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

2. Country: Greece

3. Name of wetland: Kotychi Lagoons

4. Geographical coordinates: lon: 21° 17′ lat: 38° 01′

5. Altitude (average and/or max. & min.): At sea level (dunes mean: 1 m)
Mavrovouni hill max.: 200 m.

6. Area (in hectares): 6,302

7. Overview (general summary, in two or three sentences, of the wetland's principal characteristics):
It is a coastal zone consisting of Kotychi lagoon with varying salinity, with a sandy coastal strip; Prokopos freshwater / brackish marsh and lake; Lamnia freshwater marsh thickly vegetated; and Strofilia forest with umbrella pines with extensive sandy coast and dunes.

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 form the most to the least dominant: Sp, Ss, J, K, H, O, A, E, Ts, U, 9

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

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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 Section 18

13. General location:
The site is situated in Western Greece, in the north western part of Peloponissos (Peloponese). The town of Patras (153,334 people), which is the administrative center of the Region of Dytiki Ellas and the Achaia Prefecture, lies south from the wetland at a distance of 30-50 km.

14. Physical features:
Geology and geomorphology: The coastal zone has characteristic sand dune formations. Their height ranges from 2-10 m and they extend in a width of more than 500 m in a north-south direction. Kotychi is a brackish coastal lagoon which is situated some kilometres to the north of the cape of Kyllini. It covers an area of 850 ha and is the largest lagoon remaining in western Peloponnisos after the drainage of the Agoulinitsa lagoon. The site also, includes the Strofylia forest, the Prokopos lake (450 ha) and the Lamnia marsh (450 ha).
Origins: It is a natural ecosystem, slightly modified by human interventions.
Hydrology: The site is characterised by permanent or seasonally flooded areas which have direct or indirect hydrological connection. The discharge of five streams is interrupted by the sand dune formations. This function has led to the development of Lake Prokopos and Lamia marsh behind the Strofylia marsh. The Lamia marsh has an outflow to the sea via a channel, 6,500 m long and 20-30 m wide and a surface of 900 ha is flooded during the winter period. Its depth ranges between 5 cm and 60 cm. The Kotychi lagoon is fed by 8 torrents, the largest of these being Brantzeleiko, Gouvos, Sykias and Trikokkia and by precipitation. These streams enter the lagoon mainly from south and east. At the centre of its western side there is an opening almost 30m in width, which links the lagoon with the Ionian Sea.
Depth, fluctuations and permanence of water: Kotychi is a shallow lagoon with a depth of 30-40cm. accepting seasonally considerable freshwater amounts and fringed by reeds. Its surface presents strong seasonal fluctuations (710-850 ha) depending on the annual precipitation. The depth of the water tends to be reduced due to the deposition of suspended matter brought into the lagoon by the streams.
Soil type and chemistry: The soil of the area consists mainly of alluvial and lacustrine sedimentary deposits and is rich in sand and clay. The deeper layers are a mixture of sand, grabbles, pebbles and cobles. Soils in the Strofilia forest have a sandy to loamy-sand texture with 4-16% of silt plus clay, with a humus rich surface layer and high pH (7.5-8.3).

Water quality (physico-chemical characteristics): The area which is flooded during the winter has a pH higher than 7. Temperature in Kotychi lagoon is ranging from 5 to 28 ^{o}C, salinity from 0 to 36.5 $^{o}/_{oo}$ and pH from 8 to 8.6. The lagoon is considered eutrophic to hypertrophic.
Tidal variations: The tidal variation is very narrow.
Climate: Climate is generally mild. The average annual precipitation is 833 mm. The average annual temperature is 16.1^{o}C. The coldest month is December with an average temperature of 10^{0}C. The hottest month is August with an average temperature of 25^{0}C. During winter East and Northeast winds predominate, but during summer West and Southwest winds predominate.

15. Hydrological value:
The main values are flood attenuation, groundwater recharge and water purification.

16. Ecological features:
Kotychi is the largest and the most significant lagoon in Peloponnisos. Although agricultural activity has been intensified around Kotychi lagoon, the habitats themselves have not been significantly affected. From an ornithological point of view, the lagoon has a great ecological interest because it is the southernmost lagoon on the western migration route of many birds. For this reason it is a major resting station for migratory birds. Ammophilous vegetation is limited to the narrow sandy zone on the western side which separates the lagoon from the Ionian Sea. In this zone, dunes with the dominating species *Ammophila arenaria* develop mainly near the opening of the lagoon, as well as to its Northwest. In a zone parallel to the ammophilous vegetation, characteristic vegetation comprising of *Arthrocnemum fruticosum*, *Juncus maritimus* and *J. acutus* grows. Apart from the above mentioned species, *Scirpus maritimus, Phragmites australis,* and *Elymus hispidus* are present with a high coverage. Halophytic associations grow almost all around, as well as on the islets in the lagoon. At the eastern side of the lagoon, where many streams enter it, the presence of *Phragmites australis, Scirpus maritimus*, and *Typha domingensis* is noteworthy. Also, great surfaces are covered with *Scirpus maritimus* at the northern side of the lagoon. Small clusters of *Tamarix* are found limited to the southeastern side. Brackish water vegetation grows in a large area of the shallow lagoon (Ruppia, Zostera). In the salty water occur the species *Ruppia martima* and *Enteromorpha intestinalis*. In the north - western part of the site begins the pine forest together with shrubby vegetation, which is actually the southern part of Strofilia forest.. The majority of the surrounding area is agricultural land and only a narrow natural zone occurs around the lagoon.

Strofilia forest consists of *Pinus pinea, P. halepensis,* in separate or mixed communities, with lower shrubby vegetation of *Junipers phoenicea, Erica munipuliflora, Pistacia lentiscus, Myrtus communis, Quercus coccifera* etc. It is of great ecological interest because it is the most extensive *Pinus pinea* forest in Greece and one of the biggest ones in Europe.

Prokopos lake is characterised by extensive reed beds to its northwestern part and a *Phragmites* fringe at its boundary with the Mavrovouni hill and wet meadows to its southern part with gradients of *Tamarisk* associations together with scattered small Ulmus and Salix stands. The sandy beach is dominated by *Juniperus, Arenaria, Agropyron, Sporobolus, Pangratium*, etc. The Mavrovouni hill is dominated by *Quercus macrolepis* with *Phlomis fruticosa* and associations of *J. pheonicea.*

17. Noteworthy flora:
The noteworthy flora of this lagoon includes *Centaurea niederi* which is listed in Annex II of the 92/43/EEC Directive and the Bern Convention; it is a rare local Greek endemic, which grows on calcareous rocks in the Kalogria area (Mavrovouni). It is also classified as "endangered" in the WCMC database and is protected by national legislation; The flora of the lagoon includes also the species *Halocnemum strobilaceum*, the populations of which are very degraded in Greece and must be protected; *Cotula coronopifolia*, *Coris monspeliensis, Lippia nodiflora*, and *Aqium inundatum* which all have an interesting distribution from a phytogeographical point of view; *Pancrtatium maritimum*, which is a species whose populations have been reduced along the Greek coasts; *Malcomia nana* which is a rare Mediterranean plant occurring sporadically on some sandy beaches of Greece.

18. Noteworthy fauna:
The site is the southernmost wetland on the western migration route of many birds. Among them, 55 migratory birds that breed, winter, or stage in the area are listed in Annex I of 79/409/EEC Directive. Some with significant presence are: the breeding species *Ixobrychus minutus* (11-50 p), *Himantopus himantopus* (< 25 p), *Glareola pranticola* (11-50 p) *Falco naumanni* (6-10 p), *Sterna albifrons* (6-10 p); and the wintering species *Circus aeroginosus* (6-10), *Larus genei* (101-250), *Phalacrocorax carbo* (501-1000), *Pluvialis apricaria* (11-50), *Alcedo athis* (11-50). There have been also recorded other 109 migratory species. Some of them with significant presence are: the breeding species *Tachybaptus ruficollis* (11-50 p), *Charadrius alexandrinus* (11-50 p), *Acrocephalus arundinaceus* (>500 p), *Panurus biarmicus* (>50), *Riparia riparia* (< 50), *Passer hispaniolensis* (51-100 p); and the wintering species *Cygnus olor* (101-250), *Anas penelope* (>1000), *A. crecca* (251-500), *A. platyrynchos* (501-1000), *A. acuta* (>1200), *Aythya ferina* (101--250), *Fulica atra* (>2000), *Vanellus vanellus* (251-500), *Calidris alpina* (251-500), *C. minuta* (101-250), *Tringa erythropus* (101-250), *T. totanus* (101-250), *Larus ridibundus* (>3000).

Concerning the rest of the fauna, five vertebrate species of Annex II of the Directive 92/43/EEC have been recorded: *Caretta caretta*, *Lutra lutra*, the snake *Elaphe quatuorlineata*, and the fish *Aphanius fasciatus*. Twenty two more species have been evaluated as important Greek species. Among them, *Pipistrellus pipistrellus* and *Anguis cephallonicus,* are endemic to the southwestern Greece, along with the Peloponnisos endemic fox *Vulpes v. hellenica*.

19. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)
Agriculture constitutes the primary activity in the area. Grazing is a supplementary activity. The cattle rearing is famous with high quality of beef. Fishing at sea and in the traditional lagoon systems is an important source of income, with a considerable production of best quality fish, part of which is exported. Hunting is also a social and cultural value but it is regulated.
The Strofylia forest has a significant ecological and aesthetic value. The seashore sand dunes attract a big number of visitors in the summer. There are interesting archaeological sites in proximity of the site including the Ancient Olympia..
Since 1993, local society has started attributing value to the site as a protected area, and consequently eco-tourism, environmental education and bird watching, despite that relevant

facilities are relative poor. Moreover the area is of great scientific value in the fields of biology, ecology, hydrology and geology.

20. Land tenure/ownership of:
Site: The greatest part of the Strofilia forest is owned by the Greek orthodox church. The rest of the forest is state owned. The Kotychi lagoon is exploited by the Municipal co-operative of Lechaina and the other lagoons also rented out for fisheries. Private plots exist to a very small extent.
Surrounding area: It is mainly privately owned.

21. Current land use:
Site: There are no settlements within the Ramsar site,. The current land uses are traditional fishing, hunting, and grazing. The farmland (potatoes, tomatoes, melons and watermelons), occupies 120 ha. The grazing land occupies 1,536 ha (200 cattle, 9.000 sheep), the forest 2,160 ha and the open water areas which are used for aquaculture occupy 700 ha. Finally, urban areas (roads, squares etc.) occupy 50 ha.
Surroundings/catchment: About 738 people in close proximity to the site and a few hotels have been built near the coast at the edge of the pine forest. Intensive agriculture of potato, corn, vine etc is the man land use and there is no important industrial activity in the wider area..

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:
The amount of suspended matter from the streams ending up in the shallow Kotychi lagoon have been constantly reducing its depth, allowing the extension of halophytic plants. Clearance and maintenance works in the lagoon are regularly carried out since 1989 in order to manage the reduction of depth.

Increased levels of fertilisers and pesticides are assumed to be flowing in the wetlands since streams entering the lagoon act as drainage channels collecting various pollutants from nearby agricultural land.

Pressure for land reclamation from the wetlands and the forest for agriculture has been practically stopped since 1993. Livestock farming has remained stable, but grazing pressure in the forest and the wetlands is still considered an important management problem. and the removal of stables outside the site is gradually implemented. Occasional tree-felling and tourism in the form of camping within the forest are persisting management problems.
In Strofylia forest, *P. pinea* is replaced by *P. halepensis* and there is a considerably poor regeneration of *P. pinea* during the last decades, probably due to human activities. However, experimental plantation of *Pinus pinea* is being carried out by competent authorities since 1995. Grazing within the forest does not seem to have a serious impact.

Increasing tourist activities is another threat to the ecosystems (sand dunes, forest). Pressure for tourism development has been strong but since 1993 it has been practically stopped.

Hunting pressure is managed by regulations in force, but some incidents of illegal hunting have been reported..

Unauthorised actions such as fishing with nets during the night, inappropriate solid waste disposal and sand removals have gradually decreased and periodic removal of garbage is being conducted by local authorities.

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. Projects likely to have an adverse effect on the site like tourism development, opening of new roads, new quarries, new livestock raising units were rejected. and only the necessary works of existing activities 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 measures and delimitation of zones are enforced since July 1993 by the Ministries of Agriculture, Environment and Development, which was renewed in May 1996.
A short description of the zones and the measures is as follows.

Zone A includes Strofylia forest, wetlands of Prokopos, Lamia swamp, wet meadows, sand dunes, Kotychi lagoon, reedbeds, and shallow coastal area. Core areas conprising the most sensitive bird habitats were defined. within zone A.
In zone A, outside the core areas, permitted activities (under specific terms) are: scientific research; visits for environmental education; mild recreation; controlled public use of roads entering the site; moving of vehicles only on constructed roads; conservation works for species and habitats; maintenance of existing irrigation works; free extensive grazing of cattle and sheep; improvement of the existing stables except in the forest where they have to be removed; use of lagoons for aquaculture; sea fishing and agriculture. Promotion of biological cultivation; existing drillings in forest (new drilling are prohibited), reforestation of deforested parts.
The Ramsar site is contained within zone A
A buffer zone B has been identified which includes Kalogria lagoon, Mavra Vouna mountains, agricultural land and settlements.
In this zone permitted activities under terms are: scientific research; free extensive grazing (except for goats) and preservation of stables; agriculture at agricultural land; improvement of the existing irrigation system; construction of green houses; fisheries, aquaculture and hunting according to existing regulations; use of salt pans; preservation and improvement of the road system (construction of roads leading to zone A is prohibited), works for improvement, preservation and modernisation of existing functionary and transportation facilities; excavation; house building; sport, recreation and tourist installations.
The wider area indicated as zone C includes the catchment area of the above zones A and B.
In this zone establishment of industrial units at a distance lower than 250 m from the river bed discharging either treated or untreated effluents, establishment of nuclear stations, and heavy industries are prohibited.

Zones A and B have been proposed for inclusion in the NATURA 2000 network under the codes GR2320001 and GR2330006. The same zones are already SPAs under the same codes. The site is a game refuge.

A Preliminary Management Scheme has been established in 1996 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. The Programme Agreement has an Annex with the planned works and activities, their time-table (1996-1999) 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 further priorities for the management of the sites

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 area.. Another mission that visited Greece in 1989 described the situation further.

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 reforestation, study for the regeneration of *P. pinea*, recreation sites, hydrological study for the recharge of the aquifer, selection of places for sanitary deposition of solid wastes etc.
Specific seminars to local authorities and young people interested in the conservation of the site have been carried out during 1993-95. In 1996, the Greek Biotope / Wetland Centre (EKBY) undertook an Information and Public Awareness project which lasted one year and in which representatives of local authorities and NGO's participated.

25. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)
Studies have been recently conducted on conservation and protection of Prokopos lagoon and Kotychi lagoon. There are guest houses available to students and researchers within the site near the Prokopos lagoon.

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

A fully equipped Information Centre is established at the site, accompanied by constructions for bird watching, guardhouses etc. This infrastructure supports the activities of information - public awareness, environmental education, monitoring etc. 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 is one of the most visited Greek wetlands during the summer due to the beauty of the landscape and the fine beaches. Tourist activities have increased significantly in the last years mainly at the coast line and there are a few hotels and rooms to let around the site, with about 500 beds available.

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 Western Greece. Concerning the functional (conservation) jurisdiction, co-ordination lies with the Ministry of Environment in collaboration the Ministry of Agriculture, the Prefectures of Achaia and Ilia 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 Kotychi Lagoon and Strofylia Forest
Metochi
GR-270 52 Varda
GREECE
Tel: +30-693-31234, Fax: +30-693-31652

30. Bibliographical references: (scientific/technical only)
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