Information Sheet on Ramsar Wetlands (RIS)

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

Note for compilers:

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

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

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

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DD MM YY

Designation date | Site Reference Number

2. Date this sheet was completed/updated:

24 October, 2005

3. Country:

JAPAN

4. Name of the Ramsar site:

Akiyoshidai Groundwater System

5. Map of site included:

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

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

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

6. Geographical coordinates (latitude/longitude):

Shuhodo : 34 °13 '48 "N, 131 °18 '10 "E

Akiyoshidai : 34 °15 ' 2 "N, 131 °18 '44 "E

Taishodou : 34 °16 '29 "N, 131 °19 '10 "E

Kagekiyodo : 34 °17 '31 "N, 131 °19 '40 "E

7. General location:

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

Yamaguchi prefecture/ Chugoku region

It is located in Shuho-cho (population: c. 6,400 area: c. 115 sq. km) and Mito-cho (population: c. 6,200, area: c. 130 sq. km), approximately 20 km west-northwest of Yamaguchi City (the capital of Yamaguchi Prefecture, population: c.142,000, area: c. 357 sq. km).

8. Elevation: (average and/or max. & min.)
min.:80m, max.: 425.5m

9. Area: (in hectares) **563 ha**

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

Akiyoshidai is located in the center of Yamaguchi Prefecture and it is one of the largest karst topography in Japan. The groundwater system has formed many under ground caves including Akiyoshido and amazing cave products. Bats and other cavernicoles inhabit in the caves. Also, diverse species of ground water shellfish are found in the ground water.

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

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8

12. Justification for the application of each Criterion listed in 11. above:
Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1: Akiyoshidai is the largest karst tableland in Japan. There are 450 limestone caves including Shuhodo and Taishodo, are developed by rich and complex groundwater systems. These underground caves develop along the groundwater systems producing cave products and also provide habitat for amazing cave living organisms which have retrogressive eyes.

13. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):
Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:
Japan

b) biogeographic regionalisation scheme (include reference citation):
Japan is recognized as single biogeographic region, because Japan is an island country which has unique and rich biota with many endemic species.

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

Geology: limestone
Geomorphology: Karst topography composed of limestone
Soil type: limestone/red soil
Origins: Natural. It was a coral reef during Carboniferous and Permian period. In Upper Permian period, the terrestrial land was formed as the karst topography was elevated by Akiyoshi orogenic activities. Akiyoshidai limestone is oceanic coral reef that moved by the movement of the plate and it became part of Japanese islands as accretionary prism.
Hydrology: The major flow of ground water systems in Akiyoshidai runs from Akago area in the northeast to Koto-gawa river in the west, divided into two major routes: Akiyoshido water system in the south and Taishodo water system in the north. Thousands of small dolines are developed on the tableland and they function as rain water drain. Sometimes an ephemeral lake appears in Kaerimizu uvala that is the only place superterranean stream appears on the tableland and the water drains to Aokage-gawa River through a subterranean river channel. Also, ephemeral lakes sometimes appear in ponors situated at the

upper stream of the Akiyoshidai groundwater system.
Water quality: pH 7.74, Na 4.1ppm, K 0.51ppm, Mg 1.21ppm, Ca 54.7ppm, Sr 0.092ppm, Cl 7.1ppm, alkalinity (HCO_3) 2.58meq/l, NO_3 4.4ppm, SO_4 5.2ppm, PO_4 0.031ppm, SiO_2 5.9ppm
Water level fluctuation, water permanence: A great amount of groundwater flows all year round. Flow volume changes by rainfall. Spring water is observed which is unique to karst.
Climate: Inland climate and annual temperature fluctuation is large. Annual precipitation: 2,025 mm, annual mean temperature: 13.5 degrees Celsius, fluctuation of mean temperature in each month: +2.9-+24.7 degrees Celsius (average of Akiyoshidai from 1979 to 2000), mean temperature in Akiyoshido: +14.0-+16.0 degrees Celsius

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

The huge water system like Akiyoshido water system runs through underground of Akiyoshidai from the ponor in upstream to the mouth of Akiyoshidou cave and has a lot of branch water system, and its catchment area is extremely large. The groundwater level is 80m to 170m above sea level and that has about 100m difference from the average of elevation of Akiyoshidai, so a lot of vertical caves are developed on Akiyoshidai.

Surface area: the catchment area of Akiyoshido water system is estimated 18.5 sq. km and it covers about half of Akiyoshidai. The next largest catchment area is Taishodo water system which covers one-fourth of the entire catchment area. Others are dispersed and divided into small spring waters. It is reported that the catchment area changes by fluctuation of groundwater level caused by heavy rainfalls and huge amount of groundwater flows into Akiyoshido. Within the catchment area of Akiyoshido water system, the human habitation area that consists of houses and rice paddies are located upstream at Akago district which covers about one-sixth of the whole catchment area.
General geology and geomorphological features: The whole Akiyoshidai is composed of block limestone whose calcium carbonate content is high. The limestone layer shows reversed structure and includes well-preserved fossils such as fusulinacean fossils. The discovery of the reversed structure was attracted a great deal of academic attention. Akiyoshidai shows tableland topography and a typical karrenfeld. The plateau is covered with numerous small limestone pinnacles and corrosional small dolines. The place where the small dolines swarmed is named "Umakorobi".
General soil types: Red soil. The soil was formed by impurities residue in limestone, volcanic ash and yellow sand from China and the soil is inherent in Akiyohsidai.
General land use: residential area, agricultural land, forests and grasslands.
Climate: Inland climate and annual temperature fluctuation is large. Annual precipitation: 2,025 mm, annual mean temperature: 13.5 degrees Celsius, fluctuation of mean temperature in each month: +2.9-+24.7 degrees Celsius (average of Akiyoshidai from 1979 to 2000).

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

There are developed joint system and caves in Akiyoshidai and the ground water system is also well-developed. A lot of spring water is observed in the downstream of groundwater from Koto-gasa river to Aokage-gawa river and huge amount of groundwater is produced. At some points, spring water depth is more than 50 m, which indicates the water level fluctuation endemic to karst. Groundwater is well-drained on Akiyoshidai and as the altitude gap between groundwater surface is big, no stagnant water is seen except at Kaerimizu uvala.

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

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

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

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

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

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

The diversity of groundwater shellfish is rich including *Bythinella spp.* and *Akiyoshia spp.*

In Akiyoshido, there are unique organisms endemic to the caves of Akiyoshidai plateau including *Sinella* (*Coecobtya*) *akiyoshiana*, *Allochthoniue* (*Spelaeochthonius) kobayashii akiyoshiensis* and *Rakantrechus etoi etoi*. The caves are the roosting place for six species of cave dwelling bats such as *Rhinolophus ferrumequinum*, *Rhinolophus cornutus* and *Miniopterus fuliginosus*, and their total number is estimated over 20,000.

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

Vascular plant [endangered species (EN)]*1: *Lithospermum offcinale* and 9 other species
[vulnerable species(VU)]*1: *Carex poculisquama* and 27 other species.
[near threatened species(NT)]*1:*Veronica undulate* and 4 other species.

Bryophyte [critically endangered species (CR) + endangered species (EN)]*1: *Cyathophorella hookeriana* and 7 other species.
[vulnerable species(VU)]*1: *Meteorium papillarioides*
[near threatened species(NT)]*1: *Neckeropsis calcicola* and 1 species.

Note: *1 Red List of Threatened Wildlife of Japan. Ministry of the Environment

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

[Terrestrial and freshwater shells]
Akiyoshia uenoi [vulnerable species (VU)*1]

Note: *1 Red List of Threatened Wildlife of Japan. Ministry of the Environment

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

The site has been historically used as meadow. Burning dead grass has been practised from ancient times to keep the grassland from succession and maintain it for human utilization. Ruins of Pre-historical

Jomon period was found on Akiyoshidai but those of later period are seldom found. A small forest called "Chojaga-mori" has been protected as sacred and legend forest. Historically important Naganobori copper mine exists in the vicinity of Akiyoshidai, which is the oldest mine in Japan, and the copper from this mine was used for the giant statue of Buddha in Nara in 7th century.

22. Land tenure/ownership:
(a) within the Ramsar site:
public land (Ministry of the Agriculture, Forestry and Fisheries, Yamaguchi Prefecture, Mito-cho, Akiyoshi-cho): 455 ha.
Private land: 108ha

(b) in the surrounding area:
public land, private land

23. Current land (including water) use:
The land is used for meadow, pastureland and doline tilth. Most of the spring water is used for agriculture and partly used for drinking water.

(a) within the Ramsar site:
No residents. The central area is karst grassland.

(b) in the surroundings/catchments:
Karst grassland is surrounded by forests and fringe poljes. The most typical polje is *Kama* polje which stretches between eastern Akiyoshidai and western Akiyoshidai. Polje is used as paddy fields and also as residential area for many communities. In Sayama polje at Akago district located in the upstream of groundwater, dry rivers and lost valleys are found with no superterranean streams, and most of the area is used as cropland.

24. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:
(a) within the Ramsar site:
None
(b) in the surrounding area:
None

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

Quasi- National park, Class 1 Special Zone: 563 ha (The Natural Parks Law)
*From November 1, 1955

In the special zone, such activities as erecting structures, felling trees, mining minerals, and reclamation require permission from the prefectural governor.

26. Conservation measures proposed but not yet implemented:
e.g. management plan in preparation; official proposal as a legally protected area, etc.

None

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

Scientific researches:
Many researches including geology, paleontology, mammal fossils, speleological biology, botany and hydrology have been conducted as a study field of Japan's limestone natural science. Also, many cavers visit the site for caving.

Akiyoshidai is a resting site for migratory birds and variety of bird species are observed. Seeds of plant that only grow in coastal areas germinate from the bird droppings and grow in fissure of the pinnacles. Plants in the grassland are mainly Gramineae grass and there are uncommon plants that grow only in alkali soil such as *Carex poculisquama* and many rare species such as *Pulsatilla cernua*, *Pulsatilla cernua*, *Asplenium ruta-muraria*.
Many researches have been conducted in above-mentioned areas and the results of geological researches are summarized at Akiyoshi-dai Museum of Natural History. Akiyoshi-dai Museum of Natural History has publicized 40 research reports by now.

Facilities established for research:
Akiyoshi-dai Museum of Natural History

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28. Current conservation education:
e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Management, training and awareness activities are conducted by Akiyoshidai management office.
NGOs including Association of Nature Preservation of Shuho-cho, Association of Friends of Nature in Akiyoshidai, Akiyoshidai Park Volunteers perform various activities.
Other educational information on the site is available at the Akiyoshidai Information Office, Akiyoshido Kurotani Information Office, Akiyoshido Tourists Center.
Trails are developed inside Akiyoshido, and forestry road and nature trails are developed on the tableland.
Just after the World War 2, the site was designated as a candidate site for aerial bombing training ground for the US military but it was avoided by the protest movement. A memorial monument for peace and protection was established at Mt. Tsurugi-yama.

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

There is about 1 km trail for tourists inside the cave and many tourists visit there throughout the year.
A total of 885,023 people visited Akiyoshido and Akiyoshidai in 2003.

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30. Jurisdiction:
Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.
[Territorial]
Ministry of the Agriculture, Forestry and Fisheries (National land)
Yamaguchi Prefecture (prefectural land)
Mito-cho and Shuho-cho (town-owned land)

[Functional]
Ministry of the Environment and Yamaguchi Prefecture (Quasi-National Park)
Yamaguchi Prefecture (Wildlife Protection Area)

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

Chugoku-Shikoku Regional Environment Office, Ministry of the Environment
18-28, Kuwata-cho, Okayama-shi, 700-0984 JAPAN
Tel: +81-86-223-1577
Fax: +81-86-224-2081

32. Bibliographical references:

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

- Kuramoto Tadashi et.al. 2000 "Nature Observation in Akiyoshido" Akiyoshi-dai Museum of Natural History
- Kuramoto Tadashi et.al. 2000 "Three hundred million years in Akiyoshido" Akiyoshi-dai Museum of Natural History
- Kuramoto Tadashi et.al. 1996 "Discover the nature of Akiyoshido, karst tableland and lime stone caves" Akiyoshi-dai Museum of Natural History
- Akiyoshi-dai Museum of Natural History 1995 "Akiyoshido. the History of Exploration "10pp. 6figs. Akiyoshi-dai Museum of Natural History
- Akiyoshi-dai Museum of Natural History 2003 "List of Literature on Geoscience of Akiyoshidai 1903-2002" 96pp. Akiyoshi-dai Museum of Natural History
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- Ministry of the Environment 2002 " Threatened Wildlife of Japan –Red Data Book 2nd ed.- Volume 1, Mammalia"
- Ministry of the Environment 2005 " Threatened Wildlife of Japan –Red Data Book 2nd ed.- Volume 6, Land and Freshwater Mollusks"
- Environment Agency of Japan 2000 "Threatened Wildlife of Japan -Red Data Book 2nd ed. - Volume 8, Vascular Plants
- Environment Agency of Japan 2000 "Threatened Wildlife of Japan -Red Data Book 2nd ed. - Volume 9, Bryophytes, Algae, Lichens, Fungi"
- HEIBONSYA "WILD FLOWERS OF JAPAN HERBACEOUS PLANTS"
- HEIBONSYA "FERNS AND FERN ALLIES OF JAPAN"
- Ministry of the Environment Nature Conservation Bureau 2002 "500 Important Wetlands in Japan"