



## **About BIOPAMA**

The Biodiversity and Protected Areas Management (BIOPAMA) programme aims to improve the long term conservation and sustainable use of natural resources in African, Caribbean and Pacific (ACP) countries, in protected areas and surrounding communities. It is an initiative of the Organisation of African, Caribbean and Pacific States financed by the European Union's 11th European Development Fund (EDF), jointly implemented by the International Union for Conservation of Nature (IUCN) and the Joint Research Centre of the European Commission (JRC). Building on the first five years of activities financed by the 10th EDF (2012-2017), BIOPAMA's second phase provides tools for data and information management, services for improving the knowledge and capacity for protected area planning and decision making, and funding opportunities for specific site-based actions.[www.biopama.org](http://www.biopama.org)



# State of the Portland Bight Protected Area 1999-2022



With the financial support of the European Union and the Organisation of African, Caribbean and Pacific States through the BIOPAMA Programme

## **State of the Portland Bight Protected Area 1999-2022 Report**

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### **Credits for photographs**

Many thanks to the photographers who have donated their works for use by C-CAM for conservation purposes and for use in this book. They include Ann Haynes-Sutton (who took the majority of the photographs), Robin Moore, D. Brandon Hay, Ingrid Parchment, Troy Franklin, Vaughan Turland, Suzanne Palmer, TNC/Red Cross and many others.

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### **Abbreviations used in the text**

AZE - Alliance for Zero Extinction

C-CAM - Caribbean Coastal Area Management Foundation

IAS - Invasive Alien Species

ICENS - International Centre of Environmental and Nuclear Sciences

NEPA - National Environment and Planning Agency

NFA - National Fisheries Authority

NRCA - Natural Resources Conservation Authority

PBDC - Portland Bight Discovery Centre

PBPA - Portland Bight Protected Area

SFCA - Special Fishery Conservation Area

SODECO - Solutions for Developing Countries

UDC - Urban Development Corporation

UWI - University of the West Indies

### **Acknowledgements**

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**Fish populations increase on C-CAM's artificial reef in the PBPA**

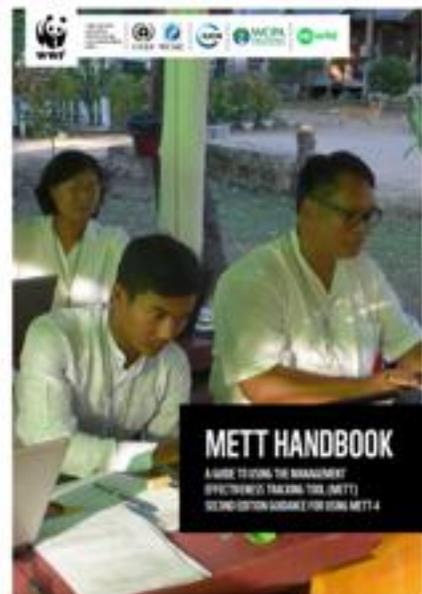
# Introduction

## Background

This document was prepared as part of a project called **“Implementing adaptive management of the Portland Bight Protected Area through METT-4 assessment”** that was funded by **BIOPAMA**. This documents highlights progress made by Portland Bight Protected Area (PBPA) partners towards addressing issues identified through METT

## BIOPAMA Project Objectives

- To assess the current state of the Portland Bight Protected Area (PBPA) using the Management Effectiveness Tool (METT)
- To test the use of the new METT-4
- To review available data on monitoring in the PBPA and prepare a popular summary “*State of the PBPA*” report.



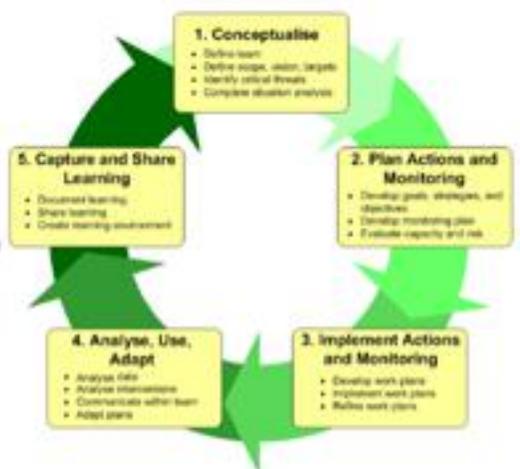
## Management Effectiveness Tracking Tool (METT)

The METT is a standard approach to tracking how well protected areas are doing. It was developed by the International Union for Conservation of Nature (IUCN) and has been adopted as a standard by many governments around the world, including Jamaica.

## Implementing the METT in the PBPA

Implementing the METT is a participatory process involving all the management agencies and representative stakeholders who get together to complete a questionnaire. The most recent METT in the PBPA was completed in May 2022.

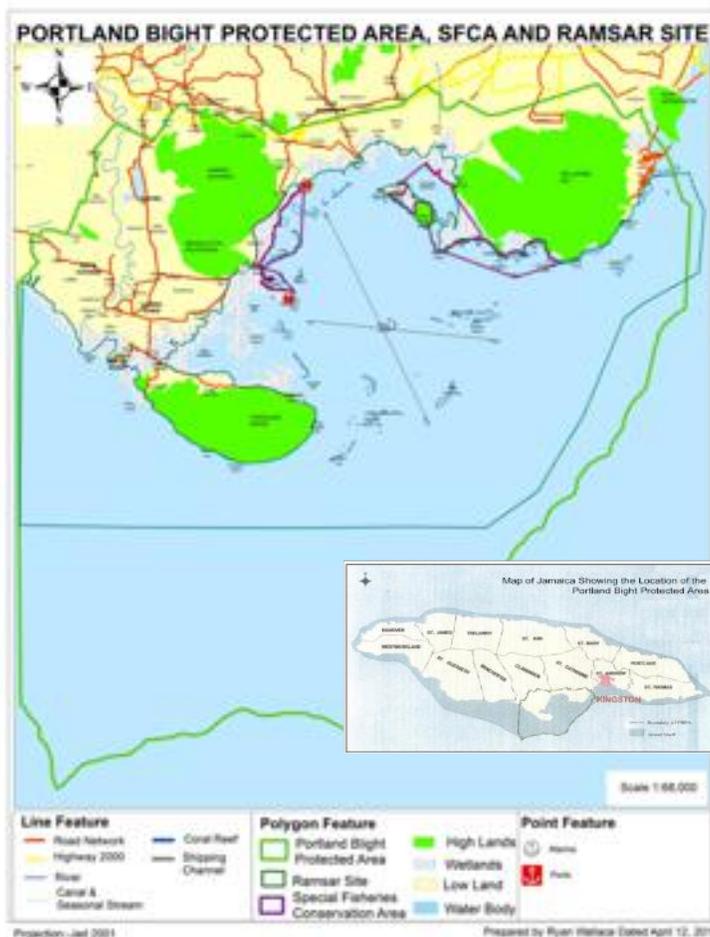
## Adaptive Management Cycle



## Adaptive Management

Adaptive management uses evidence from monitoring, evaluation and research to inform natural resource management decisions, incorporate them in plans, monitor the outcomes and then use the results to revise approaches for the next cycle of planning.

# About the PBPA



**PBPA FACTS**

- Total = 187,975 ha
- Land = 51,975 ha (5% of Jamaica's land area)
- Dry limestone forest 21,025 ha
- Sea = 135,640 ha (48% of Jamaica's island shelf)
- Wetland = 8,200 ha

## Sub-area protection in the PBPA

- **Portland Bight and Cays Ramsar site** (International Convention on Wetlands of International Importance Especially for Waterfowl).
- **Forest Reserves** (Hellshire Hills and Peake Bay) (Forest Act) .
- **Special Fishery Conservation Areas (SFCAs)** (Three Bays, Salt Harbor and Galleon Harbour) (Fisheries Act).
- **Game Reserves** (West Harbour-Peake Bay, Amity Hall, Long Island, Cabaritta Point) (Wild Life Protection Act).
- **Protected National Heritage sites** (e.g. Portland Ridge Lighthouse).

The PBPA was gazetted as a “Protected Area” under the Natural Resources Conservation Authority Act on Earth Day April 22nd, 1999. It is a multiple-use area that includes terrestrial and marine areas - agriculture, settlements, industrial and commercial areas and wilderness.

It roughly equates to an IUCN category IV - *Protected area with sustainable use of natural resources.*

The PBPA is an internationally recognized Key Biodiversity Area (Critical Ecosystem Partnership Fund), an Important Bird Area (BirdLife International) and an Alliance for Zero Extinction (AZE) site.

**Vision for the PBPA**

The PBPA is sustainably and collaboratively managed to conserve its biodiversity and preserve its cultural heritage, while providing an improved quality of life for all.

# Working together to conserve Portland Bight

**The PBPA partnership:** The overall PBPA is managed by C-CAM on behalf of the **Natural Resources Conservation Authority (NRCA)**. The **Urban Development Corporation (UDC)** manages the Hellshire Hills and Goat Islands sub-area. Other partners include the **Forestry Department, National Fisheries Authority** and **Jamaica National Heritage Trust**. These partners constitute the **Portland Bight Management Committee** which meets quarterly. C-CAM leads the preparation of PBPA Management Plans and the annual Operations Plan. The partners jointly implement the management and operations plans and incorporate the recommendations into their annual budgets.



## Community participation

The communities of the PBPA have been involved in management of the area since its creation in 1998.

This includes participation in the management planning process and user councils, the oldest of which is the **Portland Bight Fisheries Management Council**, which has been meeting every month since 1995. A Forest Management Council will be re-established in 2022.

## Management planning for the PBPA

**Management Plans:** 1998-2003; 2013-2018.

### **Sub-area plans**

- Hellshire Hills and Goat Islands, Portland Ridge; Great Goat Island (draft)
- Three Bays SFCA, Galleon Harbour SFCA, Salt Harbour SFCA

### **Biodiversity Plans**

- Hellshire Hills and Goat Island PBPA
- Portland Ridge

### **Annual multi-agency operations plans**



## **C-CAM's Mission:**

To promote conservation, sustainable development and livelihoods in coastal areas of Jamaica, particularly the Portland Bight Protected Area.

# About C-CAM

**Caribbean Coastal Area Management Foundation (C-CAM)** [www://ccam.org,jm](http://www://ccam.org,jm)

**C-CAM is a not for profit company and charity** registered in Jamaica. It is based in Lionel Town, Clarendon. Since 2003 it has managed the Portland Bight Protected Area under an Memorandum of Understanding with the Natural Resources Conservation Authority.

**.Where we work:** PBPA - (Main Office -Lionel Town, Field Office and Portland Bight Discovery Centre, Salt River) and previously at Pedro Cays.



**C-CAM's Vision: A strong innovative NGO leading Jamaica's coastal conservation and management.**

# Portland Bight Discovery Centre in Salt River



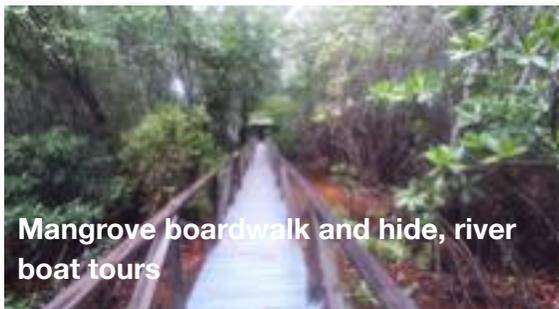
**PBDC: Increasing awareness of mangroves, dry forests and freshwater ecosystems and building capacity for climate change adaptation**



The PBDC was established in 2015 with funding from many donors.

It is the focal point for C-CAM's education, awareness and adaptation programmes and *ex situ* plant conservation.

It provides a unique opportunity to experience wetlands and to learn about the biodiversity and culture of the area, and climate change.



# Dry Forests

**Importance:** The forests of the PBPA are globally important because this type of habitat is so rare and threatened everywhere, They provide many ecological services and support human livelihoods.

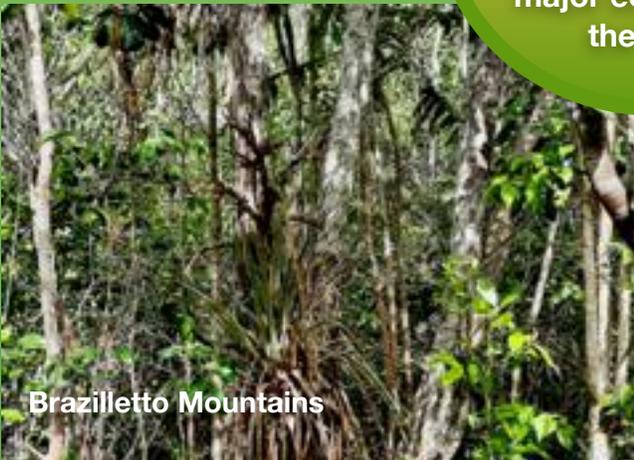


Portland Ridge



Hellshire Hills

Tropical dry forests are the most endangered and least understood major ecosystem in the world.



Braziletto Mountains



Kemps Hill

## Monitoring

- Permanent forest plots in central Hellshire.
- Numbers of patrols and prosecutions.

## Research

- University of the West Indies: various studies of dry forest ecology and birds.
- Anolid lizard genetics.

Hellshire Hills are the best examples of old growth tropical dry forest on limestone in the Caribbean.

## Challenges

- **Unsustainable use** of forest resources (e.g. excessive charcoal burning, harvest of logs, posts, sticks for fish pots, yam sticks, collection of wild orchids, etc.).
- **Invasive species** (especially mongoose, rats, Cuban Tree Frog, cats, dogs, goats and pigs).
- **Climate change** e.g. increasing frequency of hurricanes and droughts, increasing temperatures, increasing intensity and frequency of forest fires.
- **Insufficient staff and resources** for patrols, monitoring and research into the current status, distribution, and threats to species and ecosystems.



Jamaican Hutia



Spiny Tuna

Threatened animals known only from the PBPA and nowhere else in the world include:

- Jamaican Iguana *Cyclura collei*
- Portland Ridge Cave Frog *Eleutherodactylus cavernicola*
- Blue-tailed Gallywasp *Celestus dusquesneyi*
- Portland Ridge Trope *Trophidophus stullae*

## Successes

- Headstarting Jamaican Iguanas.
- PWD and Jackson Bay Gun Clubs reduce intrusions into the forest on Portland Ridge.
- Hellshire Hills patrolled by UDC rangers.
- Decreasing numbers of charcoal burners in some areas.
- Endangered forest plants are being cultivated at the C-CAM Conservation Nursery at Salt River.
- Goat numbers reduced on the Goat Islands.
- Fire suppression training for volunteers.
- Comprehensive botanical survey of Hellshire Hills and Goats Islands (2013) and partial survey of Portland Ridge (2013).
- Plans for creation of Great Goat Island Wildlife Sanctuary and supporting studies.
- Rescues of Yellow Snakes.
- Removal of alien invasive Green Iguana *Iguana iguana* from Portland Ridge.
- Effective management of game bird hunting.
- EU project funding for forest conservation.

Threatened plants known only from the PBPA and nowhere else in the world include:

- Grey Birch *Bursera hollicki*
- Jamaican Opuntia *Opuntia jamaicensis*
- Spiny Tuna *Opuntia spinosissima*

# Wetlands

**Importance:** The PBPA includes 8300 ha of Jamaica's approximately 9715 ha of mangroves. It includes 105 km of mangrove coastline - more than in any other part of Jamaica. The PBPA mangroves are mainly in good condition, and provide many ecological functions including coastal protection, fish nurseries, blue carbon sequestration and storage, habitat for economically important and threatened species.

The Cockpit Salt Marsh is one of the very few herbaceous wetlands in Jamaica outside Negril and Black River Morasses. There is also a unique seasonal wetland in Harris Savanna, which is dry most of the time but after exceptionally heavy rain it floods and a site endemic



86% of Jamaica's mangroves occur in the PBPA

Cockpit Salt Marsh

## Challenges

- Coastal development.
- Coastal erosion and sea level rise.
- Hurricane and storm damage.
- Harvest of lumber.
- Grazing by goats.
- Difficulties of coordination of survey and management efforts.
- Low level of implementation of management plans.
- Failure of mangrove replanting caused by failure to restore suitable conditions.

## Successes

- Declaration of the PB Wetlands and Cays Ramsar site (2006).
- Establishment of Portland Bight Discovery Centre in Salt River, with a focus on wetland interpretation.
- Assessments of mangrove.
- Mangrove restoration at Rocky Point funded by Jamalco.
- C-CAM support for National Mangrove Management Plan (2022).

The Portland Bight Wetlands and Cays Ramsar site is internationally recognised under the "Convention on Wetlands of International Importance especially as Waterfowl Habitat". There are only 4 Ramsar sites in Jamaica

## Wetland Restoration

In general in the PBPA, most sites that are suitable for mangroves are supporting mangroves. Where mangroves are dying and not naturally regenerating, this is caused by hydrological or other limiting factors, that must be addressed before restoration start. Therefore mangroves replanting without hydrological restoration is rarely successful and is not recommended.

C-CAM has developed a mangrove restoration plan for Peake Bay. TNC/Red Cross/University of the West Indies for the Old Harbour Bay area. SODECO is developing plans for mangroves in the centre of the PBPA.

C-CAM has restored mangroves that were damaged by an chemical spill near Rocky Point port. with support from Jamalco.



Greater Yellowlegs

## Wetland bird surveys

- C-CAM surveys and management plan for land birds in mangroves (2000-2001).
- Long-term bird banding programme at Salt River 2015-present.
- Caribbean Waterbird Census - annual surveys.
- International Shorebird Surveys - annual surveys.



Loss of the connection to the sea caused mangroves to die at Peake Bay

## Mangrove surveys

- C-CAM 1997-8: Comprehensive surveys of all mangroves in PBPA.
- C-CAM Land Birds in Mangroves.
- Forestry Department National mangrove assessment -2018 included sites in the PBPA.
- The Nature Conservancy/Red Cross (2020) assessments of mangroves near Old Harbour Bay.
- World Bank (2019) The national assessment of the economic value of coastal protection services provided by mangroves (including Old Harbour and Portland Cottage.
- UWI SODECO mangrove assessments in central PBPA.



Surveying mangroves



Planting mangroves

# Coral Reefs

**Importance:** The south shelf of Jamaica is at its widest wide off Portland Point (about 18 km, 11 miles). Much of this shelf area – and the waters of the bight itself – is sand and seagrass, but there are significant patches of coral reefs. Coral reefs are essential habitat for reef fish, and healthy coral reefs are a prerequisite for a healthy fishery. Good fisheries management practices will be to no avail if the coral reefs are degraded and cannot support enhanced fish stocks.



## Challenges

- Nutrient inflows from prevailing currents from Kingston Harbour, gullies and submarine springs.
- Poor fishing practices (including dynamite fishing mainly in the 1980s-90s).
- Overfishing and depletion of algae-eating species such as Parrotfish.
- Hurricane damage.
- Limited resources to control algae and Lionfish on BioRock reefs and coral nursery.
- Damage from shipping (pollution, grounding and anchors).
- Need to develop an additional SFCA including best coral reefs in the central PBPA.

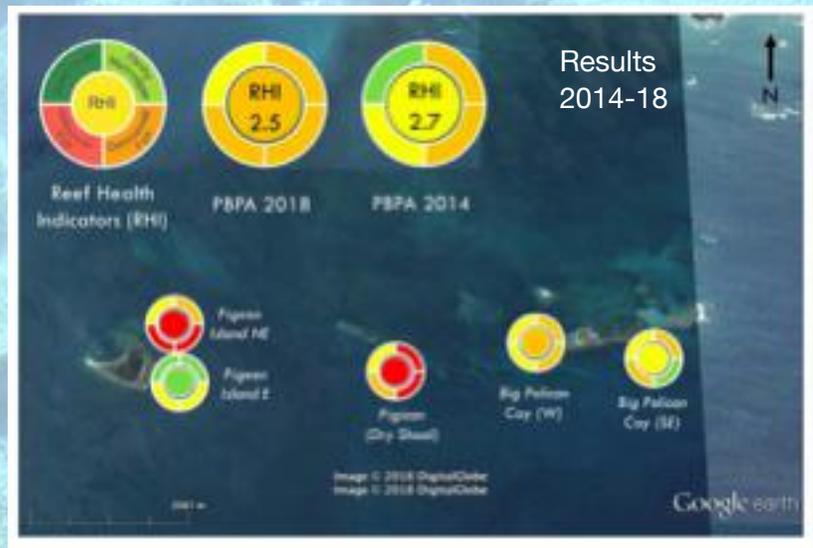
## Successes

- Reduction of dynamite fishing.
- Education and outreach.
- Successful trial installation of artificial BioRock reefs and coral nursery.
- Regular monitoring.
- Training fishers in SCUBA diving to assist with reef monitoring.



## Coral Reef surveys and monitoring

Coral reef monitoring in the PBPA began with a comprehensive assessment in the 1990s. Further assessments were carried out by the Jamaica Coral Reef Monitoring Network before and after Hurricane Ivan. NEPA also monitors sites in the PBPA as part of its national programme of Coral Reef Health Status reports. C-CAM (Palmer et al.) surveyed selected sites in 2014, 2018 and 2021. Results show that the reefs are in fair to poor condition and that condition declined between 2014 and 2018. Fish diversity was good but it was mainly composed of juveniles.



## BioRock Artificial Reefs

BioRock artificial reefs have been installed in Three Bays and Salt Harbour SFCAs. They are supporting coral growth and attracting fish.

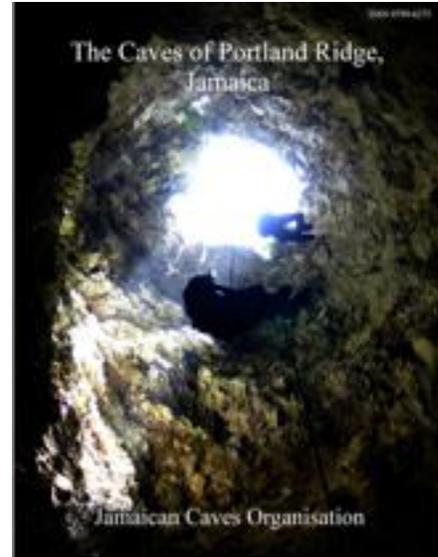
A coral nursery established at Pigeon island was working well until it was damaged by fishing gear.



Results: Palmer et al. 2014-18

# Caves

The known caves of the PBPA are located mainly in the Hellshire Hills and Portland Ridge. They are of outstanding importance for endemic species, (including the Portland Ridge Cave Frog *Eleutherodactylus cavernicola* and a possible new species of blind cave fish), ecological services (including providing habitat for at least 13 of Jamaica's 21 species of bats) and Taino artifacts. With the assistance of the Jamaica Caves Organization, C-CAM has supported a caves inventory and conservation planning but currently none of the caves has any special protection and there are no monitoring programmes,

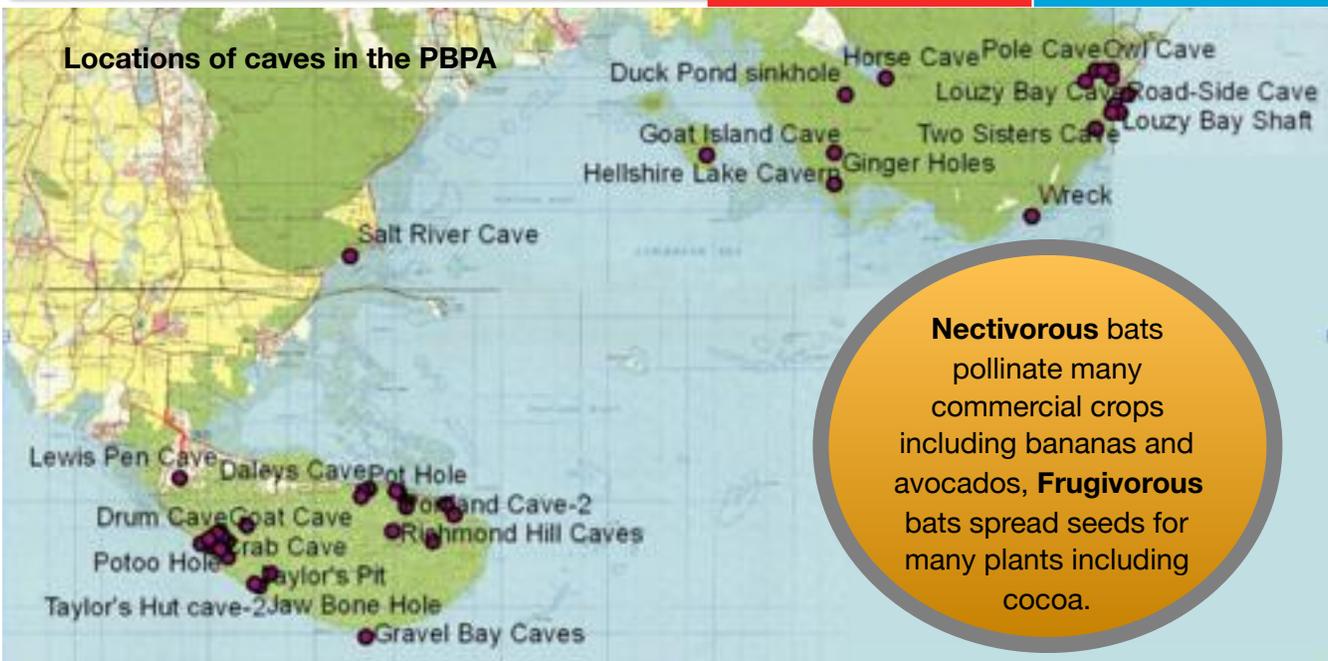


## Challenges

- Disturbance from tourists, guano harvesters and looters.
- Caves have no special protection.
- IAS - goats, rats, cockroaches etc.

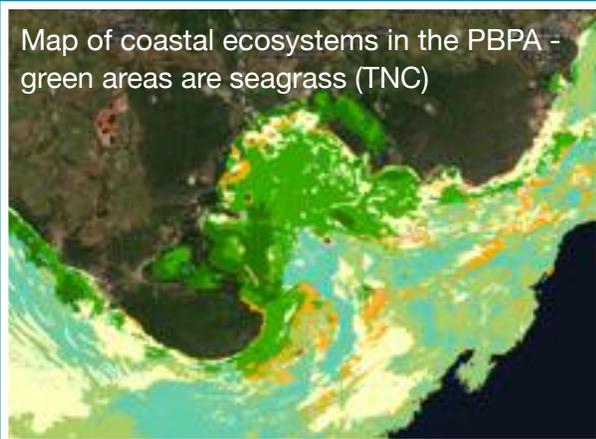
## Successes

Documentation of caves by Jamaica Caves Organization with support from C-CAM.



**Nectivorous** bats pollinate many commercial crops including bananas and avocados, **Frugivorous** bats spread seeds for many plants including cocoa.

# Seagrass beds



**Importance:** Often taken for granted, seagrass beds make a major contribution to the ecology and economy of the PBPA. They provide intermediate habitat between the reefs and the mangroves and provide habitat for juveniles of many commercially important species, including conch, lobsters and many species of fish. They stabilize the coastline and increase resilience to hurricanes and storms. They trap sediments and remove excess nutrients that could otherwise damage reefs. They fix and store blue carbon and provide habitat for threatened species including Green Turtles *Chelonia mydas* and West Indian Manatees *Trichechus manatus*.

<p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Hurricane damage.</li> <li>• Bottom trawls for shrimp (usually at night when patrolling is dangerous).</li> </ul>	<p><b>Seagrass beds sequester carbon 35x faster than rain forests</b></p>	<p><b>Successes</b></p> <ul style="list-style-type: none"> <li>• Protection of large areas of seagrass in Three Bays, Galleon Harbour and Salt Harbour SCFAs.</li> <li>• PIOJ surveys..</li> </ul>
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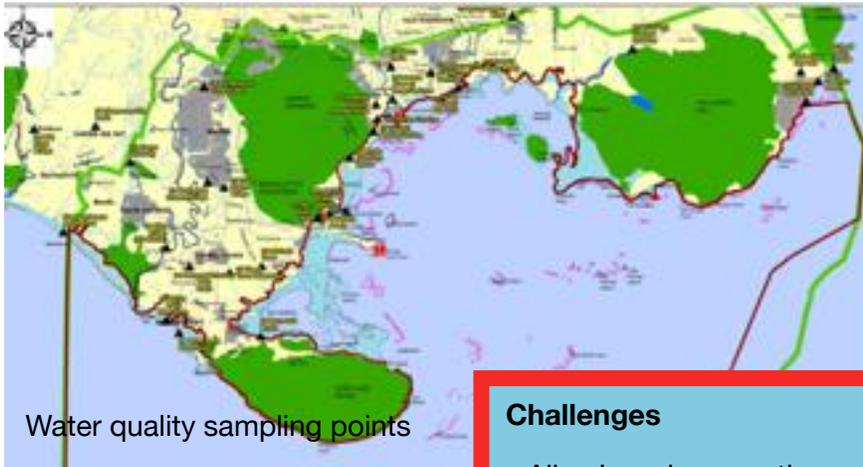
**Surveys and monitoring**

Regular patrols of the SCFAs show the presence of at least 2 manatees. This is very important because manatees are very rare in Jamaica,, with an estimated national population of less than 100.

NEPA and PIOJ are carrying out seagrass surveys in selected sites islandwide.



# Freshwater



- Challenges**
- Alien Invasive aquatic animals, plants.
  - Pollution.
  - Drought.
  - Habitat loss.
  - Saline intrusion due to excess abstraction of water
  - Conversion of freshwater wetlands.

Freshwater ecosystems are of outstanding importance for biodiversity, ecology, the economy and basic human needs. They are also among the least well-conserved ecosystems in Jamaica and the least studied in the PBPA. The drainage systems of the PBPA have been extensively modified to provide water to irrigate the sugar cane fields and other agriculture.



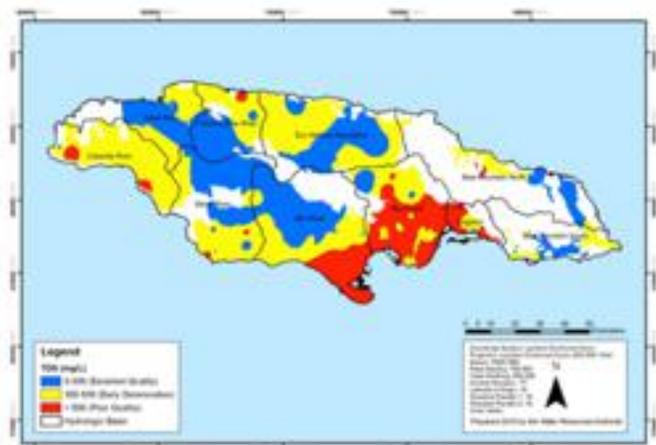
Many rivers, streams that originate far inland and gullies empty into the sea in the Portland Bight. Therefore land use practices in the hills influence water quality and sediment regimes on the coast.

As well as the large rivers of Rio Minho and Rio Cobre, there are several smaller channels and creeks (e.g. Bowers River, Salt River, Cockpit River, Salt Island Creek, Bower's Gully, Breadnut Gully, Calabash Gully, Coleburn's Gully, and Salt Gully). There are freshwater and brackish ponds in Hellshire Hills. Some abandoned fish farms still hold water.

**Successes**  
Freshwater quality monitoring programme established.

The Rio Minho has a poorly developed estuary with a small fan, mud flats and ponds and there is an associated complex of coastal lagoons to the west.

Water quality is generally poor in the PBPA.



# Sandy Beaches and Cays

**Importance;** Sandy beaches are found around Hellshire and western Portland Bight. They include some white sand beaches as well as beaches with grey or black sand - volcanic sediments that are carried from the interior via the rivers. The beaches and cays are very important for wildlife and recreation. Seabirds, marine turtles, and crocodiles nest there, Shorebirds feed there. They are also very attractive and of interest to tourists, although rough seas make them inaccessible for much of the year. Rare and endangered reptiles like the Jamaican Skink *Spondylurus fulgidus* may survive on the cays.



## Successes

- Draft cays policy prepared.
- Survey of cays (now out of date).
- Assessment of changes in beaches.

## Challenges

- No special protection or zoning for cays and beaches.
- Sea level rise and hurricane damage mean that cays and beaches are being eroded away after protective barrier reefs are destroyed.
- Invasive species including rats, cats and dogs compete with wildlife for habitat.
- Increasing frequency and volume of Sargassum deposits.
- Unregulated use including fishing camps and tourism threaten wildlife.
- Finding effective and acceptable solutions for beach erosion at Half Moon Fishing Beach, Hellshire and Old Harbour Bay.

Coastal erosion at Half Moon Bay fishing beach



## Monitoring

- C-CAM monitors beach erosion at beaches across the PBPA using the SandWatch protocol. NEPA monitors Hellshire and Jackson Bay,

# Fisheries



There are 3,000-4,000 fisherfolks in the PBPA, while an unknown number of fisherfolks from Kingston, Port Royal and the north coast also use the area. The number of persons who benefit from the fishery is much greater, including fish vendors, fish cleaners, cook shops and restaurant operators.

There are nine designated fishing beaches and 16 fish landing beaches in the area, with fisherfolks reporting a collapse of the fish stock since the 1980s. Old Harbour Bay and Rocky Point are among the largest landing beaches in Jamaica.



A study in 2008 showed that profits from fishing are marginal; nevertheless, fisherfolks continue to consider fishing an important component of their livelihoods.

The National Fisheries Authority (NFA) (formerly the Fisheries Division) is responsible for managing the fishery generally, while C-CAM manages the three SFCAs in partnership with the NFA.

Fisheries management is an important component of C-CAM's programmes. This includes the management of the three **Special Fisheries Conservation Areas (Salt Harbour, Galleon Harbour and Three Bays)**.

**Monitoring:** Data that are collected by C-CAM include the number of patrols, the number of infractions observed and incidental observations of turtles, manatees, dolphins and birds. The NFA monitors the number of registered fishers and estimated fish landings.



## Challenges

- Overfishing.
- Illegal fishing in SFCAs especially at night when patrols are unsafe.
- Pollution.
- Use of unsustainable methods inside and outside the SFCAs.
- Smuggling, drugs for guns trade and other serious crimes.

## Successes

- Establishment of SFCAs and general observance of laws by the majority of fishers.
- The majority of fishers support the SFCAs and believe they are



C-CAM Conservation Officers preparing for a survey

# Seabirds

## Importance

- Seabirds indicate marine health
- Coral reefs near seabird colonies are healthier
  - Fisheries near seabird colonies are more productive.
  - PBPA is the most important area for inshore seabird colonies in Jamaica.



Brown Noddies *Anous stolidus* ~ 250 pairs nest on Little Half Moon Cay. Reportedly there were tens of thousands there in the 1960s.

## Objectives of monitoring

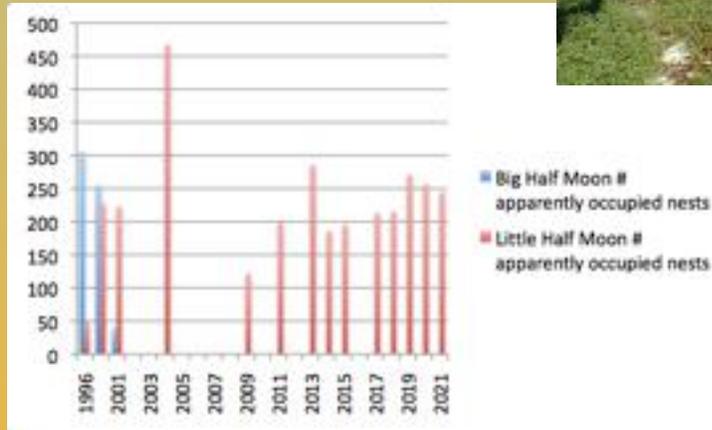
Assess long-term changes in seabird populations.

## Methods

C-CAM counts number of seabird nests annually at Half Moon Cays.

## Results

- Number of Brown Noddies has declined from nearly 500 pairs in 1996 to about 250 in 2020s.
- Number of seabird colonies has declined from 14 to 3, including 7 cays that have disappeared.



In the 1990s most Brown Noddy nests were on Big Half Moon Cay, A cat was released on Big Half Moon around 2000. By 2004 the noddies had abandoned Big Half Moon and all of them were nesting on Little Half Moon. Hurricane Ivan destroyed much of the vegetation on 2004 and the number of nesting birds collapsed. Since then numbers have recovered to about half the former levels. This is one of the very few longterm studies of seabird populations in the Caribbean.



**Number of  
PBPA nesting  
colony cays lost  
-  
SEVEN**



**Magnificent  
Frigatebirds *Fregata  
magnificens* ~ about  
30 pairs on “Two” Bush  
Cay. One of the  
mangrove islands on  
which it nests has been  
completely eroded  
away due to hurricane  
damage since 2004.**

**Brown Pelican  
*Pelecanus***

***occidentalis***  
Successful nesting in  
the PBPA has not been  
recently confirmed.



**Bridled Tern  
*Onychoprion  
anathetus***

number of nesting  
pairs has declined  
since 1997



**Least Terns *Sternula  
antillarum* ~ 10 pairs  
on Cunnyfish Reef but  
numbers are declining.**

**Numbers of nesting  
seabird species and  
populations are  
declining**

**Failure to recover  
from hurricane  
damage made 6 cays  
unsuitable for nesting**



**Recommendations**

- Census all cays every 10 years
- Continue annual monitoring of Half Moon Cays
- Assess rats and do at least one eradication
- Zone cays as off limits for development

Confirmed presence of alien  
invasive species (rats, mice, dogs,  
cats, chickens) and fishing camps:  
3 cays,

Unconfirmed presence of rats or  
mice: 4 Cays

# Columbid Gamebirds



The PBPA includes some of the most important areas in Jamaica for hunting of game birds (White-crowned Pigeon, White-winged Dove, Zenaida Dove and Mourning Dove) in season (August-September). There are five gun clubs each of which hunts in a specified area. PWD and Jackson Bay Gun Clubs manage Portland Ridge.



White-crowned Pigeon

## Challenges

- Illegal hunting of pigeons and ducks.
- Loss of game bird habitat.
- Lack of data on hunting in the PBPA.



The PBPA includes 4 Game Reserves and two Forest Reserves.

Most of the game birds shot in the PBPA are juvenile White-crowned Pigeons that migrate into the area during their post-breeding dispersal. In the past

there were large nesting colonies in the mangroves.

Today nests are dispersed among mangroves, forests and gardens in the PBPA and central Jamaica.

## Successes

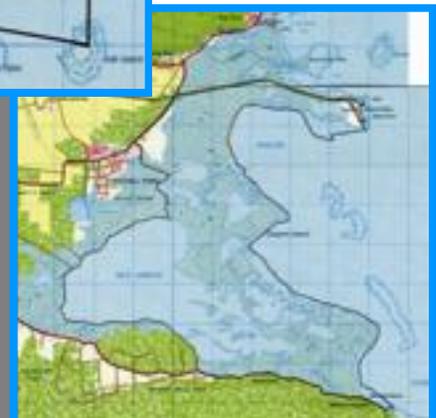
- Effective management of some areas by gun clubs
- Improved enforcement.
- Protection of key habitats as Game Reserves.



Between 20 and 25% of the estimated annual harvest of game birds in Jamaica are shot in the PBPA.

## Monitoring

- Standard field count surveys of game birds annually by NEPA.
- Number of licenses sold.
- Number of birds reported shot.



# Land Birds

PBPA includes 16 endemic bird species & 43 native land birds.



C-CAM is carrying out long-term monitoring of land birds in the mangroves at the PBDC.



The most common migrant warbler in the PBPA mangroves is the Northern Waterthrush.



The most common native warbler is the Yellow Warbler



Jamaican endemic race of the Bahama Mockingbird is only found in the dry forests of the PBPA where its populations are stable.



## Successes

### Celebrating birds - C-

CAM celebrates Caribbean Endemic Bird Festival with BirdsCaribbean in April-May and International Migratory Bird Day in October annually.

Long-term bird banding in mangroves

C-CAM land bird projects have included :

**Migratory bird conservation in western Portland Bight** – project funded by Neotropical Migratory Bird Conservation Act - 2015-2016.

**Portland Bight Bird Conservation Project** funded by National Fish and Wildlife Foundation - 1999-2001.

## Challenges

- Loss and degradation of forest habitat
- Illegal hunting
- Invasive species (e.g. Shiny Cowbird *Molothrus bonairensis*), cats

# Crocodiles



The PBPA is one of the most important locations for American Crocodiles *Crocodylus acutus* in Jamaica, and is thought to be one of the few remaining locations with relatively undisturbed nesting sites. Crocodiles are abundant in most wetlands especially Salt Island Creek and Salt River. However they roam over large areas, following rivers and streams inland, as can be seen from the incident map. C-CAM and NEPA staff are trained to rescue, remove and relocate “nuisance” animals. Locations where there are many incidents include Longville, Old Harbour and Portland Cottage.



As top predators in the food chain, crocodiles play an important role in maintaining healthy fish populations.



The American Crocodile is an endangered species (IUCN EN). It is fully protected under the Wild Life Protection Act.



- Challenges**
- Fear of crocodiles causes persecution.
  - Illegal demand for crocodile meat causes poaching.
  - Loss of wetlands habitat.
  - Squatting in crocodile habitats. because of lack of other locations for people to live.

**Successes**

Most “nuisance” crocodiles are successfully tagged and relocated by trained staff from C-CAM, NEPA and UDC.

**Monitoring:** NEPA is currently undertaking islandwide surveys and tagging of crocodiles in Jamaica including in PBPA where it is assisted by C-CAM and UDC. UWI has also carried out surveys and tagging.

# Jamaican Iguana

One of the  
hundred most  
endangered  
reptiles in the  
world



## Challenges

- Habitat loss and disturbance
- Invasive Alien Species - mongoose, dogs, cats, pigs prey on eggs, juvenile and adult iguanas.



The Jamaica Iguana Recovery Group is an partnership that includes the International Iguana Foundation, NEPA, UDC, C-CAM, Institute of Jamaica Natural History Museum, UWI and the Hope Zoo, Fort Worth Zoo, Iguana Specialist Group and others.

**Headstarting** - protecting nest sites, collecting hatchlings and rearing them at the Hope Zoo until they are large enough to survive in the wild, then releasing them in the Hellshire Hills. 1991-2006 average of 17 hatchlings collected annually. This increased to 40 hatchlings/year 2007-2014 and 100 in 2019.

## Successes

Successful head starting and predator control programmes are leading to increasing populations.

As a result, 468 headstarted iguanas have been released in the wild and head-started females are reproducing in the wild. The numbers of iguanas in the wild have increased from less than 50 to about 500.

The  
Jamaican Iguana  
*Cyclura collei*  
is found only in the  
Hellshire Hills. It is  
classified as critically  
endangered by the  
IUCN.

**IAS control** - trapping invasive alien species (mongoose, dogs, cats) has been implemented on standard trapping routes in the core iguana habitat of the Hellshire Hills since the 1990s.

# Climate Change

The impacts of climate are already being felt in the PBPA. Risks that are increasing include sea level rise, increasing temperatures, increasing flooding, drought hurricanes, storm surge and tsunami. The areas that are particularly vulnerable include Old Harbour Bay and Portland Cottage. These areas have been the subject of special studies and assessments e.g. Portland Cottage (World Bank 2019), Old Harbour Bay (Office of Disaster Preparedness 2012), The Nature Conservancy and Red Cross carried out a detailed environmental assessment of the Old Harbour Bay area (TNC 2021).

## Challenges

- Increasing risk of hurricanes, storm surge, beach erosion, fire causing damage to human life, livelihoods and property as well as natural ecosystems
- Insufficient allowances being made for climate change risks in development planning and expansion of formal and informal settlements despite the development and dissemination of many plans.
- No build zones not respected.

## Successes

- Documentation of impacts of hurricanes and storms.
- Studies, assessment and plans for climate change Adaptation.
- **Portland Bight Discovery Centre** is a focal point for education and awareness programmes re climate change adaption and a demonstration site.
  - No-build zones established.

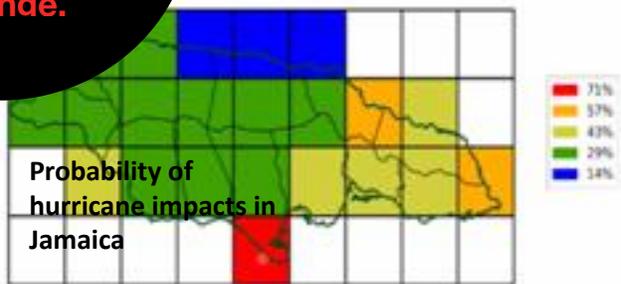
**PBPA is the most vulnerable place in Jamaica to climate change.**

## Monitoring

- Beach monitoring by C-CAM and NEPA.
- Weather stations (Meteorological Office).
- Sea temperatures monitored.



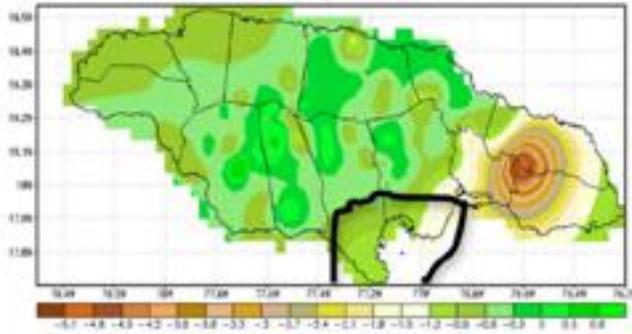
Many houses in Portland Cottage were totally destroyed by Hurricane Ivan



**Increasing temperatures** - more hot days, more hot nights.

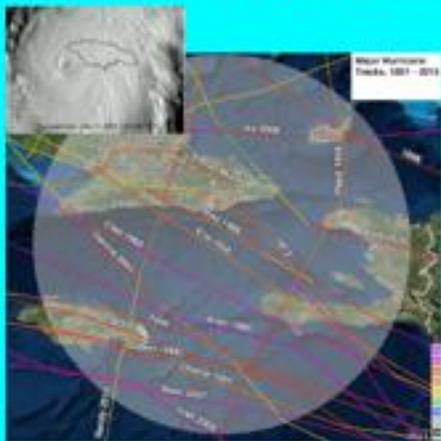
**Decreasing rainfall** will cause more droughts - but **more intense rainfall events** will cause more flooding.

Rainfall Trend Slope for 1992-2010



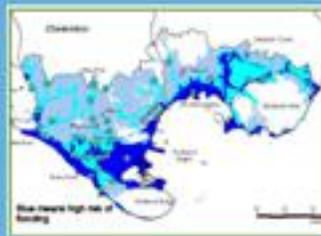
Browner areas on the map are getting less rain. Rainfall is decreasing in the PBPA (area bounded in black), especially in May-July and August-September. Less rain means more droughts - and more fires.

**More intense hurricanes and storms**



Paths of hurricanes 1851-2015. More hurricanes are affecting the south coast of Jamaica.

Portland Ridge is the most likely place in Jamaica to be hit by a hurricane.



More frequent floods



Higher storm surges



Old Harbour Bay, Salt River and Portland Cottage are some of the places in Jamaica most at risk from storm surge.



**Loss of coastal land due to sea level rise.** Look carefully for the pale brown lines enclosing pale blue - these are the areas which will be lost if sea level rises 1.5 m. This is expected to happen by 2100 if current trends continue.

Sea level rise is caused by expansion of sea water as it warms, plus the melting of ice sheets and glaciers.



# Pollution

Pollution in the PBPA includes marine and freshwater pollution, solid wastes and air pollution. It affects human health and the ecology of the area, therefore pollution control and monitoring is a high priority for management. Some of the most impactful sources of pollution that affect the PBPA are in the upper watersheds or up-current to the west (Kingston Harbour or even Haiti).

## Major sources of pollution in the PBPA

### Freshwater

- Pollution of Rio Minho from Ewarton bauxite plant.
- Sugar wastes (dunder, and wastes).
- Malfunctioning sewage plants, and effluent and leachate from villages and towns with no central sewage disposal systems pollute surface and ground water.
- Sediments and agricultural chemicals in rivers and streams (including those from the upper watershed).
- Outflows from fish farms.
- Sediment from sand mining along Rio Cobre.

### Terrestrial

- Terrestrial solid wastes and garbage (including extensive fly tipping exacerbated by lack of sanitary landfill facilities in Clarendon – the nearest disposal sites are Martin’s Hill near Mandeville and Riverton in Kingston).

### Air

- Alumina dust from loading at ports.
- Sodium hydroxide odours and dust from the red mud lake at Hayes.
- Smoke from power plants at Old Harbour Bay and wildfires,
- Smoke from medical waste incinerator in Hill Run, St. Catherine.
- Dust and noise from limestone quarries in Braziletos and Hellshire.
- Dust and smoke from charcoal burning.

### Marine

- Outflows from Kingston Harbour carried into the PBPA by longshore current.
- Marine solid wastes and garbage.
- Heated water and chemicals from power plants.
- Ballast water and accidental spills from ships.

### Noise

- Roads.
- Pumping stations and power stations.
- Railway.

Rio Cobre in spate carries heavy loads of silt from the upper watershed



## Challenges

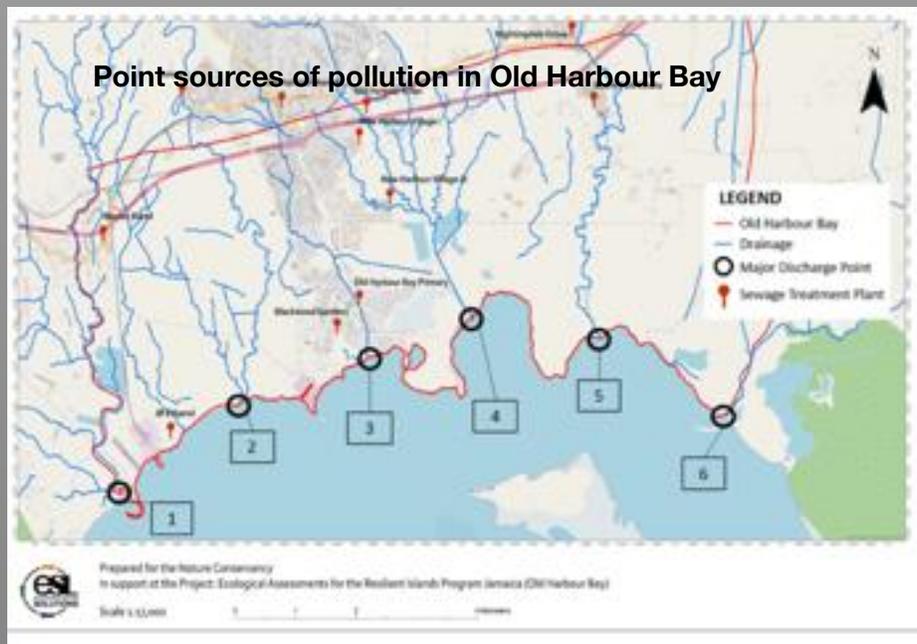
- Lack of capacity for monitoring and enforcement.
- Low levels of compliance with laws and regulations.
- Lack of feasible alternatives.
- Insufficient data sharing, analyses of data and reporting.

## Successes

- Joint water quality monitoring (NEPA, C-CAM, ICENS).
- Demonstration at PBDC of use of artificial wetlands for sewage treatment as a viable and cheap option for domestic sewage treatment.
- Work in progress to establish a water quality laboratory at C-CAM's field office in Salt River

## Monitoring

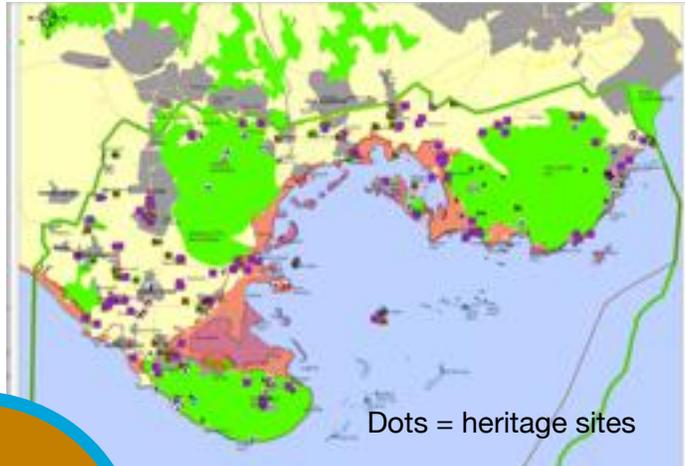
- C-CAM monitors coastal water quality for NEPA at marine sites, and with ICENS at freshwater and marine sites.
- C-CAM's community monitors and Conservation Officers report pollution incidents including resulting fish kills and oil spills.



# Heritage and Culture

The rich natural resources of the PBPA have attracted people since the earliest Taino settlements in about 700 AD. The Tainos were followed by Spanish - ports and haitos - then English pirates, ports, and indigo, cotton and sugar plantations. Even the Americans established 2 bases in the PBPA in WW2.

The JNHT has documented more than 300 important archaeological sites from every phase of Jamaica's history in the PBPA. There are also unique cultural events such as Indian festivals that are not celebrated in other parts of Jamaica. Community members indicate that they know many more undocumented heritage sites.



**Halse Hall (1702)  
is the oldest  
inhabited house  
in Jamaica.**



- Challenges**
- Lack of resources to maintain known sites and to document additional ones.
  - Climate change, development, vandalism and theft are destroying important sites before they can be documented or protected.



- Successes**
- Partnership between C-CAM and JNHT to document and conserve known sites.
  - Documentation of heritage sites.
  - Protection of selected national heritage sites.



# Further Reading

## Selected websites

<https://ccam.org.jm>

BIOPAMA – [www.biopama.org](http://www.biopama.org)

<https://savegoatislands.org>

ACP – [www.acp.int](http://www.acp.int)

<https://udcja.com>

EU – [www.Europa.eu](http://www.Europa.eu)

## Selected Reports and plans

C-CAM 2014. **Management Plan for the Portland Bight Protected Area**

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Maclaren, K. 2020. **Forest Restoration Plan for Portland Ridge**. Report prepared for C-CAM.

NEPA. 2019. **Draft Great Goat Island Wildlife Sanctuary Management Plan**, UDC, Kingston, Urban Development Corporation.

Oberli, A. 2013. **A botanical assessment of parts of Portland Ridge**. Report prepared for C-CAM.

Palmer, S. 2014. **Biophysical reef assessment, Portland Bight Protected Area, Jamaica**. Report prepared for C-CAM.

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Rogers, P. and Macfarlan, A. 2020. **What is adaptive management and how does it work?** Monitoring and Evaluation for Adaptive Management Working Paper Series, Number 2, September. Retrieved from: [www.betterevaluation.org/monitoring\\_and\\_evaluation\\_for\\_adaptive\\_managementseries](http://www.betterevaluation.org/monitoring_and_evaluation_for_adaptive_managementseries).

C-CAM thanks **BIOPAMA** for funding the project ***“Implementing adaptive management of the Portland Bight Protected Area through METT-4 assessment”*** that included this booklet. We also thank the many other funders, supporters and volunteers who have contributed to managing and conserving the PBPA since 1999.



**BIOPAMA**



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