Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

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

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

Notes for compilers:

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

2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.

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.

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:

20th march 2012

3. Country: Grenada, West Indies

4. Name of the Ramsar site:

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

Levera Wetland

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 ❑

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

a) Site boundary and area

The Ramsar site boundary and site area are unchanged: ❑

or
If the site boundary has changed:
i) the boundary has been delineated more accurately ❑; or
ii) the boundary has been extended ❑; or
iii) the boundary has been restricted** ❑

and/or

If the site area has changed:
i) the area has been measured more accurately ❑; or
ii) the area has been extended ❑; or
iii) the area has been reduced** ❑

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

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

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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 site corresponds to the boundaries of Levera Pond Protected Area, which extends from the area surrounding the Levera Pond including the Pond and mangroves, across to Levera Beach, the marine areas between Levera Beach and Sugar Loaf Island and Sugar Loaf Island itself.

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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.

12°13'28.85"N, 61°36'36.80"W

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 Levera wetland is located in the north-eastern region of the island of Grenada, adjacent to the Atlantic Ocean and Caribbean Sea. It extends from the area surrounding the Levera Pond including the Pond and mangroves, across to Levera Beach, the marine areas between Levera Beach and Sugar Loaf Island and Sugar Loaf Island itself. The closest administrative town is Sauteurs in the parish of St. Patrick .The LPPA abuts private and public lands where a range of land uses occur.

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

0 (sea level)

11. Area: (in hectares)

518.22 hec

12. General overview of the site:
Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

Levera contains three of the most valued tropical marine ecosystems: mangrove forest and pond, sea grass beds and coral reefs. It has sustainably been used for social, economic and cultural activities by adjacent communities, nearby town of Sauteurs., and the Grenadians generally. It is important for wildlife and turtle nesting. Topographically, the LPPA varies from flat lagoon and beach areas to moderately steep terrain east and west of the pond. In this area of Grenada, the climate is mediated by the constant prevailing northeast trade winds. The annual rainfall is approximately 1500 mm to 2000 mm and the mean annual temperature ranges between 25 °C to 27.5 °C. The region experiences a very long dry season for over five months of the year (JECO Caribbean 2007).

13. Ramsar Criteria:
Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1 •	2 •	3 •	4 •	5 •	6 •	7	8 •	9
(1)	(2)	(3)	(4)	❑	❑	❑	❑	(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:

Deleted: ¶

The site provides a unique representation of an almost pristine ecosystem, including a mangrove swamp, sandy beaches, coral reefs, seagrass beds and an offshore island.
The majority of the land areas adjacent to the Pond drain directly into it and after heavy persistent rainfall, the Pond overflows at its entrance at Levera Beach and discharges into the sea. During these heavy rains, sediment from upland areas wash into the Pond, then out to the sea and finally settles on the underlying sea floor. The merging of the Pond with the sea is a relatively isolated and infrequent occurrence and happens when there is heavy persistent rainfall or during periods of high storm surge. The Pond effectively functions as a natural flood control and desalinating basin, where sediments and other contaminants are removed from storm water.

Criterion 2:

The species of particular note for management purposes are in terms of its vulnerability according to IUCN Red List, are the critically endangered species leatherback turtles (*Dermochelys coriacea*), hawksbill turtles (*Eretmochelys imbricate)*, and elkhorn coral (*acropora palmata*). The site also hosts the endemic Grenada Hook-billed Kite (*Chondrohierax uncinatus mirus),* critically endangered.

Criterion 3:

The site hosts the endemic Grenada Hook-billed Kite (*Chondrohierax uncinatus mirus),* which depends on forest habitats, including wooded freshwater swamps, mangrove swamps. This subspecies of the Hook-billed Kite is listed as Endangered (EN) by the IUCN Red Data List due to its limited range and small population. Its threatened status is most likely due to loss of habitat which impacts availability of food and nesting sites, and human persecution.

Criterion 4:

Approximately 900 nests of the critically endangered (IUCN Red List of Threatened Species) leatherback turtle (*Dermochelys coriacea*) were recorded at Levera Beach in 2007 (F Grenada Department of Fisheries 2008). The critically endangered (IUCN Red List of Threatened Species) hawksbill turtle (*Eretmochelys imbriacta*) is also known to nest at Levera Beach.

The site is a critical area for the survival of the endemic supspecies of the Hook-billed Kite (*Chondrohierax uncinatus mirus).* Smith and Templ, listed threats to the kite population as continuing habitat destruction, depletion of native snail populations through pest control efforts and the introduction of exotic snails, some of which prey on other snails, and shooting, which was legal at the time.

Criterion 9: The site regularly supports at least 1% of the individuals of *Dermochelys coriacea.* It is of particular significance as a nesting site receiving from 200 to 900 nesting activities annually.The Levera Beach records the largest aggregation of nesting leatherback turtles, *Dermochelys coriacea,* in Grenada, with approximately 80-90% of the total leatherback nesting activity for the island taking place there (Grenada Department of Fisheries 2008).

In 1996, Spotila and collaborators provided the most recent global estimation of the world population of this species, compiling published data, unpublished information and personal comments from 28 leatherback nesting sites, estimating that 20,000 to 30,000 adult females existed at that time in the world.

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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:**

The site belongs to the Windward Islands moist forests ecoregion, inside the Caribbean bioregion, The ecoregion is known by its biological richness and diversity.

b) **biogeographic regionalisation scheme** (include reference citation):

World Wide Fund Ecoregions:
Dinerstein, Eric; David Olson; Douglas J. Graham; et al. (1995). *A Conservation Assessment of the Terrestrial Ecoregions of Latin America and the Caribbean.* World Bank, Washington, D.C..

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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.

Topographically, the area varies from flat lagoon and beach areas to moderately steep terrain east and west of the pond. In this area of Grenada, the climate is mediated by the constant prevailing northeast trade winds. The annual rainfall is approximately 1000 and the mean annual temperature ranges between 25 °C to 27.5 °C. The region experiences a very long dry season for over five months of the year.
In the terrestrial zone the Levera Wetland consist of a 23 acres Pond which is a volcanic crater surrounded by bands of red, black and white mangroves and associated Button Wood species and has an outlet to the marine area. The Eastern and Northen boundaries of the mangroves consist of a sandy beach which contains salt-tolerant grasses, herbs, and shrubs, leading up to stabilizing ground cover with species such as *Coccoloba* and *Nickernu*t, *Caesalpinea Bonduc*.

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 Levera Pond is thought to be the in-filled caldera of an ancient volcano. It is a freshwater system surrounded by red (*Rhizophra mangle*), white (*Laguncularia racemosa*), black (*Avicennia germinans*) and buttonwood (*Conocarpus erectus*) mangroves. The water in Levera Pond covers approximately 23 acres. The majority of the land areas adjacent to the Pond drain directly into it and after heavy persistent rainfall, the Pond overflows at its entrance at Levera Beach and discharges into the sea. During these heavy rains, sediment from upland areas wash into the Pond, then out to the sea and finally settles on the underlying sea floor. The merging of the Pond with the sea is a relatively isolated and infrequent occurrence and happens when there is heavy persistent rainfall or during periods of high storm surge.

Levera Beach consists of coarse white sand, is approximately 700 m long and averages between 40 -50 m wide (Grenada Department of Fisheries 2007). The beach terminates in rocks (of volcanic origin) at both ends. A large amount of silt has been released onto the beach from high levels of erosion that occurred after the failed golf course on the lands to the west of the pond. To the east of Levera Beach is Sugarloaf Island, which is separated from the mainland by a narrow and shallow sea channel. At this channel, the Atlantic Ocean and Caribbean Sea meet. These merging water bodies cause the area to have strong wave and current action.

Sugarloaf Island is located due east across the channel from Levera Beach. It has a small sandy beach and a shallow lagoon area, which is protected by a small rock groyne on the eastern end. The beach and lagoon areas are adjoined to the west by a relatively narrow spur reef, which extends no more than 4 m deep. North along this spur reef there is a shallow high-energy reef crest, which extends out into the channel and provides the spur reef area with natural protection from the currents and forces of wave energy from the north.

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

The Levera Pond provides an area for floodwater control and desilting basin for runoff form steep slopes of Levera Hill, which drains to the ocean at the Levera Beach. In addition the Pond influences the micro-climate of the area which experience at times 9 month without any rainfall. The area forms and interesting example of land/water interface, sediment trapping and shoreline stabilization.

19. Wetland Types

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

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

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

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

c) 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.

C: Coral Reefs

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

The Levera Wetland is a highly productive ecosystem consisting of mangroves, seagrass beds, and coral reefs and forms an interesting example of the Land/water interface. Levera pond a basin mangal is considered as a nutrient basin containing high volumes of dissolve and produce organic matter which form a significant part of the food chain for that area. These nutrients and organisms [some microscopic] enter the marine area when the pond empties periodically providing nutrients for finfish and shellfish important to the fishing industry. Mangrove and pond support a rich biodiversity including the spawning and foraging habitats of important fish and other wildlife.
Three zones exist in the mangrove (1) The red mangroves is a zone around the pond (2) Black mangroves are in the zone next to the re mangroves away from the pond and (3) There is a mixed white mangrove and button wood zone furthest from the pond. Associated habitats consist of small patches of Fimbristylis on the seaward borders of the pond , mixed with manchineel, coconut palmsl and seagrape.
Seagrass consists of a *Halimeda/Thallasia* zone, *Thallasia/Syringodium/Halodule* zone and the coral colonies consist mainly of *Diploria clivosa* and *Porites astreoides.*

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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.*

Mangrove:
Rhizophora mangle, Avicennia germinans, Laguncularia racemosa, Conocarpus erecta, Thespesia populnea, Acrosticum aureum exists in the area. **Average height of mangrove forest, 13-16 m**

Seagrass: Thallasia testiudinum, Halimeda opuntiaingodium, Syringodium filiforme
Algae: Caulerpa cupressoides, Penicillus capitatus, Liagora sp., Udotea sp

22. Noteworthy fauna:

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., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Marine Fauna:

Species	
Strombus gigas	Queen Cunch
Abudefduf saxatilis	Sargeant major
Tripneustes ventricosus	White sea egg
Acanthurus bahiarus	Ocean surgeon
Pomacentrus partitus	Bicolor Damsel
Pomacentrus fuscus	Dusky Damsel
Pomacentrus planifrons	3 spot Damsel
Millipora complanata	Fire coral
Halichoeres masculipinne	Clown wrasse
Panulirus argus	Caribbean spiny lobster
Siderastrea radians	Starlet coral
Porites asteroides	Mustard hill
Acropara palmata	Elkhorn Coral
Dendrogyra cylindrus	Pillar Coral
Diploria clivosa	Brain coral
Stephanocoenia michilini	Blushing star
Porites divaricata	Finger coral
Gorgonia sp.	Sea Fan

Fauna: Birds

Migrant Species [status on this site only]	
Scarlet ibris [possibly extinct]	*Audacious ruber*
Broadwing Hawk [Chicken hawk]	Buteo platypterns anthiullerum
Grenada Hook-billed Kite [emdemic/endangered]	*Chondrohierax uncintus mirus*
Red neck pigeon [National Bird]	*Columba squamos*
Osprey	*Pandion haliaetus*
Laughing gull	*Larus atricilla*
Magnificent Frigate bird	*Fregata magnificens*
Brown Booby	***Sula leucogaster***
Brown Pelican	*Pelicana occidentelis*
White-Cheeked Pintail	*Anas bahamensis*

Fauna: Birds

Resident Species	**[status on this site only]**
Coccyzus minor	**Mangrove cuckoo**
Oxyura dominical	**Masked Duck**
Fulica caribae	***Caribbean Coot [water fowl]***
Sterna maxima	**Royal Tern**
Butorides virescens	**Green back heron**
Chlorostilbon musica [endangered]	**Blue Tailed Emerald Humming Birds**
Himantopus himamtopus	***Common Silt [Vulnerable]***
Rostrhamus sociabilis	***Everglade Kite [Endangered]***
Dendrocygna bicolor	**Fulvous Tree-Duck [endangered]**
Myiarchus nugator	**Grenada Flycatcher [endemic]**
Tangara cucullata	**Lesser Antillean tanager [vulnerable].**
Oryzoborus angolensis	**Lesser Seed-Finch [Endangered]**
Rallus maculatus	**Spotted Rail [vulnerable]**

Fa**una: Land and migratory**

Resident Species[status on this site only]	
Land Crabs	Cardisoma guanhumi
Ghost Carbs	Ocypode quadrate
Tree Boa	Corallus endyris
White Headed Worm Snake [threatened]	Leptotypholops margaritae
Boddaert's Tree Snake [threatened]	Mastigodryas bruesi
Mongoose	Herpestes aurepuctatus
Iguana [threatened]	Iguana iguana
Tree Lizard [status uncertain]	Anolis richandi
Garmen Ground Lizard [status uncertain]	Ameiva tobagana
Lesser Chapman's Murine Opposum [Vulnerable]	Marmosa fuscatacarri
Leatherback Turtles [endangered]	Dermochelys conacea
Loggerhead Turtle[endangered]	Caretta caretta
Hawkbill Turtle[endangered]	Eretmochelys imbricatea
Green Turtle[endangered]	Chelonia mydas

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:

Levera wetland is viewed as part of the natural heritage of the surrounding communities (in particular Rose Hill and River Sallee) and contributes to the culture of the people in a variety of ways. The natural resources of the area including crabs, fish, opossum/manicou (*Marmosa robinsoni* and *Didelphis marsupialis*), iguana have been harvested for decades by local communities. Furthermore, a number of extractive activities including fishing both within the Levera Pond and the marine areas, hunting of wildlife, harvesting of mangrove wood for charcoal production and harvesting of plants for livestock fodder have been practised by resource users. Locals engage in recreational activities in the area which include picnicking, cooking, swimming, fishing, camping, sports, and turtle watching.

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?

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:

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24. Land tenure/ownership:
a) within the Ramsar site:

The Government of Grenada and the Grenada Development Company, Inc owns the mangroves forest and pond area within the site. The government of Grenada by way of a cabinet Conclusion [annex] has stated that pond and mangrove forest should be protected and managed by the forestry department. See attached proposed management plan

b) in the surrounding area:

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25. Current land (including water) use:
a) within the Ramsar site:

Over the years, the communities surrounding the LPPA, especially Rose Hill and River Sallee, have relied on the biodiversity resources present as a source of subsistence. The resources extracted for human consumption include crabs, fish, birds, opossum/manicou, iguana and armadillo/tatou. Of the 42 households interviewed during the socio-economic study conducted in the Rose Hill and River Sallee communities, 35 (83%) consumed resources from the LPPA.

Many persons from other communities in Grenada visit Bathway Beach on weekends and holidays for camping, cooking, and sea bathing. The majority of these persons do not go as far as

the LPPA. All visitors and tourists to Grenada that were surveyed indicated that they visit the LPPA for recreational purposes. The main activities participated in are turtle and bird watching. There are four tour guides who offer organized turtle watching tours during the turtle nesting season but there are no organised bird watching tours.

b) in the surroundings/catchment:

Development in the areas surrounding the LPPA started in the mid to early 2000s with the clearing of the land in adjacent upland areas (to the west of the LPPA) for the creation of a golf course. Currently, a club house and a security booth sit on this property.

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26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site:

While parts of the LPPA are still in a pristine state, environmental threats (notable from habitat destruction, over-exploitation and pollution) are increasing rapidly, requiring immediate action to protect the terrestrial, estuarine, coastal and marine ecosystems. The major human-induced pressures on the ecological values of the LPPA include:

- **Activities which negatively impact the water quality of the Pond and marine areas;**
- **Fishing activities which impact populations of fish and non-target species;**
- **Tourism activities where there are inappropriate interactions of humans with biodiversity;**
- **Improper solid waste disposal;**
- **Predation or competition from introduced species; and**
- **Alteration of marine and terrestrial ecosystems through land filling and dredging and erection of coastal structures.**

b) in the surrounding area:

Hunting

The open season for hunting in Grenada extends from October to March; however some persons choose to hunt all year round. Hunting during the closed season has led to declines in the populations of certain species of wildlife and has even placed others in danger of becoming extinct. Currently, the opossum or manicou (*Didelphis marsupialis* and *Marmosa robinsoni*) as it is locally called - is the most hunted animal in Grenada (Dunn 2000). There is a strong consensus among hunters that many manicou have young in February and March. The harvesting of females while they are with young places the population at risk of extinction. Thus, this critical period should be protected. Therefore, close and open season dates will be reviewed and revised for manicou and other hunted species (Dunn 2000) based on the results of investigations into the biology, ecology and reproductive cycles of these organisms.

Predation by Mongoose (*Herpestes auropunctatus*)

Mongoose (*Herpestes auropunctatus*) was originally introduced to Grenada to control rat populations in cane fields. Many persons on island regard this species as a dangerous and damaging pest. Mongooses have no natural predator in Grenada and carry rabies. Although the effect of mongoose predation on other species has not been studied quantitatively, it is thought to be responsible in part for lowering the populations of many native species such as snakes, manicou, tatou and some birds (Dunn 2000, Rusk 2008). Further, the mongoose is known to be destructive to lizards, snakes, turtle eggs and hatchlings (Dunn 2000). Powell and Henderson (2005) have attributed the elimination of several populations of Lesser Antillean Garman's ground lizard (*Ameiva ameiva*) to mongooses.

Germano et al. (2003) noted that the Garman's ground lizard probably was once common in open areas at lower elevations within Grenada, but that the current distribution is highly fragmented. They state that

these lizards are abundant in only a very few locations and absent from many relatively natural areas with apparently suitable habitat. They attributed most of the apparent decline to predation by the mongoose and noted that existing populations often are associated with a high level of human activity, which presumably reduces the frequency of mongoose/lizard encounters. Mongooses are very abundant in the LPPA and are having a negative impact on populations of susceptible faunal species in the area.

Habitat Destruction / Construction / Development

Activities such as sand mining, coastal development and sea level rise due to global warming all negatively impact wildlife. The construction of hotels and homes with bright lights on and near beaches, domestic animals, and the lighting of bonfires and driving on beaches causes reduction in turtle populations due to disorientation, compaction of nests and direct killing of individuals. The destruction of wildlife habitat for agriculture and development is having a negative impact on a number of Grenadian species. Many mangroves and freshwater wetlands, critical habitats for birds and other wildlife, are at risk from development (CCA 1991). Charcoal cutters and other users have caused significant damage to the mangroves within the LPPA (CCA 1991).

One of the fastest growing economic sectors in Grenada is the construction industry (Dunn 2000) due to widespread construction of private residences and hotels. In the early 2000s numerous acres of land were cleared adjacent to the Levera Pond for the construction of a golf course. This caused excessively high levels of erosion, and sediment runoff into the pond. In addition, high levels of fertiliser were applied to the golf course lands which washed into the pond with heavy rains. The detrimental effect of this clearing of land and fertilising on the ecology of the pond and its associated fauna has not been quantitatively determined, but the relatively recent over colonisation of the pond by a water lily provides evidence that the ecological balance of the area has changed.

Agriculture

The uncontrolled grazing of livestock within the LPPA has an adverse affect on the biodiversity in the area. In areas where animals such as goats and cattle are allowed to roam freely, woodland and forest areas have become degraded over time. Regeneration of these areas seldom occur if the animals are left to roam without restrictions as seedlings which emerge are rapidly consumed by them (Dunn 2000).

Most watersheds in Grenada consist of substantial areas of agricultural landscapes where fertilizers and pesticides are used to compensate for reduced fertility caused by high rates of leaching and to control pests. Inevitably, residues from chemicals applied to soils and pests drain down landscapes and river courses with substantial amounts ending up in the marine zone (Finlay 2000). One of the 71 watersheds in Grenada drains through Levera Pond and to the ocean at Levera Beach. Runoff from upland hillside areas flows towards Levera Pond to Levera Beach. Thus, Levera Pond functions as a de-silting basin where sediments and other contaminants are removed from storm water. Thus, any fertilizers used in the upland areas around the LPPA eventually wash into the Levera Pond and the surrounding marine areas and affect the ecological balance of these ecosystems.

Natural Disasters

During June to October hurricanes are prevalent in the Eastern Caribbean. Grenada is located just south of the major tropical storm tracks and has a lower hurricane landfall history and probability than the other Caribbean islands. Records show that from 1900 to present over 95 hurricanes and tropical storms passed within the 300km radius of the island. However, only three hurricanes have passed directly over Grenada in the last 50 years: Janet 1955, Ivan 2004, and Emily 2005, which shows that Grenada has a low vulnerability to hurricanes (Smith Warner International 2008). Given the threats of the consequence of climate change such as sea level rise, it is predicted that the frequency and severity of hurricanes in Grenada may increase in the future.

Hurricanes can potentially have a serious impact on the biodiversity in the LPPA area. These can potentially damage both wildlife populations and the habitats upon which these organisms depend for survival. Groome (1970) reported that after the passage of Hurricane Janet in 1955, wildlife populations in Grenada were severely reduced. Henderson and Berg in their 2005 paper reported that the herpetofauna of the island was negatively affected by the passage of Hurricane Ivan since much of the shade-providing canopy was greatly reduced. Apart from hurricanes, the LPPA is vulnerable to several other types of natural hazards such as flooding, coastal erosion, tsunamis and storm surges.

Solid Waste Disposal

Mangroves within the Caribbean have traditionally been used as dumping grounds. The mangroves around the Levera Pond are also used as a dumping ground for household and construction waste. This is a major factor responsible for changes in the faunal composition within the LPPA as garbage provides hiding places for animals such as mongooses and rats that are destructive to the wildlife in the area.

Legislation

The laws pertaining to wildlife in Grenada are outdated and not effectively enforced (Ludeke et al. 1989). Wildlife conservation efforts are very sporadic with enforcement being routinely disregarded. Thus, much work needs to be done to improve, update and enforce the legislation of Grenada for the protection and conservation of the biodiversity on the island.

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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.

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

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

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

No

d) Describe any other current management practices:

Tree planting activities by NGO's and CBO's in exposed areas,under supervision of the Forestry and National Parks Department

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28. Conservation measures proposed but not yet implemented:

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

There's a proposed management plan for the site which includes three conservation zones i.e. wetland conservation zone, turtle conservation zone and fisheries management zone. Proposals have also being made for Surveillance, Regulations, Compliance and Enforcement within the site

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29. Current scientific research and facilities:

None

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

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.

There's one welcome/visitor centre in the area where general information can be obtained about the site. Arrangements are usually made for school visits and environmental education programmes related to the functions of the site and resources within

An opportunity exists to extend visitor appreciation of the LPPA's unique natural and heritage values through the development of educational and interpretative materials and programmes. Education is a major mechanism through which to achieve the management goals and thus, the strategic objectives of the LPPA. Public education will be provided through the production and distribution of printed material, face-to-face contact and educational displays. Appropriate signage will be installed at the Visitor's Center, entrance/start of the LPPA, around the Pond and at Levera Beach with the appropriate logos clearly visible.

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

The site is used for recreation/Tourism on the local, regional and international levels.

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

a)Ministry of Agriculture, Forestry& Fisheries Department;
(b)Min. of Environment, (c)Physical Planning Department

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

Chief Forestry Officer
Mr. Aden Forteau
Chief Forestry Officer (Ag.)
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