

# LITERATURE REVIEW

For the

*ASSESSMENT AND MAPPING OF THE SOUTHWEST REGION OF ANTIGUA  
FOR THE RIDGE TO REEF DEMONSTRATION PROJECT  
OF THE SUSTAINABLE ISLAND RESOURCE MANAGEMENT MECHANISM*

SUBMITTED TO:

Small Island Resource Management Mechanism (SIRMM) Project

Environment Division (National Executing Agency, NEA)  
Government of Antigua and Barbuda



SUBMITTED BY:



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## Literature Review

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### OVERVIEW

The Literature Review report forms part of the contractual obligations of Island Resources Foundation to provide a critical examination of documents, reports, information and other materials relevant to the successful completion of this project, to the development of the demonstration area, and to the long-term sustainable management of the Southwest Watershed of Antigua. The Review is an output component of the **Assessment and Mapping of the Southwest Region of Antigua for the Ridge to Reef Demonstration Project (RTRDP) of the Sustainable Island Resource Management Mechanism (SIRMM)**.

On August 09, 2010, Island Resources Foundation entered into contract with the Government of Antigua and Barbuda "To comprehensively map the southwest region of Antigua, identifying key natural features; both terrestrial and marine at scales appropriate for management."

Below, the Foundation provides an evaluation and analysis of the level of current knowledge covering numerous subject areas, including the environment, natural resources management, parks and protected areas (PPAs), archival materials, reports, impact assessments and characterisations, research and more. The review spans centuries, looking at the earliest historical material on the area thus far found, a travelogue from the late 1700s, to the most recent studies and reports on the Southwest Region. The report also provides an overview of how the Review was conducted and as well as a summary of the resources and sources of information available to the project, its coordinating mechanism and to the SWW stakeholders.

### METHODOLOGY AND APPROACH

This Literature Review focuses on materials and information relevant to the ecological, environmental, social and historical issues of the Southwest Watershed (SWW) Region of Antigua. To undertake the review, the Foundation researched and sourced extant literature, imagery and available data relevant to the area from various local and international institutions. The IRF team examined and reviewed documents, and sought

feedback from the Environment Division (ed.), the Forestry Unit, the Fisheries Division, the Museum of Antigua and Barbuda library, the Environmental Awareness Group library, and from on-line and on-site searches of the Library of Congress in Washington, DC and the Brooklyn and the New York Public Libraries in New York. The team also used the extensive resources of the Foundation's environmental reference libraries, and also tapped into local and regional marine and terrestrial biodiversity experts.

Many of these library resources are inaccessible outside the United States and Europe, and access may be restricted to institutions of higher learning, large research and government institutions, museums, and others with the financial capacity to afford the costly subscription fees. This is a major drawback for small countries, NGOs, individuals and those with limited financial capacities.

Though these resource libraries are extremely important sources of much of the historical and recent documents, maps and images on a wide range of subject matter that pertain to Antigua and Barbuda, the lack of direct access, the location of these institutions in the larger and richer Western countries, and the general lack of awareness in Antigua and Barbuda that these resources are available make these library resource institutions of very limited use to the country.

Additionally, while these institutions and other sources provide a significant amount of material and historical accounts, the information available may only address more general subjects and may only mention these islands in passing.

The review looks at material pertaining to the "southwest" region and nearby areas, and begins the date period at the year 1400, and ends at 2010. The time period is further divided into 200-year intervals, and a summary is provided for each period. However, given that we are just 10 years into the 21<sup>st</sup> Century, we have chosen not distinguished this period on its own.

Though the team undertook extensive searches, discussions and tapped into various sources, the list of documents and pertinent information is by no means complete. One of the major drawbacks of this effort is the relatively short time-frame provided for pulling together the review. Efforts like this need at least six months, and sometimes more, to allow the researcher(s) to search, locate, access and review documents and sources, and then to draft the report.

There are hundreds of bits and pieces of information in private holdings housed in far - lung libraries and collections, especially within the confines of old and dusty files and boxes in such places as the Ministry of Agriculture, Lands and Survey, the library of the Museum of Antigua and Barbuda, the Environmental Awareness Group (EAG), and various other resource entities. For decades, these documents have remained out of

the public purview. In most instances, much of this material is not cataloged, and has been allowed to deteriorate.

A list of key sources and information resources provided in **Appendix I** of this report.

## THE SWW REGION AND NEARBY AREAS

There is no clear cut formal definition of the “southwest region” of Antigua. The area traditionally identified as the southwest is all the hilly area from Sugar Loaf to Darkwood. But herein lays the difficulty of defining the area. Wallings for example has several delineations, and may include a broad area that includes the Signal Hill ridge, encompassing the upper areas of Doiggs, the upper levels of Claremont, upper and lower Fig Tree Drive, over to Sage Hill and around to southern John Hughes. However, the older delineation, prior to the 1980s, would have included the areas draining into Wallings Dam No. 1 and the general area around Walling Dam No. 2, i.e., the hills that feed the reservoirs.

For the purposes of this project, the southwest region includes, but is not limited to the Wallings Forest and Fig Tree Drive, Cades Reef and the Cades Bay Marine Reserve, Mount Obama to Darkwood, areas east of Bolans and Jennings and goes eastward to include all of the volcanic hills to Sugar Loaf and Barbers. Except for the Marine Reserve, these aggregate centres generally fall within the traditional definition of the Shekerley Mountains. However, some areas occur outside of this range, but within the Volcanic District of the island. These areas include the country’s highest point Mount Obama at 402 metres (formerly Boggy Peak), several urban centres, including John Hughes, Sawcolts, Bendals, parts of Buckleys, Jennings, Bolans, Jolly Hill, Johnsons Point, Urlings and Old Road. There are also a number of commercial activities and interests, including quarrying, farming, surface and groundwater extraction, marinas, hotels, recreational activities and protected areas.

The Demonstration area includes terrestrial, coastal and marine components.

The Literature Review focuses on information relevant to the region outlined above and also for adjacent areas.

## LITERATURE SUMMARIES

The review below, is laid out first through chronological order, then by sub-heads—broad subject areas and issues. The biodiversity section is further subdivided by taxa and then by chronological order: the earliest documents first followed by the most recent.

### 1400 to 1600

Christopher Columbus passed Antigua during his second voyage to the region in 1493 but did not stop at the island. His memoirs mention Antigua, but virtually no other report is available that details Antigua or Barbuda during this period of the islands' history.

The fact that there seem to be little or no reports for this period may be an artifact of the islands' colonial histories. However, is not suggestive, given the historical period, that little or written accounts were done for these islands. Undoubtedly, there exist material for Antigua and Barbuda from this period, but so far, little has turned up.

## 1600 to 1800

### Historical Accounts, Reports, Travelogues and Memoirs

Similar to the above period, accounts and works from the early colonists are difficult to locate.

The British colonised Antigua in 1632 with Barbuda following soon thereafter. Some of these early accounts do survive, but they are quite rare and are often in bad shape or difficult to access.

One such account was done sometime in the late 1700s by Maria Riddell (summarised below). The exact date of her works is in question since a number of publication dates were provided by her agent and also because a number of reprints were presented.

### **Riddell, Maria. 1802. Voyages to the Madeira and Leeward Caribbean Isles, with sketches of the natural history of these islands. Printed by N. Coverly.**

This is the earliest known travelogue on Antigua. The work is written by a woman variously known as Maria Riddell, Maria Banks, Maria Banks Riddell or as Maria Banks Fletcher. For some time, she hid her authorship of the book. Though she seems to go to great pains to hide her identity, it was not unusual for the time since even male authors often used pseudonyms, or other deceptions to hide their true identities.

Riddell was the daughter of a governor of the Leeward Islands, William Woodley. She visited him in 1788, and on her return to England she wrote her book. She provides detailed accounts of her travel to the islands from England as she stops at Madeira, St. Kitts, Antigua and Barbuda. She describes the people she met, the landscapes, culture and social habits, flora, fauna and agriculture, and provides a list of species for both plants and animals—one of the earliest for the islands. She includes many species found throughout the SWW today, and some that have since gone extinct, including the Antigua Racer (*A. antiguae*), the Agouti (*Dasyprocta sp.*) and the Opossum (*Didephis sp.*).

The book was published around 1792, but officially listed as 1802, though this date may

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be for a later edition. It was reportedly completed in two volumes. However, copies often consist only of Volume I.

## 1800 to 2000

This of course is the most prolific and significant period for reports, accounts, travel journals, letters, diaries, etc. One of the earliest known references for Wallings is Antigua and the Antiguans (Lanagan, 1844), though this is in passing as she travels on a joy ride through that part of the country. Many of the works from this period, where Wallings is mentioned, date from around the mid- to late-1800s, and were primarily authored by naturalists who came to the island to collect specimens.

### **Lanagan, F.T. 1844. *Antigua and the Antiguans*, volume II. Saunders and Otley, London.**

In its day, this work was one of the most celebrated accounts of Antigua. Written by F.T. Lanagan (sometimes referred to as Flannigan), the two-volume book is a personal account of slavery, the by-then extinct Caribs, and the state of the plantations and sugar production, as well as the prominent families of the day.

Interspersed in between her stories of people and the height of the Antiguan plantation society and government, Mrs. Lanagan manages to visit and describe parts of Wallings and Figtree Drive.

She visits "Tom Moore Spring," a historical natural source of water that originates below Wallings Reservoir No. 1. She describes the spring: "[T]he water is as clear as crystal, and of a refreshing coolness; and it trickles from beneath the roots of a large bamboo growing by, each drop looks like liquid pearl". After the spring, she proceeds on Fig-tree Hill. She describes the landscapes around the hill and the valley, and names many of the large species of trees as she and her party make their way to what is now Old Road Village and the on to other places in the south of the island. Her description provides a contrast of the landscapes of yesterday to that of today and allows us to understand how human activities have and continue to influence and impact the human and natural environments.

### **Coleridge, Henry Nelson. 1826. *Six months in the West Indies in 1825*. John Murray, Albemable Street.**

In this travel journal, of a type very popular in the 1800s to the early 1900s, Coleridge describes his journeys in Barbuda, Antigua and other islands of the region. Coleridge also visited Antigua and other islands in the region. During his visit to Antigua, he mentions the famous spring at Wallings, the same visited by Lanagan, though not by name. This is one of the first and few written mentions of the spring. Of it he says: "...a remarkably sweet and transparent one is to be found on the left hand side of the road

at some little distance before the descent of Figtree Hill. If you are nice, you should take a glass tumbler to see the precious liquor sparkle; otherwise there is an antique Negro always croning hard by who will lend you a clean calabash."

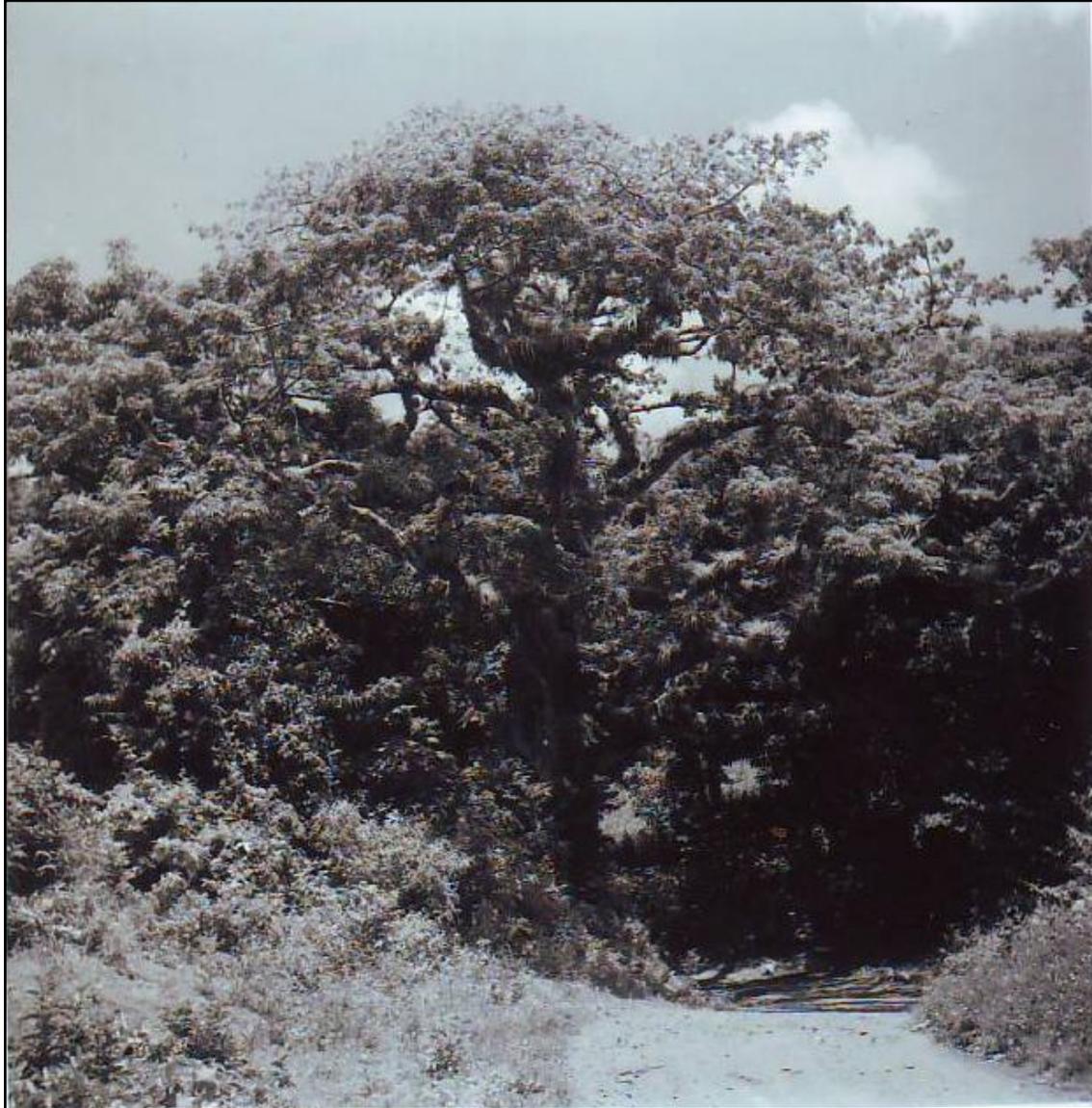
Coleridge's visit to Antigua seems more preoccupied with the social graces of the day. His mentioning this very historic spring is remarkable given how obscure it is today, and given how much damage and abuse it has undergone in recent years.



**Fall of an Old Silk Cotton Tree at Wallings: Photo of Tree Felling at Wallings, circa 1800 by John Anjo.**

The date of this photo is not known, but may be from the 1880s to the 1890s before Wallings was completely deforested. Though the caption may give the impression that the Silk Cotton (*Ceiba pentandra*) fell naturally, it is obvious from the trunk left standing that it has been cut deliberately. The striated roots visible about the standing trunk are likely those of a strangler fig (*Ficus cf. trigonata*).

This and the photo of Figtree Drive below (following reference) are housed in the library collection of the Museum of Antigua and Barbuda.



Figtree Drive, circa 1900 by John Anjo.

As with the prior photo, the exact date of the image below is unknown, but it is believed to have been taken at a later date. Anjo took many photos and turned them into postcards. This photo also appears on the cover of this report. It displays a *Ceiba pentandra* along Figtree Drive before the advent of paved roads.

**Nicholson, Desmond. 1994. *Heritage landmarks of Antigua and Barbuda*. Museum of Antigua and Barbuda.**

Compiled by the late Desmond Nicholson, this book describes many of the more prominent natural, historical and other landmarks of Antigua and Barbuda, including

Wallings Reservoir and forest. He discusses the history and origin of the Victorian architecture of the stone works and describes some of the more common trees and plants in the surrounding forest.

**Smith, K.B & F.C. Smith. 1986. To shoot hard labour. Karia Press.**

This account, based on the oral stories, traditions, and the retelling of the tales provided by Samuel Smith, more popularly known as "papa sammy," who lived to be 105 (1877-1982), the landscapes, people, social welfare, race relations, and his travels throughout the islands, including his experiences in the SWW region, are described in vivid details and provides a rare historical account of the immediate years after the abolition of slavery in Antigua.

**Environmental, Natural Resources Management and Conservation Issues**

**Eastern Caribbean Natural Areas Management Program (ECNAMP), 1980. Antigua: Preliminary data atlas. Survey of Conservation Priorities in the Lesser Antilles, ECNAMP, St. Croix.**

ECNAMP (now CANARI, the Caribbean Natural Resources Institute) produced a series of data atlases for the Eastern Caribbean, identifying critical species, existing and proposed parks and protected areas, and environmental issues. The series was the culmination of a cooperative effort of the Caribbean Conservation Association and the Wildland Management Center of the University of Michigan with funding by the Rockefeller Brothers Fund, United Nations Environment Programme (UNEP), International Union for the Conservation of Nature (IUCN), World Wildlife Fund (WWF), Canadian International Development Agency (CIDA) and the Caribbean Development Bank, and was a survey of conservation of conservation priorities in the region. Several areas, species and issues located within or nearby to the SWW are identified.

**Caribbean Conservation Association and Island Resources Foundation, 1991. Antigua and Barbuda Country Environmental Profile. Island Resources Foundation, Washington, DC.**

To date, this is the most comprehensive review and compilation of baseline information on the environmental issues and factors that influence and impact on the environment and affect the long-term development of Antigua and Barbuda.

**Goreau, Maya & Thomas J. Goreau. Ecological assessment of Antigua and Barbuda reefs: report to the Environmental Awareness Group. Global Coral Reef Alliance.**

Maya and Thomas Goreau carried out a rapid ecological assessment of coral reefs and the marine environments of areas along the north, west, south and east coast of Antigua and several areas of Barbuda from August 25 to 29, 1996. The report details

their observations of the conditions of the reefs, the types of communities, the marine substrates, species, diseases, impacts, water quality and other issues.

**Bunce, Leah. 1997. Integrated Coastal Zone Management of Common Pool Resources: A case study of coral reef management in Antigua, West Indies. PhD Dissertation, Department of Environment, Duke University Marine Laboratory.**

Leah Bunce, who spent some time in Antigua studying marine conservation issues, working along with the Fisheries Division, the Environmental Awareness Group and the Island Resources Foundation's Eastern Caribbean Biodiversity Program office in Antigua back in the 1990s, did her PhD thesis focusing on issues of conflict, resource use, coastal degradation, pollution and other impacts, local policy and institutional capacities and other factors.

**Post Georges Disaster Mitigation. 2001. Post Georges Disaster Management project, OAS, Hazard Assessment and Mapping for Antigua and Barbuda.**

Hurricane Georges passed through the islands of the Eastern Caribbean in September 1998, causing significant social, economic and infrastructural damage. In response, "the US Agency for International Development-Jamaica/Caribbean Regional Program (USAID-J/CAR), established a program entitled Hurricane Georges Reconstruction and Recovery in the Eastern Caribbean, targeting Antigua and Barbuda and St. Kitts and Nevis. The Organization of American States' Unit for Sustainable Development and Environment (OAS/USDE) implemented the disaster mitigation capacity building component for USAID-J/CAR, under the project Post-Georges Disaster Mitigation (PGDM). [See PGDM background information for further details.] The PGDM included four primary objectives: 1. develop national hazard mitigation policies and plans, 2. strengthen building practices, 3. strengthen national emergency shelter policies and programs, 4. support public information programs on hazard mitigation." The surveys, assessments and mapping cover the entire island of Antigua and include coastal and terrestrial characterisations. For more details and complete documents, maps, shapefiles and more, please refer to the project's website: <http://www.oas.org/pgdm/>

**Cooper, B R & V. Bowen. 2001. Integrating Management of Watersheds and Coastal Areas in Small Island States of the Caribbean, National Report for Antigua and Barbuda. Environment Division, Ministry of Tourism and Environment, Government of Antigua and Barbuda.**

In this report, compiled for the Environment Division, Cooper and Bowen explore the myriad issues and concerns that continue to affect the watersheds of Antigua, including coastal and marine resources. The authors provide a detailed review of the resources, features and characteristics of the watersheds, providing known statistics

(size, location, elevation, rainfall, etc.), and the legal, policy and institutional capacities for management, and provide recommendations for improving management regimes, training, legal frameworks, long-term monitoring, conservation and more.

**James, Philmore. 2002. *Management plan for Cades Bay Marine Reserve, Antigua, West Indies*. Organisation of American States Small Project Facility.**

The Cades Bay Management Plan was done through consultations with stakeholders, and encompasses an area of diverse both terrestrial and marine habitats, species, issues, communities and land-uses. The priority areas of the plan include the protection and restoration of marine species, and the preservation of rare and fragile ecosystems, estuaries, mangroves, sea grass beds, spawning and nursery areas, and to provide a template for the integrated approach to the management of existing and future protected areas.

**Baldwin, Jeff. 2007. *Understanding tourist beaches as eco-social landscapes: seeking sustainability through integration of human and non-human wealth production*. Études caribéennes.**

In this paper, Jeff Baldwin explores how coastal tourism development affects the environment, how conflicts develop, the ecological framework reacts, and the approaches that may be used to create a balanced and sustainable approach. He uses Antigua as a primary example. He says "*Antigua, a small island in the West Indies, provides a good illustration of how tourism might affect environments and environments affect tourism, and how we might understand and manage those interactions more effectively for all concerned.*" Much of the issues discussed are acutely pertinent to the SWW region and its future development.

**Lindsay, Kevel. 2007. *Ava View Development, Antigua: a terrestrial characterisation*. Ivor Jackson and Associates.**

This characterisation report, similar to the two project site characterisations summarised below, forms part of the requirement for the submittal of an Environmental Impact Assessment (EIA) to the Environment Division for the then proposed hotel and residential development project, the Ava View Development Project at Bolans Hill, Bolans Village. The report details the terrestrial survey of the project site and surrounding areas. It provides a list of flora, fauna, a vegetation community overview, ecological characteristics and a set of recommendations. The report was done for Ivor Jackson of Ivor Jackson and Associates who was retained to conduct the project's EIA.

**Lindsay, Kevel. 2007. *Reef Club Development, Antigua: a terrestrial characterisation*. Ivor Jackson and Associates.**

This report summarises the terrestrial ecological field survey and assessment results of the proposed Reef Club Development Project, located at Goat Head situated mid-way between the villages of Urlings and Old Road on the south coast of Antigua. This effort forms part of the requirement for the submittal of an Environmental Impact Assessment (EIA) to the Environment Division, of the proposed project development activities. The report details the terrestrial survey of the project site and surrounding areas. It provides a list of flora, fauna, a vegetation community overview, ecological characteristics and a set of recommendations. The report was done for Ivor Jackson of Ivor Jackson and Associates who was retained to conduct the project's EIA.

**Lindsay, Kevel. 2008. *Chrystal Bay, Valley Church, Antigua: a terrestrial characterisation.* Ivor Jackson and Associates.**

The terrestrial characterisation forms part of the requirement for the submittal of an Environmental Impact Assessment (EIA) to the Environment Division for the then proposed hotel and residential development project, the Crystal Bay Development Project. The report details the terrestrial survey of the Valley Church marsh and pond and surrounding area, located at Valley Church Bay, Antigua. It provides a list of flora, fauna, a vegetation community overview, ecological characteristics and a set of recommendations. The report was done for Ivor Jackson of Ivor Jackson and Associates who was retained to conduct the project's EIA.

**Lindsay, Kevel, Jean-Pierre Bacle & John Mussington. 2008. *Biodiversity inventory and status assessment for the Codrington Lagoon National Park and the proposed Wallings Forest Protected Area: final report.* Island Resources Foundation for the Environment Division and the Organisation of American States.**

In 1988, the Island Resources Foundation Team undertook a biodiversity characterization of the Codrington (Barbuda) Lagoon National Park and the proposed Wallings Forest Reserve for the Environment Division, Ministry of Tourism and the Environment, Antigua and Barbuda to. These two survey efforts form part of the long-term planning and management thrust to ensure the sustainable management of two of Antigua and Barbuda's most recognizable and valuable natural icons. The report provides species lists for both sites, characterisations of the sites with respect to habitat, biodiversity, and existing threats and outstanding features, an assessment of invasive species, including distribution; it describes existing conditions, site observations, natural disaster vulnerabilities, and recommendations for the management of biological resources.

**Mitchell, Arthur H. 2009. *Wallings Forest Conservation Area management plan, Volume I: current conditions and management prescriptions.* Environment Division, Ministry of Ministry of Tourism, and the Organisation of Eastern Caribbean States.**

Part of a long-term effort to management the natural resources, landscape, stakeholder issues, and other factors affecting the Wallings Forest, the author, Dr. Arthur Mitchell provides detailed management prescriptions for a five-year period.

**Mitchell, Arthur H. 2009. *Wallings Forest Conservation Area management plan, Volume II: Annex. Environment Division, Ministry of Ministry of Tourism, and the Organisation of Eastern Caribbean States.***

In Volume II, Dr. Mitchell provides maps, species lists, legal framework, stakeholder engagement report, plan budget and other auxiliary issues to the overall Management Plan.

Geography, Geology and the Physical Landscape

**Nugent, Nicholas. 1819. *Geology of the Island of Antigua. American Journal of Science, Series 1, Volume I.***

One of the first (or perhaps the first) published paper on the geography of Antigua. Nugent, a local doctor on Antigua, had a keen interest in the geology and natural history of the island and published his preliminary observations in the American Journal of Science.

**Nugent, Nicholas. 1821. *Sketch of the geology of the island of Antigua. Transactions of the Geological Society of London, Series 1, Volume 5.***

Dr. Nugent followed up is preliminary paper (see above) with a more detailed note.

**Hovey, S. 1839. *Geology of Antigua. American Journal of Science, Series 1, Volume XXXV.***

Professor Hovey, a contemporary, colleague and friend of Dr. Nugent, visited Antigua, observed the islands' geography and geology, collected specimens and studied Nugent's works and findings and published his own results, which he admitted were based on Dr. Nugent's work and on a published paper by Dr. Thomas Nicholson in the *Antigua Almanac and Register*. The Nicholson paper has not been located for this Literature Review.

**Gregory, J.W. 1895. *On the Palawon-tology and physical geology of the West Indies. Journal of the Geological Society of London, Volume LI.***

Dr. Gregory provides an update to the paleontology of Antigua, adding new insights to the work of the previous authors.

**Purvey, M.J.C. 1885. *Esquisse géologique de l'île d'Antigoa. Bulletin du Museo Royal d'Histoire Naturelle de Belgique, Volume III.***

Purvey's work revised much of Nugent earlier research, observations and theories on the geology of the island, and provides a much more comprehensive framework for the origins of the island's landscape and a better understanding of geological forces at work.

**Spencer, J.W.W. 1901. Geological and physical development of Antigua. Quarterly Journal of the Geological Society of London, Volume LVII.**

Professor Spencer revises the formations of Antigua as presented first by Nugent then Purvey, and reorganises the basal structure and sequence of the evolution of the island's geology.

**Guppy, R.J.L. 1911. On the Geology of Antigua and other West Indian Islands with reference to the physical history of the Caribbean region. Quarterly Journal of the Geological Society of London, Volume LXVII.**

Guppy published his findings after visiting the island in 1910, and much of his arguments and ensuing discussions are in support of his theory of the "Great Antillean Dislocation," which postulates a deep and significant Caribbean fault stretching from Trinidad in the south, passing through Antigua to Sombrero then to Haiti in the north.

**Brown, Amos P. 1913. Notes on the geology of the island of Antigua. Proceedings of the Academy of Natural Sciences, Volume 65, No. 3.**

Brown reviews the observations and works of the preceding authors and summarises their work, then provides his own observations and suggested a revision of the formations of the island.

**Charter, C.F. 1937. Soil survey (reconnaissance) of Antigua and Barbuda. Crown Agents for the Colonies.**

Charter conducted the fieldwork for his classification of soils in 1936, and based in on the American system. He provides one of earliest and definitive assessment and analysis of the soils, both of Antigua and Barbuda, including physical and chemical properties, characteristic, locations and distributions, uses and conditions, origins, and describes, defines and maps 24 types.

**Hill, I. 1966. Soil and land use surveys no. 19: Antigua and Barbuda. Regional Resource Center, University of the West Indies.**

Part of a Caribbean series of atlases compiled by the University of the West Indies (UWI), the Antigua report provides details on 33 soil-types for the island, including all of the SWW Region. Hill's work continues to be the most highly referenced work on Antigua's soils, however, a more modern approach, analysis and assessment is needed.

**Kanm, J.L. 1981. Trace-element concentration and distribution in the sediments of Antigua, British West Indies: Unpublished Master's Thesis, Northern Illinois University, DeKalb.**

Kanm analyses the marine sediments in the harbours and bays of Antigua and provides a report on their compositions, possible origins, changes and issues.

**Maulter, H.G., M.P. Weiss & D.V. Nicholson. 1986. Antigua: reefs, rocks and highroads of history. Leeward Islands Science Associates, Contribution No. 1.**

The authors attempt to provide a modern overview of the geological features, distribution of formations, minerals, coastal and marine sediments and overlay this with a brief geographic and historical and current events sketch to show the interplay of various forces that shape the island's present landscape.

**Weiss, Malcolm P. & H.G. Maulter. 1988. Modern reefs and sediments of Antigua, West Indies. Department of Geology, Northern Illinois University, DeKalb.**

Though the document is published in map form (1:40,000 scale), the authors also provide detailed overview of the island, the locations, types of sediments and reviews changes to the marine environment from the period 1954 to 1981.

**Weiss, Malcolm P. 1990. Reefs of Antigua, West Indies: changes over 40 years. Transactions of the 12<sup>th</sup> Caribbean Geological Conference, St. Croix, U.S.V.I, August 17<sup>th</sup>-11<sup>th</sup>, 1989.**

Weiss provides detailed observations on the conditions of the marine communities, structure, changes, losses, threats and other issues that occurred over a 40 year span, starting in 1941. His conclusions are based on interpretations from aerial photos from the earliest period and from his own observations.

**Tomblin, John F. 2005. The Geology of Antigua, Barbuda and Redonda: rocks, minerals and fossils. Sun Printing and Publishing.**

This is the most up-to-date and recent effort to characterise the geology of Antigua. Tomblin discusses sediment accretion, fossils, minerals and formations throughout the island.

## **Biodiversity**

### **General**

**Harris, D. R. 1965. Plants, animals, and man in the Outer Leeward Islands, West Indies: An ecological study of Antigua, Barbuda and Anguilla. University of California Press. Berkeley and Los Angeles.**

Completed as part of his thesis requirement for the degree of Doctor of Philosophy at the University of California, this work by David R. Harris remains one of the most detailed summaries of the issues relating to the country's biodiversity up to this time. Still a key reference, especially for the historical notes, it details the plant communities of Wallings, as well as species.

**Faaborg, J. & W. Arendt. 1985. *Wildlife assessments in the Caribbean*. U.S. Department of Agriculture Forest Service, International Institute of Tropical Forestry.**

This report was an outcome of the Caribbean Environmental Action Plan, an early regional conservation mechanism of the United Nations Environment Programme. As part of a global effort to assist Caribbean governments to better manage their natural resources and usher in careful and wise development options, UNEP in concert with the International Institute for Tropical Forestry undertook surveys and assessments of wildlife of nine Lesser Antillean islands, including Antigua. The report provides habitat information for critical species, areas of special concern, harvesting and use, and recommendations for managing these resources sustainably. It includes terrestrial and coastal resources, and a large part of the effort for the Antigua section focuses on the SWW Region.

**Lindsay, Kevel. 2003. *A Nature Guide for Antigua, Barbuda and Redonda*. Environmental Awareness Group.**

This Guide, compiled by Kevel Lindsay for the EAG and technically unpublished, is a comprehensive work that examines the landscapes, species, sites and issues related to the natural history of Antigua and Barbuda.

**Lindsay, K & Jean-Pierre Bacle. 2009. *Ecological characterization of the Body Ponds Watershed, Antigua*. Environment Tourism Consulting for the Environment Division, Antigua.**

This report is the most up-to-date resources and issues characterisation of any watershed in Antigua and Barbuda, focusing on the Body Ponds Watershed and nearby areas. It provides a list of birds, plants, freshwater fishes, vegetation communities, heritage resources, environmental concerns and a vegetation map, the most detailed of any area of Antigua to date. Given the proximity of this watershed to other areas of the SWW, the details outlined in this report are quite significant to the SWW Demonstration Project and to the mapping of its resources.

### **Reptiles and Amphibians**

**Lynne, W.G. 1957. *Notes on a collection of reptiles and amphibians from Antigua, British West Indies*. Herpetological, Volume, 13.**

Lynne spent four days on Antigua in 1953, during which time she observed and collected a number of species of terrestrial reptiles and amphibians of Antigua. The author provides a short report on the seven species observed and the specimens collected.

**Widecast. 1992. *Sea Turtle Recovery Action Plan for Antigua and Barbuda*. Authored by J. Fuller, K. Eckert and J.I. Richardson for CEP Technical Report No. 16.**

This recovery plan is fourth in a series of works developed to aid and assist Caribbean governments in the discharge of their obligations under the Specifically Protected Areas and Wildlife (SPAW) Protocol, and to promote a regional capability to implement scientifically sound sea turtle conservation and management programmes. The plan provides details on each species, their distribution, conservation status, threats, the nesting habitats, and ways to save them.

**Nicholson, Desmond V. 2001. *Some fauna and flora of Antigua*. Museum of Antigua and Barbuda.**

Desmond Nicholson provides short summaries on a number of the birds, mammals, amphibians, reptiles, invertebrates, marine life and plants of Antigua, including locations, distributions, scientific, common and local names, and a bit of the folklore of the island. Many of the species mentioned are found through the SWW region.

**Daltry, Jennifer C. 2007. *An introduction to the herpetofauna of Antigua, Barbuda and Redonda, with some conservation recommendations*. Applied Herpetology 4.**

**Danforth, S.T. 1934. *The birds of Antigua*. The Auk, Volume 51(3).**

Dr. Jenny Daltry of Fauna and Flora International, UK, who is best known for her work and involvement in the conservation of the Antigua Racer (*Alsophis antiguae*), compiled this paper as part of a regional collection of works on the Caribbean herps. The paper provides a detailed overview of 29 reptiles and amphibians for Antigua, Barbuda and Redonda, many of which are found or were found in the SWW region.

#### **Mammals**

**Morton, M. 1994. *A Short Survey of the Bats of Antigua and Barbuda*. Environmental Awareness Group.**

Morton, with the support and assistance of Lindsay, conducted the first and at the time, most comprehensive survey of the bats of Antigua and Barbuda. They captured species in many areas of the SWW and described roost sites, quality of habitats, including threats.

**Pedersen , Scott C., Adams, Rick A., Jon D. Appino, Hugh Genoways, Peter A. Larsen, Kevel C. Lindsay, Matthew N. Morton & Vicki J. Swier. 2006. *Bats of Antigua, northern Lesser Antilles*. Museum of Texas Tech University, Number 249.**

This paper reviews the previous bat survey and research efforts on Antigua up until that point in time, and publishes results of mist net and roost surveys undertaken by Dr. Scott Pedersen, mammologist, from fieldwork conducted throughout the island, including several locations in the SWW.

**Lindsay, Kevel C., Gary K. Kwiecinski, Scott C. Pedersen, Jean-Pierre Bacle and Hugh H. Genoways. 2010. *First record of *Ardops nicholli* from Antigua, Lesser Antilles*. *Mammalia*, Volume 74.**

This paper provides the first record for the Lesser Antillean Forest Bat (*A. nicholli*) based on a juvenile female specimen caught by Lindsay in 2009. The paper provides the results of the study of the specimen and assigns it to the sub-species *Ardops nicholli annectens*, which is endemic to Antigua and Guadeloupe.

#### **Invertebrates**

**Edwards, F.W. & H.E. Box. 1940. *Notes on mosquitoes*. *Annals and Magazine of Natural History*, Series 11, Volume 5.**

Edwards and Box, both resident scientist on Antigua and the time, provide a report on the species of mosquitoes collected throughout the island, including species collected in the SWW. The paper lists about 21 species.

**Sewlal, Jo-Anne Nina. 2008. *Spiders of Antigua*. *Historical and Archaeological Society Newsletter*, No. 103.**

Jo-Anne, a Trinidad and Tobago native and University of the West Indies PhD candidate visited Antigua in 2007 to collect and study the spiders of Antigua. He brief account provides a list of species, their descriptions, habits and habitats.

#### **Birds**

There are a number of guides, reports, accounts and lists that describe and provide an overview of the native birds of the SW Region and nearby areas. Official records of the island's bird fauna go back to the 1800s when ornithologists and other naturalists collected specimens and recorded their observations in published reports. Those relevant to the SWW include:

**Ober, Fred. A. 1879. *Catalog of birds of Antigua and Barbuda, from collections made for the Smithsonian Institution by Fred. A. Ober, with his observations*. *Proceedings of the***

### **United States National Museum, Volume I.**

The earliest of these is a report on the collection of birds made in Antigua by Fred Ober in 1877. Ober collected specimens from throughout Antigua, and the catalogue includes a number of species from “the southern hills” of the island.

### **Danforth, Stuart T. 1934. *The birds of Antigua*. *The Auk*, Volume 50.**

One of the earliest and most comprehensive reviews of the native birds of Antigua at the time, Stuart Danforth's work stands out because he not only described the species but also lists where he collected and observed his specimens as well as their stomach contents (what they ate). His collection from Wallings includes the *Patagioenas squamosa* and *Margarops fuscatus*.

### **Danforth, Stuart T. 1939. *Supplement to the birds of Antigua*. *The Auk*, Volume 56.**

Published after Danforth's death in 1938, this short supplement to his earlier paper (see above) updates his list of species, including many waterbirds and some warblers observed in the SWW.

### **Holland, C.S. & J.M. Williams. 1978. *Observations on the birds of Antigua*. *American Birds*, Volume 32(6).**

This paper by Carroll Holland and Janet Williams is to date, the most comprehensive report on the birds of Antigua and locations for observing them. The paper provides some background information on bird observations at Wallings, as well as an account of the species, and most importantly, the rare and endangered species of birds to be found there, including the White-crowned Pigeon (*Patagioenas leucocephala*), the Scaly-naped Pigeon (*Patagioenas squamosa*), the Bridled Quail Dove (*Geotrygon mystacea*), Ruddy Quail Dove (*Geotrygon montana*), the Brown Trembler (*Cinclocerthia ruficauda*) and the Pearly-eyed and Scaly-breasted Thrashers (*M. fuscatus* and *Alenia fusca*), and migrant wood warblers.

### **Prosper, Joseph, Victor Joseph, Andrea Otto & Shanee Prosper. 2008. *Report: waterbirds in Antigua and Barbuda*. *Waterbird Conservation for the Americas*.**

This report, compiled by members of the Environmental Awareness Group as “[P]art of an evaluation of waterbirds population and their conservation in the Caribbean, a project coordinated by BirdLife International within the initiative of Waterbird Conservation for the Americas and sponsored by the U.S. Fish and Wildlife Service (Neotropical Migratory Bird Conservation Act)” provides an overview of the critical sites for waterbirds in Antigua, Barbuda and Redonda, and includes a list of sites, including those in the SWW, the species and their conservation status.

**Prosper, Joseph, Victor Joseph, Andrea Otto & Shanee Prosper. 2009. Report: waterbirds in Antigua and Barbuda. Important bird areas of the Americas: Antigua and Barbuda. Birdlife International.**

The Important Bird Areas is an international effort started by BirdLife International in the 1980s in the United Kingdom and other parts of Europe, aimed to and has proven an effective conservation tool by bringing prominence and spotlighting the key sites for critical species and the issues surrounding them, though the designation does not confer any regulatory or other legal protection to the site.

The Antigua and Barbuda report provides a list of the key sites, and within the SWW, these include the Valley Church and nearby wetlands, the Christian Valley-Mount Obama area and Wallings.

There are also several trip reports from various birdwatchers, many of which include lists of birds observed in the forests, woodlands, fields, wetlands and along the shores of this region:

**Richard, Fuller & Rebecca M. Webb. 1997. Birding Trip Report, Antigua.**

Birding trip report by Richard A Fuller and Rebecca M. Webb, this provides a summary of the birds seen during their trip to Antigua, which included Wallings.

**Southern Caribbean Bird Alert. May 2001.**

Lists two Western Sandpipers seen at Darkwood.

**Southern Caribbean Bird Alert. December 2004.**

Provides a list of migrant warblers observed at Wallings.

The Southern Caribbean Bird Alert reports may be accessed via:  
<http://ttfnc.org/rarebird.php>

**Jamarillo, Alvaro. 2005. Sighting record listing: Leeward Islands**

List of birds seen in Antigua, Barbuda and Montserrat on a trip, 1/29/2005 to 9/29/2005.

**Jamarillo, Alvaro. 2006. Sighting record listing: Leeward Islands**

List of birds seen in the Lesser Antilles, including Antigua and Barbuda, 4/6/2006 to 4/22/2006.

**Flora, Forests and Vegetation**

**Wheeler, L. 1916. *The botany of Antigua*. Journal of Botany, Volume 54.**

Dr. Wheeler, who resided in Antigua for nearly two years, published one of the first and earliest works that dealt specifically with the vegetation and flora of the island. He describes the Antigua landscapes, geography, a bit on the geology, and provides an overview of the vegetation communities (called plant associations) and plants species, including that of The Volcanic Region.

**Alston, A.H.G. 1935. *Pteridophyta of Antigua*. *Journal of Botany* Volume 73.**

Compiled by Alston and H.E. Box, this work represents the only report on the ferns of Antigua to date. Chris et al (2009) includes ferns in the most recent work on Antigua's flora, but the Alston work focuses only on ferns, and describes many of the locations where the species were noted. At the times, many of these areas were small patches and tracks of forest and woodlands, and it therefore allows researchers some understanding of landscaping changes over time. Most of the ferns described were and still are found only in the SWW Region.

**Beard, J. S. 1949. *Forestry and timber in the Windward and Leeward Islands*. *Guardina Commercial Printery, London*.**

Beard describes the forest communities of many of the Lesser Antilles, the availability of suitable timber resources, harvesting of species, the quality of wood and many other issues. The only significant forests in Antigua at the time were in the SWW Region, though extraction by then was extremely limited due to the small size of trees.

**Beard, J. S. 1949. *The natural vegetation of the Windward and Leeward Islands*. *Oxford Memoirs*, 21.**

Beard made such a lasting impression on regional forest experts that his tome is considered the most important work on forest ecosystems of the region. Beard used the very young secondary "pole forest" at Wallings to set up a number of study plots, and described the composition of species as well as the distribution. The list of species he produced is often compared to more recent lists, including a 1988 study by Mackler and Hannah that reprised his research.

**Loveless, A. 1960. *The vegetation of Antigua, West Indies*. *Journal of Ecology* 48.**

Written up largely as a composite manuscript based on the observations and the long-term studies of H.E. Box, the then renowned botanist of Antigua, and C.F. Charter, soil scientist, Loveless developed this thesis as a study of the environmental, biological and human influences on the then plant communities of the island. He provides an excellent overview of the meteorological and moisture influences on the vegetation. He also lists the species of plants associated with the various community types found at and around Wallings.

**Harris, David R. 1962. The invasion of oceanic islands by alien plants: an example from the Leeward Islands, West Indies. Transactions and Papers (Institute of British Geographers), No. 31.**

Harris is one of the earliest researchers to report on the issue of non-native invasive species of plants and animals. In this detailed review, a follow-up to his extensive study of these three islands: *Plants, animals and man in the outer Leeward Islands* (1965), Harris examines and discusses the role of man in the invasion of islands by non-native plant species and how and why these plants evolve to dominate the landscapes, influence ecosystems and ecological processes and human communities, culture and habits.

**Mackler, R & P. Hannah. 1988. The forest at Wallings Reservoir, Antigua West Indies, 44 years after J.S. Beard's Study: conjecture on the patterns of change. Commonwealth Forestry Review, 67(3).**

A follow up to and a reprisal of Beard's study, the researchers set up study plots above the reservoir and looked at the woody species. They provide comparative results for theirs and Beard's earlier work.

**Bacon, P.R. 1993. Mangroves in the Lesser Antilles, Jamaica, and Trinidad and Tobago. LD Lacerda (ed.), Conservation and Sustainable Utilization of Mangrove Forests in Latin America and Africa Regions. Part I-Latin America. International Society for Mangrove Ecosystems.**

The late Dr. Bacon compiled one of the most important modern baseline reports on mangroves and salt ponds of the Eastern Caribbean, and to date, it remains the only systematic and rigorous efforts of its kind. Bacon provides a list of almost all of the sites on profiled islands, including Antigua, listing names, coordinates, species, features, characteristics and more, and this includes all of the mangroves systems in the SWW, including a description of the Carlisle Bay mangrove system before the development of the hotel.

**Francis, J., C. Rivera and J. Figueroa. 1994. Toward a woody plant list for Antigua and Barbuda: past and present. Gen. Tech. Rep. SO-102. New Orleans, LA: US Dept. of Agriculture, Forest Service, Southern Forest Experiment Station.**

This technical report by Francis, *et al.* provides a list of species of woody plant species for Wallings and other areas of Antigua and Barbuda as well as an overview of forest communities for the islands.

**Lindsay, Kevel & Bruce Horwith. 1997. A vegetation classification of Antigua, Barbuda and Redonda. Island Resources Foundation.**

Also completed as part of IRF's Biodiversity Program, the *Classification* is the most comprehensive and up-to-date attempt to profile the plant communities of the islands, and includes the vegetation alliances and associations, as well as their most prominent species of plants to be found at Wallings forest.

#### **Environmental Impact Assessments (EIAs) and Environmental Studies**

Several environmental impact assessments and environmental studies have been undertaken for the Southwestern Watershed and adjacent areas. The list below is not complete, but includes:

**Nichols, Maynard & Coroline Rogers. 1990. *Assessment of offshore disposal sites, Jolly Harbour, Antigua: final report.* Coastal Resources Foundation.**

The report summarises the assessment and observations of marine and coastal communities of Deep Bay and Jolly Beach as part of the efforts to develop the then Lignum Vitae Bay, which is now the Jolly Harbour Marina and development.

The report includes details on the species, ecosystems and the environment of the area.

**Jackson, Ivor. 2006. *Environmental impact assessment: canopy tour project, Antigua, final report.* Ivor Jackson and Associates.**

This report provides an assessment of the site of the then proposed rain forest Canopy Tour Project and its potential impacts on the area. Does not provide extensive details of the area's environment and biodiversity.

**Jackson, Ivor. 2007. *Environmental impact assessment: Reef Club Development, Antigua, final report.* Ivor Jackson and Associates.**

The Reef Club Development EIA provides an assessment of the site of the then proposed Reef Club Development project east of Cades Bay. The report includes as part of the appendices, a detailed plant list, vegetation survey and fauna.

**Jackson, Ivor. 2007. *Environmental impact assessment: Ava View Development, Antigua, draft final report.* Ivor Jackson and Associates.**

Though situated just outside the northwestern boundary of the SWW, this EIA report provides a detailed plant list, vegetation survey and fauna and other critical information that is relevant to the surrounding areas.

**Jackson, Ivor. 2008. *Environmental impact assessment: Valley Church Development, Antigua, final report.* Ivor Jackson and Associates.**

Though details of this EIA are not currently available, Kevel Lindsay, the PI of this project,

undertook the ecological characterisation for this EIA. Mr. Lindsay provided detailed plant list, vegetation survey and fauna information in his report to Ivor Jackson and Associates.

**Jackson, Ivor. 2008. *Environmental impact assessment: Tamarind Hills Resort, Antigua, final report*. Ivor Jackson and Associates.**

This EIA reports on the potential impacts and field survey results for the potential impacts of the proposed Tamarind Hills Resorts situated just north of Darkwood Beach. However the report does not include a great deal of information on the area's biodiversity and natural environment.

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## BIBLIOGRAPHY

In addition to the above reviewed literature and materials, there are several additional documents that may be of significance to the SWW and adjacent regions, and they are included in the accompanying bibliography.

The reason for including them below may be that:

The team was unable to obtain copies for the review process, but thought the item significant enough to mention;

The material may not specifically focus on any given area, but the issues, situations and factors outlined, as well as the resources described are of interest and significance to the long-term management of the region; and

The document may be on the natural resources management, conservation or biodiversity/ecology of Antigua, and may be informative, one way or another, on the future challenges and issues for the long-term sustainable management of the SWW Region.

Ahmad, N. 1984. Land capability of Antigua and Barbuda. Depart. Reg. Dev., Organization of American States.

Ahmad, N. 1985. *Land use in Antigua and Barbuda*. Organization of American States.

Archer, A. 1984. *Report on the land-based sources of pollution in coastal, marine and land areas of CARICOM states*. Prepared for UNEP/CARICOM/PAHO project for the protection of the coastal and marine environment of Caribbean islands.

Bacon, P.R. 1991. *The status of mangrove conservation in the CARICOM islands of the Eastern Caribbean*. Report to the Commission of the European Communities as part of the Tropical Forestry Action Plan for the Caribbean Region.

Barnes, M.J.C. 1996. *A Provisional Guide to Some Common Moths of the Eastern Caribbean*. Unpublished in files of Island Resources Foundation.

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## APPENDIX I

### LIBRARY AND ONLINE RESOURCES FOR LITERATURE SEARCHES, RESEARCH AND INQUIRIES

Many of the more comprehensive and extensive collections are situated outside of the country, but they still offer an invaluable resource for anyone. However, there are several sources for information research that may be of interested anyone undertaking serious research. Most of the international organizations listed are located in the United States. This is despite the fact that much of the historical reports, notes, journals, diaries and letters are from European sources. Nevertheless, many of these documents are available from the Library of Congress, and now through monumental efforts to digitize old documents and make these more widely available, many collections are now accessible online.

#### INTERNATIONAL SOURCES

Brooklyn Public Library (BPL) [www.brooklynpubliclibrary.org](http://www.brooklynpubliclibrary.org)

Originally envisioned as a small network of libraries throughout the independent city of Brooklyn, the BPL system was approved by an Act of Legislature of the State of New York on May 1, 1892, and later passed by resolution of the Brooklyn Common Council on November 30, 1896.

Today, the BPL system is the fifth largest library system in the nation, existing independently alongside the New York Public Library (serving the Bronx, Manhattan, and Staten Island) and the Queens Borough Public Library. Consisting of 58 branches located within a half mile of every Brooklyn resident, plus a business library in Brooklyn Heights, and the only public bookmobile in New York City.

As an independent system, separate from the New York City and Queens libraries, the Brooklyn Public Library serves the borough's 2.5 million residents, offering thousands of public programs, millions of books and use of more than 850 free Internet-accessible computers.

The mission of Brooklyn Public Library is to ensure the preservation and transmission of society's knowledge, history and culture, and to provide the people of Brooklyn with free and open access to information for education, recreation and reference.

*NB:* Description taken from the BPL website.

**Food and Agricultural Organization (FAO) [www.fao.org](http://www.fao.org)**

In 1943, forty-four governments, met in Hot Springs, Virginia, the United States, and committed themselves to founding a permanent organization for food and agriculture.

In 1945, the first session of FAO Conference, which was held in Quebec City, Canada, established FAO as a specialized United Nations agency.

In 1951, the FAO headquarters was moved to Rome, Italy, from Washington, DC in the United States.

The FAO of the United Nations leads international efforts to defeat hunger. Serving both developed and developing countries, FAO acts as a neutral forum where all nations meet as equals to negotiate agreements and debate policy. FAO is also a source of knowledge and information. The Organization helps developing countries and countries in transition modernize and improve agriculture, forestry and fisheries practices and ensure good nutrition for all.

The FAO website is a great resource on various subject areas pertaining to food, forestry, fisheries, ecology and other issues. The site allows the searcher to access most of the organization's publications.

*NB:* Description taken from the FAO website.

**Journal Storage (JSTOR) [www.jstor.org](http://www.jstor.org)**

JSTOR was founded in 1995 to build trusted digital archives for the scholarly community. Today, it works with the scholarly community to preserve their work and the materials they rely upon, and to build a common research platform that promotes the discovery and use of these resources.

With participation and support from the international scholarly community, JSTOR has created a high-quality, interdisciplinary archive of scholarship, is actively preserving over one thousand academic journals in both digital and print formats, and continues to greatly expand access to scholarly works and other materials needed for research and teaching globally. The organization is investing in new initiatives to increase the productivity of researchers and to facilitate new forms of scholarship.

JSTOR is a not-for-profit organization dedicated to helping the scholarly community discover, use, and build upon a wide range of intellectual content in a trusted digital archive. The organization's overarching aims are to preserve a record of scholarship for posterity and to advance research and teaching in cost-effective ways. It operates a research platform that deploys information technology and tools to increase productivity and facilitate new forms of scholarship. JSTOR collaborates with organizations that can help it achieve its objectives and maximize the benefits for the scholarly community.

JSTOR is only available online and through participating subscriber institutions such as museums, libraries and research organizations. Access to JSTOR's material resources is not available to individuals outside of organizational membership. For countries such as Antigua and Barbuda, membership and access may be obtained through affiliated member institutions.

JSTOR has offices located in Ann Arbor, Michigan, and Manhattan, New York.

*NB:* Description taken from the JSTOR website.

**The New York Public Library (NYPL) [www.nypl.org](http://www.nypl.org)**

The New York Public Library consists of 86 libraries in the Bronx, Manhattan, and Staten Island: four world-acclaimed research libraries, a large network of neighborhood branch libraries, four central libraries with in-depth subject collections, and a library for the blind and physically handicapped. All libraries in the NYPL system may be used free of charge by all visitors.

The New York Public Library comprises simultaneously a set of scholarly research collections and a network of community libraries, and its intellectual and cultural range is both global and local, while singularly attuned to New York City.

It is historically a privately managed, nonprofit corporation with a public mission, operating with both private and public financing in a century-old, still evolving private-public partnership.

The NYPL was founded in 1895 as a private collection, and officially opened its doors on May 24, 1911.

*NB:* Description taken from the NYPL website.

**The Library of Congress (TLoC) [www.loc.gov/index.html](http://www.loc.gov/index.html)**

An agency of the legislative branch of the U.S. government, the Library of Congress (TLoC) encompasses several integral service and support units (see website for list). TLoC is the United States' oldest federal cultural institution and serves as the research arm of Congress. It is also the largest library in the world, with millions of books, recordings, photographs, maps and manuscripts in its collections.

The Library's mission is to make its resources available and useful to the Congress and the American people and to sustain and preserve a universal collection of knowledge and creativity for future generations. The Office of the Librarian is tasked to set policy and to direct and support programs and activities to accomplish the Library's mission.

Though much of the TLoC is searchable online, many of its collections are only available on-site and via the computer databases, accessible only via the Library computers.

The Library of Congress has offices and branches in the Washington, DC, Maryland and Virginia areas.

NB: Description taken from the TLoC website.

**Island Resources Foundation (IRF) [www.irf.org](http://www.irf.org)**

Island Resources Foundation (IRF) was founded in the U.S. Virgin Islands in 1972, dedicated to the premise that islands are special places, with particularly fragile environments and exceptionally vulnerable development options. The primary geographic focus for over three decades has been the insular Caribbean, and the central mission has been to assist small islands to meet the challenges of social, economic and institutional growth while protecting and enhancing their environments.

An underlying premise for all of the Foundation's work has been the recognition that, in small islands, *information* is the basis for informed decision making about the environment. Thus, when Island Resources was first organized in St. Thomas, U.S. Virgin Islands in the early 1970s, an early priority became the acquisition of documentation focused on environmental topics related to small islands, especially those in the Caribbean region.

Over time, in excess of 10,000 documents, books, unpublished reports, maps and photographs on insular ecosystems, historic and scenic places, tourism, coastal resource management, marine pollution, land use management, parks and protected areas, marine recreation, beaches, coral reefs, coastal erosion, environmental impact assessment, environmental planning, species and other resources undergoing change were assembled at the Foundation's headquarters in St. Thomas.

In addition to collecting documentation on priority subject areas, at both an island-specific and Caribbean-regional level, each of the nearly 200 discrete projects the Foundation has developed and implemented has involved the assembly of vast amounts of more detailed data and information, significantly adding to our library holdings year by year, island by island, and by project.

As the Foundation's library became better known among neighboring islands, regional institutions, government agencies and international bodies, and as the Foundation developed its own publication series, exchange arrangements became possible, which also added to the Foundation's ability to acquire new materials for its library collection.

In the Caribbean, the IRF library has remained unmatched. To help keep track of this expanding collection, in the early-1990s the Foundation, in cooperation with the Eastern Caribbean Center at the University of the Virgin Islands, cataloged a part of the Foundation's library using CDS-ISIS library cataloging software (from UNESCO via ECLAC licensing). Materials cataloged at that time primarily focused on the Caribbean

geographic collection and included approximately 40 percent of the shelved materials.

In 1997, the Foundation donated its regionally recognized library at St. Thomas to the College in Tortola. The collection is now housed at the College's Learning Resource Centre at the Paraquita Bay campus of the H. Lavity Stoutt Community College.

A satellite library was established in the mid-1980s at the Foundation's Washington, DC office. Approximately 25 percent of the primary library holdings are now available at the Washington facility.

**Biodiversity Heritage Library (BHL) [www.biodiversitylibrary.org/About.aspx](http://www.biodiversitylibrary.org/About.aspx)**

The Biodiversity Heritage Library is a work in progress. Ten major natural history museum libraries, botanical libraries, and research institutions have joined to form the Biodiversity Heritage Library Project. The group is developing a strategy and operational plan to digitize the published literature of biodiversity held in their respective collections. This literature will be available through a global "biodiversity commons."

The participating libraries have over two million volumes of biodiversity literature collected over 200 years to support the work of scientists, researchers, and students in their home institutions and throughout the world. The 10 member libraries of the Biodiversity Heritage Library (BHL) members now have over 1.124 million pages of key taxonomic literature available on the web.

The BHL will provide basic, important content for immediate research and for multiple bioinformatics initiatives. The core of our natural history and herbaria library collections will be available to a truly global audience. Web-based access to these collections will provide a substantial benefit to people living and working in the developing world -- whether scientists or policymakers.

- Participating institutions include:
- American Museum of Natural History (New York, NY)
- The Field Museum (Chicago, IL)
- Harvard University Botany Libraries (Cambridge, MA)
- Harvard University, Ernst Mayr Library of the Museum of Comparative Zoology (Cambridge, MA)
- Marine Biological Laboratory / Woods Hole Oceanographic Institution (Woods Hole, MA)
- Missouri Botanical Garden (St. Louis, MO)
- Natural History Museum (London, UK)
- The New York Botanical Garden (New York, NY)
- Royal Botanic Gardens, Kew (Richmond, UK)
- Smithsonian Institution Libraries (Washington, DC)

The Biodiversity Heritage Library Project strives to establish a major corpus of digitized

publications on the Web drawn from the historical biodiversity literature. This material will be available for open access and responsible use as a part of a global Biodiversity Commons. We will work with the global taxonomic community, rights holders, and other interested parties to ensure that this legacy literature is available to all.

*NB:* Description taken from the BHL website.

### Online Search Engines and Resources:

Google [www.google.com](http://www.google.com), Yahoo [www.yahoo.com](http://www.yahoo.com) and [www.bing.com](http://www.bing.com)

Although it may seem a cliché, online search engines and resources are invaluable tools for locating documents and information on just about any subject. Not only can they lead a searcher to documents, but they also provide access to images, names, places, people and various types of information, and a searcher may also ask questions and get answers.

Copies of quite a number of the references listed in this document may be found by doing a broad or specific query using these search engines.

Wikipedia [http://en.wikipedia.org/wiki/Main\\_Page](http://en.wikipedia.org/wiki/Main_Page)

Wikipedia is a multilingual, Web-based, free content encyclopedia project. The name Wikipedia is a portmanteau (combination of words and their meanings) of the words wiki (a type of collaborative Web site) and encyclopedia. Wikipedia's articles provide links to guide the user to related pages with additional information.

Wikipedia is written collaboratively by volunteers from all around the world. Since its creation in 2001, Wikipedia has grown rapidly into one of the largest reference Web sites, attracting at least 684 million visitors yearly by 2008. There are more than 75,000 active contributors working on more than 10,000,000 articles in more than 250 languages. As of today, there are 2,573,601 articles in English; every day hundreds of thousands of visitors from around the world make tens of thousands of edits and create thousands of new articles to enhance the knowledge held by the Wikipedia encyclopedia.

Because Wikipedia is an ongoing work to which, in principle, anybody can contribute, it differs from a paper-based reference source in important ways. In particular, older articles tend to be more comprehensive and balanced, while newer articles more frequently contain significant misinformation, un-encyclopedic content, or vandalism. Users need to be aware of this to obtain valid information and avoid misinformation that has been recently added and not yet removed (see *Researching with Wikipedia* for more details). However, unlike a paper reference source, Wikipedia is continually updated, with the creation or updating of articles on topical events within seconds, minutes or hours, rather than months or years for printed encyclopedias.

With this in mind, though enormously popular, and used extensively by students, researchers and lay people, Wikipedia should always be used with some caution. Facts obtained from the site should always be checked and re-checked for accuracy.

Wikipedia is hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other projects.

NB: Description taken from the Wikipedia website.

## REGIONAL AND LOCAL SOURCES

### Environmental Awareness Group (EAG) [www.eag.org.ag](http://www.eag.org.ag)

The EAG was established in 1989 and is of the few NGOs in Antigua.

The Group helps local people and visitors from overseas appreciate the importance of conserving the wildlife and natural resources of Antigua and Barbuda. It receives and gives out environmental information and works on conservation projects in partnership with the Government, the general public, private companies and overseas organisations.

The EAG maintains an extensive collection of materials in its library, located at the Antigua and Barbuda Museum on Long Street. Much of this information was collected during preparation of the *Antigua and Barbuda Environmental Profile*, from the period from 1989 to 1991. It was the explicit wish of the technical team leader and profile author, Island Resources Foundation that the local NGOs working on the Profile are provided with the extensive research materials and data coming out of the writing of the document. This was left with the EAG and in some respect, with the Museum resources library as well.

Though not available online, the EAG library is an important resource for students, researchers and visitors.

### Caribbean Journal of Science (CJS) [www.caribjsci.org](http://www.caribjsci.org)

The CJS began publication in 1961 with the sponsorship of the College of Arts and Sciences of the University of Puerto Rico at Mayagüez. Its mission as a non-profit scholarly journal is to publish quality papers about Caribbean natural science and to make them widely available--free of cost over the Internet and at a low price in the traditional printed medium.

The CJS website has been online since 1995, and in 1997 it began supplementing the printed journal with a digital version. The CJS was the first scientific journal to digitalize its complete collection and offer it in a CD-ROM, and is one of the few journals that offer free and unrestricted access to all its articles.

The CJS publishes articles, research notes, and book reviews pertinent to the Caribbean region. The emphasis is on botany, zoology, ecology, conservation biology and management, geology, archaeology, and paleontology. The CJS now publishes three issues (February, June and October) per year.

*NB:* Description taken from the Caribbean Journal of Science website.

**International Institute of Tropical Forestry (IITF)** [www.fs.fed.us/global/iitf/about.html](http://www.fs.fed.us/global/iitf/about.html)

The International Institute of Tropical Forestry (IITF), US Department of Agriculture - Forest Service, was created in 1939 in Río Pederast, Puerto Rico. As a scientific institution, the IITF is committed to research in tropical forestry and the transfer of technologies. To address aspects of physical, social, and economic issues in managing tropical forests, the IITF has more than sixty years of experience in interdisciplinary research.

The IITF is involved in partnerships for policy and program coordination with many local government agencies as well as with non-government conservation organizations. A recent and expanding effort provides guidance and financial incentives to local authorities for projects in urban forestry. Research partnerships exist with over fifty institutions. Internationally, staff consultancies and research have occurred in virtually all of the Caribbean Island, Mexico, Central America, South America, and parts of tropical Asia.

Though not searchable online, IITF provides a list of its publications and allows the researcher to request publications through its online portal.

*NB:* Description taken from the IITF website.

**Museum of Antigua and Barbuda (MoAB)** [www.antiguamuseums.org](http://www.antiguamuseums.org)

The Museum of Antigua and Barbuda on Long Street, St. John's, was opened in 1985 by the Historical and Archaeological Society by Desmond Nicholson. The Society was established in 1956.

The Museum is a must on the primary and secondary school and the tourist circuit. It is an important research and information source for local, regional and international scientists, students and individuals interested in the history of Antigua and Barbuda, and indeed the Caribbean region.

MoAB hosts an extensive collection of historical, archaeological, environmental and ecological material, though this is not searchable via the Internet. However, the museum provides a list of its publications online. Nevertheless, the Museum library is an important resource for information on the SWW. The few old and dated historical images of Wallings are housed here at the Museum.

**National Archives of Antigua and Barbuda (NAoAB)**

The National Archives operates under the direction of the Ministry of Education and is located at Victoria Park, St. John's.

Unfortunately, the archives resources are not available online, and until then, research inquiries are accepted via postal mail, and research is done at no charge but for copying and postal costs. Nevertheless, the Archives is an important local resource, especially since much of the information on some of the estates and for official Leeward Islands government documents.

**Antigua Public Library (APL) [www.antiguapublib.info](http://www.antiguapublib.info) and [www.antiguapublib.org](http://www.antiguapublib.org)**

The Public library was founded in 1830 as a private venture. The aim was the "gradual formation of a permanent library of general literature, and the establishment in connection with the library, of a reading room." Before 1843, the establishment of the Antigua Library Society by an act of parliament transformed the library's status to that of a corporation. However, in 1843 its proprietors were ruined when an earthquake not only damaged their private properties, but also partially destroyed the library. This led to the property becoming government owned in 1854. The library was then managed by trustees whose powers were increased in 1871.

In 1900, the city board "superseded the trustees and undertook its maintenance and control." In 1907 the City Board was abolished and Ordinance 4 was enacted empowering the Governor to appoint "trustees of the real and personal property of the library, and to make rules for its management. The trustees then regarded the building and contents as trust property.

In 1974 a major earthquake again damaged the building and it was judged unsound. Subsequently, in 1975, the library was temporarily moved to a new location, upstairs of the Silston's Library, and its services were reduced to a primary focus on children. It was again moved to Lolita's building on Market Street in 1978. Here the adult library opened its doors, but there was not enough space to accommodate a children's library. This was added one year later, when in 1979 additional space was rented in the same building to house the Children's Department.

*NB:* Description taken from the APL website.

**Private Collections And Resources**

Private materials are sources are perhaps the most unique information resource available to researchers and interested persons. Much of the information from private sources that were obtained for this review come from the collections of team members, long-term IRF associates and colleagues.

Island Resources tapped into the collections and expertise of a number of people, including:

- **Kevel Lindsay**, current project's Principal Investigator – Brooklyn, NY
- **Jean-Pierre Bacle**, current project's Natural Resource Specialist - Washington, DC
- **Brian Cooper**, EAG President - Antigua
- **McRonnie Henry**, former Antiguan Forestry Officer – Maryland

Much of the information collected by these individuals is not available for circulation and is not formally cataloged. However, given the breadth of knowledge that they possess, these individuals are key sources for rare bits and pieces of information, documents, reports, and events, and can provide guidance on a host of subjects and issues.