly speaking, Mediterranean with rainy winters and dry summers. However, one encounters many specific climatic types ranging from the semi-arid and desert-like type of Southeastern Crete to the cold wet continental type of the Rodopi mountain range in the north, on the Greek-Bulgarian border.

The abiotic diversity, most notably the "mosaic" of micro-climatic types, is reflected in the presence of a highly diverse flora and fauna and a great variety of ecosystems.

The flora of Greece is composed of Mediterranean, Central European and Irano-caspian elements. Over 6,000 plant species have been recorded so far. There is a large number of endemic species relative to the size of Greece, due to the isolation of the numerous mountains and islands. In Europe, a higher number of species is found only in the Iberian Peninsula, where the flora also includes species of the Atlantic zone.

The fauna consists of a rich mixture of European, Asian and African species, including a considerable number which are endemic. The freshwater fish fauna is one of the richest in Europe: 107 species, of which 37 are endemic, in the standing and running water systems of the country. Moreover, 40 endemic subspecies have been recorded. The herpetofauna is also one of the richest in Europe, with at least 18 species of amphibians and 59 species of reptiles, approximately 60% of which inhabit the broader areas of the Greek wetlands. Greece is also important ornithologically. About 407 bird species have been recorded, of which 240 nest in Greece (59% of the total). Some species (e.g. *Pelecanus crispus*) nest only in Greece of all EU countries. The mammals of Greece include 116 species, of which 57 belong to IUCN endangered species categories. Finally, the number of invertebrate species has been estimated at 25,000, a very large number when compared to the country's small size.

The ecosystems range from the semi-desert like ones of Southeastern Crete to the cold climate mountain forests of birch, Scotch pine, and spruce. This variety often appears within small areas. For example, in a 150 km transect from the coasts of the North Aegean to the top of the Rodopi mountain one encounters ecosystems of Mediterranean, Central European and Scandinavian type.

A cardinal attribute of the terrestrial as well as the wetland-azonic ecosystems of Greece is that in spite of the often severe man-induced degradations, they maintain their pristine character to a considerable degree. Few countries of the European Union have such a high biotic diversity in a state so close to pristine conditions. Even the degraded forest and phrygic ecosystems keep, at least qualitatively, their natural structure.

WETLANDS

Wetlands are 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 six metres. A cardinal characteristic of the transitional zone between the permanently flooded and the strictly terrestrial areas is the presence of hydromorphic soils and hydrophytic vegetation.

Wetlands, those which have not yet been degraded by Man, support a wonderful world of living organisms that form complex food webs. A notable wetland feature is the plethora of waterfowl which reproduce, nest, feed, and rest in wetland habitats. Several of these bird species are migratory and are protected by international conventions (e.g. Ramsar, Bonn) and EEC Directives (e.g. 79/409/EEC on wild birds, 92/43/EEC on Habitats).

Greece has today about 400 large and small wetlands. Several of them are composite and form wetland mosaics or complexes. The most common wetland types in Greece are: rivers, estuaries, deltas, lagoons, shallow lakes, shallow marine formations, marshes. Their total area is still quite large (210,000 ha) in spite of the heavy losses that occurred during the last two generations.

Wetlands have multiple values for man because :

- their high biological diversity is essential to the breeding of superior yielding plants and farm animals, to advances in science and to the security of many industries that use living resources.
- they provide drinking and irrigation water, enrich underground waters, protect against floods, improve water quality and reduce damage from frost and heat stress.
- they support fish and game and provide rich grazing land for farm animals.
- they offer opportunities for recreation, ecological tourism, education, and research
- they are linked with the history, myths, and traditions.

There is presently a trend in Greek society towards the recognition of the immense importance of the multiple values of the country's wetland resources. This trend however, has not so far attained the necessary strength to arrest wetland degradation which is caused by unsustainable activities in the wetlands and their watersheds. The road to the sustainable management of wetland and terrestrial ecosystems will therefore be long and hard. The outlook is optimistic provided that conservation efforts are coordinated and that human communities living close to natural ecosystems are more actively involved in conservation and management.



CONSERVATION AND MANAGEMENT



Twenty five per cent of Greek territory is today characterised as forest land and is subject to the protection of the forest code, a strong legal instrument. Sixty five per cent of forest land is owned by the State.

Since 1937, Greece has started to identify natural areas of specific ecological importance and place them under special protection. There are seven categories of protected areas:

a. National Parks (11): Areas of special ecological interest for their vegetation, flora and fauna, and other characteristics. They cover 65,000 hectares. The most renowned is the one on Mount Olympus.

b. Aesthetic Forests (19): About 33,000 hectares are in this category due to their landscape aesthetics and ecological importance.

c. Natural Monuments (51): Small areas hosting single trees, groups of trees, small forested sites, geological formations, or even very small islands, of specific ecological, historical or cultural interest.

d. Wetlands: The inventory of Greek wetlands published by EKBY in 1994 lists 378 sites and complexes of sites covering about 210,000 hectares. According to the Ramsar Convention, ratified by the Greek Parliament in 1974, all these wetlands should be preserved and protected. However, 11 sites or complexes of sites are recognised as Wetlands of International Importance and enjoy special protection status.

e. Controlled hunting areas (7): These areas have sizes ranging from 500 to 5,000 hectares. Hunting is allowed only to those holding special permits and under severe restrictions.

f. Game refuges: There are numerous areas all over Greece where hunting is altogether forbidden to ensure the protection and reproduction of game species.

g. National Marine Parks: This is a very recent development for Greece. So far, only one such park has been established, in the Sporades Islands, for the protection of the monk seal.

h. Special Protected Areas according to Directive 79/409/EEC: Directive 79/409/EEC on the Conservation of Wild Birds was ratified in Greece by the Joint Ministerial Decision of the Ministers of National Economy and of Agriculture, No. 414985/85. The directory "Important Bird Areas (IBAs) in Europe" included 113 sites of importance in Greece. Of these 113 sites, 50 are protected under the "Special Protection Areas" (SPA) regime.

In addition, Council Directive 92/43/EEC of 21 May 1992, also known as the "Habitats Directive", is a recent legislative instrument in the field of nature conservation. Following on from the Directive on the Conservation of Wild Birds, it establishes a common framework for the conservation of natural habitats and of wild fauna and flora species and provides for the creation of a network of Special Areas of Conservation (SAC) called "Natura 2000" to "maintain or restore, at favorable conservation status, natural habitats and species of wild fauna and flora of Community interest".

The legal framework pertaining to the conservation and management of the above mentioned protected areas has not so far been enforced effectively. However, the efforts towards improving the laws and enforcing them are gradually being put at higher priority levels both by the government and by society.

R O O T S A N D O R I G I N

The Greek Biotope/Wetland Centre (or EKBY by its Greek initials) has its roots in the Goulandris Natural History Museum. The Museum was established in Athens in 1964 as a non-profit institute for research, public awareness, information and education in the conservation of the natural environment. Its present premises (3,500 m²) include a large herbarium, zoological and geological collections, exhibition halls, a library, and laboratories (Entomology, Botany, Geology, Hydrobiology, Biotechnology, Herpetology, Ornithology, and Information). As an extension of the Museum an Environmental Research and Education Centre (11,000 m²), also known as the "Gaia Centre", is under construction.

The Museum's work has received national and international recognition. It has been honoured by the Academy of Athens (1978), the Greek Red Cross (1987), the Aristotle University of Thessaloniki (1988) and the Alexandros Onassis Foundation (1990), while the Council of Europe named it European Museum of the Year in 1983. Mrs. Niki Goulandris, the Museum's President, was named "Woman of Europe" for 1991. Presently she is a member of the World Commission for Culture and Development formed by UNESCO.

EKBY has adopted the policies and nature conservation principles of the Museum. It was established in 1991 by the Museum with European Community funding and the support of the Worldwide Fund for Nature (WWF), following an application by the Greek Ministry of Environment, Physical Planning and Public Works. EKBY is based at Thermi, close to the city of Thessaloniki, where its facilities are located.



PRINCIPLES OF OPERATION

- Biotopes/wetlands are collective social assets of Greece and the European Union; their management does not only concern their owner(s) (e.g. the state, local community, cooperative, monastery, Public Power Corporation, individual) but is determined by their character as collective assets which must be used wisely so as to ensure their sustainability.
- The Greek state and Greek society have the moral and financial obligation to conserve this country's natural and cultural heritage, of which biotopes/wetlands are a part, and which is shared by all Europe, for future generations. A nation's natural heritage and cultural heritage are closely related and interdependent concepts.
- Economic activities are not necessarily in conflict with nature conservation provided that they are wisely planned and conducted.
- The problems of Greek biotopes/wetlands cannot be isolated from local, regional, national and international problems concerning the use of renewable natural resources. Piece-meal solutions produce only short term benefits. The long term harmonisation of the needs of Man with those of Nature is more effectively ensured through integrated sustainable practices which must address conservation problems at the watershed level at least. The sustainability of natural ecosystems depends on the sustainability of man-made ecosystems, and vice versa.
- Wide participation and involvement of government services, educational and research institutes, public authorities, professional organisations and NGOs, is necessary for the successful planning and implementation of environmental policies.





O B J E C T I V E S

EKBY's overall objective is to promote the sustainability of renewable natural resources in Greece and in the rest of Europe and the Mediterranean region.

The specific objectives are:

- To advance scientific knowledge.
- To monitor the initiation and evolution of activities related to agriculture, fisheries, energy, industry, transportation, housing, and tourism which may harm natural ecosystems, and to contribute to the sustainable performance of these activities.
- To provide scientific and technical information and consultation, especially to the Greek government and to collaborating environmental agencies in the European Union.
- To raise public awareness of the natural, economic and cultural values of wetland and terrestrial systems and encourage a positive attitude to them.
- To promote education and training in the sustainable development and management of renewable resources.
- To provide the competent authorities with documented arguments for policies and laws leading to sustainable development as well as with services relevant to the wise management of natural resources in actual field conditions.





FIELDS OF ACTION

EKBY is active in the following fields:

• Natural areas management

Preparation of specifications and supervision of management plans.

Elaboration of management plans and restoration studies and support for their implementation.

EXAMPLES OF PROJECTS/ACTIVITIES

Specifications of management plans for protected areas:

Drawing up of specifications and guidelines based on Greek and foreign experience, for the preparation of management plans. Elaboration of specifications of specific management plans for Natura 2000 sites.

Conservation and management of sites of Community Importance in Greece (Directive 92/43/EEC): Preparation of management plans for 10 sites which had been proposed for inclusion in the Natura 2000 Network. Organisation of public awareness campaigns. Preparation of a monitoring guide for Natura 2000 sites.

Wise use of irrigation water at Ramsar sites: Economic and technical ex-ante evaluation of the Prespa irrigation scheme. Evaluation of the Axios irrigation scheme and identification of ways to increase irrigation efficiencies so as to prevent the disruption of the Delta's functions. Survey of the irrigation water use in the Kerkini area, which showed several options of wise management of water resources that would lead to the preservation of the lake's multiple functions.

Ecological studies (Agios Mamas lagoon, Kalamas Delta, Rivers Nestos and Strymon wetland forests): Collection of data on the ecological conditions with the aim of formulating management proposals.

Wetland restoration: An approach was developed to evaluate the various solutions proposed since 1960 on the restoration of former Lake Karla. The evaluation was based on the degree

to which these solutions contribute to the restoration of the wetland functions. For this purpose, a technique based on GIS was used. Preliminary studies aiming at the restoration of other drained wetlands (Lake Mavrouda, Drana Lagoon) were also prepared by EKBY.

Organisation of management bodies: Project steered by the Ministry of Environment, to organise local management bodies which will, as a first step, undertake to operate the public awareness and the wardening infrastructure in 8 Ramsar wetlands.





• **Scientific and technical information**

National information archives for natural areas.
National information archives for sustainable development of renewable natural resources.

EXAMPLES OF PROJECTS/ACTIVITIES

Inventory of Greek wetlands as natural resources: This activity was the first approximation to inventory the Greek wetlands in order to create a national archive of wetland information. Abiotic and biotic features, values, uses, threats and positive actions were recorded and a concise database of the above was created. Inventory sheets have been completed for about 400 wetland sites and have been published in a 587 page volume, which was also translated into English. A digitised thematic map was produced showing all wetlands of Greece classified according to area size and type. Four thematic maps (environmental impacts due to human activities, resource depletion, changes in water regime, and uses) were also produced.

Inventory, identification, evaluation and mapping of the habitat types and flora and fauna species in Greece (Directive 92/43/EEC): Data on 296 sites hosting habitat types and flora and fauna species of Community interest were collected and processed with the full support and steering of the Ministry of Environment and the Ministry of Agriculture (General Secretariat for Forests and the Natural Environment). A documented and evaluated scientific list of proposed sites of Community Importance in Greece was prepared to help the Greek state establish and operate the European Network of Special Areas of Conservation (Natura 2000) in Greece.

Collection and analysis of data on the vegetation of Greece (or Inventory of Greek vegetation): This activity was carried out in collaboration with the European Union for Vegetation Survey. Its main purpose was to set the foundation for the creation in the future of a phytosociological map and a complete syntaxonomical classification of the vegetation units of Greece. Information gaps were identified and a data base of phytosociological measurements (relevés) and the pertinent references was formed.

European Environmental Agency: EKBY is a partner in the European Topic Centre for Nature Conservation (ETC/NC) of the European Environmental Agency (EEA). It has also been appointed by the Greek Ministry of Environment as the EEA's National Reference Centre for Nature in Greece.

Greek and EU Environmental Legislation: Preparation and publication of a book presenting Greek and EU environmental legislation, which makes available to all concerned citizens the potentialities offered by the existing environmental laws in Greece and the European Union.



• Applied Research

Research oriented towards addressing management problems.

EXAMPLES OF PROJECTS/ACTIVITIES

Soil characteristics as indicators of wetland identification:

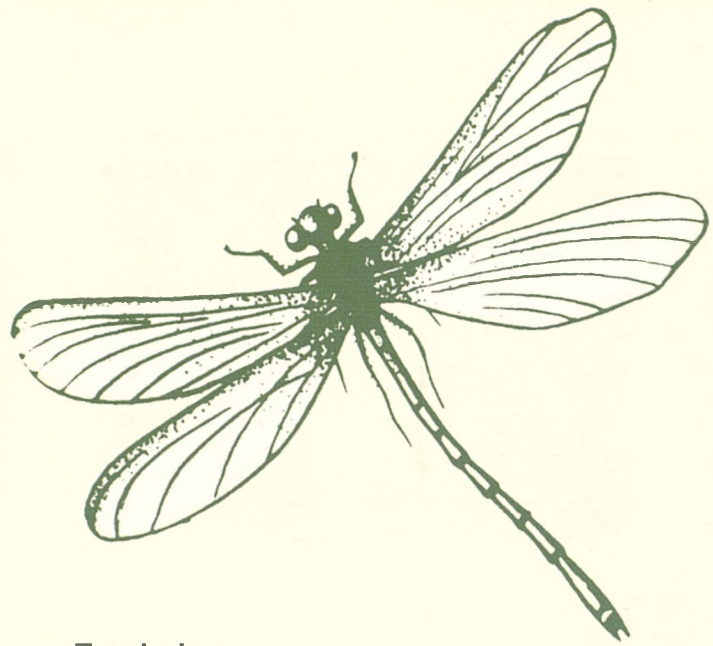
The long term hydrology patterns of wetland sites were evaluated by establishing permanent monitoring stations in Epanomi wetland, measuring water table fluctuations, matrix suction, redox potential, and other redox indicators (Fe, Mn).

Heavy metal content in the soils of the Axios Delta: This work provides the baseline information for monitoring heavy metal pollution trends in the natural environment, and also suggests ways to prevent metal forms from becoming available to plants.

Agricultural practices and water quality: Field tests of the effects of fertiliser application, mulching, and ploughing on the quality of surface runoff water, aimed at formulating proposals for the sustainable management of the hydrological basin of Lakes Koronia and Volvi.

The use of natural systems in water pollution control: Survey of the efficiency of macrophytes and especially *Typha* species to treat wastewater. Evaluation of the potential of this approach in constructing artificial wetlands in Greece to treat sewage from small villages. Initiation of a large pilot project involving the establishment of experimental constructed wetlands and the monitoring of parameters indicating the potentialities of those wetlands to treat waste water.





• Training

Assessment of training needs and planning and implementation of projects to train managers and users of natural resources.

EXAMPLES OF PROJECTS/ACTIVITIES

Assessment of training needs: Inventory of training institutes and projects; assessment of training needs; investigation of potential collaborators for the performance of future training projects; preparation, execution, and evaluation of training programmes for people involved in wetland management.

Training projects: Two training courses on environmental impact assessment for the staff of pertinent civil services. A training project on the wise use of water resources at the area of Lake Kerini.





• **Public awareness and education**

Planning and implementation of awareness projects with regard to the values of the natural environment and the benefits from sustainable development.

Planning and implementation of Environmental Education projects.

EXAMPLES OF PROJECTS/ACTIVITIES

"AMPHIBION" newsletter : An eight-page illustrated bimonthly newsletter, first published in April 1993, with conservation news, information on key problems etc. Its mailing list reaches 7,000 entries (including civil services, experts, communities, NGOs, libraries, school teachers, the Press, members of the Greek and of the European Parliament, etc.). A summary in English is mailed abroad.


Environmental Education: Organisation of, or support for, more than 45 educational seminars on the importance of wetlands, on Environmental Education techniques, etc. Awards to Environmental Education school projects. Preparation of 5 Environmental Education packages.

Photographic exhibitions: Exhibitions on wetlands have been prepared and presented in Greece and abroad.

Production of communication material: EKBV has published more than 21 leaflets and 23 posters. It has also produced educational maps on Greek wetlands and the proposed Natura 2000 sites, and a 382-page illustrated book entitled "Greek Wetlands" in Greek and English.

Relations with the Press: A total of 151 interviews were given and 61 press releases were distributed during 1991-1996. As a result of EKBV's actions, 4 articles appeared in the press in 1991, 27 in 1992, 61 in 1993, 171 in 1994, 220 in 1995 and 379 in 1996.





- **Implementation of specific projects**

Planning and implementation of specific projects and missions (e.g. preparation of projects specifications, scientific missions, and advice and assistance on specific matters).

EXAMPLES OF PROJECTS/ACTIVITIES

Consultant to "Egnatia S.A.": The company which is responsible for the construction of the Egnatia highway has assigned to EKBY to carry out an ecological study of the Nestos area.

Consultant to the Public Property Corporation: EKBY drew up the specifications and supervised the preparation of the management plan for the Pinios Delta in Thessaly.

Consultant to the "Development Agency of Thessaloniki S.A.": Drafting of specifications and supervision of a study on the development of ecotourism at the area of Langadas (wider area of Ramsar site "Lakes Volvi - Koronia").

STAFF AND INFRASTRUCTURE

EKBY is governed by a Managing Board chaired by Mrs. Niki Goulandris.

It is staffed with experts on ecology, natural resources' management, hydrology, phytosociology (wetland, marine and terrestrial), GIS and mapping, environmental science, Environmental Education, and project management; their work is supported by experienced administrative personnel.

EKBY's own 1200 m² building is on a plot of land provided by the Farm of the Aristotle University of Thessaloniki. The building offers space for offices, library, lecture/exhibition hall, laboratory etc. Equipment includes a Novell network with 15 terminals and supporting instruments, a UNIX network, personal computers, digitiser, colour scanner and plotter, photocopiers, etc. It uses GIS software, (ArcInfo and ArcView) and specialised data storage and processing programmes. Field equipment includes two off road vehicles, GPS instruments, portable instruments for water quality measurements, etc.

The library contains books, magazines, maps, air photographs, press clippings, a fairly rich collection of mimeographed reports and studies, and communication material prepared by others (video tapes, natural sound cassettes, posters, leaflets). All information is available to Greek and foreign experts and students.



NETWORK OF COMMUNICATION & COLLABORATION



The idea to establish EKBY originated in 1989 in the context of a project on the "Conservation and Management of Greek Wetlands: Strategy and Action Plan" which was supported by WWF, the Laboratory of Ecology of the School of Agriculture (Aristotle University), and IUCN. Thirty Greek and expatriate experts representing various disciplines and bodies had participated in that project. Therefore, EKBY is a product of wide collaboration. Since its establishment, it has developed a wide network of communication and collaboration both nationally and internationally and utilised and initiated opportunities of partnership in actions falling within its objectives. It supports other organisations undertaking projects in the same field, and helps to coordinate these projects whenever possible.

EKBY cooperates closely with:

- government services and local authorities, particularly those responsible for the management of biotopes and especially wetlands,
- educational and research institutes in Greece and abroad,
- pertinent services of the European Commission, the Ramsar Bureau and agencies participating in international projects,
- non-government environmental organisations.

Bodies with which EKBY has collaborated in the past or is still collaborating:

Greek Ministry of Environment
Greek Ministry of Agriculture
Greek Ministry of Education
Regions of Anatoliki Makedonia -Thraki and Dytiki Makedonia
Local authorities

University of Athens
Aristotle University of Thessaloniki
University of Patras
Democritus University of Thrace
University of the Aegean
National Agricultural Research Foundation
Institute of Marine Biology of Crete
National Centre for Marine Research, Greece

Greek NGOs

European Centre for Nature Conservation (ECNC)
European Environmental Agency (EEA)
Instituto Nacional para la Conservacion de la Naturaleza (ICONA), Madrid, Spain
Joint Research Centre, Ispra, Italy
Ministère de l' Environnement, France
Ministero dell Ambiente, Italia
Musée National d'Histoire Naturelle de Paris
Ramsar Convention Bureau
Instituto da Conservacao da Natureza - ICN Portugal
Station Biologique de la Tour du Valat, Arles, France
United Nations Environment Programme - Mediterranean Action Plan (UNEP/MEDA)
University College London, UK
University of Kentucky, USA
US Fish and Wildlife Service, USA
Wetlands Center of the University of Florida, USA
Wetlands International (formerly IWRB)
World Conservation Union (IUCN)
Worldwide Fund for Nature (Greece, International, Italia, Mediterranean)

EKBY's SPECIFIC CONTRIBUTION TO CONSERVATION APPROACHES



In Greece EKBY has pioneered the development of the following concepts/procedures for the conservation and management of renewable resources.

- functions and values of natural ecosystems
- positive interactions between natural and man-made ecosystems
- use of objective criteria to identify wetlands
- inventorying natural ecosystems
- monitoring ecological changes
- mapping wetland habitats
- wetland hydrology
- wetland restoration and rehabilitation
- approaches to save irrigation water in order to relieve pressure on natural wetland habitats
- preparation of management plans for protected areas
- use of constructed wetlands in waste-water treatment
- planning, implementation, and evaluation of training projects
- methods in public awareness campaigns







T H E F U T U R E

EKBY's future actions will be based on the principles it has adopted, the experience and continuous training of its personnel, and the development of new approaches aimed at sustainable development in Greece, the Mediterranean and South-Eastern Europe. These actions will:

- maintain the balance among (a) collecting, producing, and disseminating technical information, (b) management problem solving, and (c) promoting public awareness and Environmental Education.
- continue to be performed through wide participation and collaboration
- be adaptable to new emerging conservation needs so that EKBY maintains its capacity of prompt response to technical assistance requests.





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