# Information Sheet on Flyway Network Sites

**Notes for compilers:**

The management body intending to nominate a site for inclusion in the East Asian - Australasian Flyway Site Network is requested to complete a Site Information Sheet. The Site Information Sheet will provide the basic information of the site and detail how the site meets the criteria for inclusion in the Flyway Site Network.

The Site Information Sheet has been divided into two sections. Part 1 (Section 1-14) seeks basic information on the site and it is essential that it be completed. Part 2 seeks additional information and is optional.

The Site Information Sheet is based on the Ramsar Information Sheet. If the site proposed for the Flyway Site Network is an existing Ramsar site then the documentation process can be simplified. In this case the National Government Partner need only send a copy of the existing sheets with additional details on Question 1 and 10 of the Flyway Site Information Sheet.

Once completed, the Site Information Sheet (and accompanying map(s)) should be submitted to the Flyway Partnership Secretariat. Compilers should provide an electronic (MS Word) copy of the Information Sheet and, where possible, digital copies of all maps.

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## Part 1: Essential Information

### 1. Name and contact details of the compiler of this form:

The full name, institution/agency, and address of the person(s) who compiled the SIS, together with any telephone and fax numbers and e-mail address.

i. **Dr. Tapan Kumar Dey**
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## 2. Date this sheet was completed:

The date on which the SIS was completed (or updated).

15 May 2011

## 3. Country:

The official (short) version of the country name.

Bangladesh
(The Peoples Republic of Bangladesh)

## 4. Name of the Flyway Network site:

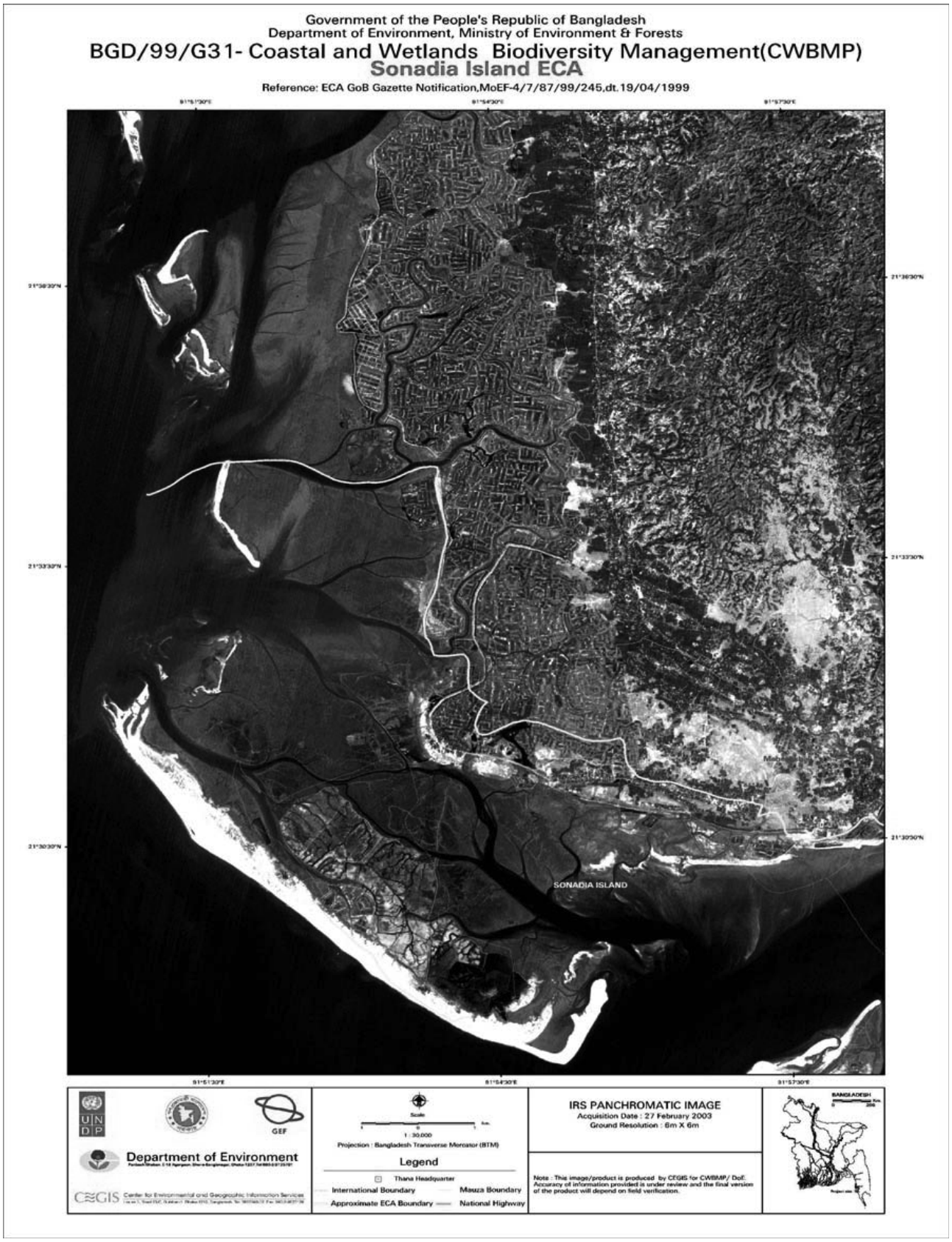
The precise name of the designated site in the national language and English. This name will be used precisely as given on the Site certificate. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Sonadia

## 5. Map of site:

The most up-to-date available and suitable map of the wetland should be appended to the SIS (in hardcopy and, if possible, also in digital format). The map must clearly show the boundary of the site.


**The current site boundary is shown below: the site is that part lying south of the yellow line.**


Government of the People's Republic of Bangladesh
Department of Environment, Ministry of Environment & Forests
BGD/99/G31- Coastal and Wetlands Biodiversity Management(CWBMP)
Sonadia Island ECA
Reference: ECA GoB Gazette Notification,MoEF-4/7/87/99/245,dt.19/04/1999
SONADIA ISLAND
Department of Environment
GEF
CEGIS
Scale
1 : 30,000
Projection : Bangladesh Transverse Mercator (BTM)
Legend
Thana Headquarter
International Boundary
Mauza Boundary
Approximate ECA Boundary
National Highway
IRS PANCHROMATIC IMAGE
Acquisition Date : 27 February 2003
Ground Resolution : 6m X 6m
Note : This image/product is produced by CEGIS for CWBMP/ DoE. Accuracy of information provided is under review and the final version of the product will depend on field verification.
BANGLADESH

**6. Geographical coordinates** (latitude/longitude, in decimal degrees):

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.

**Sonadia Island is a part of the Moheskhali upazila located between 21°28'26.92"N, 91°55'53.74"E and 21°32'49.47"N, 91°50'38.45"E.**

**(Source- Bangladesh's proposed deep-sea port at Sonadia Island by Zahirul Islam, MarineLife Alliance and CWBMP-DoE)**

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

**1-4 meter above sea level (Source-CWBMP/The Socio-Economic Survey December 1998)**

**8. Area:**

The total area of the site, in hectares. If the areas of discrete site units are known, please also list each of these together with the names (or labels) used to identify and differentiate these units.

**4,924 ha (Source-Project Document, CWBMP)**

**9. General overview of the site:**

A brief summary of the site (limited to not more than two sentences), mentioning principal physical and ecological functions, and its importance for migratory waterbirds.

**Sonadia island supports the last remaining remnant of mangrove forest in south east Bangladesh. In addition to this important mangrove area, the island supports large numbers of sand dune vegetation, waterbirds, rich communities of mollusks and echinoderms and marine turtles.**

**Located in the far south-eastern corner of Bangladesh, the site lies a few kilometres north of Teknaf Peninsula, north-west of Cox's Bazar town. The site includes Sonadia Island (in its entirety) and part of the adjacent Moheshkhali Island (the majority of Ghotivanga Mouza), both of which fall under the Kutubjum Union, Moheshkhali Upazilla. Together these areas are termed the "Sonadia Island ECA". The island is separated from Cox's Bazar by the Moheshkhali Channel and from Moheshkhali Island by the Bodor Khal. This distance substantially changes due to tide. Sonadia is a Mouza under the union of Kutubjom which is one of the 9 unions of Moheshkhali Upazilla under Cox's Bazar District.**

**10. Justification of Flyway Site Network criteria:**

Please provide waterbird count information that demonstrates that the site meets the criteria of the Flyway Site Network (Annex 1). That is:

- it regularly supports > 20 000 migratory waterbirds; or,
- it regularly supports > 1 % of the individuals in a population of one species or subspecies of migratory waterbird; or,
- it supports appreciable numbers of an endangered or vulnerable population of migratory waterbird
- it is a "staging site" supporting > 5 000 waterbirds, or > 0.25% of a population stage at the site.

A listing of the populations of migratory waterbirds covered by the East Asian – Australasian Flyway Partnership and the 1% thresholds is attached (Annex 3).

The "staging site" criterion is particularly difficult to apply and application of this should be discussed with the Secretariat. Also note that some species have several populations that are very difficult to distinguish in the field.

**Consistent detection of globally threatened shorebird species across the course of one winter suggests that the Sonadia Island is an extremely important site for at least three endangered waders, throughout their migration period. Although this Island is not currently recognized as a Wetland of International Importance, it fulfills the following criteria based on waterbirds.:**

**A2**

**Sonadia Island is hosting one critically endangered, one endangered and one vulnerable shorebird: Spoon-billed Sandpiper (CE), Spotted Greenshank (EN), and Great Knot (VU).**

**A6**

**Bird et al. (2010) counted a minimum of 25 Spoon-billed Sandpipers, which represents 6-4% (estimated global population is 400–600 by Zöckler *et al.* (2010)) and 28 Spotted Greenshanks from Sonadia Island, which represent 5.6-2.8% of the global population estimate (500-1000) by Birdlife International (2010).**

**Table 1. Two threatened migratory waterbirds which meet 1% criteria in Sonadia**

| Species | EAAF population | 1% of EAAF population | Peak count (date) | Source |
|---|---|---|---|---|
| Spoon-billed Sandpipers | <3,000 | 10 | 25 (Mar 2010) | Bird et al. (2010) |
| Spotted Greenshank | 500-1,000 | Case basis (possibly 5-10) | 28 (Mar 2010) | Bird et al. (2010) |

**Sonadia Island is of great significance for migratory shorebirds, waterfowl, gulls and terns. It also provides refuge for many resident species such as Small Pratincoles, terns, egrets and herons. Sonadia Island clearly meets two criteria based on threatened species. Here we treat Sonadia as a single site under eight different coastal wetlands, three of which meet 1% criteria (Table 1). Kaladia**

**and Baradia were previously described as international important sites under 1% criteria based on AWC survey in 1991, where no survey was conducted between 2003 and 2007 (Chowdhury et al. in prep., Bird et al. 2010). This Island has been proposed as a Ramsar site in 2007 by the Forest Dept. of Bangladesh.**

## 11. Wetland Types:

List the wetland types present (see Annex 2). List the wetland types in order of their area in the Flyway Network site, starting with the wetland type with the largest area.

**E, I, J, K**

## 12. Jurisdiction:

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

**All wetlands are government property controlled by Ministry of land. On behalf of the Ministry of Land District & Upazilla land administration look after of these water bodies.**

## 13. 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.

**Department of Environment is responsible for ECA Management and Forest Department is responsible for mangrove plantation and wildlife management.**

## 14. Bibliographical references:

A list of key technical references relevant to the wetland, including management plans, major scientific reports, and bibliographies, if such exist. Please list any functional/active Web site addresses dedicated to the site or which prominently feature the site, and include the date that the Web site was most recently updated. When a large body of published material is available about the site, only the most important references need be cited, with priority being given to recent literature containing extensive bibliographies.

1. **Ahmed, M. & Khan, M.A.A. (1981) Studies on the ecology of mangroves of Sonadia Island, Chittagong, Chittagong University Studies, Part II, Vol. 5, 1981.**
2. **Bird, P. J., Lees, A. C., Chowdhury, S. U., Martin, R. & Haque, U. H. (2010) A survey of the Critically Endangered Spoon-billed Sandpiper *Eurynorhynchus pygmeus* in Bangladesh and key future research and conservation recommendations. Forktail 26: 1-8**

3. **Coastal and Wetland Biodiversity Management Project → Conservation Management Plan (CMP) of Sonadia. Website: www.doe-bd.org/cwbmp**
4. **IUCN (2006) 2006 IUCN Red List of Threatened Species. www.iucnredlist.org. Downloaded on 30 June 2006.**
5. **Rashid, S.M.A. and Islam, M.Z. (2005) Review: Conservation and research on marine turtles in Bangladesh. In Shanker, K. and Chowdury, B.C. (eds) Sea Turtles of the Indian Subcontinent, Wildlife Institute of India, Dehradun, India, pp 200-216.**
6. **Sivasubramaniam, K (2003) Protection and Conservation of Coastal Biodiversity and Natural Resources for Sustainable Livelihood and Environmental Security in the Coastal Waters of Bangladesh. GoB/UNDP/FAO Empowerment of Coastal Fishing Communities for Livelihood Security Project, Cox's Bazar, Bangladesh.**
7. **Sorder, S. (2005) Bangladesh Mid-Winter Waterfowl Census, Nature Conservation Committee, Dhaka, Bangladesh.**
8. **Zöckler, C., Syroechkovskiy, E. & Atkinson, P. W. (2010) Rapid and continued population decline in the Spoon-billed Sandpiper *Eurynorhynchus pygmeus* indicates imminent extinction unless conservation action is taken. Bird Conservation International 20: 95-111**
9. **Zöckler, C. (2006) Spoon-billed sandpiper expedition Bangladesh 2006, posted at: http://www.worldtwitch.com/2006_thailand_bird_reports.htm (March 2006).**

# Part 2 – Optional

### 15. 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.

**Climate:**

**The National Conservation Strategy Implementation Project-1 (NCSIP-1) Survey of Fauna (MoEF, 2001b) describes the climate as moist tropical maritime with high rainfall concentrated during the monsoon (usually June-September) and a dry period of 4-5 months. Average annual rainfall for Cox's Bazar for 1987-1996 varied from 2,867 mm to 4,684 mm. The temperature remains high year-round with small seasonal differences – the mean annual maximum and minimum temperatures recorded at Cox's Bazar for 1987-1996 were 30.3ºC – 33.0ºC and 19.3ºC-22.4ºC respectively. Humidity remains relatively high throughout the year, it averaged 79.7% at Cox's Bazar for 1987-1996. From November-February the prevailing winds are from the north-west, from March-May from the south-west and from June-September from the south-east. Access to the site is limited during the rainy season to those times when the channel isn't rough. Ghotivanga may still be reached by road during bad weather.**

**The site is particularly susceptible to cyclones and tidal surges. Cyclonic storms develop in the Bay, generally in April-May and October-November, occasionally coming to shore and causing severe damage to human settlements and vegetation. As a result of climate change, sea level rises of up to 43 cm are expected by 2050 and more frequent and extensive cyclones and tidal effects are expected (Alam, 2003). Historical tidal data for the 22 years to 2005 at the Cox's Bazar coastal station has shown a sea level rise of 7.8 mm/annum, which is many times more than the mean rate of global sea level rises over the past 100 years (MoEF, 2005a).**

**The site is particularly susceptible to cyclones and tidal surges – it is a High Risk calamity area classified as Hazard Class 16 (DoE, nd). As a result of climate change, sea level rises up to 43 cm are expected by 2050 and more frequent and extensive cyclones and tidal effects are expected (Alam, 2003). Historical tidal data for the 22 years to 2005 at the Cox's Bazar coastal station has shown a sea level rise of 7.8mm/annum, which is many times more than the mean rate of global sea level rises over the past 100 years (MoEF, 2005a).**

**Hydrology:**

**The whole site is an estuarine area. The eastern part of the site is fed by freshwater from the Bakkhali River estuary and Moheshkhali Channel, and the western part of the site from the Kuhelia River. There is a lack of freshwater streams on Sonadia Island. The Island has two lagoons; one in the south-eastern corner of approximately 35 ha and one in the north-western corner of approximately two ha. Due to the geologic nature of the Island, rain water accumulates**

in the soil providing a reservoir for drinking water. No information on the hydrology of Ghotivanga became available during the preparation of this plan.

Geology:

While little information regarding the geology of the site has become available during the preparation of this plan, the NSCIP-1 Survey of Fauna (MoEF, 2001b) describes the five main geological formations of the Teknaf Peninsula including the coastal plain, which probably most closely resembles that of the site. The quaternary of the coastal plain is described as a complex of various sediments including old sand beach, old calcareous corals, silty clay, acid-sulphate clays and alluvial deposits.

Soils:

Sonadia Island consists of 30% sandy soil (including sand dunes), 30% sandy loam and 40% muddy soils (the intertidal zone, which is subject to continuous siltation). The depth of mud varies from a few centimetres to a few metres (DoE, 1999). No information on the soils of Ghotivanga came available during the preparation of this plan.

Topography:

Sonadia Island is a gently sloping low-lying barrier island with an altitude range of 0-4 metres (DoE, 1999). Ghotivanga is also low-lying with a similarly low altitude. The extremely low altitude of the site is a very important conservation management consideration as the Island in particular is subject to flooding during tidal surges, and is therefore very vulnerable to sea level rises.

Sand dunes, beaches and sandy shoals:

An intertidal sandy beach and sandy ridge extends for approximately 12.5 km along the length of the western side of Sonadia Island, from north-west to south east. The beach is rich in mollusc shells. Winds and waves are the major forces determining the features of the dunes. Two dune ridges are recognised; one known as "Barchar" and the other, "Moghchar", covering a relatively smaller area. There are also several sand bars/shoals along the upper north-western part of the site (approximately two km in length) and along Ghotivanga's south-eastern coastline, adjacent to the Moheshkhali channel (approximately four km in length, but not continuous). The beaches and shallow shoals surrounding the site provide an excellent staging area and wintering ground for migratory waterfowl and shorebirds, and the sand dunes provide nesting grounds for marine turtles.

Salt marshes and mudflats:

There are several salt marsh and mudflat areas fringed with intertidal grassy vegetation and mangrove saplings. GIS calculations estimated a total mudflat area of 1,175 ha in 1999; the current

**area of mudflat is unknown. The largest undisturbed salt marsh area is in south Sonadia Island; other areas include along the mangrove formations north of Sonadia West village, between Moheshkhali and Sonadia Islands, and along the mangrove formations of Baradia-Vanga canal in Moheshkhali. The mudflats are important habitat for migratory and resident birds and mud crabs.**

**Mangrove:**

**The site supports the last remaining remnant of natural mangrove forest in south-east Bangladesh. The mangroves have developed in a lagoonal coastal setting rather than in a deltaic formation, with salt-tolerant dominant species attributed to the extreme ecological factors of high salt-content soil and water (Ahmed et. al., 1981, in GoB/GEF/UNDP, 1999). The distribution of mangrove within the site is at the sheltered inland part of Sonadia Island and a very narrow intertidal area on the edge of the estuary, covering an area of 332 ha, and at northern Ghotivanga, covering an area of 169 ha , giving a total mangrove area of 500 ha. The mangrove is dominated by the shrubby Aegialitis rotundifolia and consists of seven tree species of which Avicennia spp. and Aegialitis rotundifolia constitute the upper and lower stratum, attaining a maximum height of 3.6 and 2.4 metres respectively (Ahmed & Khan, 1981).The mangroves provide an excellent wintering ground for migratory waterfowl and shorebirds, and nursing and feeding ground for fish and shrimp species.**

**Estuarine and in- and near-shore waters:**

**The site's in- and near-shore waters consist of a number of channels separated by shallow sand bars. The site also has several mangrove-dominated estuarine canals and lagoons, covering a total area of approximately 316 ha. The eastern part of the site is fed by freshwater from the Bak-khali River estuary and Moheshkhali Channel, and the western part of the site from the Kuhelia River. The in- and near-shore waters provide important habitat for the breeding, growth and development of many in- and near-shore fishes and invertebrate species of the north-eastern part of the Bay of Bengal.**

## 16. Physical features of the catchment area:

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

## 17. Hydrological values:

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

## 18. General ecological features:

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

## 19. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy 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 SIS.*

(Please add here the species which do not comes under sec no 14)

## 20. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 10. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the SIS.*

(Please add here the species which do not comes under sec no 14)

**Sonadia Island is of great significance for migratory shorebirds, waterfowl, gulls and terns. It also provides refuge for many resident species such as Small Pratincoles, terns, egrets and herons. Moreover, Sonadia Island is an important nesting ground for both Olive Ridley *(Lepidochelys olivacea)* and Green Turtles *(Chelonia mydas),* both these species are categorized as "Endangered" in the 2006 IUCN Red List of Threatened Species. Three species of endangered cetaceans: Finless Porpoise *(Neophocaena phocaenoides)*, Irrawaddy Dolphin *(Orcaella brevirostris*) and Bottlenose Dolphin *(Tursiops aduncus)* are known to occur in the canals, off shore and near shore areas of Sonadia Island (CWBMP 2006). On 7 March 2010 we saw c.5 Irrawaddy dolphins near Belekardia (N21 31.718 E91 50.973).**

## 21. 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:

**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?

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:

**22. Land tenure/ownership:**

a) within the Flyway Network site:

b) in the surrounding area:

**23. Current land (including water) use:**

a) within the Flyway Network site:

b) in the surroundings/catchment:

**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 Flyway Network site:

b) in the surrounding area:

**25. Conservation measures taken:**

**a)** List national and/or international category and legal status of protected areas, including boundary relationships with the Flyway Network 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.

**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?:

**d)** Describe any other current management practices:

### 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.

### 28. 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.

### 29. Current recreation and tourism:

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

# Annex 1: Criteria for the inclusion of sites in the Flyway Site Network

**(from the Partnership Text)**

To be considered for inclusion in the Flyway Site Network, this Partnership adopts the following criteria:

a. Convention on Wetlands (Ramsar, Iran, 1971) criteria for internationally important sites for migratory waterbirds. That is:

   Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

   Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

   Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

b. The staging criteria as applied under the Asia - Pacific Migratory Waterbird Conservation Strategy. That is:

   i. A staging site should be considered internationally important if it regularly supports 0.25% of individuals in a population of one species or subspecies of waterbirds on migration.

   ii. A staging site should be considered internationally important if it regularly supports 5,000 or more waterbirds at one time during migration.

c. Under exceptional circumstances a site can be nominated if it supports migratory waterbirds at a level or stage of their life cycle important to the maintenance of flyway populations. Justification of such nominations will be considered by the Partnership on a case by case basis.

# Annex 2: Ramsar Classification System for Wetland Type

The codes are based upon the Ramsar Classification System for Wetland Type as approved by Recommendation 4.7 and amended by Resolutions VI.5 and VII.11 of the Conference of the Contracting Parties. The categories listed herein are intended to provide only a very broad framework to aid rapid identification of the main wetland habitats represented at each site.

To assist in identification of the correct Wetland Types to list in section 19 of the RIS, the Secretariat has provided below tabulations for Marine/Coastal Wetlands and Inland Wetlands of some of the characteristics of each Wetland Type.

**Marine/Coastal Wetlands**

A -- **Permanent shallow marine waters** in most cases less than six metres deep at low tide; includes sea bays and straits.

B -- **Marine subtidal aquatic beds**; includes kelp beds, sea-grass beds, tropical marine meadows.

C -- **Coral reefs**.

D -- **Rocky marine shores**; includes rocky offshore islands, sea cliffs.

E -- **Sand, shingle or pebble shores**; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.

F -- **Estuarine waters**; permanent water of estuaries and estuarine systems of deltas.

G -- **Intertidal mud, sand or salt flats**.

H -- **Intertidal marshes**; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.

I -- **Intertidal forested wetlands**; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

J -- **Coastal brackish/saline lagoons**; brackish to saline lagoons with at least one relatively narrow connection to the sea.

K -- **Coastal freshwater lagoons**; includes freshwater delta lagoons.

Zk(a) – **Karst and other subterranean hydrological systems**, marine/coastal

**Inland Wetlands**

L -- **Permanent inland deltas**.

M -- **Permanent rivers/streams/creeks**; includes waterfalls.

N -- **Seasonal/intermittent/irregular rivers/streams/creeks**.

O -- **Permanent freshwater lakes** (over 8 ha); includes large oxbow lakes.

P -- **Seasonal/intermittent freshwater lakes** (over 8 ha); includes floodplain lakes.

Q -- **Permanent saline/brackish/alkaline lakes**.

R -- **Seasonal/intermittent saline/brackish/alkaline lakes and flats**.

Sp -- **Permanent saline/brackish/alkaline marshes/pools**.

Ss -- **Seasonal/intermittent saline/brackish/alkaline marshes/pools**.

Tp -- **Permanent freshwater marshes/pools**; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.

Ts -- **Seasonal/intermittent freshwater marshes/pools on inorganic soils**; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

U -- **Non-forested peatlands**; includes shrub or open bogs, swamps, fens.

Va -- **Alpine wetlands**; includes alpine meadows, temporary waters from snowmelt.

Vt -- **Tundra wetlands**; includes tundra pools, temporary waters from snowmelt.

W -- **Shrub-dominated wetlands**; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.

Xf -- **Freshwater, tree-dominated wetlands**; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.

Xp -- **Forested peatlands**; peatswamp forests.

Y -- **Freshwater springs; oases**.

Zg -- **Geothermal wetlands**

Zk(b) – **Karst and other subterranean hydrological systems**, inland

Note: "**floodplain**" is a broad term used to refer to one or more wetland types, which may include examples from the R, Ss, Ts, W, Xf, Xp, or other wetland types. Some examples of floodplain wetlands are seasonally inundated grassland (including natural wet meadows), shrublands, woodlands and forests. Floodplain wetlands are not listed as a specific wetland type herein.

**Human-made wetlands**

1 -- **Aquaculture** (e.g., fish/shrimp) **ponds**

2 -- **Ponds**; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).

3 -- **Irrigated land**; includes irrigation channels and rice fields.

4 -- **Seasonally flooded agricultural land** (including intensively managed or grazed wet meadow or pasture).

5 -- **Salt exploitation sites**; salt pans, salines, etc.

6 -- **Water storage areas**; reservoirs/barrages/dams/impoundments (generally over 8 ha).

7 -- **Excavations**; gravel/brick/clay pits; borrow pits, mining pools.

8 -- **Wastewater treatment areas**; sewage farms, settling ponds, oxidation basins, etc.

9 -- **Canals and drainage channels, ditches.**

Zk(c) -- **Karst and other subterranean hydrological systems**, human-made