Information Sheet on Ramsar Wetlands (RIS) –
2006-2008 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes 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. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.

3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

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

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DD MM YY

Designation date | Site Reference Number

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2. Date this sheet was completed/updated:

23 July 2008

3. Country:

Malaysia

4. Name of the Ramsar site:

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Lower Kinabatangan-Segama Wetlands

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only)**:**

a) Designation of a new Ramsar site : √ ; or
b) Updated information on an existing Ramsar site:

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged: ❑
or
If the site boundary has changed:
i) the boundary has been delineated more accurately ❑; or
ii) the boundary has been extended ❑; or
iii) the boundary has been restricted** ❑
and/or
If the site area has changed:
i) the area has been measured more accurately ❑; or
ii) the area has been extended ❑; or
iii) the area has been reduced** ❑

** **Important note**: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site: (Annex 1)
Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:
i**) a hard copy** (required for inclusion of site in the Ramsar List): √;

ii**) an electronic format** (e.g. a JPEG or ArcView image) √;

iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** ❑.

b) Describe briefly the type of boundary delineation applied:
e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The boundary of the Ramsar site follows the legally-gazetted boundaries of three contiguous protected areas: Trusan Kinabatangan Forest Reserve, Kuala Maruap and Kuala Segama Forest Reserve, and Kulamba Wildlife Reserve.

8. Geographical coordinates (latitude/longitude, in degrees and minutes): **(Annex 1)**
Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

N5°25’0” - N5°50’0” / E118°15’0” - E118°55’0”

9. General location:
Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

The site lies along the east coast of the state of Sabah. It is mainly within the administrative district of Kinabatangan, with the northern tip under the administrative district of Sandakan. The nearest large town is Sandakan, which lies to the northwest of the site. The main access to the site is by boat.

10. Elevation: (in metres: average and/or maximum & minimum)

Predominantly at sea level, with several isolated steep hills rising to a maximum altitude of 70 m above sea level in the southern and central parts of Kulamba Wildlife Reserve.

11. Area: (in hectares)

Total - 78,803 hectares (ha); comprising the three Forest Reserves: Trusan Kinabatangan Forest Reserve (40,471 ha), Kulamba Wildlife Reserve (20,682 ha), and Kuala Maruap and Kuala Segama Forest Reserve (17,650 ha).

12. General overview of the site:

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

The Lower Kinbatangan-Segama Wetlands is of global conservation importance for its rich biodiversity; the site harbours rare, threatened and endangered large mammal species including the world's smallest elephant. It is one of only two known sites in the world inhabited by ten species of primates, four of which are endemic to Borneo. Predominant wetland types found within the site are mangrove and brackish forest (including nipah swamps), peat swamp forest, and wet grasslands on peat, all of which are completely protected within three contiguous protected areas: Trusan Kinabatangan Forest Reserve, Kulamba Wildlife Reserve, and Kuala Maruap and Kuala Segama Forest Reserve. This 78,803 ha site is located within the largest forest-covered floodplain in Malaysia, and possibly in Southeast Asia.

13. Ramsar Criteria:

Tick the box under 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). All Criteria which apply should be ticked.

1 • **2** • **3** • **4** • **5** • **6** • **7** **8** • **9**

14. Justification for the application of each Criterion listed in 13 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: The site is a particularly good representative example of natural coastal mangrove, brackish and peat swamp forest systems, characteristic of the Indo-Malayan Realm (Udvardy, 1975). The peat swamp forest within the site is dominated by *Lophopetalum multinervium* (local name: *perupok*), a unique natural peat swamp forest association found only in the eastern part of Sabah. The site protects the largest remaining contiguous block of mangroves in Malaysia, and possibly in the southern Sulu Sea region.

Criterion 2: The site supports 16 species of fauna and 9 species of flora which are listed in Appendices I or II of the Convention on International Trade in Endangered Species (CITES), and/or in the 2007 IUCN Red List of Threatened Species. Or in App I of CMS.

Mammals:

Vernacular Name	Scientific Name	IUCN Status	CITES Status	Remark
Hose's Leaf Monkey	*Presbytis hosei*	DD		Endemic to Borneo
Red Leaf Monkey	*Presbytis rubicunda*	LR		Endemic to Borneo; two sub-species occur, separated by the Kinabatangan
Silvered Leaf Monkey	*Trachypithecus cristatus*	NT		Rare primate, endangered in Malaysia
Long-tailed Macaque	*Macaca fascicularis*	NT		Most common primate recorded
Pig-tailed Macaque	*Macaca nemestrina*	Vu		Uncommon; encroaches into oil palm plantations
Bornean Gibbon	*Hylobates muelleri*	NT		Endemic to Borneo, relatively common
Proboscis Monkey	*Nasalis larvatus*	En	Appendix 1	Endemic to Borneo; Lower Kinabatangan represents one of the last strongholds for this species on Borneo
Orang utan	*Pongo abelli*	En	Appendix 1	Northeast Bornean sub-species
Sumatran Rhinoceros	*Dicerorhinus sumatrensis harrisoni*	CR	Appendix 1	Bornean subspecies
Binturong	*Arctictis binturong*			
Hairy-nosed Otter	*Lutra sumatrana*	Vu		Restricted range species, rare in

				Malaysia, may be locally common.
Smooth Otter	*Lutra perspicillata*	Vu		Vulnerable
Borneo Pygmy Elephant	*Elephas maximus borneensis*	En	Appendix 1	Bornean sub-species
Banteng	*Bos javanicus*	En	Appendix 1	
Greater Mousedeer	*Tragulus napu*			
Sambar Deer	*Cervus unicolor*			
Bearded Pig	*Sus barbatus*			Common
Malayan Sun Bear	*Helarctos malayanus euryspilus*	DD		Bornean sub-species
Marbled Cat	*Pardofelis marmorata*	Vu		unconfirmed record
Bornean Clouded Leopard	*Neofelis diardi*	Vu	Appendix 1	Endemic to Borneo

The Sumatran Rhinoceros *Dicerorhinus sumatrensis harrisoni* (Bornean subspecies) has been recorded several times in the Kulamba Wildlife Reserve, and once close to the Segama River. Believed to be fewer than 300 individuals left in the world due to poaching and habitat fragmentation, Sumatran rhinos are critically endangered. Previous estimates suggest that there were 30 to 50 rhinos on the island of Borneo, all in Sabah. Evidence of the Tembadau *Bos javanicus* has been recorded in all parts of the Kulamba Wildlife Reserve with a total population of about 70 animals. Though there is inadequate data at present to estimate the size of the population, it is estimated that the reserve supports the largest density of this species in Sabah. The Borneo Pygmy Elephant *Elephas maximus borneensis* (Bornean sub-species) is the smallest known sub-species of elephant in the world. DNA analysis conducted in 2003 showed that Asian elephants in Borneo are genetically distinct and may have separated from those in mainland Asia about 300,000 years ago. Less than 1,500 Borneo Pygmy Elephants remain in the wild, mostly in the state of Sabah. This species has been recorded from the dryland forest and hills in the central and southern parts of the Kulamba Wildlife Reserve, and occasionally in the lower Segama area.

The total estimated population of the Orang utan *Pongo abelli* (Northeast Bornean sub-species) is 11,000. Tabin Wildlife Reserve (located to the south of the Ramsar Site), Kulamba Wildlife Reserve and the Lower Segama area are the last stronghold of the specie in eastern Sabah. Proboscis Monkey *Nasalis larvatus* populations have been recorded within the entire Ramsar site. A recent survey concluded that the lower Kinabatangan area, including the Lower Kinabatangan Wildlife Sanctuary and the Ramsar site are the stronghold of the *N. larvatus* population in Sabah, with an estimated population of more than 3,200 animals. This species breeds in the mangrove, riverine and peat swamp forests.

Birds:

1. Lesser Adjutant *Leptoptilos javanicus* - Vulnerable
2. Chinese Egret *Egretta eulophotes* - Vulnerable ;CMS- App I
3. Storm's Stork *Ciconia stormi* – Endangered

Reptiles and Amphibians:

4. Tomistoma (False Gharial) *Tomistoma schlegelii* – Appendix I; Endangered

Plants (vernacular names in brackets):

5. (Keruing kasugoi) *Dipterocarpus validus* – Critically Endangered
6. (Selangan daun bulat) *Hopea wyatt-smithii* – Critically Endangered
7. Light Red Meranti (Seraya tembaga) *Shorea leprosula* – Endangered
8. (Kapur merah) *Dryobalanops beccarii* - Endangered
9. (Katong-katong) *Cynometra inaequifolia* - Vulnerable
10. Agarwood (Gaharu) *Aquilaria malaccensis* – CITES Appendix II; Vulnerable
11. (Ipil laut) *Intsia bijuga* - Vulnerable
12. (Bangkita) *Rhizophora apiculata* – Lower Risk
13. (Geronggang biabas) *Cratoxylum formosum* – Lower Risk

Criterion 3: The Ramsar site is located within one of only two known sites in the world inhabited by ten species of primates: Orang utan *Pongo abelli*, Proboscis Monkey *Nasalis larvatus*, Slow Loris *Nycticebus coucang*, Western Tarsier *Tarsius bancanus*, Red Leaf Monkey *Presbytis rubicunda*, Long-Tailed Macaque *Macaca fascicularis*, Pig-Tailed Macaque *Macaca nemestrina*, Bornean Gibbon *Hylobates muelleri*, Silvered Leaf Monkey *Trachypithecus cristatus* and Hose's Leaf Monkey *Presbytis hosei*. Four of these are endemic to Borneo: Hose's Leaf Monkey, Red Leaf Monkey, Proboscis Monkey and Bornean Gibbon.

The Storm's Stork *Ciconia stormi* is the second most endangered stork in the world; the Kinabatangan area represents a stronghold in Malaysia. The Crested Toad *Bufo divergen,* also know *as Ingerophrgnus divergens LC* and Hose's Bush Frog *Philautus hosii* are endemic to Borneo. Of the fish species found in the area, *Labiobarbus sabanus* is known only from the Kinabatangan and Segama river basins in Sabah; *Kryptopterus parvanalis* only from northeastern Borneo; and *Leptobarbus hosii* only from northern Borneo.

The peat swamps forests (PSF) found in the site are unique to the east coast of Sabah, representing a true natural PSF type which is dominated by *Lophopetalum multinervium* (known locally as *perupok*).

Criterion 8: The two large rivers, the Kinabatangan and Segama, flow through the site and form important spawning and nursery grounds for fish and prawn species **(Annex 2)**. The Marbled Sleeper Goby *Oxyeleotris marmorata* and the Giant Freshwater Prawn *Macrobrachium rosenbergii* are particularly important protein sources of the local inhabitants. *Macrobrachium rosenbergii* is a freshwater prawn species but requires brackish water for spawning, and the Ramsar site holds one of the largest spawning sites of the species in Sabah.

Among other fish that spawn in the site, species with a high commercially valuable as food source include *Anguilla malgumora*, *Clarias teysmanni*, *Mystus nemurus*, *Mystus sabanus*, *Oxyeleotris marmorata*, *Pangasius macronema*, *Pangasius nieuwenhuisii*, *Pangasius tubbi*, *Puntius bramoides*, *Puntius bulu* and *Puntius sealei*. For ornamental fish, important species are *Nematabramis everetti*, *Osphronemus goramy*, *Rasbora hubbsi*, *Rasbora myersi*, *Rasbora sumatrana* and *Trichogaster trichopterus*.

15. 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:

Indo-Malayan Realm

b) biogeographic regionalisation scheme (include reference citation):

Udvardy, M.D.F. (1975). A classification of the biogeographical provinces of the world. IUCN Occasional Paper No. 18. Morges, Switzerland: IUCN.

16. 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.

The site is located within a flat depositional plain fed by sediments from the Kinabatangan and Segama rivers; the Kulamba River Basin catchment exists entirely within the Ramsar site. It is within Watson's (1928) Inundation Class 5 (i.e. inundated by abnormal or equinoctial tides; and flooded up to twice a month).

The site is dominated by Weston soils, derived from fine textured sulphidic alluvium, subject to regular inundation by saline tidal water. Intermittently, at altitudes of less than 3 m, soils of siliceous sand are formed on old beaches inland and also on actively developing coastal beaches. Peat soil is dominant in the Kulamba Wildlife Reserve. The depth of peat varies from a few centimetres to over 6 m.

The climate of the site and its catchment area is strongly tropical with high temperature, humidity and rainfall (between 2,500 - 3,000 mm annually). The site is affected by two annual monsoons: the Southwest monsoon between May and September, and the Northeast monsoon between November and March. The Northeast monsoon is generally dominant, bringing the heaviest rains between October and

February. The transition period in April brings the driest weather. The site also experiences extreme climatic conditions during El Niño and La Niña events.

The site receives freshwater input from two large rivers: the Kinabatangan and Segama rivers, as well as several smaller rivers such as the Kretam River. One significant hydrological feature is the presence of large bays such as Kuala Segama and Dewhurst Bay that appear to avoid siltation and maintain a significant depth. Water quality within the streams of the Kulamba Wildlife Reserve is typical of peat swamp habitats: the salinity ranges from 1.7 – 1.9 ppt; pH from 6.4 – 7.5; temperature from 25.5 - 29.9 ^{o}C; conductivity is low at 27.6 – 31.2µS/cm; total suspended solids (mg/L) are high at 126.8 – 214.5 mg/L; and dissolved oxygen generally low at 4.6– 5.9 mg/L.

The tidal range at Sandakan is between 2.6 and 0.4 m CD (Chart Datum: Lowest Astronomical Tide), although the tidal range on a single day is rarely more than 1 m.

17. Physical features of the catchment area:

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

At 1.78 million ha, the 560 km long Kinabatangan River is the largest catchment in Sabah and drains a large portion of State's interior; its main sub-catchments are Kuamut, Maliau and Lokan. Because of this large catchment area, the floodplain is strongly influenced by upstream rainfall, and parts of the lowland forest can be flooded for more than a month. The 350 km long Segama River has a catchment area of 515,000 ha; its main sub-catchments are Danum and Bole.

The principal wetland vegetation types throughout the catchment area comprise riverine forest, freshwater swamp forest, peat swamp forest and open swamps. A large number of meanders and oxbow lakes (about twenty) occur in the region due to the active process of flooding, changes in the river's course, erosion and deposition. Besides oxbow lakes, there are also several shallow freshwater lakes along the river notably Butong and Labaung near Bukit Garam. Limestone forest can be seen at Sukau and near Batu Putih. The surrounding areas consist of remnants of pristine lowland dipterocarp forest and logged-over swamp forest, burnt lowland dipterocarp forest, and cocoa and oil palm plantations. Approximately 1,500 plant species are known to occur in the lowland dipterocarp forests, 600 in freshwater and riverine forests, 300 on limestone outcrops, 50 in mangroves and coastal forest, and 10 in lakes and treeless wetlands.

18. Hydrological values:

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

No study has been conducted to ascertain the hydrological values of the site. However, potential hydrological values are expected to include: shoreline stabilization, flood and erosion control and sediment trapping. The peat swamp forest habitat may play an important role in as a sink for atmospheric carbon. The Kulamba River Basin could play a significant role in providing subsurface water storage to sustain the wetland ecosystem. The Kinabatangan River is a source for rural water supplies within the river basin, and is also one of the sources of urban water supply for the Kinabatangan and Sandakan Districts.

19. 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.

Wetland types in order of their dominance (by area)

Wetland Type	Description
I	**Intertidal forested wetlands**; complete mangrove zonation (includes seaward or riverine margins of the mangrove, main mangrove zones, and back swamp mangrove), transitional forest, and *nipah* swamps.
U	**Non-forested peatlands**; permanently waterlogged and represented by almost pure clumps of sedge, *Thoracostachyum bancanum* (Cyperaceae).
Xp	**Forested peatlands**; dominated by *Lophopetalum multinervium* swamp forest (local name: *perupok*), a unique natural peat swamp forest association found only in the eastern part of Sabah.

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

The site consists of natural vegetation on sandy beaches, with various zones of tidal swamp, including permanently inundated marshes and forest on peat soils.

Casuarina equisetifolia (locally known as *Aru*) dominate almost all of the coastal sandy beaches or banks above the tide level, forming narrow strips in the Trusan Kinabatangan and Kuala Maruap and Kuala Segama forest reserves. In the Kulamba Wildlife Reserve, stands of *Casuarina equisetifolia* and *Excoecaria agallocha* form a broad strip in front of peat swamp formations.

The mangroves can be separated into three distinct zones: (i) sturdy mangrove pioneers such as *Avicennia marina* and *Sonneratia alba* predominate in the most seaward or riverine margins of the mangrove; (ii) in the main mangrove zone *Rhizophora mucronata* and *Rhizophora apiculata* line the tidal river banks and deltaic estuarine areas. Other associates commonly found in this zone are *Brugueira gymnorrhiza*, *Ceriops tagal*, *Lumnitzera littorea*, and *Xylocarpus granatum*; and (iii) the back mangrove zone is predominated by large stands of *Bruguiera gymnorrhiza*. In the upper limits of this zone, other associates are *Heritiera littoralis* and *Lumnitzera littorea* becoming more prominent alongside nipah palm *Nypa fruticans*. To a lesser extent, on the landward fringes of this zone where the transition to dry land is relatively abrupt and on the sandy-mud heaps which are often associated with crabs at the back of woody mangroves, are smaller stands of *Nibong* palm *Oncosperma trigillaria*, often mixed with *Bruguiera* and *Excoecaria*. Wildlife species found in the mangrove areas include the Proboscis Monkey, Oriental Small-clawed Otter, Smooth Otter, and crocodiles. The mangrove forest and tidal flats in the area are frequented by waterbirds such as the Lesser Adjutant, Chinese Egret, and Oriental Darter.

Several vegetation types have been identified in the Kulamba Wildlife Reserve with mixed swamp forest (open swamp forest and closed-canopy swamp forest) and dryland forest (primary dipterocarp forest) dominating the landscape. The open swamp forest is dominated by thick scrub and grasses, and frequently flooded. Large tree species include *Terminalia* spp. Prominent tree species in the closed-canopy forest include *Licuala* spp., *Campnosperma auriculata, Alstonia spatulata, Homalanthus populneus, Baccaurea stipulata, Planchonia valida, Memecylon laevigatum* and *Pternandra caerulescens*. In parts, notably to the east of Sungai Kapis, *Campnosperma auriculata* is the most abundant tree and the ground is dominated by *Hypolytrum nemorum*. Dryland forest occurs on both flat land and on steep hills in the centre and south of the reserve. Tree species found in this area include *Dipterocarpus caudiferus, D. validus, Shorea leprosula, Vatica oblongifolia, Cymnometra inaequifolia, Sindora* sp., *Irvingia malayana* and *Aquilaria malaccensis*. Much of the intact peat swamp forests (PSF) are found towards the western and southern portion of the reserve. These forests are unique to the east coast of Sabah, representing a true natural PSF type which is dominated by *Lophopetalum multinervium* (known locally as *perupok*). Large parts of the peatland area were burnt in series during the severe El Nińo events of the past. At present, the burnt area is virtually dominated by large clumps of sedge *Thoracostachyum bancanum*, where large mammal species such as the Sumatran Rhinoceros, Tembadau (Banteng) and Borneo Pygmy Elephant roam.

The waters off the Ramsar Site are known to support a population of the endangered Dugong *Dugong dugon* and the Irrawaddy dolphin *Orcaella brevirostris*.

The coastal mangroves are an important nursery habitat for commercially important fish and prawn species. Communities living adjacent to the site depend on the fishery resources for their livelihood and sustenance. The wide mangrove belts of Eastern Sabah, such as those found in the site, are the largest contiguous mangrove areas in the southern Sulu Sea and as such, are thought to be of transboundary importance for fishery resources. The wetlands also play an important role in settling the sediment and organic loads of the Kinabatangan and Segama rivers. Tropical peat swamp forests, such as those found in the Kulamba Wildlife Reserve, are known to play an important role in carbon sequestration.

The entire Ramsar site is of global conservation importance for its high biodiversity and therefore has tremendous potential as a destination for tourism, recreational and educational activities.

21. Noteworthy flora (Annex 3):

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, 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.*

The peat swamps forests (PSF) found in the site are unique to the east coast of Sabah, representing a true natural PSF type which is dominated by *Lophopetalum multinervium* (known locally as *perupok*).

Keruing kasugoi *Dipterocarpus validus* is endemic to Kalimantan, Sabah and the Philippines; it yields wood-oil and timber. Selangan daun bulat *Hopea wyatt-smithii* is species of mixed dipterocarp forest and is under severe threat from habitat degradation.

Light Red Meranti (Seraya tembaga) *Shorea leprosula* is found in Indonesia, Malaysia, Singapore, and Thailand where it has suffered massive population reduction mainly because of exploitation for timber. Kapur merah *Dryobalanops beccarii* is found in mixed dipterocarp forests in Brunei Darussalam, Indonesia (Kalimantan) and Malaysia (Sabah, Sarawak). It is a heavy hardwood sold under the trade names of 'Kapur.'

Katong-katong *Cynometra inaequifolia* is a species of legume in the Fabaceae family. It is found in Malaysia, the Philippines, and possibly Thailand. Agarwood (Gaharu) *Aquilaria malaccensis* is a species of plant in the Thymelaeaceae family, which is found in Bangladesh, Bhutan, India, Indonesia, Iran, Laos, Malaysia, Myanmar, the Philippines, Singapore, and Thailand. It is the principal producer of the resin-suffused agarwood, used for perfume and incense. Ipil laut *Intsia bijuga* produces one of the most valuable timbers of South East Asia. The species has been exploited so intensively for timber that in most countries few trees are left in natural stands. The species is considered to be almost extinct in Sabah.

Bangkita *Rhizophora apiculata* is native to tropical and subtropical coastal areas from the African east coast, throughout Asia to Australia and to most islands of the eastern Pacific Ocean. Its main uses are for timber, fuelwood, charcoal, dyes, and traditional medicine. The wood of Geronggang biabas *Cratoxylum formosum* is used for firewood and charcoal.

Some noteworthy flora in the site are (Bangkita) *Rhizophora apiculata* – LR; (Geronggang biabas) *Cratoxylum formosum* – LR

22. Noteworthy fauna(Annex 4) :

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.*

The site is known from previous records to be an important habitat for several rare and endangered waterbird species with population levels greater than 1% of the regional (i.e. Asia) population of the following species: Storm's Stork *Ciconia stormi* (Endangered); Lesser Adjutant *Leptoptilos javanicus* (Vulnerable); Chinese Egret *Egretta eulophotes* (Vulnerable) and Oriental Darter *Anhinga melanogaster* (Near threatened). Seven species of the family Ardeidae (Egrets) have been recorded in the area. The Directory of Important Bird Areas in Malaysia (2007) notes that the entire Kinabatangan wetland area (including the upstream areas of the Ramsar site) harbours more than 3% of the world population of Storm's Stork. All the eight species of the hornbills in Sabah. White-crowned Hornbill *Aceros comatus*, Bushy-crested Hornbill *Anorrhinus*

galeritus, Wrinkled Hornbill *Aceros corrugatus*, Wreathed Hornbill *Aceros undulatus*, Asian Black Hornbill *Authracoceros malayanus*, Oriental Pied Hornbill *Authracoceros albirostris*, Rhinoceros Hornbill *Buceros rhinoceros*(NT), Helmeted Hornbill *Buceros vigi l and* Cinnamon-headed Green Pigeon *Treron fulvicollis* – NT are found within the Ramsar Site.

The Malayan Sun Bear *Helarctos malayanus euryspilus* (Bornean sub-species) has been recorded in the central and southern parts the Kulamba Wildlife Reserve, but its population size has yet to be determined.

The noteworthy species found in the area are Bornean Gibbon (*Hylobates muelleri*)-NT; Long-tailed Macaque *Macaca fascicularis* – NT; Hose's Leaf Monkey *Presbytis hosei* – DD; Red Leaf Monkey *Presbytis rubicunda* – LR; Silvered Leaf Monkey *Trachypithecus cristatus* – NT; Malayan Sun Bear *Helarctos malayanus euryspilus* (Bornean sub-species) – DD; Malayan Sun Bear *Helarctos malayanus euryspilus* (Bornean sub-species) – DD; Estuarine Crocodile *Crocodylus porosus* LC; (Bangkita) *Rhizophora apiculata* – LR; (Geronggang biabas) *Cratoxylum formosum* – LR

23. Social and cultural values:

a) Describe if the site has any general social and/or 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:

There are three villages located adjacent to the site: Kampung ("village" in Malay) Tundun Bohangin, Kg. Mumiang, and Kg. Abai. Other villages in the vicinity of the site are Kg. Mumiang, Kg. Dagat, Kg. Tidung and Kg. Parit. All these villages were established more than 70 years ago. The people living here comprise a mixed population of the Sungai, Bajau, Suluk, Kagayan and Bugis ethnic groups. Subsistence farming and fishing (about 90% of the villagers are fishermen) are the main economic activity of the community here. The population density within the Ramsar site is less than 5 inhabitants per square kilometre.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

No.

If Yes, tick the box ❑ and describe this importance under one or more of the following categories:

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

a) within the Ramsar site:

The land within the site is gazetted as Permanent Forest Estates under the Forest Enactment 1968, and owned by the state government of Sabah. However, there are approximately 1,870.16 ha of dry land within the mangroves that were alienated during the colonial administration and an additional 701.31 ha of land along the landward boundary of the Ramsar site that has been converted to agricultural land.

b) in the surrounding area:

Most of the land is owned by individuals or oil palm companies. Some areas are owned by the state government and classified as 'Stateland.'

25. Current land (including water) use:

a) within the Ramsar site:

Activities within the site are limited to small-scale fisheries, wildlife tourism and small-scale extraction of mangrove poles by local villagers.

b) in the surroundings/catchment:

The principal land uses in the catchment areas of the Ramsar site are protected areas, commercial forestry, agriculture (mainly aquaculture and oil palm), and settlements.

The allocation of land use within the Kinabatangan River Basin catchment is as follows:

- Protected areas in the upper catchment: approximately 7.5%; and in the lower catchment including the Ramsar site: 4.5%;
- Commercial forestry mostly in the upper catchment areas: 53%; and
- Agriculture (including oil palm and aquaculture) located mostly in the lower catchment and floodplain areas and settlements: 35%.

The allocation of land use within the Segama River Basin is as follows:

- Protected areas in the upper catchment: approximately 12%; and in the lower catchment including the Ramsar site: 16 %;
- Commercial forestry mostly in the upper catchment areas: approximately 42%; and
- Agriculture (including oil palm) located mostly in the lower catchment and floodplain areas and settlements: 30%.

26. 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:

There is small-scale extraction of mangrove poles by local villagers for use in the construction of houses, boats and fishing structures, as firewood and as raw materials for the one licensed traditional charcoal-making kiln in the area. However, the impact of this is minimal and extraction is strictly monitored by the relevant government agencies.

Some incidences of illegal hunting and poaching have been reported, particularly in the Kulamba Wildlife Reserve. However, these were isolated cases and action has been taken by the relevant government agencies to mitigate future incidences.

(b) in the surrounding area:

The site is located downstream of a massive oil palm plantation development and could potentially suffer environmental degradation from untreated solid and liquid waste, and land-clearing activities. Effluents from oil palm-related activities, if uncontrolled, could result in pollution of the water flowing into the streams and rivers within the Ramsar site and have a negative impact on aquatic and marine life. Plantation workers may encroach into the site to exploit its natural resources. Land clearing for the establishment of new plantations greatly increases the risk of fire.

Effluents from aquaculture operations (e.g. fertilizer and pesticide/herbicide run-off) and settlements (liquid and solid waste) could have a negative impact on the water quality within the Ramsar site.

Eco-tourism is a rapidly growing industry in the lower Kinabatangan area. If uncontrolled, tourism-related infrastructure development could result in negative impacts on the natural habitats and resources of the site.

The invasive water-fern *Salvinia molesta* has become established in several oxbow lakes in the Kinabatangan catchment. As the plant has high tolerance for salinity, it may be transported along the waterways downstream and become established within the Ramsar site. There are unconfirmed reports of *Salvinia* occurring in the oxbow lakes around Kampung Abai, which is located just outside the boundary of the Ramsar site.

27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

(Sabah) Forest Enactment 1968, comprising Class V (mangrove forest reserve) and Class VII (wildlife reserve). All three sites were gazetted as Forest Reserves on 14 March 1984.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia; Ib; II; **III**; **IV**; V; **VI**

c) Does an officially approved management plan exist; and is it being implemented?:

No.

d) Describe any other current management practices:

The Sabah Shoreline Management Plan (2005) establishes a clear framework of strategic guidelines and sustainable policies for effective management of the State's shorelines. Under the plan, the Ramsar Site is located entirely within an Environmental Protection and Conservation Zone, with a number of strategies defined for its management.

The Sabah Development Corridor (SDC) was launched by the Honorable Prime Minister of Malaysia in 2008. The main aim of the SDC Blueprint is to enhance the quality of life of the people by accelerating economic growth, promoting regional balance and bridging the rural-urban divide while ensuring sustainable development via environmental conservation. The Ramsar site is located within the "Sabah Biodiversity Conservation Zone" in the eastern sub-region of the SDC.

The site lies within WWF's Sulu-Sulawesi Marine Ecoregion (SSME). Since 1999, WWF (through their offices in Malaysia, Indonesia and the Philippines) has worked to develop a comprehensive conservation management plan for the SSME. In February 2004 at the COP7 of the Convention on Biological Diversity (CBD) in Kuala Lumpur, the Environment Ministers of the three countries signed a Memorandum of Understanding that adopted the SSME as a regional, inter-governmental programme. The Ramsar site overlaps with one of the three Priority Conservation Areas (PCA) identified in the Malaysian portion of the SSME. The SSME has also been named a flagship programme under the Brunei Indonesia Malaysia Philippines - East ASEAN Growth Area (BIMP-EAGA) partnership.

Under the Ninth Malaysian Plan (2006 – 2010), the Mangrove Sustainable Management project is being undertaken by the SFD; all mangrove reserve areas including those within the site are being inventoried, and management plans for these areas will progressively be prepared.

28. Conservation measures proposed but not yet implemented:

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

The Town and Regional Planning Department (TRPD) has prepared the Integrated Coastal Zone Management Plan (ICZM), which amongst others, has identified the coastal line of lower Kinabatangan for designation as a conservation area.

The development of a management plan for the Lower Kinabatangan-Segama Wetlands is scheduled to commence in November 2008 under the Phase II of the Bornean Biodiversity & Ecosystems Conservation (BBEC) Programme, which is a joint effort by the State Government of Sabah, Federal Government of Malaysia and Japan International Cooperation Agency (JICA). The BBEC programme began in October 2007 and will end in September 2012. The management plan will be prepared using a participatory approach, involving various agencies and stakeholders including the district offices, Forestry, Wildlife and Fisheries departments, and University of Malaysia Sabah, and will be coordinated by the Sabah Biodiversity Centre. The management plan will include a component on activities to promote education and public awareness about the importance of wetlands and mangroves.

29. Current scientific research and facilities:
e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

An inventory of the mangrove forests in the area is being undertaken by the Sabah Forestry Department as part of the Mangrove Sustainable Management project.

The Danau Girang Field Centre, a collaborative research and training facility located in the Lower Kinabatangan Wildlife Sanctuary, and managed by Cardiff University and the Sabah Wildlife Department, conducts biodiversity research and provides training in tropical biodiversity assessment.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:
e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Although there are no current CEPA activities within the site, there are numerous NGOs organizing wetland-related CEPA activities in the vicinity of the site.

i. World Wide Fund for Nature (WWF) – generally in the Kinabatangan area
ii. HUTAN (French NGO) – Kg. Sukau (Sukau village) along the Kinabatangan River
iii. Rainforest Discovery Centre (RDC), Sabah Forestry Department – at Sandakan
iv. KOPEL (Community Ecotourism Co-operative of the Batu Puteh Community, Lower Kinabatangan River) – based at Kg. Batu Putih along the lower Kinabatangan River

Additionally, the Kota Kinabalu Wetland Centre in the state capital Kota Kinabalu, which is managed by the NGO Sabah Wetlands Conservation Society, provides wetland educational and recreational programmes for students and the general public.

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

At least two private companies run daily wildlife boat cruises in the area. The journey starts from Sandakan, passes through the site and proceeds to Sukau, which lies upstream of the site along the Kinabatangan River. Its proximity to the city of Sandakan, the second-largest city in Sabah renders it of high potential value for tourism, education and recreation.

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

The Lower Kinabatangan-Segama Wetlands is owned by the state government of Sabah, and wholly managed and administered by the Sabah Forestry Department.

33. 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.

Director
Sabah Forestry Department
KM 10, Labuk Road
Locked Bag 68
90009 Sandakan, Sabah
Malaysia
Tel: (089) 660811, 660125, 660824
Fax: (089) 669170
Email: htan@sabah.gov.my

34. Bibliographical references:
Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

Acres, B.D., RP Bower, P.A. Burrough, C.J. Folland, M.S. Kalsi, P. Thomas and P.S. Wright. (1975). The Soils of Sabah (Volume 2), Land Resource Study No. 20. Land Resource Division, ODM, London.

Anon. (2007). 4th Sumatran Rhino Conservation Workshop. A workshop organized by the Sabah Wildlife Department with collaboration from the SOS Rhino, WWF-Malaysia and Universiti Malaysia Sabah. Kota Kinabalu. Unpublished.

Banks, E. (1931). A popular account of the mammals of Borneo. J. Malay. Bran. Roy. Asia Soc., 9:1-139.

Beasley, I and T.A. Jefferson. (1997). Marine mammals of Borneo: a preliminary checklist. Sarawak Mus. J., 51:193-210.

Beasley. I. (1998). Research on the Irrawaddy dolphin (*Orcaella brevirostris*) in East Malaysia. Unpublished report submitted to Ocean Park Conservation Foundation.

Boonratana, R. (2000). A Study of the Vegetation of the Forests in the Lower Kinabatangan Region, Sabah, Malaysia. Malayan Nature Journal 54: 271-288.

Dolar, M.L.L., A.A. Yaptinchay, S.A.B. Jaaman, M.S. Santos, S.B.S. Muhamad, W.F. Perrin and M.N.R. Alava. (1997). Preliminary investigations of marine mammal distribution, abundance and interactions with humans southern Sulu Sea. Asian Marine Biology 14: 61-81

Fernando, P.J., Vidya, T.N.C., Payne, J., Stuewe, M., Davidson, G., Alfred, R.J., Andau, P., Bosi, E., Kilbourn, A., and Melnick, D.J. (2003). DNA analysis indicates that Asian Elephants are native to Borneo and are therefore a high priority for conservation. *PLos Biology* 1: 1 – 6.

Forestry Department Sabah. (2005). Preferred Check-list of Sabah trees.

Fox, J.E.D. (1972). The Natural Vegetation of Sabah and Natural Regeneration of Dipterocarp Forests. Ph.D. thesis, University College of North Wales, Bangor, U.K.

Jaaman, S.A., E. Tangon and R. Lim. (2000). An Investigation of Marine Mammals in the Bay of Sandakan and Labuk, East Coast of Sabah. Proceedings of the Malaysian Science and Technology Congress 2000, 18-20 September 2000, Kota Kinabalu, Sabah.

Malim, T.P., Andau, M. and Ambu, L.N. (1998). The elephant population of Sabah, Malaysia – status and current strategies for conservation. Paper presented in the Hokkaido International Symposium on Long-term Ecological Research, Land-use and Biodiversity of Changing Environments: Several studies in southeast Asia. Unpublished.

Payne, J. (1985). Kulamba Wildlife Reserve Survey Report and Management Recommendations. Report to the Wildlife Section, Sabah Forest Department. Project MYS 62/84. Kuala Lumpur: WWF Malaysia.

Payne, J. (2006). Master list of Sabah protected areas: Recommended list with background discussion & justification. WWF Malaysia.

Prudente, C. and G. Balamurugan. (1999). Sungai Kinabatangan "Partners for Wetlands" Project: A Partnership for Sustainable Development and Conservation. *Sabah Society Journal* 16: 41-56.

Sabah Wildlife Department. (2006). Orang-utan Sabah State Action Plan. Unpublished.

Sebastian, A.C. (1999) Human-Wildlife Conflict in the Proposed Kinabatangan Wildlife Sanctuary, Sabah. (An Evaluation of the Issues and Recommendations for Management). Aonyx Environmental Services.

Sharma, D. (1992). A Wildlife Survey of the Proposed Kinabatangan Park, Sabah. Project 3880 & MYS 196/91. Kuala Lumpur: WWF Malaysia.

Sheldon, F.H., R.G. Moyle and J. Kennard. (2001). Ornithology of Sabah: History, Gazetteer, Annotated Checklist, and Bibliography. *Ornithological Monographs* 52: 1-285.

Udvardy, M.D.F. (1975). A classification of the biogeographical provinces of the world. Occasional Paper No. 18. IUCN, Morges, Switzerland.

Universiti Malaysia Sabah. (2003). Lower Kinabatangan Scientific Expedition 2002. Maryati Mohamed, A. Takano, B. Goossens and Rajah Indran (eds). Published by Universiti Malaysia Sabah, 164pp.

Universiti Malaysia Sabah. (2006). Lower Segama Scientific Expedition. Maryati Mohamed, H. Bernard, Sofian Abu Bakar, and R. Matsunaga (eds). Published by Universiti Malaysia Sabah, 186pp.

Watson, J.G. (1928). Mangrove forests of the Malay Peninsula. Malayan Forest Records No. 6. Forest Department, Federated Malay States, Kuala Lumpur.

World Wide Fund Malaysia and Sabah Forest Department. (1985). Kulamba Wildlife Reserve. Kuala Lumpur. Unpublished.

Yeap, C.A., A.C. Sebastian and G.W.H. Davidson (compilers). (2007). Directory of Important Bird Areas in Malaysia: key sites for conservation. Malaysian Nature Society. (MNS Conservation Publication No.8)

Annex 2: List of fish and prawn species found in the Lower Kinabatangan-Segama Wetlands Ramsar site

(Species listed in the following table are not listed in the Red List of IUCN or CITES Appendix)

Fish:

Vernacular Name	Scientific Name	Family Name	Remark
Local names: Sinsilud, Belud	*Anguilla malgumora* Synonym: *Anguilla borneensis*	Anguilliadae	Has high commercial value as food fish
Spotted Sea Catfish	*Arius maculatus*	Arridae	
Beardless Sea Catfish	*Batrachocephalus mino*		
Local name: Leleh kembang	*Clarias teysmanni*	Claridae	Has high commercial value as food fish
Local names: Cemperas, Kemperas, Tempua	*Cyclocheilichthys repasson*	Cyprinidae	
	Labiobarbus sabanus Synonym: *Dangila sabana*	Cyprinidae	Known only from the type locality, the Kinabatangan and Segama river basins in Sabah
Carp; Local name: Sebarau	*Hampala macrolepidota*	Cyprinidae	
Chela	*Chela sp.*	Cyprinidae	
	Leptobarbus hosii	Cyprinidae	Distribution: northern Borneo
	Leptobarbus melanotaenia	Cyprinidae	
	Nematabramis everetti	Cyprinidae	Has commercial value as ornamental fish
	Puntius bramoides	Cyprinidae	Has high commercial value as food fish
Local names: bulu-bulu, temelian	*Puntius bulu*	Cyprinidae	Has high commercial value as food fish
Local name: Turungau	*Puntius sealei*	Cyprinidae	Has high commercial value as food fish
	Rasbora hubbsi	Cyprinidae	Has commercial value as ornamental fish
Silver Rasbora	*Rasbora myersi*	Cyprinidae	Has commercial value as ornamental fish
Local name: Seluang	*Rasbora sumatrana*	Cyprinidae	Has commercial value as ornamental fish
Local names: Batduan, Tunjungan	*Garra borneensis*	Cyprinidae	
Halfbeak	*Dermogenys pusillus*	Hemiramphidae	
Tank Goby	*Glossogobius giuris*	Gobiidae	
	Kryptopterus parvanalis	Siluridae	Distribution: northeastern Borneo
Catfish	*Leiocassis sp.*	Bagridae	
Catfish; Local name: Baung	*Mystus nemurus*	Bagridae	Has commercial value as food fish
Catfish	*Mystus sabanus*	Bagridae	Has commercial value as food fish
	Ompok sabanus	Siluridae	
Black Snakehead	*Ophiocephalus melanosoma*	Ophicephalidae	
	Osphronemus goramy	Ophicephalidae	Has high commercial value as ornamental fish

Marbled Sleeper Goby	*Oxyeleotris marmorata*	Eleotridae	Has high commercial value as food fish
	Pangasius macronema	Pangasiidae	Has high commercial value as food fish
	Pangasius nieuwenhuisii	Pangasiidae	Has high commercial value as food fish
	Pangasius tubbi	Pangasiidae	Has high commercial value as food fish
Dusky-hairfin anchovy; Local name: Bersia	*Setipinna melanochir*	Engraulidae	
Archerfish	*Toxotes chatareus*	Toxotidae	
Blue Gourami	*Trichogaster trichopterus*	Anabantide	Has commercial value as ornamental fish

Prawn:

Vernacular Name	Scientific Name	Remark
Giant freshwater prawn	*Macrobrachium rosenbergii*	Has high commercial value as food fish

Annex 3: List of noteworthy flora species found in the Lower Kinabatangan-Segama Wetlands Ramsar site

(Key: FR = Forest Reserve; CR = Critically endangered; En = Endangered; Vu = Vulnerable; LR = Lower risk)

Scientific Name	Family Name	IUCN Status	CITES Status	Remark
Aegiceras corniculatum	Myrsinaceae			
Ardisia macrocalyx	Myrsinaceae			Kuala Segama
Asclepias curassavica	Asclepiadaceae			Kuala Meruap Mangrove FR
Aquilaria malaccensis	Thymelaeaceae	Vu	Appendix II	
Avicennia alba	Avicenniaceae			
Avicennia marina	Avicenniaceae			
Avicennia officinalis	Avicenniaceae			
Barringtonia pterita	Lecythidaceae			Kuala Segama
Blumea balsamifera	Compositae			Kuala Meruap Mangrove FR
Bruguiera gymnorrhiza	Rhizophoraceae			Young shoot eaten by proboscis monkey
Bruguiera parviflora	Rhizophoraceae			Kuala Meruap Mangrove FR
Bruguiera sexangula	Rhizophoraceae			
Caesalpinia bonduc	Leguminosae			Kuala Meruap Mangrove FR
Cassia tora	Leguminosae			Kuala Meruap Mangrove FR
Casuarina equisetifolia	Casuarinaceae			Kulamba
Centrosema pubescens	Leguminosae			Kuala Meruap Mangrove FR
Cerbera manghas	Apocynaceae			Kulamba Wildlife Sanctuary
Cerbera odollam	Apocynaceae			
Ceriops decandra	Rhizophoraceae			
Ceriops tagal	Rhizophoraceae			Kuala Meruap Mangrove FR
Cratoxylum formosum	Guttiferae	LR		Kuala Segama
Crotalaria pallida	Leguminosae			Kuala Meruap Mangrove FR
Cynometra inaequifolia	Leguminosae	Vu		
Cyperus javanicus	Cyperaceae			Kuala Segama & Kuala Meruap Mangrove FR
Daemonorops fissa	Palmae			Kuala Segama
Dalbergia sp.	Leguminosae			Terusan Kinabatangan

Derris elegans	Leguminosae			Kuala Meruap Mangrove FR
Dipterocarpus validus	Dipterocarpaceae	CR		Kuala Segama
Dryobalanops beccarii	Dipterocarpaceae	En		Kuala Segama
Erythroxylum cuneatum forma *cuneatum*	Erythroxylaceae			Kuala Meruap Mangrove FR
Euonymus castaneifolius	Celastraceae			Kuala Segama
Excoecaria agallocha	Euphorbiaceae			Kulamba
Fagraea splendens	Loganiaceae			Kuala Segama
Ficus globosa	Moraceae			Kuala Segama
Ficus variegata	Moraceae			Kuala Segama
Flagellaria indica	Flagellariaceae			Kuala Segama & Kuala Meruap Mangrove FR
Garcinia forbesii	Clusiaceae			Kuala Meruap
Hedyotis cf. pulchella	Rubiaceae			Kuala Meruap Mangrove FR
Heritiera littoralis	Sterculiaceae			
Hibiscus tiliaceus	Malvaceae			
Hopea wyatt-smithii	Dipterocarpaceae	CR		Kuala Segama
Hydnophytum sp.	Rubiaceae			Kuala Segama
Intsia bijuga	Leguminosae	Vu		
Jackiopsis ornata	Rubiaceae			Kuala Segama
Lophopetalum multinervium	Celastraceae			
Lumnitzera littorea	Combretaceae			
Lumnitzera racemosa	Combretaceae			
Magnolia gigantifolia	Magnoliaceae			Kuala Segama
Neouvaria acuminatissima	Annonaceae			Kuala Segama
Nypa fruticans	Palmae			Flowers eaten by proboscis monkey
Polyalthia sp.	Annonaceae			Kuala Segama
Polyosma mutabilis	Escalloniaceae			Kulamba Wildlife Sanctuary
Pongamia pinnata	Leguminosae			Kulamba Wildlife Sanctuary
Rhizophora apiculata	Rhizophoraceae	LR		Kuala Meruap Mangrove FR; young shoot eaten by proboscis monkey
Rhizophora mucronata	Rhizophoraceae			Kuala Meruap Mangrove FR
Scaevola sericea	Goodeniaceae			Kulamba Wildlife Sanctuary
Scurrula ferruginea	Loranthaceae			Kuala Meruap Mangrove FR
Scyphiphora hydrophyllacea	Rubiaceae			
Shorea leprosula	Dipterocarpaceae	En		
Sonneratia alba	Lythraceae			
Sonneratia caseolaris	Lythraceae			Fireflies perch on branches/leaves.
Symplocos celastrifolia	Symplocaceae			Kulamba Wildlife Sanctuary
Terminalia copelandii	Combretaceae			Kuala Segama
Thespesia populnea	Malvaceae			Kulamba
Vitex trifoliata	Verbenaceae			Kulamba
Xylocarpus granatum	Meliaceae			

Annex 4: List of noteworthy fauna species found in the Lower Kinabatangan-Segama Wetlands Ramsar site

(Key: CR = Critically endangered; En = Endangered; Vu = Vulnerable; NT = Near-threatened; LC = Least concern; LR = Lower risk; DD = Data deficient)

Birds:

Vernacular Name	Scientific Name	IUCN Status	CITES Status	CMS* Status	Remark
Lesser Adjutant	*Leptoptilos javanicus*	Vu			
Oriental Darter	*Anhinga melanogaster*	NT			Sabah last stronghold in Malaysia
Chinese Egret	*Egretta eulophotes*	VU		Appendix I	
Storm's Stork	*Ciconia stormi*	En			2nd most endangered stork in the world, the Kinabatangan area represents a stronghold in Malaysia
Rhinoceros Hornbill	*Buceros rhinoceros*	NT			
Wrinkled Hornbill	*Rhyticeros corrugatus*				
Black Hornbill	*Anthracoceros malayanus*				
Cinnamon-headed Green Pigeon	*Treron fulvicollis*	NT			

* CMS: Convention on Migratory Species

Reptiles and Amphibians:

Vernacular Name	Scientific Name	IUCN Status	CITES Status	Remark
Cat Snake	*Boiga dendrophilla*			Common, Protected under State law
Estuarine Crocodile	*Crocodylus porosus*	LC		
False Gharial	*Tomistoma schelgeli*	En	Appendix 1	
Crested Toad	*Bufo divergens*			Endemic to Borneo
Brown Bullfrog	*Kaloula baleata*			
Mangrove Frog	*Fejervarya cancrivora*			
Grass Frog	*Fejervarya limnocharis*			
Hose's Bush Frog	*Philautus hosii*			Endemic to Borneo
Collett's Tree Frog	*Polypedates colletti*			
Four-lined Tree Frog	*Polypedates leucomystax*			
Dark-eared Tree Frog	*Polypedates macrotis*			
Frilled Tree Frog	*Rhacophorus appendiculatus*			