

Information Sheet on Ramsar Wetlands

(RIS) -2006-2008 version

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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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

October 10, 2007

3. Country:

The People's Republic of China

4. Name of the Ramsar site:

Fujian Zhangjiangkou National Mangrove Nature Reserve

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's boundary and area has not changed.

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**

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:

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 proposed wetland has the same boundary as the existing National Mangrove Nature Reserve in Zhangjiangkou, which lies between the Zhangjiang water gate in the west and the Shifan Tower and the county boundary in the east, with the surrounding natural river banks as its boundary.

8. Geographical coordinates (latitude/longitude, in degrees and minutes):

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.

117°21'-117°30'E, 23°53'-23°57'N

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 wetland is located within the estuary of Zhangjiang River in Yunxiao County, Fujian Province. It is 85 km southwest to Xiamen.

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

0 m - 8 m

11. Area: (in hectares)

2,358 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.

Zhangjiangkou National Mangrove Nature Reserve is a type of mangrove marsh reserve, mainly protecting mangrove ecosystems, endangered wildlife, aquaculture genetic resources. The site is located in the estuary of Zhangjiang River, consisting of estuary waters, intertidal forest wetlands (mangrove marshes), tidal flats (intertidal mudflats) and salt marshes. The main wetland type is permanent mangrove marsh which is dominated by mangrove plant species such as *Kandelia candel* (referred as Qiuqie in Chinese), *Aegiceras corniculatum* (referred as Tonghua in Chinese), *Aricennia marina* (referred as Baigurang in Chinese) and *Cyperus malaccensis* (referred as Duanyejiangdu in Chinese), covering about 55% of the total wetland.

Due to the wetland's high productivity, high decomposition and restitution rate, the mangrove community could provide ideal inhabit and foraging habitat for more than 150 bird species and 240 other aquatic animal species. It is also an important aquacultural provenance, especially for razor clam (*Sinonovacula constricta*) (referred as Yicheng in Chinese), about 450 tons of young clam collected annually in the reserve and serve as a major supply source for nearby aquaculture. It is also an essential provenance of many other important economic fish species such as *Clupanodon punctatus* (referred as Banji in Chinese), *Mugil cephalus* (referred as Ziyu in Chinese), *Sparus latus* (referred as Huangqidiao in Chinese) and *Engraulis japonicas* (referred as Ribenti in Chinese).

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.

| | | | | | | | | |
|----------|----------|----------|---|---|---|---|----------|---|
| <u>1</u> | <u>2</u> | <u>3</u> | 4 | 5 | 6 | 7 | <u>8</u> | 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: Mangrove forests in the Zhangjiang estuary play an important role in the resistance of typhoon disaster and maintenance of regional microclimate. The site is the northernmost natural distributed region of mangrove species *Bruguiera gymnorhiza* and *Acanthus ilicifolius*, within which the mangrove forests hold the most flourishing natural communities with the most mangrove species in the north to the tropic. The wetland exhibits representative and typical estuarine ecological features in its biogeographic region.

Criterion 2: 2 critically endangered specie, 3 endangered species, and 2 vulnerable species are recorded in the IUCN Red List (2007).

| Species Latin name | Chinese name | Category in the IUCN Red List | Class of national protected animal | CITES Appendix | CMS Appendix |
|-------------------------------|------------------|-------------------------------|------------------------------------|----------------|--------------|
| <i>Eretmochelys imbricata</i> | Daimao | CR | II | | |
| <i>Dermochelys coriacea</i> | Lengpigui | CR | II | I | |
| <i>Caretta caretta</i> | Xigui | EN | | | |
| <i>Chelonia mydas</i> | Luhaigui | EN | II | | |
| <i>Lepidochelys olivacea</i> | Taipingyangligui | EN | II | | |
| <i>Egretta eulophotes</i> | Huangzuibailu | VU | II | | I |
| <i>Larus saundersi</i> | Heizuiou | VU | | | I |

Criterion 3: The wetland provides habitat for numerous wetland animals. Due to heterogeneity, the biodiversity is considerably rich. There are 224 vascular plant species, of which *Kandelia candel* (referred as Qiuqie in Chinese), *Aegiceras corniculatum* (referred as Tonghua in Chinese), *Aricennia marina* (referred as Baigurang in Chinese) and *Cyperus malaccensis* (referred as Duanyejiangdu in Chinese) are dominant species, 359 wild vertebrate species (154 bird species (*Ardea cinerea* (referred as Canglu in Chinese), *Ardeola bacchus* (referred as Chilu in Chinese) and *Egretta garzetta* (referred as Bailu in Chinese) as representative species), 13 amphibian species such as *Bufo melanostictus* (referred as Heikuangchanchu in Chinese) and *Rana guentheri* (referred as Zhaowa in Chinese), 37 reptile species such as *Chinemys reevesii* (referred as Wugui in Chinese) and *Caretta caretta* (referred as xigui in Chinese), 141 fish species such as *Clupanodom punctatus* (referred as Banji in Chinese), *Mugil cephalus* (referred as Ziyu in Chinese), *Sparus latus* (referred as Huangqidiao in Chinese) and 14 mammal species such as *Mus musculus* (referred as Xiaojiashu in Chinese)) in the site. It is a significant genetic pool for numerous aquacultural resources as well as a hot spot of regional biodiversity.

Criterion 8: The wetland is the feeding ground, genetic source, spawning and breeding place for many important fish species such as *Simonovacula constricta* (referred as Yicheng in Chinese), *Clupanodom punctatus* (referred as Banji in Chinese), *Mugil cephalus* (referred as Ziyu in Chinese), *Sparus latus* (referred as Huangqidiao in Chinese), *Engraulis japonicas* (referred as Ribenti in Chinese), *Solen grandis* (referred as Dazhucheng in Chinese), *Scylla serrata* (referred as Juyuanqingxie in Chinese) and *Oratosquilla kempfi* (referred as Heibankouxiagu in Chinese). More than 70% direct income from the aquaculture of the residents in the neighborhood of the reserve.

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:

South China Region, Sino-India Subrealm, Oriental Realm

b) biogeographic regionalisation scheme (include reference citation):

The Biogeography of Fauna in China (Zhang Rongzu, 1999)

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.

Geology and geomorphology: Zhangjiangkou mangrove wetland lies in the Zhangjiang estuary, southeast of Yunxiao County, Fujian Province, which geologically located in the Minyue granite hill sub-region. The mountains near the site belong to the branch of the southeast extension of the Bopingling Mountains. The topography shows an apparent ladder-like decreasing pattern in elevation from northwest to southeast, which is relatively high in the east, north and west, while wide and flat in the south and center. The matrix in the Zhangjiang estuary is composed of residual deposits and sedimentary deposits in the Quaternary Period, formed by ancient sediment, modern fluvial outwash, marine and aeolian sediment.

Soil: The soil in Zhangjiangkou mangrove wetland originates from sediments of coastal mud and sands, with a depth of more than 2 meters. The soil is composed of fine particles and usually shows semi-fluid status with high water content, lacking of oxygen, showing reduced state and marsh features. The soil in this site has high salinity (generally more than 10‰) and the pH value ranges from 3.5 to 7.5, representing relatively high acidity. Abundant plant relicts, organic matters (4.48% in average) and calcium exist in the soil.

Hydrology: The Zhangjiang River is the main river in Yunxiao County, formed by the confluence of Anhou stream, Mapu stream, Xiahe stream, Heping stream, Nan stream and Huotian stream, and finally flows into Dongshan Gulf in the East Sea. The total river length is 58 km and the catchment area is about 855 km². The annual average runoff is 6.35×10⁸ m³.

Tidal variation: The tidal type is irregular semidiurnal tide, with the mean tidal range of 2.32 m, the highest tide level of 7.7 m and the lowest tide level of 3.03 m.

Water quality: The annual average dissolved oxygen (DO) content is 7.3 mg/L, the annual average active phosphate content is 0.38 μmol/L, the annual average total nitrogen (TN) concentration is 7.25 μmol/dm³, chemical oxygen demand (COD) concentration ranges from 0.58 to 2.31 μmol/L, the range of total suspended matter (TSM) content is 1.9-18.32 mg/L, the average of oil content is 23.3 μg/L, the perennial water quality lies between II and III levels. The water pH

value ranges from 8.02 to 8.45. The water temperature ranges from 14.85 °C to 25.56 °C.

Climate: The site is located in the subtropical maritime monsoon climate zone. Abundant sunshine, heat and water resources lead to warm and humid climate. According to the climatic data from 1960 to 1999, annual average temperature is 21.2 °C, the maximal temperature is 38.1 °C and the minimal temperature is 0.2 °C, the hottest period lies between July and September, the annual precipitation ranges from 2 493.2 to 1 348.4 mm with an average of 1714.5 mm. The precipitation is mostly distributed between April and September. The average annual evaporation capacity is 1718.4 mm, the average annual relative humidity is 79%. The annual average sunshine duration is 2125.1 hours. The annual average fog-day is 7.7 d.

17. Physical features of the catchment area:

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

The catchment covers an area of 855 km², consisting of hills and river alluvial flats with obvious valleys and river channels. The main soil types include red soil and paddy soil. Both sides of the river valleys in the site are lowlands, beyond which are mountains, farmlands, fishing ponds and residential areas. Mountainous areas cover 80% of the region. The forest coverage is 56.7% while farmland coverage is 8% which is dominated by paddy fields. The catchment belongs to the subtropical maritime monsoon climate zone. The forest vegetation belongs to the south subtropical vegetation type.

18. Hydrological values:

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

The Zhangjiangkou mangrove wetland is located within the typhoon-prone area, where there are 150 typhoon events influencing Yunxiao County during 1955-1980 with a frequency of 5.8 per year. The wetland plays important roles in protecting the coastline, alleviating damages of typhoon and purifying water. According to the monitoring results, the water quality in the wetland is at II-III level by China's national water quality classification standard.

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 | <u>F</u> | <u>G</u> | H | <u>I</u> | 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 category | Wetland type in the site | Percentage of extent in the Ramsar site |
|------------------|----------------------------|---|
| F | Estuary water area | 45.0% |
| G | Intertidal mudflats | 42.9% |
| I | Forest wetland of tideland | 12.1% |

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.

Vegetations in the wetland can be categorized into 3 types which are mangrove, costal marsh and coastal arenaceous vegetation. They can be further categorized into 13 formation types and 22 association types. The mangrove plants include 5 families, 6 genus and 6 species, the salt marsh plants include 16 families, 27 genus and 29 species, and the coastal plants include 59 families, 152 genus and 184 species. Because of abundant nutrition in this region, the microbes are rich, including 10 orders, 12 families, 27 genus and 45 species. Compared with terrestrial environment, the amount of soil bacteria in the mangrove forests is greater, and that of Actinomycetes and fungi is less, which is the main feature of the quantitative distribution of soil microorganism in the reserve.

There are many plants such as *Cyperus malaccensis* (referred as Duanyejiangdu in Chinese) growing in the intertidal mudflats. Owing to the abundant benthos, this region is an important feeding ground for birds, and also for fish during the flood tide period. It is critical for aigrets in terms of breeding and inhabiting. Over 3000 individuals of aigret nidificate here, including *Ardeola bacchus* (referred as Chilun in Chinese), *Egretta garzetta* (referred as Bailu in Chinese), *Nycticorax nycticorax* (referred as Yelu in Chinese) and *Bubulcus ibis* (referred as Niubeilu in Chinese). It is also an important breeding and inhabiting place for Passeriformes, including

Sturnus sericeus (referred as Siguangliangniao in Chinese), *Zosterops japonicus* (referred as Anlvxiuyanniao in Chinese) and *Pycnonotus sinensis* (referred as Baitoubei in Chinese).

Due to the high heterogeneity, the estuarine waters are the main habitats for various aquatic animals, especially for the important economic fish such as *Clupanodom punctatus* (referred as Banji in Chinese), *Mugil cephalus* (referred as Ziyu in Chinese), *Sparus latus* (referred as Huangqidiao in Chinese) and *Engraulis japonicas* (referred as Ribenti in Chinese).

21. Noteworthy flora:

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.***

Intertidal mangrove communities in the wetland mainly consist of *Kandelia candel* (referred as Qiuqie in Chinese), *Aegiceras corniculatum* (referred as Tonghua in Chinese), *Aricennia marina* (referred as Baigurang in Chinese), *Bruguiera gymnorrhiza* (referred as Mulan in Chinese), *Acanthus ilicifolius* (referred as Laoshule in Chinese), *Phragmites communis* (referred as Luwei in Chinese), *Phragmites karka* (referred as kakailu in Chinese), *Derris trifoliata* (referred as Yuteng in Chinese), etc., among which *Kandelia candel*, *Aegiceras corniculatum* and *Aricennia marina* are dominant species. There live *Aricennia marina*, *Bruguiera gymnorrhiza* and *Bruguiera gymnorrhiza* forests with continuous and large coverage in the site, which could represent the nature status of mangrove forests in the north margin of the mangrove region, and are of great biogeographic significance.

22. 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.***

In this wetland, there live 359 species of wild vertebrates, including mammals of 4 orders, 9 families and 14 species, birds of 15 orders, 38 families and 154 species, reptiles of 3 orders, 11 families and 37 species, amphibians of 1 order, 5 families and 13 species, and 141 fish species. There are 77 species listed in the Agreement between the Government of P.R. China and Japan for the Protection of Migratory Birds and Their Environment and 41 species listed in the Agreement between the Government of P.R. China and Australia for the Protection of Migratory Birds and Their Environment. Waterfowls are important part in the fauna as a whole.

Within the wetland there are 2 species of national first-class protected wild animals which are *Sousa chinensis* (referred as Zhonghuabaihaitun in Chinese) and *Python molurus bivittatus* (referred as miandianmangshe in Chinese), 19 national second-class protected species such as *Tursiops truncatus* (referred as Kuanwenhaitun in Chinese), *Neophocaena phocaenoides* (referred as Jiangtun in Chinese), *Egretta eulophotes* (referred as Huangzuibailu in Chinese), *Numenius*

borealis (referred as Xiaoshaoyu in Chinese), *Tringa guttifer* (referred as Xiaoqingjiaoyu in Chinese), *Chelonia mydas* (referred as Luhaigui in Chinese), *Caretta caretta* (referred as Xigui in Chinese), *Dermochelys coriacea* (referred as Lengpigui in Chinese), *Lepidochelys olivacea* (referred as Taipingyangligui in Chinese) and *Rana tigrina* (referred as Huwenwa in Chinese). In addition, the wetland is an important economic aquacultural genetic pool within which *Clupanodom punctatus* (referred as Banji in Chinese), *Mugil cephalus* (referred as Ziyu in Chinese), *Sparus latus* (referred as Huangqidiao in Chinese) and *Engraulis japonicus* (referred as Ribenti in Chinese) are economic fish of importance, *Tegillarca granosa* (referred as Nihan in Chinese), *Paphia undulata* (referred as Bowenbafei in Chinese), *Solen gouldii* (referred as Changzhucheng in Chinese), *S. grandis* (referred as Dazhucheng in Chinese), *Sinonovacula constricta* (referred as Yicheng in Chinese), *Ostrea denselamellosa* (referred as Milinmuli in Chinese) are economic mollusk of importance, *Penaeus japonica* (referred as Ribenduixia in Chinese), *Alpheidae distinguendus* (referred as Xianmingguxia in Chinese), *A. japonicus* (referred as Ribenguxia in Chinese) and *Scylla serrata* (referred as Juyuanqingxie in Chinese) are economic crustaceans of importance.

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:

The reserve provides favorable habitats for the benthos and fishes. Abundant aquacultural resources create good conditions for local economic development. For example, *Tegillarca granosa* became a famous product which is sold to many other countries. In the Dongxia town located near the Zhangjiangkou wetland, fishery is the major industry with the annual aquatic production of 35,850 tons. While in Zhuta village the annual aquatic production value from the natural reserve reaches 11.5 million RMB (approximately 1.9 million Swiss Francs), accounting for 73.5% of the total from local agriculture, forestry and fishery.

Biodiversity conservation of the Zhangjiangkou mangrove wetland is the foundation of development which has been widely recognized by local people. Periodically fishing for young individuals of *Sinonovacula constricta* with moderate intensity, as well as breeding adult individuals of *Sinonovacula constricta* and *Tegillarca granosa* in the surrounding swamps have become unique scenery in the wetland. Besides, due to the abundant biological resources and its special geography, the wetland has become a scientific research base of Xiamen University, Beijing Forestry University, Fujian Agriculture and Forestry University and Fujian Academy of Forestry. It is also a destination of ecotourism and environmental education that many people would enjoy.

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:

State ownership. The local government and the nature reserve have the right to use the land.

b) in the surrounding area:

State ownership. The local government and community have the right to use the land.

25. Current land (including water) use:

a) within the Ramsar site:

The whole wetland is under the protection of this national nature reserve.

Core area: About 700 ha. Over 39.2% of this region is covered by mangrove forests. The Land cover types of the rest areas are tidal flats and waters. Owing to the shallow and narrow channels for shipping, human disturbance is rare. The intensity of wetland use by local people is slight, therefore the impact on the birds and other protected wildlife is small. In addition, the scientific researches and monitoring activities are mainly conducted in this region.

Buffer area: About 460 ha. Tidal flats and estuary waters cover 70% of this region within which some mangrove plants and *cyperus malaccensis* are scattered. During the period of low tidal level, fishing activities decrease. While during the period of high tidal level, some site-fishing activities emerge on the inundated tidal flats and water areas.

Experiment area: About 1,200 ha. Eighty percent of the area is estuary waters. It is not only the fishing ground for local villagers, but also important place for the production of *Sinonovacula constricta*. Human activities with moderate intensity produce little impact on reserve. Also, ecotourism, scientific research and education are developed in this region.

b) in the surroundings/catchment:

Surrounding regions are mainly occupied by fishing ponds and farmlands (about 60% of the total area). The main cultivated types include aquacultural species such as *Scylla serrata*, *Tegillarca granosa* and *Clupanodon punctatus*, and crops such as rice and vegetables. Mountainous (about 30% of the total area) areas are mainly cultivated with fruits such as longan and lichee. The downstream areas are mainly utilized by aquaculture.

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 wetland:

The negative factors mainly include diseases, insect pests and biological invasions. There was an outbreak of diseases and pests in *Avicennia marina* which could affect the growth to some extent. The invasion of *Spartina alterniflora* in the wetland is in a relatively slight degree now, but might produce some impacts on the wetland as well as the natural growth of the mangrove.

b) in the surrounding area:

Due to the demand of aquaculture for land, the aquacultural expansion would occupy some natural wetlands, thus produce impacts on the integrality of the wetlands.

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.

Mangrove Nature Reserve in Zhangjiangkou was established in 1992, promoted to provincial nature reserve in 1997 (area: 1,300 ha) and national nature reserve in 2003 (area: 2,360 ha).

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?

Master Plan of Zhangjiangkou National Mangrove Nature Reserve and *First-Stage Preliminary Construction Design of Zhangjiangkou National Mangrove Nature Reserve* have been approved by the State Forestry Administration and implemented in September 2007.

d) Describe any other current management practices:

According to *Regulations of the People's Republic of China on Nature Reserves* (1994), *Management Measure of Nature Reserve for Forest and Wild Animals of the People's Republic of China* (1985), *Law of the People's Republic of China on the Protection of Wildlife* (1988), *Management Rules of Natural Reserve on Forest and Wildlife of Fujian Province* (1995), *Notice on Intensifying Wetland Protection and Management* (by the General Office of Fujian Provincial Government) and other related laws and regulations, exploitations of wetland resources are restrained and animal hunting is forbidden within the site. Moreover, monitoring on the natural

resources in the wetland is implemented.

Through the alliance with Hongkong MaiPo Nature Reserve, advanced management ideas and technologies were introduced into the reserve. A committee was set up to held regular meetings through which assistant administrations as well as community residents expressed their advices and opinions. Thus, community cooperating management of the natural reserve is realized. Projects on sustainable use of wetland resources and technical trainings of substitution industry were actively implemented to reduce the social and economic pressure by the exploitation of wetlands. Also, the experiments on ecological breeding were conducted to reduce the impacts on the wetland from the traditional disinfection approaches

28. Conservation measures proposed but not yet implemented:

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

None.

29. Current scientific research and facilities:

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

Scientific research programs: “Comprehensive Scientific Investigation for National Mangrove Nature Reserve in Zhangjiangkou” by Professor Peng Lin of Xiamen University was completed successfully in 2001. “Research on Mangrove Pest Control Technology” by the nature reserve in collaboration with Professor Jinshui Huang of Fujian Academy of Forestry was carried out since 2003 and completed now. In 2005, many research programs such as “Experiments of Ecological Breeding Mode”, “Investigation on the Dependence of Economic Development of Community Residents on the Nature Reserve” and “Human Impacts on the Nature Reserve”, are being carried out in collaboration with WWF (World Wildlife Fund) Hongkong. Currently, a research project in collaboration with Beijing Forestry University is proposed to the International Tropical Timber Organization (ITTO).

Scientific research facilities: A bird-watching center is established (150 m²). The reserve had signed cooperation agreements with Xiamen University and Beijing Forestry University. Through the cooperation with WWF Hongkong, many equipments and instruments such as telescopes and GPS were purchased. The research facilities are expected to be further improved.

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.

A bird-watching center with an area of 150 m² was established. Local school teachers, students and the public were organized to participate in the environmental education activities. Since January 2007, over 10 propaganda activities were held and totally more than 420 persons have been involved. In addition, the reserve printed over 10,000 “Mangrove Maps”, over 6,000 propaganda booklets and 1,000 posters.

31. Current recreation and tourism:

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

Taking environmental education as the primary aim, the Zhangjiangkou mangrove wetland nature reserve is developing a series of seasonal ecotourism under the condition that the mangrove ecosystems and the waterfowls' habitats are not to be infected. The main contents include bird-watching, wetland scenery, popular science of wetlands and intimately contacting wetlands. At the initial stage of ecotourism currently, the reserve receives about 1,200 visitors in 2006.

32. Jurisdiction:

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

Territorial Jurisdiction: Yunxiao County Government

Functional/sectoral Jurisdiction: Forestry Agency of Fujian Province under the supervisor of State Forestry of Administration

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organization(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.

Management Administration of Zhangjiangkou National Mangrove Nature Reserve, Fujian
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34. Bibliographical references:

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

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- [2] Wu Zhengyi. 1980. *The Vegetation of China*. Beijing: Science Press.
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