

Information Sheet on Ramsar Wetlands (RIS)

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Designation date

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Site Reference Number

2. Date this sheet was completed: October 27th, 2005 Revised April 21st 2006

3. Country: Barbados

4. Name of the Ramsar site: Graeme Hall Swamp

5. Map of site included:

a) Hard copy (required for inclusion of site in the Ramsar List): *yes*

b) Digital (electronic) format (optional): *yes*

6. Geographical coordinates: 13°04'06"N, 59°34'39"W

7. General location: On the south coast of Barbados in Worthing, Christ Church. The swamp is located 5km outside of the city limit of the capital Bridgetown. Highway seven (7) is a major road artery which runs parallel to the swamp and is well serviced by public transportation. Local public transportation routes which service the area include Oistins/Speightstown omnibuses and public service vehicles licensed to operate on Route eleven (11) of the transport network.

8. Elevation: The swamp is located at sea level

9. Area: Approximately 33.23 hectares

10. Overview:

Graeme Hall Swamp is an important ecosystem to Barbados and has several unique features. The swamp is connected to the St. Lawrence lagoon and is the last remaining complete ecosystem of its type left in Barbados. It has the largest body of inland water (4.86 ha / 12 acre lake in addition to wetland area) on the island and contains the largest remaining area of red mangrove (*Rhizophora mangle*) and white mangrove (*Laguncularia racemosa*) forest. The swamp ecosystem has been proposed as a Barbados National Heritage Site, and has also been established as one of two Caribbean Coastal Marine Productivity Programme (CARICOMP) monitoring sites in Barbados (Oxenford and Parker 1998).

11. Ramsar Criteria:

1	2	3	4	5	6	7	8
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12. Justification for the application of each Criterion listed in 11. above:

Criterion 1: Graeme Hall Swamp has several unique features. The swamp is the last remaining complete ecosystem of its type left in Barbados and has the largest body of inland water on the island (4.86 ha lake in addition to wetland area). It also contains the largest remaining area of red mangrove

(*Rhizophora mangle*) and white mangrove (*Laguncularia racemosa*) forest. It is the only location on the island where a mangrove forest, a seagrass bed and a shallow nearshore hard coral reef can be found in close proximity to each other.

Criterion 2: The presence of the peregrine falcon (*Falco peregrinus*), listed in CITES Appendix I, has been recorded in the Swamp.

Criterion 4: At least eighty-four (84) bird species have been recorded at the Sanctuary, which is home to the widest diversity of resident and migratory birds on the island, including locally threatened species such as the Caribbean coot (*Fulica caribaea*) and the Yellow warbler (*Dendroica petechia*). The oldest nesting colony for the snowy egret (*Egretta thula*) is at the swamp, as is the first known breeding colony of Little Egret (*Egretta garzetta*) to become established in the Americas.

13. Biogeography

a) Biogeographic Region: Barbados is the most easterly of the islands of the Caribbean and lies in the Atlantic Ocean. As one of the Windward Islands, Barbados has been classified under the FAO Global Ecological Zone (GEZ) as tropical containing the following vegetation types: Tropical rain forest / Windward Islands Moist Forest (TAr), Tropical moist deciduous forest / Windward Islands Dry Forest (TAwa) and scrub ecoregions with Tropical dry forest / Windward Islands Xeric Scrub (TAwb).*

b) Biogeographic Regionalisation Scheme: FRA (2000): Global Ecological Zoning for the Global Forest Resources Assessment 2000 (Final Report). FAO. Rome, 2001. Link: http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/006/ad652e/ad652e00.htm

14. Physical features of the site:

Graeme Hall is historically a naturally created coastal wetland area with mangrove forests. However, the swamp environment was enhanced with the artificial creation of a 12 acre lake and adjoining ponds on the western section of the swamp. The swamp serves as a central drainage point of an 11,000 acre watershed area. In previous times, the mangrove wetland, seagrass bed and shallow nearshore hard coral reef ecosystems interacted with each other to function as one large ecosystem. However, despite the close proximity to each other this interaction is currently negligible. In the western quadrant of the swamp, a shallow, roughly rectangular brackish lake is surrounded by a dense fringe of red and white mangrove stand. A detailed survey shows that the shores of the lake drop rapidly to a depth of 1m or more, except along the northeastern shore, which remains shallow (<0.5m) due to the presence of a deep layer of soft mud. The average depth of the lake is 1.32m and the maximum depth is 2.71m.

15. Physical features of the catchment area:

The physical features of the catchment area are the same as those of the site. The geology of Graeme Hall Swamp can be described as consisting of marine beach and modern dune deposits, characterized by coastal clays specifically of the montmorillonite type. The climate within the swamp is consistent with the general tropical climate of Barbados. The water level within the swamp rises during the rainy season which begins in June and ends in October.

16. Hydrological values:

A hydrology study will be conducted by the Government of Barbados in the near future.

17. Wetland Types

a) Presence:
Marine/coastal:

A	B	C	D	E	F	G	H	I	J	K	Zk(a)
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* When the first European settlers arrived in Barbados in 1627 they found most of the island covered with tropical forests. However, within 30 years about 80% of the forested area had been cleared for agriculture, especially sugarcane. Nowadays tropical forests exist only in isolated portions of the island.

Inland:

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

1	2	3	4	5	6	7	8	9	Zk(c)
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b) **Dominance:** For Graeme Hall the order of dominance is: J > I > Xf > W

18. General ecological features:

Red mangroves dominate much of the lake shoreline, although white mangroves dominate the northeastern shore and are also found in isolated clusters along the southern boundary of the swamp. There are areas in the western section of the swamp that contain brackish water and areas in the eastern section where there is fresh water. A freshwater marsh is located in the eastern quadrant of the swamp, which contains a large stand of mature white mangroves and a network of man-made drainage canals with lotus and water lilies, water lettuce, and filamentous green algae. The banks of the canals support a dense growth of sedges and strips of grassland. The CARICOMP mangrove monitoring site is located in the largest contiguous stand of accessible red mangrove trees, along the eastern shore of the lake. In addition, a wide variety of fish, crustacean, bird and mammalian species inhabit the swamp.

19. Noteworthy flora:

The Red mangrove (*Rhizophora mangle*) and the white mangrove (*Laguncularia racemosa*) stands within Graeme Hall are the largest healthy mangrove stand left on the island. Graeme Hall is the only mangrove ecosystem on the island that contains a substantial number of red mangroves; the other small mangrove stands on the island predominantly consist of white mangroves.

20. Noteworthy fauna:

Significant winter resident migrant birds include osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), black-crowned night heron (*Nycticorax nycticorax*), yellow-crowned night heron (*Nyctanassa violacea*), great white egret (*Egretta alba*), sora rail (*Porzana Carolina*), belted kingfisher (*Ceryle alcyon*), parula warbler (*Parula americana*) and northern waterthrush (*Seiurus noveboracensis*).

Migratory bird species passing down the Eastern Caribbean Flyway and using the sanctuary for a staging point include the spotted sandpiper (*Actitis macularia*), solitary sandpiper (*Tringa solitaria*), upland sandpiper (*Bartramia longicauda*), pectoral sandpiper (*Calidris melanotos*), semipalmated plover (*Charadrius semipalmatus*), american golden plover (*Pluvialis dominica*), black-bellied plover (*Pluvialis squatarola*), hudsonian godwit (*Limosa haemastica*), whimbrel (*Numenius phaeopus*), lesser yellowlegs (*Tringa flavipes*), short-billed dowitcher (*Limnodromus griseus*), stilt sandpiper (*Calidris himantopus*), ruff, grey heron, pied-billed grebe, green-winged teal, blue-winged teal, american wigeon, northern pintail, northern shoveler, peregrine falcon (*Falco peregrinus*) and merlin (*Falco columbarius*).

Additional resident species include important local breeding populations of green-backed heron (*Eulampis holosericeus*), masked duck (*Nomonyx dominicus*), common moorhen (*Gallinula chloropus*), Caribbean coot (*Fulica caribaea*), scaly-napped pigeon (*Columba squamosa*), antillean crested hummingbird (*Orthorhynchus cristatus*), grey kingbird (*Tyrannus dominicensis*), yellow warbler (*Dendroica petechia*), Lesser Antilles elaenia (*Elaenia martinica*), black-whiskered vireo (*Vireo altiloquus*), black-faced grassquit (*Tiaris bicolor*), and Lesser Antilles grackle (*Quiscalus lugubris*), cattle egret (*Bubulcus ibis*), great egret (*Casmerodius albus*), little egret (*Egretta garzetta*), snowy egret (*Egretta thula*), *Anas acuta*, *Anas clypeata*, *Anas crecca* and *Dendrocygna autumnalis*.

Other species include the green monkey (*Chlorocebus aethiops*), mongoose (*Herpestes javanicus*), fisherman bat (*Noctilio leporinus*), several herpetile species, a wide diversity of invertebrate life and aquatic life that includes over twenty (20) of fresh and brackish water fish species such as tarpon, snook, white mullet and the unique killifish (*Rivulus marmoratus*), which is the only vertebrate in the world to fertilize its own eggs. Local biologists consider the main fish species of interest in the swamp to be the marine species that have become isolated from the sea, becoming breeding residents in the lake.

- 21. Social and cultural values:**
Social and cultural values have historically included leisure and fishing (by a small number of individuals). Planned social and cultural activities include eco-tourism, educational field-classroom activities, an environmental demonstration area and a field research site for university studies.
- 22. Land tenure/ownership:**
(a) within the Ramsar site:
The 13.86 ha (34.25 acres) of the western portion of the swamp is privately owned by the Graeme hall Nature Sanctuary. The 19.37 ha (47.86 acres) of the eastern section is owned by the Government of Barbados and is vested in the Barbados Agricultural Development & Marketing Corporation (BADMC). The total acreage of the swamp is 33.23 ha (82.11 acres).
(b) in the surrounding area:
The swamp is surrounded by land that is used for residential, agricultural and commercial purposes.
- 23. Current land (including water) use:**
(a) within the Ramsar site: The western section is currently being operated as a nature reserve and an eco-tourism centre and the eastern section is used to some extent by people for the purpose of leisure and fishing by a small number of individuals. Neither water extraction for irrigation nor hunting occurs in this area.
(b) in the surroundings/catchment: The swamp is surrounded by land that is used for residential, agricultural and commercial purposes.
- 24. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:**
(a) within the Ramsar site:
The swamp ecosystem consists of brackish water and has become isolated from tidal exchange with the sea, mainly due to commercial beach-front development, the construction of a coastal highway, elevation of the south coast shoreline by approximately 50 cm and also as a result of significant sand accretion on the beach. Several historical connections to the sea have been reduced to a single channel that is now controlled by a sluice gate; the effective operation of the sluice gate is however hampered by sand accretion. This has led to a long-term accumulation of nutrients in the swamp water system, as well as poor surface and sub-surface water circulation, low oxygen levels and high bacterial counts.

To date, fishing has been suspended pending a review of the health implications of the water quality concerning the suitability of fish for human consumption. In addition, the fish populations are being assessed for sustainability given the introduction of an aggressive tilapia species into the swamp.
(b) in the surrounding area:
The ecological character of the swamp may also be affected by run off from neighbouring agricultural fields and from the residential and commercial properties that surround this ecosystem.
- 25. Conservation measures taken:**
The western section of the swamp has an environmental assessment programme in place, which has been approved by all of the relevant government regulatory agencies. The assessment programme is being undertaken jointly with the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies Cave Hill Campus and the Graeme Hall nature Sanctuary.
- 26. Conservation measures proposed but not yet implemented:**
The Graeme Hall Swamp has been designated as a proposed national heritage site by the Government of Barbados in the Draft National Physical Development Plan (2003).
- 27. Current scientific research and facilities:**
The privately owned western section of the swamp has an on-going environmental assessment

programme in operation. The programme has two main foci:

- i. A monitoring programme focused on water quality with three main objectives:
 - a. Monitor any changes in water quality in relation to the activities of the Nature Sanctuary;
 - b. Attempt to identify the water quality of source inputs on to sanctuary land; and
 - c. Compare data collection from the Nature Sanctuary with relevant water quality standards for mangrove environments.
- ii. A monitoring programme for the biotic environment, with the following objectives:
 - a. Assess the site biodiversity and census fauna and flora species occurring at the site;
 - b. Establish bio-criteria to monitor the status of biotic populations in the long-term;
 - c. Monitor the status of biotic populations in relation to activities of the Nature Sanctuary, especially the carrying capacity of human visitation.

The eastern section of the swamp has been partially included within the water quality-testing programme being undertaken on the western side, with three sampling sites being situated on the eastern lands. However, the need to expand the water quality testing work on the eastern section of the swamp; to develop a vegetation restoration programme; to conduct a hydrology study and to initiate a study of the biotic communities present in the eastern section of the swamp has been recognized by the Government of Barbados.

28. Current conservation education:

A small area (less than 10%) of the western portion of the swamp has been adapted for public visitation as an education field classroom facility. Support structures include a boardwalk, observation hides, observation deck, information signage, and the provisions of education interpretation materials. The Nature Sanctuary also provides guided tours of the swamp (which is restricted to only certain areas) to organized school groups as a free service and approximately over 2,000 school children each year are taken through the site. In the summer of 2000 a draft education proposal was prepared by the nature Sanctuary and sent to the curriculum office of the Ministry of Education for comment. In 2001, an education project funded by the British High Commission developed a workbook aimed at primary school aged children as a follow-up exercise to re-enforce the environmental information verbally disseminated during the tour. In the latter months of 2002, work began on the preparation of an extended programme of providing an educational work pack to all students visiting the swamp in organized school field trips. A website www.barbadosbirds.com has been created as a local environmental education resource and to provide information to all interested parties.

29. Current recreation and tourism:

The western section of the swamp operates as an eco-tourism nature sanctuary and has been visited by over 3000 tourists and locals alike. The swamp is also used for recreational boating and fishing to a limited extent.

30. Jurisdiction:

This site is jointly owned by the Graeme Hall Nature Sanctuary and the Government of Barbados which has vested the land in the Barbados Agricultural Development and Marketing Corporation (BADMC). The Ministry of Energy and the Environment serves as the Administrative Authority for the site.

31. Management authority:

The Graeme Hall Nature Sanctuary and the BADMC have management responsibility for their portions of the site. The contact details for both owners are as follows:

Mr. Harry Roberts
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Graeme Hall Nature Sanctuary
Worthing, Christ Church
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The contact details for the Administrative Authority is as follows:

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32. Bibliographical references:

Draft National Physical Development Plan (Amended 2003).

FAO (2000): Global Ecological Zoning for the Global Forest Resources Assessment, Rome: http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/006/ad652e/ad652e00.htm

Graeme Hall Nature Sanctuary (2005): www.graemehall.com

Parker, C. and H.A. Oxenford (1998). Barbados. Pp. 177-185. In: UNESCO, CARICOMP - Caribbean coral reef, seagrass, and mangrove sites. Coastal region and small island papers 3, UNESCO, Paris.