Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Bureau. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

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

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DD MM YY

Designation date | Site Reference Number

2. Date this sheet was completed/updated:
13 January 2003

3. Country:
Malaysia

4. Name of the Ramsar site:
Sungai Pulai

5. Map of site included:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps.

a) hard copy (required for inclusion of site in the Ramsar List): *yes* ☐ -or- *no* ☐

b) digital (electronic) format (optional): *yes* ☐ -or- *no* ☐

6. Geographical coordinates (latitude/longitude):
1^0 16-30' N, 103^0 30-34' E

7. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

Administrative region Pontian District, Nearest town – Pontian which is 48 km from the Estuary of Sungai Pulai near Village Peradin

8. Elevation: (average and/or max. & min.)

Sea level

9. Area: (in hectares)

9,126 hectares

10. Overview:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

Estuary of the Sungai Pulai river with the largest block of mangrove forest in the state and the largest remaining intact riverine mangrove area in Peninsular Malaysia.

11. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8

12. Justification for the application of each Criterion listed in 11. above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1: *Sungai Pulai is probably the largest and most intact riverine mangrove system remaining in West Malaysia. With its associated seagrass beds, intertidal mudflats and inland freshwater riverine forest it represents one of the best examples of a lowland tropical river basin in Malaysia. Sungai Pulai is rich in its mangrove diversity consisting of a total of twenty-four species even though the majority of it is Rhizophora mucronata-Bruguiera parviflora production forest. The forestry practices that are being carried out are sustainable and are managed well. The extensive riverine mangroves support a rich biological diversity of fauna comprising of 7 amphibians, 12 reptiles, 55 birds, 26 mammals and 111 fish species.*

The mangroves are not under imminent threat as the water quality is found to be good and the mangroves in a healthy condition. There are sufficient mother trees to provide young propagules. Regeneration is occurring at a good rate. Sungai Pulai is a typical example of representative coastal wetland type found in the tropics, which is, a mangrove swamp system. It plays a major role in the natural control of coastal flooding.

Criterion 2: *To summarize, 3 wetland-dependent birds are near threatened (Mangrove Pitta, Mangrove Blue Flycatcher, Mangrove Whistler) and previous findings of Sungai Pulai, these wetlands support many threatened and vulnerable 2 primates (Long-tailed Macaque, Pig-tailed Macaque) whereas the Scaly Anteater; Common Porcupine; Smooth Otter and Bearded Pig are either classified as vulnerable or near threatened. From this information and perspective both Sungai Pulai Mangroves should be considered internationally important wetlands.*

In Peninsular Malaysia, it has been observed that coastal mangroves are more intact and are not facing serious threats from development as compared to riverine mangroves. Riverine mangroves are threatened ecological communities as siltation, erosion, pollution (both land and water based) and conversions to other non-compatible land uses easily impact them. Currently Sungai Pulai consists of a large riverine mangrove ecosystem where the mangroves are used sustainably and are in a healthy condition. This riverine mangrove area should be protected from further developmental pressures since there are no other remaining good examples of such an ecosystem in Peninsular Malaysia.
From time to time there have been sightings of the Estuarine Crocodile Crocodylus porosus in Sungai Pulai (personal communications). This suggests that Sg. Pulai is a possible nesting area for the Estuarine Crocodile.

In our field surveys, Avicennia lanata a mangrove species endemic to Malaysia was recorded in Sungai Pulai. This is a new record and new site for the occurrence of this plant since it was previously recorded in Singapore and Malacca and more recently in Sarawak

Criterion 3: *The Sungai Pulai mangroves is home to about 24 'true' mangrove plant species as well as 21 more mangrove associated species which represents a very rich species diversity if compared to other mangrove areas in Peninsular Malaysia.*

Larut Matang Mangroves has 21 species of 'true' mangroves species in a larger area of mangroves (40,151 ha) as compared to Sungai Pulai mangroves of 9,126 ha. Given the smaller size of Sungai Pulai it greatly contributes to the biological diversity of the region.
The Sungai Pulai mangrove forest is unique in the sense they are an example of good estuarine mangroves, which are tide dominated. They are largely influenced by high tidal range with strong bi-directional tidal currents. The current disperses the sediments brought to the coast by the many rivers. The channels in Sungai Pulai are quite stable and maintained by the bi-directional tidal flow to and from the mangrove forest.

A survey of the fauna of Pulai mangroves revealed that 6 species of mammals are true mangrove dependent species. The dependent mammal species include the Colugo, Long–tailed (Crab–eating) Macaque, Smooth Otter and a few bats species including the Dog–Faced Fruit Bat, Common Long-tongued Bat, Cave Fruit Bat and the Brown Bat. Another interesting species is the rare Flat-headed Cat that feeds on fish.

The larger mangrove areas of Sungai Pulai are particularly important for the specialised mangrove dependent species such as the Mangrove Pitta and Mangrove Blue Flycatcher. The tall-undisturbed mangrove trees are important nesting sites for the Grey Heron, Brahminy Kites, White-bellied Sea Eagles, Little Egrets, Serpent Eagles and presumably the Lesser Adjutants. The relatively

undisturbed sites in Sungai Pulai including the Nipah swamps may be nesting sites of the Estuarine Crocodile.

Criterion 7: *Sungai Pulai Mangroves and its associated mudflats are home to 111 fish species, 22 shellfish species, 3 crab species and 15 prawn species. It is an important habitat for marine fisheries as it supports a significant proportion of fish species.*

Each of these marine fish species belong to a number of taxa, with different life history stages, species interactions and different ecological roles to play at different stages of their life-cycle. Some marine crabs require mangrove stilt and prop roots and mudflats to live; shellfish require the soft mud of the mangrove forest floor to survive and the fish and prawns require an area where freshwater meets and mixes with marine water, thus the estuary of Sungai Pulai is an ideal environment for the early developmental stages of their young.

Criterion 8: *Estuaries are important habitats for marine fisheries as it is a well-known fact that juveniles of certain fish and prawn species prefer lower salinities in the stages of their growth.*

Penaeid prawns generally spawn in deep waters offshore and their post larvae and juveniles seek shelter and food in the numerous estuaries and creeks that drain mangrove swamps for periods of up to 3 months before migrating into the adjacent sea to mature and spawn.

In the Sungai Pulai Mangrove, four Penaeid prawn species and the catfish eel (Plotosus canius) use the route along Sungai Pulai from the upper reaches along its various tributaries and creeks to the main estuary before they mature and spawn in the open sea of the Straits of Johor. This is an important migration path for the fish and prawns to or from a spawning or feeding ground or nursery. Since Sungai Pulai is dissected by 5 major rivers, hence each individual river mouth play an important role as a nursery ground depending on the extent to which their natural cycles of inundation, tidal exchanges, water fluctuation and nutrients are retained. The five major rivers are Sungai Karang, Sungai Redan, Sungai Jeram Choh, Sungai Ulu Pulai and Sungai Jeram, which play a role in continuously bringing fresh water into the upper reaches of Sungai Pulai estuary. This has a profound effect on the tidal inundation and exchange there and influences Sungai Pulai's role as an ideal fish and prawn nursery ground.

The freshwater inflow into the mouth of these rivers play an important role in providing shelter and food to young juveniles of fish and prawns,

Many local fishermen depend on Sungai Pulai for their continuous fish stocks, which is the potential exploitable component of inshore fishing in the area.

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13. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

b) biogeographic regionalisation scheme (include reference citation):

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14. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Geology/soil Sungai Pulai is typified by the clayey alluvial soil or mud (readily erodible clayand silt) which has a high nutrient content and retaining capacity.

Origins – Natural Sungai Pulai is typical example of a natural estuarine system which is dissected by numerous channels and creeks and flanked by extensive riverine mangroves.

Hydrology – tidal level variations are from 0.1 till 3.7 m. Tidal currents are strongest with speeds of 2 knots during spring tide at the estuary. The Sungai Pulai catchment experiences a humid climate with rain from both the North- east and South -west monsoons. Rainfall is common throughout the year and ranges between 2500 and 2750mm annually.

Water quality is relatively good with no traces of any heavy metals with very low dissolved nitrates and suspended solids.

15. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

The catchment of Sungai Pulai is dominated by a coastal large low lying wetlands i.e. mangrove swamps and mudflats, with isolated mountain peak in Gunung Pulai with height of 654 m.

16. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The Sungai Pulai estuary plays an important significant role in sediment transport which are largely due to wind induced waves. Sedimentation rates between 1-2 cm /year exist in the shallow water areas of the estuary. The mangrove fringes (where in some instances vary from 500m to 20m width) play an important role in shoreline stabilization and preventing severe flooding in near by villages of the Sungai Pulai estuarine system.

The entire mangrove forests act as sediment traps with its substantive roots system. (prop, stilt and buttress roots).

17. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp Ts • U • Va • Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

I,F,G,B

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

The Sungai Pulai Mangroves can be broadly distinguished into 4 vegetation types:

- *Avicennia forests. Avicennia dominated forest is found as a pioneer at the seaward side at the estuary of Sg. Pulai fronting Tanjung Piai. The dominant species are Avicennia alba (Api-api putih) and A. marina (Api-api jambu) with scattered trees of A. officianalis and Sonneratia alba (Perepat).*
- *Rhizophora-Bruguiera forests. This commercial mangrove forest type occupies large areas within the Sg. Pulai MFR. Forest here include trees such as Rhizophora apiculata (Bakau minyak), Rhizophora mucronata, Bruguiera cylindrica (Berus), B. parviflora and Ceriops tagal (Tengar). A rare species Avicennia lanata (Api-api bulu) was also found among them along the south coast bordering the Straits of Johor. This species is endemic to Malaysia and has a restricted distribution.*
- *Luminitzera-Scyphiphora forests. This vegetation type occurs landward of the Rhizophora-Bruguiera forests. It represents a transition to the dryland mangroves of the hinterland and is inundated only by high spring tides. A characteristic feature of this zone, which makes walking cumbersome, is the frequent large mounds made by the mud lobster Thalassina anomala. Dominant species here include Lumnitzera littorea with scattered groves of Scyphiphora hydrophyllacea (Cingam), and the highly abundant mangrove ferns Acrostichum aureum and A. speciosum (Paku Piai). The palm Nypa fruticans (Nipah) grows gregariously along the riverbanks with greater freshwater influence.*

- *Dryland mangroves. This vegetation type occur at the landward boundary of Sg. Pulai MFR. Inundated only by occasional high spring tides, mangrove species here give way to other swamp species which include Hibiscus tiliaceus (Bebaru), Cerbera odollam (Pong-pong), Podocarpus polystachyus (Podo laut), Intsia bijuga (Merbau ipil), Planchonella obovata (Menasi) and Trema corymbosa. The Rattan Calamus erinaceus (Rotan bakau) and palm Oncosperma tigillarium (Nibong) are characteristic species of dryland mangroves. Pandanus species also occur.*
  Main Habitats: Estuary, rivers, mudflats, sea grass beds, Mangroves forests

Fish: About 111 species of fish and 15 species of penaeid prawns were found living in the mangrove estuary of Sg. Pulai. Among the fish species identified, the following may be considered of high economic value; Epinephalus tauvina (Grouper), Lates calarifer (Sea Bass or Giant Sea Perch), Lutjanus argentimaculatus and L. johnii (Snappers), Polynemus indicus and Eleutheronoma tetradactylum (Threadfins), Pampus argenteus (Pomfret) and Pomadasys hasta (Gerut-gerut). All the 15 species of prawns may be considered species of commercial importance.

Birds: A total of 55 bird species were recorded in the Sungai Pulai area. Among them were 5 migratory species, which include the Great White Egret, Pacific Golden Plover, Common Greenshank, Common Kingfisher and Black-capped Kingfisher. These birds nest elsewhere and are migrants to Malaysia and feed largely on the mudflats, which lies in association with the mangroves. These migratory species depend on the mangroves for resting and feeding purposes while enroute the East Asian-Australasian Migratory Flyway.

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19. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS*.

Mangroves species:

- *Avicennia lanata - a rare species, which is endemic to Malaysia (Tomlinson, 1986). The species was previously thought to be restricted to Melaka and Pahang with a few historical records from Singapore (now believed to be extinct there), but has recently also been found in Sarawak. Its presence in the Sg. Pulai is therefore of National and International significance.*
- *Bruguiera sexangula - the only Bruguiera that sometimes forms stilt roots. It occupies the more inward parts of the mangrove and is less common than the similar B. gymnorrhiza. It has an ornamental potential.*
- *Podocarpus polystachus - a small to medium sized tree growing along rocky and sandy shores. It is often planted in urban areas as an ornamental tree.*

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20. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS*.

Two bird species, the Mangrove Pitta and Mangrove Blue Flycatcher, are mangrove-dependent species and would be at risk if the Sg. Pulai mangrove area experiences more reduction. They are both considered near-threatened under the World List of Threatened Birds (Collar et al. 1994) and have also been included in List II (birds under consideration for "upgrading" to threatened status) under the IUCN Red List of Threatened Species (IUCN, 2000). Another mangrove-dependent species, the Mangrove Whistler is also found here.

Other Fauna: The Long-tailed Macaque and Pig-tailed Macaque are listed as near-threatened and vulnerable species, respectively in the IUCN Listing of Endangered Animals (IUCN, 2000).

The Scaly Ant-eater or Pangolin Manis javanica was recorded based on local information solicited in the area and is listed as a near-threatened species in the IUCN listing. The Common Porcupine and the Smooth Otter are listed as vulnerable species whereas the Bearded Pig is listed as a near-threatened species under the IUCN Listing.

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21. Social and cultural values:

e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

Fisheries production: It was estimated that 11% of the total fish catch and 34% of the shrimp catch in Johor where Sungai Pulai is located consisted of mangrove-dependent species. This amounts to 20% of the value of the total marine fish landings or about RM 54 million annually in the state of Johor. About 38 villages located at the fringe of the Sungai Pulai Mangrove Forest Reserve have a high dependence on mangroves resources for e.g. cutting of mangrove wood for poles, charcoal production aquaculture activities and home stay for eco-tourists. Fisheries related activities in the mangroves and mudflats play an important supplementary income for the inshore fishermen of the site.

22. Land tenure/ownership:

(a) within the Ramsar site: *State Reserve land and Mangrove Forest Reserve*

(b) in the surrounding area: *private land*

23. Current land (including water) use:

(a) within the Ramsar site: *mangrove production*

(b) in the surroundings/catchment: *agriculture and habitation*

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

(a) within the Ramsar site:

The new port being established in the estuary of Sungai Pulai will likely lead to increased wave energy reaching the east shore of estuary thus accelerating coastal erosion and eventually threatening the bunds behind the mangroves. Some of these are now less than 50 m wide (cf. observation on site).

(b) in the surrounding area:

Sea-based water pollution in the coastal areas of the estuary may arise from the development of the Tanjung Pelepas Port that will involve large dredging and reclamation works. These activities will directly impact the shores of Sungai Pulai estuary. Siltation/erosion may occur due to sediment transport and water flow changes. Release of adsorbed heavy metals and toxic organics into the water phase may occur due to resuspension of seabed sediment during dredging operations, hence water quality is compromised.

Sungai Pulai is located near the second link to Singapore and also in the vicinity to the Tanjung Pelepas port where huge containers are loaded and unloaded with cargo at the port on the western shore of Sungai Pulai. Being close to Singapore and the International waters many ships ply to and fro and the likelihood of oil spills from the ships are a potential threat to the mangroves of Sungai Pulai.

25. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

The Sungai Pulai Mangroves is protected as a Forest Reserve under the National Forestry Act 1984 and is managed as a sustainable use forestry under the Johor State Forestry Department. Currently there exists an Integrated Management Plan for the sustainable use of Mangroves in Johor state where Sungai Pulai Mangrove Forest Reserve is located. This Plan is a 10 year plan from 2000-2009 which has been endorsed by the state forestry department.

26. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

27. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

- *The site is frequented by local universities research staff to conduct many different aspects of research from biodiversity to socio-economic concerns.*
- *Local NGOs do visit the mudflats to gather information about the annual waterbird counts which is compiled into the Asian Waterfowl Census report.*

- *No field stations and current projects at the site.*

28. Current conservation education:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

In this site there are no visitors' centres or hides. A mangrove brochure and poster depicting biological diversity of mangroves has been developed by the Johor State Park Corporation for public dissemination.

29. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Only one site-specific mangrove related eco-tourism venture exists near the fringe of Sg. Pulai MFR, located at Kg. Belokok (Peradin Kampung Ku Resort). It houses 2 chalets, a restaurant, a 40 m fishing jetty, a floating raft, an abandoned charcoal producing furnace, and has a 280 m long boardwalk which transverses into the Sg. Peradin section of the Sg. Pulai MFR. Local interviews conducted here concluded that this resort is currently sitting on a former jetty point (small harbour) which use to serve as a transit to Singapore and Johor Bahru during the colonial days. The remnants of the abandoned harbour deck still remains. Fishing trips and boat rides can be solicited from this resort. The number of tourists is seasonal and there are no recent figures of visitor arrivals.

30. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Johor State Park Corporatin under the State Government of Johor

31. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

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32. Bibliographical references:

scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

- *Wetlands International Malaysia Programme. 2001. Ecological Assessment of Sungai Pulai Mangrove Forest Reserve and Proposed Tanjong Piai State Park: To determine its status as wetlands of International Importance (Ramsar Sites)*
- *Collar, N.J., Crosby, M.J. and Stattersfield, A.J. (1994). Birds to Watch 2: The World List of Threatened Birds. Birdlife Conservation Series No. 4, Bird Life International, pp. 407.*
- *IUCN (2000). 2000 IUCN Red List of Threatened Species. IUCN-The World Conservation Union. Published by IUCN. Compiled by Craig Hilton-Taylor. 61 pp.*
- *MPMJ (1999). Management Plan for the Mangroves of Johor 2000-2009. Forestry Department Peninsular Malaysia, Johor State and DANCED, 236 pp.*
- *Tomlinson, P.B. (1986). The botany of mangroves. Cambridge University Press, UK. 400 pp.*