

1. Date this sheet was completed/updated 1/6/1998

2. Country: Greece

3. Name of wetland: Axios - Loudias - Aliakmon Delta

4. Geographical co-ordinates: lon: 22⁰ 43' lat: 40⁰ 30'

5. Altitude (average and/or max. & min.): 2 m

6. Area (in hectares): 11,808

7. Overview (general summary, in two or three sentences, of the wetland's principal characteristics):

The site is an extensive coastal zone formed by the three rivers and includes the lower river beds of the rivers and their estuaries with predominant salt marshes and extensive mudflats. Natural vegetation areas are criss-crossed by the drainage ditches delineating the arable land. In spring and summer the neighbouring extensive rice fields are flooded, creating a unique landscape.

8. Wetland type (please circle the applicable codes for wetland types as listed in Annex I of the Explanatory Note and Guidelines document):

marine-coastal: A · B · C · D · E · F · G · H · J · K

inland: L · M · N · O · P · Q · R · Sp · Ss · Tp Ts ·
U · Va · Vt · W · Xf · Xp · Y · Zg · Zk

man-made: 1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9

Please now rank these wetland types by listing them from the most to the least dominant: H, G, 4, 3, F, A, J, 5, 6,

9. Ramsar Criteria: (please circle the applicable criteria; see point 12, next page)

1a · 1b · 1c · 1d | 2a · 2b · 2c · 2d | 3a · 3b · 3c | 4a · 4b

Please specify the most significant criterion applicable to the site: 3b

10. Map of site included? Please tick yes or no

(Please refer to the Explanatory Note and Guidelines document for information regarding desirable map traits)

11. Name and address of the compiler of this form:

HELLENIC MINISTRY OF ENVIRONMENT, PHYSICAL PLANNING
AND PUBLIC WORKS
ENVIRONMENTAL PLANNING DIVISION
NATURAL ENVIRONMENT MANAGEMENT SECTION

36, TRIKALON STR. / GR-115 26 ATHENS
 TEL +30 1 69 18 202, 69 17 620 / FAX: +30 1 69 18 487

With the collaboration of:

THE GOULANDRIS NATURAL HISTORY MUSEUM
 GREEK BIOTOPE / WETLAND CENTRE (EKBY)
 14th KILOMETRE THESSALONIKI - MIHANIONA / GR-57001 THERMI
 TEL. +30 31 473.320, +30 31 475.604 / FAX: +30 31 471.795

12. Justification of the criteria selected under point 9, on previous page

Criterion 1: see sections 14 and 16

Criterion 2: see sections 17 and 18

Criterion 3: see section 18

Criterion 4: see Sections 16 and 18

13. General location:

The site is situated in Northern Greece, at the central part of Makedonia (Macedonia). It is located at 20 km W-SW from the city of Thessaloniki (750,000 inhabitants) which the second largest city in Greece and the administrative centre of the Region of Kentriki Makedonia.

14. Physical features:

Geology and geomorphology: The area is a complex wetland consisting of the Axios Delta in the east, the mouth of Loudias and the delta of the River Aliakmon to the west, flowing into the gulf of Thermaikos. The rich material carried down by the rivers has created an extensive marshland, and sandy islets. The geomorphology of the area is almost flat, with alluvial layers on older formations due to the sedimentation of the rivers. The mean total volume of the sediments in the delta rises up to 14,260,000 m³/year.

Origins: It is a natural ecosystem intensively modified by human interventions (1938).

Hydrology: The river of Axios is entering Greece from the Former Yugoslav Republic of Macedonia.. Flood incidents do not occur in the Greek territory and all three rivers are embanked. A diversion dam was constructed, 28 km upstream the river mouth, during 1954-1958. The water reservoir behind the dam has a volume of 2.5X10³ m³ and contributes to the daily water discharge regulation in the Axios irrigation projects. Downstream of the dam the river discharge can be less than 1 m³/sec, during peak irrigation period in dry seasons. The average annual discharge of Axios River is 127 m³/sec

Aliakmon is the longest Greek river (320 km) and has an average annual discharge of 46 m³/sec. Since 1974, a reservoir and a hydroelectric power plant have been constructed several km away from the site with a storage capacity of 1.22X10⁹ m³. Later on, three successive smaller reservoirs were built downstream the main reservoir, mainly for hydroelectric power production. The Aliakmon river is used for irrigation of a total area of 130,000 ha, drinking and industrial purposes.

Loudias River functions as a drainage channel. of the former extensive lake and marshes of Yanitsa drained in the 30's. In 1990, a dam was constructed, 9 km far from the mouth of the river. The average annual discharge is 2-3 m³/sec and the maximum discharge is 340 m³/sec.

Soil type and chemistry: Soils are mostly dominated by clay and silt. In the near estuary zone, soils are intensively saline and alkaline.

Water quality (physico-chemical characteristics): From the three rivers Loudias is the most degraded one with the highest microbiological, organic and anorganic load. Levels of

dissolved oxygen are low whereas heavy metals have been detected in the sediments. Dissolved oxygen is high in River Axios where, however, COD values are increased. Microbiological load is in a moderate state but ammonia and phosphates are rather high. Zinc, iron and mercury have been detected in the sediments but not at a dangerous level for human health.. River Aliakmon has the best water quality among the three rivers.

Tidal variations: Tides exist with a very narrow range.

Catchment area: The part of the catchment area of Axios River located in the Greek territory is 2,550 km² and comprises only the 10% of its total catchment area. The catchment area of the Aliakmon river is 8,500 km². The catchment area of the Loudias River is 1,250 km²

Climate: The climate is of Mediterranean type with hot and dry summers and cold humid winters. The average annual temperature is 14°C. The hottest month is July with maximum temperature 25°C. The coldest month is February with minimum temperature 5°C. The contribution of rainfall has high variation. The mean precipitation is 400 mm. Winds of North/NorthWest direction predominate mainly during winter.

15. Hydrological value:

Before the construction of dams, the wetland had important sediment trapping and water purification values. Today, there is still a value for groundwater recharge as groundwater from Axios and Aliakmon rivers is used for drinking purposes. Moreover, surface and groundwater from the rivers is used for irrigation of the plains of Thessaloniki, Imathia and Pieria..

16. Ecological features:

The habitat diversity is one of the main characteristics of the Delta:. Sandbanks which are slightly covered by sea water at all times, estuaries, mudflats and sandflats not covered by sea water at low tide, large shallow inlets and bays. In more details, six distinct vegetation zones can be recognised: 1. The halophytic vegetation, which predominates the Delta. 2. The scrubland with tamarisk, which is found mainly at the edges of the river, but also further inland. 3. Rush meadows, which are found mainly in areas protected from the effects of salt water (this type of vegetation has shrunk as the meadows have been reclaimed for farmland) 4. Reedbeds with *Phragmites australis*, *Bolboschoenus maritimus* and *Typha latifolia*, which are found at the mouth of the river and along the riverbanks and drainage canals. 5. Hydrophytic species, like *Potamogeton spp.*, *Myriophyllum spicatum*, *Ceratophyllum spp.* etc, that flourish wherever there are shallow expanses of fresh water - irrigation canals, drainage ditches, rice paddies. Riparian forest is found along the banks of the river and on the many islets formed in the river bed. The principal species are poplar, alder and willow. 6. Finally, rich communities of mussel beds colonise sea water of depth 1-10 m.

The area supports diverse bird populations including endangered and rare species. Rice fields occurring in the delta are used as feeding ground by birds. Parts of the estuaries and the rivers as well as sea water of less than 6m depth serve as spawning ground for fish populations of Thermaikos gulf and the N. Aegean Sea. The concentration of nutrients and the small water depths favour shell aquacultures.

17. Noteworthy flora:

Two taxa, *Salvinia natans* and *Trapa natans* are included in WCMC list and are protected by national legislation. Hydrophytic species, like *Potamogeton spp.*, *Myriophyllum spicatum*, *Ceratophyllum spp.* provide valuable habitats for fish species.

18. Noteworthy fauna:

Both marine and freshwater fish are found in Axios river and 36 different species have been identified. One of them, *Aphanius fasciatus*, is included in Annex II of Council Directive 92/43/EE, 33 of them are indigenous and include perch, carp, eels, mullet, needlefish, and one endemic species of roach (*Rutilus macedonicus*). Three other species have been introduced.

Foxes, jackals, badgers, martens, weasels, hares and wildcats - even wolves occasionally - and at least ten other species inhabit the dense vegetation found along the shores of the river. Two mammal species, *Lutra lutra* and *Citellus citellus* are included in Annex II of Council Directive 92/43/EE, and *Pipistrellus nathusii* is included in National Red Data List.

Six amphibian and 15 reptile species have been observed, although the amphibian and reptilian populations of the Delta have not been studied in detail. One of them *Emys orbicularis* is included in Annex II of Council Directive 92/43/EE. Two reptiles *Coluber gemonensis*, and *Natrix tessellata* are protected by international conventions. From the invertebrates, *Lycaena dispar*, which is included in Annex II of Council Directive 92/43/EE, has been observed in the area.

The most impressive feature of the Delta are birds. It should be noted that two species found in the Delta, *Pelecanus crispus* and *Numenius tenuirostris*, are threatened with extinction. The site is an important wintering and resting station for 174 migratory bird species, of which 63 are included in Annex I of 79/409 Directive. It is also a breeding site for a significant number of bird species (41 species). About 215 different species have been identified; of these, 109 are waterfowl or shorebirds, which depend on water, during most of their life cycle. These species come to the Delta to nest, to winter, or to rest during their long migratory journeys. During spring and summer the occupants of the Delta belong to the herons whose nesting colonies are among the largest in Europe. From April to September *Egretta garzetta*, *Nycticorax nycticorax*, *Ardeola ralloides*, and *Ardea purpurea* can be seen to feed in the extensive rice paddies, the coastal saltmarshes, the canals and the riverbanks. During these months exist also *Platalea leucorodia*, *Plegadis falcinellus* and *Phalacrocorax carbo* as well as waders such as *Tringa totanus*, *Himantopus himantopus*, *Recurvirostra avosetta* and terns. Thousands of ducks winter in the Delta. Most have flown south from their northern nesting grounds to spend the winter months in a milder climate, but some species, including *Tadorna tadorna* and *Anas platyrhynchos*, are full time residents. A total of 12 different species of ducks have been observed. In winter there are also many birds of prey, including buzzard, long-legged buzzard, falcons, other species such as *Egretta alba* (which nested formerly in the Delta), *Ardea cinerea*, and *P. pygmeus* (>3300) as well as a variety of shore birds, including stints, curlews, and turnstones. Most shore birds, however, are seen during the spring and autumn migration, for the Delta is a major resting place for migratory birds on their long journeys.

19. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

The wider area of the site has enormous economic significance, as agriculture is the main activity and most of the plain of Thessaloniki is irrigated by the water of Axios river. The surrounding area produces more than 70% of the entire national rice crop production, a major source of income for the local population. Of secondary importance is the activity of grazing which appears sporadically and is not well organised.

The shallow waters of the Delta and the adjacent coastal area provide shelter to the fry of most of the fish in Thermaikos Gulf. Thus, the site has tremendous importance for maintaining the fishing grounds of the North Aegean Sea.. Mussel farming in the Delta accounts for 90% of the country's total mussel harvest production and is one of the most important - and profitable - activities practised by the local population.

The site is not far from important archaeological sites, of which the most visited is the tombs of Vergina, capital of the ancient Macedonian Kingdom.

The social value of the site as a protected area is increasing and has led to the development of a value for eco-tourism, environmental education and bird watching, although relevant facilities are low. Moreover the area is of great scientific value in the fields of biology, ecology, hydrology and geology.

20. Land tenure/ownership of:

(a) site: It is state property except some land (cultivated) which is privately owned

(b) surrounding area: Most of the plain is agricultural land, allocated by the state to the local municipalities and communities for agricultural use.

21. Current land use:

Site: The dominant uses are fishing and grazing. The controlled extraction of sand from the riverbed satisfies most of the requirements of the construction industry in the Prefecture of Thessaloniki.

Surroundings/ catchment: It is used for agricultural activities mainly for rice farming.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:

The dams and the irrigation networks constructed since 1925 have reduced the amount of water of River Axios reaching the delta, especially in summer. Three dams have also been constructed along River Aliakmon. Despite this intensive use of water, there is no serious evidence of salinization of surface and groundwater in the site. Even though the water demand is very high both for drinking and irrigation, there is an increasing effort to manage water use for the benefit of the site since 1990.

Another problem related to the operation of dams is that the amount of alluvial deposits has been reduced, thus expected to affect the future formation of the coastline. In relation to this and the projection of global warming, studies have been carried out in order to estimate the possible sea level rise in Thermaikos Gulf.

A main threat of further land use reclamation for agriculture has been removed since no further drainage works have been carried out since 1979. A pressure was exerted in 1989-90 regarding the establishment of a racing track in Aliakmon Delta, but the authorities denied permits and the project was consequently abandoned.

Many studies and consultations were held when planning the construction and operation of the Thessaloniki Sewage Treatment Station in 1989-90. Following Environmental Impact Studies, the decision favoured the operation of the Station in the vicinity of the site and the

outflow of the treated wastes (second degree of treatment) directly through a pipeline to the sea at a proper depth, in order to avoid degradation of the wetland site. Since 1992 the Station is operating successfully and water quality monitoring results are positive and its upgrading to reach third degree of treatment is being planned. Consequently, the water quality in Thermaikos Gulf has been increasingly higher and many areas are recolonised by fish and benthic organisms.

Although human activities are very low within the Ramsar site, urban wastes, agricultural and industrial effluents from the entire catchment, both in Greece and in Former Yugoslav Republic of Macedonia (FYROM) are drained by the river Axios and end up in the Delta.. In order to deal with transboundary pollution incidents, on-line monitoring of water quality is being conducted along the Axios River and any exceeding values are automatically communicated to the Prefecture and the Ministry of the Environment. Bilateral discussions between the two states involved have been carried out on this issue. The sources of pollution of Axios river in the Greek territory have been identified since 1988 and measures have been since taken for minimising pollution by industrial units.

Extensive fishing and aquaculture takes place mostly in the marine area, both by professionals and amateurs. A project for the removal of litter as well as the management of empty mussel shells, deposited in quantities by the aqua-cultures has been enforced. Although cattle raising units do not exist in the site, free grazing of cattle takes place extensively. Hunting pressure is high during the allowed hunting period and incidents of breaking hunting regulations have been gradually reduced.

Sand extraction from the river bed of Axios was considered a major problem, because an sand islet with heron colony was destroyed in 1988. However, since 1990, sand extractions are permitted only after examination of the natural features of the site of the extraction spot.

A procedure for approval of Environmental Terms for a number of works and activities through Environmental Impact Studies has been established in Greece in 1990. Aiming to holding back the further loss and degradation of the site, all relevant planned works have been examined under this procedure by the Environmental Authorities. The majority of projects concerning animal farms, and/ or agricultural improvement was rejected whereas only the absolutely necessary and less disturbing ones have been permitted.

23. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices: whether an officially approved management plan exists and whether it has been implemented)

A set of management / protection measures and delimitation of zones were established in June 1998 from the Ministries of Agriculture, Environment and Development A short description of the zones and measures is as follows:

Zone A includes the area of the delta, parts of the river beds of the three rivers, halophytic and riparian vegetation, shallow coastal water, Alyki salt pan and the estuaries of Gallikos River. Core areas comprising the most sensitive bird habitats are defined within this zone.

In zone A, outside the defined core areas, permitted activities (under specific terms) are: scientific research; daily visits and environmental education activities; use and maintenance of the existing road network; management works for species and habitats; free extensive

grazing of cattle and sheep (animal farms should be removed); extensive aquaculture; fisheries management; shell culture under specific regulations; harbouring and sailing of small boats; disposition of urban effluents from the city of Thessaloniki; temporary sand removal (for two years); removal of illegal constructions and works for the production of salt in Alyki salt pans.

The whole Ramsar site is included in Zone A

A buffer zone is defined as Zone B, which comprises mainly agricultural area

Permitted activities (under specific terms) are: scientific research; daily visits and mild sport activities; management works for species and habitats; free extensive grazing of sheep and cattle and modernisation of the existing farms; agriculture; maintenance and modernisation of the existing irrigation network (extension is prohibited); use and maintenance of the road network (construction of roads towards zone A is prohibited); works for maintenance and , improvement of infrastructure; construction of green houses; extension and modernisation of existing fish culture units; use of agricultural storage rooms and construction of small new ones; building of one floor houses and apiculture.

Zones A and B have been proposed for inclusion in the NATURA 2000 network under the code GR1220002. Parts of this zones are already an SPA under the code GR1220010. The site is a game refuge.

A Preliminary Management Scheme has been established in 1997 on the site by a Programme Agreement signed by the Ministers of Environment and Agriculture, the Regional Environmental Services and Local Authorities. It comprises a Joint Committee for the steering of the implementation, it has a flexible administration and the required secretariat/ co-ordination support provided is by a Local Development Institution named "Thessaloniki Development Co". The Programme Agreement has an Annex with the planned works and activities, their time-table (1997-1999) and budget. Priority actions include the operation of an Information Centre, works for the ecological development of the area (placement of signs, construction of warden houses, observation towers etc.), training of the personnel, warding of the site.

Preliminary Management Schemes have a three-fold aim: 1) to respond quicker to the matters that arise concerning the every day management problems of the sites and 2) to carry out projects concerning infrastructure, monitoring and management, and 3) to co-ordinate relevant authorities in working out the futher priorities for the management of the sites

Additional measures have been taken with regard to grazing on community owned land, with the subcidised removal of grazing animals. Additional wetland surfaces in the vicinity of the area, the Alyki Kitrous salt pan and Gallikos river delta, have been proposed for protection under the national legislation. Decisions taken at a Prefectural level define the terms of disposing sewage and industrial effluents in the rivers Aliakmon and Loudias (since 1984 and 1985, respectively) and the Gulf of Thermaikos (since 1994).

Conservation actions for the heron colonies have been taken by the competent authorities in co-operation with the Hellenic Ornithological Society.

The Red Alert System, undertaken by WWF-Greece, (1990 to 1997) had as objective to arrest further degradation of this internationally important wetland, through the

collaboration of users, conservation and management bodies, decision-makers, and NGOs. Scientists resident in the area, watched the activities that threatened the wetland directly or indirectly, determined their causes and informed the relevant bodies about the dangers of degradation, but also about wetland functions and values.

The installation of the secondary sewage treatment of the city of Thessaloniki has been completed since 1992 and the inflow of the treated water into the sea near the site is being monitored. The proposal of discharging the treated effluents in the wetland of Axios has been abandoned. A pilot project connected to this issue is being implemented outside the site in the estuary of Gallikos river, where three artificial wetlands have been created using part of the treated wastes, from the Sewage treatment Unit.

The site is included in the Montreux Record since 1990. Under the Management Guidance Procedure a mission that visited Greece in 1988 described the main problems of the site. Another mission visited the site in 1989 and reported on its status.

24. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

The site is proposed for the category of National Wetland Park, according to the Law 1650/86 (legal text under preparation, in form of a Presidential Decree).

Further management proposals not yet officially approved, have been elaborated for many aspects of the management of the site, as part of the documentation required for the establishment of the National Wetland Park including the establishment of a permanent Management Scheme. The conservation actions proposed are in accordance with the "Guidelines on Management Planning for Ramsar sites and other Wetlands" and include management of agricultural activities with the view of reducing the consumption of water, a project for management of irrigation water, study for the compatible development of aqua-culture, on the ground delineation of core areas.

A project of financial incentives for the voluntary implementation of environmental measures in agricultural land, under the agri-environmental regulation 2078/92, is to be submitted for approval. The project includes promotion of biological cultivation, reduction of grazing, long-term pause of cultivation and reduction of the amount of fertilisers used.

25. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

Numerous research projects, some complete and some on-going, study the geomorphology, the flora, the fauna, the culture and the history of this area. Most outstanding is a project concerning monitoring and conservation actions for *Phalacrocorax pygmaeus* and *Anser erythropus* undertaken by WWF and the Hellenic Ornithological Society.

A program for monitoring *Numenius tenuirostris*, is being carrying out parallel to the inventory of waterbirds by the General Secretariat of Forests and Natural Environment of the Ministry of Agriculture in co-operation with the Hellenic Ornithological Society.

26. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

A fully equipped Information Centre is established and another one is planned in order to cover the extensive site, which is located very close to big urban centres. This infrastructure together with constructions for bird watching, guardhouses, supports the activities of information - public awareness, environmental education, monitoring. Specific actions of information and public awareness include special publications, video tapes, CD Roms, organisation of workshops and guided tours of visitors and schools.

27. Current recreation and tourism: (state if wetland is used for recreation/tourism; indicate type and frequency/intensity)

The site does not have an important use for tourism, since the quality of sea shores is not ideal for swimming. There are about 1000 bed places in the wider area but most of the facilities are of low quality. Small fish taverns operate at the edges of the site. Hunting attracts a number of visitors, not only from the neighbouring villages but also from the bigger cities. The fact that the wetland is so near the city of Thessaloniki, provides many opportunities for leisure activities like countryside walks, photography and nature observation, as well as for learning about local activities (shellfish farming, rice growing, etc.). Besides, it is an ideal spot for environmental education, and scientific research.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture/Dept. of Environment etc.)

Territorial jurisdiction over the site has the Region of Kentriki Makedonia. Concerning the functional (conservation) jurisdiction, co-ordination lies with the Ministry of Environment in collaboration with the Ministry of Agriculture, the Prefectures of Thessaloniki, Imathia and Pieria and Local Authorities.

29. Management authority: (name and address of Local body directly responsible for managing the wetland)

No single body legally responsible for the direct local conservation of the wetland exists. The Preliminary management Scheme is guided by a Joint Committee presided by a representative of the Ministry of Environment. Secretarial assistance is provided by :
Information Centre of Aliakmon - Axios - Loudias - Gallikos Delta and Alyki Kitrous
Chalastra
GR-573 00 Chalastra
GREECE
Tel: +30-31-792244, 793330 Fax: +30-31-792343

30. Bibliographical references: (scientific/technical only)

Athanasiou, H. 1990. Wetland habitat loss in Thessaloniki plain, Greece. UCL. Msc Thesis.
Athanasiou, H., A. Dimitriou, S. Kazantzidis. 1997. The Axios Delta. WWF-Greece.
Babalonas, D. and E. Papastergiadou. 1988. Flora and vegetation in the wetlands of the Axios - Loudias - Aliakmon Rivers. Aristotle University of Thessaloniki, Department of Biology, Laboratory of Systematic Botany and Phytogeography.
Economidis, P.S. 1991. Check list of freshwater fishes of Greece. Hellenic Society for the Protection of Nature. Athens.
Ministry of the Environment, Planning and Public Works (YPEXODE). 1996. Specific Environmental Study (Programme for tackling specific environmental problems and the operation system of the protected area of Axios - Loudias - Aliakmon Delta.) YPEXODE. Athens. Part I.

- Ministry of the Environment, Planning and Public Works (YPEXODE). 1986. Programme for the Delineation of Ramsar Wetlands. Wetland of Axios - Loudias - Aliakmon Delta. YPEXODE. Athens. TOPIOTECHNIKI Ltd. 1992. Delineation and management study for the Axios - Loudias - Aliakmon Delta and Aliki Kitrous. Athens. 200 p. (In Greek).
- Zalidis C. G. and A. L. Mantzavelas (eds). 1994. Inventory on Greek wetlands as natural resources (First approximatio). Greek Biotope/Wetland Centre (EKBY). English edition. xvi + 448 pp