Biodiversity

Courtesy of Miss Idalia Machuca
August 2013
Biodiversity

This module is intended for teachers interested in teaching their classroom about the topic of biodiversity, especially that of Belize. We consider the definition of biodiversity, the damage it is experiencing, and ways in which we can protect it. We will also take a look at interesting organisms, in particular marine animals, which we find in Belize.

Lessons within this module:
- Organisms
- Biodiversity
- Biodiversity (Belize)
- Biodiversity Damage (Belize)
- Protected Areas (Belize)
- Manatee
- Whale Shark
- Hawksbill Sea Turtle
- Cassiopea (Upside-down Jellyfish)
- Nassau Grouper
- Red-footed Booby Bird
- Crinoid: Feather Star

Supplementary items are also provided for this module: Classroom Activities, Fact Sheets, Information Sheets, Lesson Plans, and Workbooks
Related learning goals as specified by the Ministry of Education:

- (Social Studies: L) What are the physical features of Belize?
- (Social Studies: M) What is the physical environment of Belize like?
- (Social Studies: U) What is the role of our natural resources in the Social, Political, and Economic development of the country?
- (Social Studies: MU) How do some human activities and industries harm our natural resources?
- (Social Studies: U, Science: L) What is ‘pollution’?
- (Science: M) How is water polluted?
- (Science: M) How are animals and plants affected by pollution?
- (Social Studies: U) What are the anti-pollution measures we can take?
- (Science: L, Social Studies: M) What are some methods of conservation and preservation?
- (Social Studies: U) What organizations are involved in the conservation of our natural resources?
- (Social Studies: U) Do we have conservation and protection laws?
- (Social Studies: L) What is a ‘Protected Area’ and what happens there?
- (Science: M) What is the need to prevent over-fishing?

- (Science: L) What is a ‘living thing’? What is a ‘non-living thing’?
- (Science: M) What are the seven characteristics of living things?
- (Science: LM) What is the difference between 'herbivores', ‘carnivores’, and ‘omnivores’?
- (Science: L) What is the difference between ‘egg layers’ and ‘live breeders’?
- (Science: M) What is the difference between ‘producers’, ‘consumers’, and ‘decomposers’?
- (Science: M) What are ‘vertebrates’ and ‘invertebrates’?
- (Science: M) What is a ‘flowering plant’? What is a ‘non-flowering plant’?
- (Science: L) How are animals different now compared to the past?

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2 M = Elementary school Middle Division and U = Elementary school Upper Division
Organisms
An organism is a living being, commonly characterized by: movement, feeding, respiration, growth, reproduction, and sensitivity to stimuli.

Flora
A term used to cover plants, fungi, and algae.
- **Plants**
  Photosynthesis is the process where a plant turns sunlight into energy, which they use to grow.
  - **Flowering**
    Plants with flowers and fruits that contain the seeds.
    - **Monocotyledons**
      Monocot seedlings have one cotyledon or “seed-leaf” (i.e. sugar cane, corn, orchids).
    - **Dicotyledons**
      Dicot seedlings have two cotyledons (i.e. beans, citrus fruits, hibiscus).
  - **Non-Flowering**
    Plants that do not have any flowers or fruits (i.e. algae, ferns, mosses).

Fauna
A term used to refer to animals.
- **Vertebrates**
  Vertebrates have backbones (“vertebrae”).
  - **Mammals**
    Mammals are warm-blooded. They have hair on their bodies, and produce milk for their babies.
  - **Reptiles**
    Reptiles are cold-blooded. They have scales on their bodies.
  - **Amphibians**
    Amphibians are cold-blooded. They breathe through their skin and go through metamorphosis.
  - **Birds**
    Birds are warm-blooded. They have feathers and lay eggs with hard, waterproof shells.
  - **Fish**
    Fish are cold-blooded. They have scales and breathe underwater through gills.
- **Invertebrates**
  Invertebrates have no backbone.
Biodiversity

Biodiversity is short for “biological diversity.” Biological diversity is used to express the variety of living things.

Ecosystems are plants, animals, micro-organisms, and their non-living environment functioning as one.

The primary cause of biodiversity loss is increasing human population and its increasing demands for food, medicine, and fuel.

50-90% of the plants and animal species on Earth are found in the tropics.

Ecosystem services provided by biological diversity are food, water, shelter, clothing, medicine, climate regulation, and pollution processing.

The value of goods and services provided by ecosystems is about US$33 trillion per year.

Biodiversity has ecological, genetic, social, economic, scientific, educational, cultural, recreational, and aesthetic value.

5-30 million species live on Earth, but only 1.9 million have been identified.

Biodiversity has declined by more than a quarter in the last 35 years.

At least 16,928 species are threatened with extinction.

Biodiversity is threatened by climate change, pollution, over-exploitation, invasive alien species, and habitat change.

Oceans cover about 70% of the Earth’s surface.

Natural disasters are stronger and more frequent when ecosystems are disrupted.

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Biodiversity (Belize)

According to the 2010 report on Biological Diversity issued by the Government of Belize, the country has:
- 3,408 species plants
  - 2,500 dicotyledons
  - 1,500 monocotyledons
  - 613 medicinal plants
- 46 amphibians
- 141 reptiles
- 577 birds
- 163 mammals
- 1,302 fish, invertebrates, and algae

We also have endemic species:
- 58 plants
- 2 fish
- 2 amphibians
- 1 reptile

And those at risk:
- 43 mammals are endangered
- 137 species of plants and animals are in the IUCN Red List 2009

And, let’s not forget:
- The Belize Barrier Reef System
  - About 80% of the Mesoamerican Barrier Reef System
  - World Heritage Site since 1996
Biodiversity Damage (Belize)

According to the 2010 report on Biological Diversity issued by the Government of Belize, there are:
- 137 species of plants and animals are in the IUCN (International Union for Conservation of Nature) Red List 2009 of Threatened Species

Trends in terrestrial and marine ecosystems can be observed to get an idea of the status of our biodiversity.

An indicator species is one that is observed closely and whose status (or condition) reflects the status of its environment.

We will consider as indicators some of the species that are at medium to very high risk on an international scale and on a national scale.

### Indicator Species of International Concern

<table>
<thead>
<tr>
<th>Indicator Species of International Concern</th>
<th>Level of Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critically Endangered</strong></td>
<td></td>
</tr>
<tr>
<td>Goliah Groupers</td>
<td>Very High (0.87)</td>
</tr>
<tr>
<td>Hawksbill Turtle</td>
<td>Medium (2.19)</td>
</tr>
<tr>
<td><strong>Endangered</strong></td>
<td></td>
</tr>
<tr>
<td>Loggerhead Turtle</td>
<td>Medium (2.23)</td>
</tr>
<tr>
<td>Green Turtle</td>
<td>Medium (2.47)</td>
</tr>
<tr>
<td>Nassau Grouper</td>
<td>High (1.82)</td>
</tr>
<tr>
<td><strong>Vulnerable</strong></td>
<td></td>
</tr>
<tr>
<td>Queen Triggerfish</td>
<td>High (2.00)</td>
</tr>
<tr>
<td>West Indian Manatee</td>
<td>Medium (2.80)</td>
</tr>
<tr>
<td>Hogfish</td>
<td>High (1.34)</td>
</tr>
<tr>
<td>Mutton Snapper</td>
<td>Medium (2.38)</td>
</tr>
<tr>
<td>Cubera Snapper</td>
<td>Medium (2.17)</td>
</tr>
<tr>
<td>Whale Shark</td>
<td>Medium (3.00)</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>Medium (2.10)</td>
</tr>
</tbody>
</table>

### Indicator Species of National Concern

<table>
<thead>
<tr>
<th>Indicator Species of National Concern</th>
<th>Level of Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scarlet Macaw</td>
<td>Very High (0.54)</td>
</tr>
<tr>
<td>White-lipped Pecary</td>
<td>Very High (0.83)</td>
</tr>
<tr>
<td>Oscillated Turkey</td>
<td>Very High (0.91)</td>
</tr>
<tr>
<td>Crested Guan</td>
<td>High (1.54)</td>
</tr>
<tr>
<td>Xate Palm</td>
<td>High (1.95)</td>
</tr>
<tr>
<td>White-tailed Deer</td>
<td>High (1.72)</td>
</tr>
<tr>
<td>Mountain Mullet</td>
<td>High (2.50)</td>
</tr>
<tr>
<td>Jaguar</td>
<td>Medium (2.48)</td>
</tr>
<tr>
<td>Bayleaf Palm</td>
<td>Medium (2.65)</td>
</tr>
<tr>
<td>Pimento/Pepi Palm</td>
<td>Medium (2.53)</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>High (1.76)</td>
</tr>
</tbody>
</table>

### Indicator Species of International Concern

<table>
<thead>
<tr>
<th>Indicator Species of National Concern</th>
<th>Level of Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Tail Snapper</td>
<td>Medium (2.63)</td>
</tr>
<tr>
<td>Spiny Lobster</td>
<td>Very High (1.00)</td>
</tr>
<tr>
<td>Queen Conch</td>
<td>High (1.39)</td>
</tr>
<tr>
<td>Permit</td>
<td>Medium (2.54)</td>
</tr>
<tr>
<td>Bonefish</td>
<td>Medium (2.97)</td>
</tr>
<tr>
<td>Snook</td>
<td>High (2.00)</td>
</tr>
<tr>
<td>Tarpon</td>
<td>Medium (3.00)</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>Medium (2.22)</td>
</tr>
</tbody>
</table>
Biodiversity Threats (Belize)

Climate change
- Changes in global climate causes increases in temperature and sea level, which in turn cause forest fires, floods, coral bleaching, mangrove forest damage, severe hurricanes and storms, and extinctions.
- For more detailed information, refer to the Climate Change Module.

Improper waste disposal
- Number one environment issue in Belize.
- For more detailed information concerning plastic waste, refer to the Plastic Pollution Module.

Water and air pollution

Deforestation
- Deforestation can be caused by climate change, human-related activities, or forest fires.
- While plants are destroyed or damaged, animals lose the plants they used as shelter and food.
- The deforestation of mangrove forests causes special damage to coastal and marine ecosystems since they provide shelter, nursery grounds, nesting sites for birds, and food.

Invasive species
- An invasive species is one that is not native to the land it is found in. It was introduced and is likely to have a negative effect on the population of other organisms found in the area.
- Example: African Nile Tilapia was introduced into Belize’s river systems after Hurricane Mitch in 2002. This species is a threat to the survival of our local fish because it is more aggressive and reproduces quickly.
- Example: The Tokay Gecko was first observed in the early 90’s in Belize. The Tokay Gecko may be responsible for the declining population in the local geckos.

Protected areas management
- Challenges include limited financial resources, equipment, training, transportation, and staff.
Protected Areas (Belize)

According to the 2010 report on Biological Diversity issued by the Government of Belize, Belize has 102 protected areas as follows:

1. Forest Reserves (managed by Forest Department) oversee the sustainable extraction of timber. 
   **Examples:** Freshwater Creek Forest Reserve (Corozal and Orange Walk), Caye Caulker Forest Reserve (Belize), Mountain Pine Ridge Forest Reserve (Cayo), Maya Mountains Forest Reserve (Stann Creek), Swasey Bladen Forest Reserve (Toledo).

<table>
<thead>
<tr>
<th>Types of Protected Area</th>
<th>Quantity</th>
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</tr>
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<tbody>
<tr>
<td>Forest Reserves</td>
<td>19</td>
<td>Marine Reserves</td>
<td>8</td>
</tr>
<tr>
<td>National Parks</td>
<td>17</td>
<td>Spawning Sites</td>
<td>13</td>
</tr>
<tr>
<td>Nature Reserves</td>
<td>3</td>
<td>Public Reserve</td>
<td>6</td>
</tr>
<tr>
<td>Wildlife Sanctuaries</td>
<td>7</td>
<td>Bird Sanctuaries</td>
<td>7</td>
</tr>
<tr>
<td>Natural Monuments</td>
<td>5</td>
<td>Private Reserves</td>
<td>8</td>
</tr>
<tr>
<td>Archaeological Reserves</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A **protected area** is a location that receives special protection because of its natural, ecological, and cultural value.

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Figure 1: Belize's Protected Areas
Source: Belize Forestry Department
2. **National Parks** protect and preserve natural features of national significance that are enjoyed by the people for tourism and recreation.  
**Examples:** Honey Camp (Corozal and Orange Walk), Bacalar Chico National Park and Marine Reserve (Ambergris Caye, Belize), Guanacaste National Park (Cayo), St. Herman's Blue Hole (Cayo), Laughing Bird Caye National Park (Stann Creek), Sarstoon-Temash National Park (Toledo).

3. **Archaeological Reserves** (managed by the Institute of Archaeology) include Maya ruin sites.  
**Examples:** Santa Rita (Corozal), Lamanai (Orange Walk), Altun Ha (Belize), Caracol (Cayo), Serpon Sugar Mill (Stann Creek), Lubaantun (Toledo).

4. **Private Reserves** (owned by non-governmental conservation initiatives) oversee the responsible extraction of resources.  
**Examples:** Shipstern (Corozal), Rio Bravo (Orange Walk), Monkey Bay (Belize), Aguacate Lagoon (Cayo), Golden Stream (Toledo).

5. **Marine Reserves** (administered by the Fisheries Department) ensure the sustainable extraction of marine resources and protect marine wildlife and its environment.  
**Examples:** Hol Chan Marine Reserve (Belize), Glover's Reef (Belize), Gladden Spit and Silk Cayes Marine Reserve (Stann Creek), Sapodilla Cayes (Toledo).

6. **Bird Sanctuaries** (managed by the Forest Department) provide nesting and roosting sites for birds.  
**Examples:** Doubloon Bank (Orange Walk), Bird Caye (Belize), Monkey Caye (Toledo).

7. **Wildlife Sanctuaries** (managed by the Forest Department and other organizations) are aimed at preserving land for important species to live in.  
**Examples:** Corozal Bay Wildlife Sanctuary (Corozal), Crooked Tree Wildlife Sanctuary (Orange Walk and Belize), Cockscomb Basin Wildlife Sanctuary (Stan Creek and Toledo).

8. **Natural Monuments** are unique geographic features.  
**Examples:** Blue Hole, Half Moon Caye, Thousand Foot Falls, Victoria Peak.

9. **Nature Reserves** have the highest level of protection, not allowing tourism access or resource extraction.  
**Examples:** Bladen, Burdon Canal, and Tapir Mountain Nature Reserves.
Now, we will be taking a close look at 7 interesting creatures in Belize.

- Manatee
- Whale Shark
- Hawksbill Sea Turtle
- Cassiopea (Upside-down Jellyfish)
- Nassau Grouper
- Red-footed Booby Bird
- Crinoid: Feather Star

The IUCN Red List of Threatened Species is an inventory of the status of different species. It evaluates the extinction risk of organism.

The image on the right shows the statuses that eventually lead to the extinction of a species.
# Manatees

<table>
<thead>
<tr>
<th>What are they?</th>
<th>What do they eat?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manatees are mammals with gray, thick, wrinkled skin. They are also called “sea cows”. They can weigh more than a thousand pounds and are about 9 feet long!</td>
<td>They are herbivores, which means they eat only plants. They like mangrove leaves, turtle grass, and algae.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Where do they live?</th>
<th>How do they breathe?</th>
</tr>
</thead>
<tbody>
<tr>
<td>They like the warm waters of the Caribbean Sea and the Gulf of Mexico. It is also found in West Africa and the Amazon.</td>
<td>They are mammals, so they need to breathe the oxygen in the air. They come up every 3-5 minutes when they’re awake, and every 20 minutes when they’re asleep. Some scientists believe they come up to breathe without even fully waking up!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What are manatee moms like?</th>
<th>How fast do they swim?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manatees like to stay by themselves, but mom manatees stay close to their babies for about two years. They only have one baby (or “calf”) at a time, and they have a very strong bond.</td>
<td>They usually swim at 3-5 miles per hour. They don’t need to swim fast because they don’t need to catch prey and they don’t have natural predators.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How long can they live?</th>
<th>Can they learn tricks?</th>
<th>What is their sight like?</th>
</tr>
</thead>
<tbody>
<tr>
<td>They are capable of living up to 60 years. You can tell the age of a dead manatee by counting the growth layer rings on their ear bones.</td>
<td>Definitely. The part of a mammal’s brain responsible for thinking is bigger in manatees than in humans!</td>
<td>Manatees can see blue, green, and gray, but not red. They are nearsighted and see things less clearly than humans. They see well enough to be able to identify plants to eat. If they can’t see something, they observe it with one eye and then with the other, or they just touch it.</td>
</tr>
</tbody>
</table>
Manatees (Threats and Protection)

**Are they threatened?**

They are **vulnerable**, which is one step away from being endangered.

Manatees hear on a high frequency, while most boats emit low frequency sounds, causing the manatees to not hear boats nearby. Unfortunately, they do not have the time to get out of the way, and as a result, they suffer maiming, disfigurement, and fatal injuries. Open wounds lead to infections, and hits cause internal injuries. Such horrible incidents are so prevalent that the scars on manatees are now even being used by us to tell them apart.

Manatees may also ingest fishing gear or become entangled in it. Ingesting such materials blocks their digestive systems, eventually killing them.

While hunting of manatees is illegal, they were once killed for their hides and bones. Unfortunately, there is still illegal hunting.

**How can we protect them?**

Familiarize yourself with the location of manatee speed zones before you go boating. Once on the water, avoid boating over seagrass beds and shallow areas as this is where manatees might be feeding. If you see a manatee (or its snout, back, tail, or flipper), remain a safe distance away. If you want to observe the manatees, you can cut the boat’s motor. Also, avoid throwing your trash into the water as it could be accidentally ingested by the manatees.

Avoid feeding the manatees. If they get accustomed to being fed by humans, they may be tricked by people who actually want to harm them.

Properly dispose of your fishing lines and hooks as these are dangerous to manatees.

Volunteer at or donate to the Manatee Rehabilitation Centre, where orphaned or injured manatees are rehabilitated and then reintroduced into the wild.
Whale Shark

What are they?
The whale shark is a fish, the largest in the world. It can weigh more than 47 thousand pounds and be as long as 40 feet.

Where do they live?
They like to live in tropical or even warm temperate regions. They are mostly seen offshore, but are sometimes found entering lagoons or mouths of rivers. In Belize, they frequently visit the southern Belize Barrier Reef and the Gladden Spit Area off the coast of Placencia.

What do they eat?
They eat plankton, which are microscopic plants and animals, and sometimes small fish and fish eggs. Whale sharks are filter feeders. This means they suck in large volumes of water and food, filter out food, and expel the water through their gills.

Are they threatened?
They are vulnerable, which is one step away from being endangered.

Threats include habitat loss, coastal development, land-based and marine pollution, increased boat traffic, collisions with boats, irresponsible tourism activities, and being hunted for their meat or fins.

How can we protect them?
We can raise awareness of the situation, and take action through policy, science, and legal and communications work.

We can support organizations like Oceana who are working on an international level to protect and restore shark populations.
Hawksbill Sea Turtle

What are they?
The hawksbill sea turtle is very similar to other marine turtles, except for its sharp, hooked beak-like mouth. An adult turtle weighs about 180 pounds and can have a length of 3 feet.

Where do they live?
They live in the ocean, mangrove swamps, lagoons, and most commonly in tropical coral reefs. They spend most of their lives offshore in the tropical waters of the Indian, Pacific, and Atlantic (which includes the Caribbean Sea) Oceans.

What do they eat?
They are omnivores, meaning they can eat both plants and animals, but they love eating sea sponges! They also feed on sea anemones, jellyfish, and algae.

What are their shells like?
The hawksbill’s shell, also called “carapace”, has an interesting combination of light and dark colours. These colours change according to the water temperature.

Are they threatened?
They are critically endangered, which is one step away from being extinct.

They are threatened by the hunting for their shells. They are killed to use their beautiful shells for jewelry, ornaments, and other decorations. In some parts of the world, they are even eaten as a delicacy. They are also harmed by pollution, boat strikes, and destruction of their habitats.

How can we protect them?
We can raise awareness about the laws that prohibit the import and export of turtle products, and the killing and capture of the hawksbill sea turtle.

Dispose of your trash properly.
Encourage responsible fishing practices.
Cassiopea (Upside-down Jellyfish)

**What are they?**
Cassiopea is also called the “upside-down jellyfish” because its flattened bell (head) rests at the bottom underneath its tentacles. The jellyfish can be white, blue, green, and brown. In Belize, they are usually about 4-5 inches big.

**What do they eat?**
They are mostly photosynthetic, which means they make their own food using the sun’s energy. They sometimes eat plankton, which they capture by spewing stinging cells into the water.

**Are they always upside down?**
Sometimes, they swim right side up, but they prefer not to. They like to keep their tentacles floating above them to provide shelter for the algae that helps them with photosynthesis.

**Where do they live?**
They live in warm and shallow coastal waters around the world. They like to live in lagoons, mudflats, and mangrove swamps. These jellyfish are usually found resting on the sea floor.

**Are they threatened?**
The upside-down jellyfish is one of the thousands of species that have not yet been assessed by the IUCN Red List. Therefore, we do not have an official status for this species.

**How can we protect them?**
N/A
# Nassau Grouper

**What are they?**
They are fish commonly just referred to as “groupers”. They can grow up to 3 feet and weigh about 55 pounds. They have 4-5 irregular dark strips on a gray body and black dots around their eyes. They can camouflage themselves by changing their colour.

**Where do they live?**
They live in tropical waters near reefs. They live in the coasts of Central and northern South America. Groupers are usually found around coral reefs and rocky bottoms up to 90 metres in depth.

**What do they eat?**
Groupers are predators. They hide and wait until they catch their prey, which is usually shrimps, crabs, and fish.

**When do they spawn?**
In Belize, thousands of groupers come together during the full moon in December and January to spawn. This is why they are called “groupers”.

**Are they threatened?**
They are **endangered**, which is one step away from being extinct.

The Nassau grouper has been overfished. Since their spawning locations are predictable, they are easy fishing targets.

Also, when coral reefs are harmed or destroyed, the grouper loses its habitat.

**How can we protect them?**
In Belize, fishing of the Nassau grouper is banned during spawning season.

Share your knowledge and concern with fishermen. The Nassau grouper needs a lot of time to grow and to reproduce. If they are fished responsibly, the country will benefit. Otherwise, we may push the grouper into extinction.
# Red-footed Booby Bird

**What are they?**
The Red-footed booby bird is a sea bird. It has red feet and legs, and its bill is pink and blue. In Belize, they are commonly white with black feathers bordering their wings. Sometimes, you can spot others that are brown that may or may not have a white belly and tail. The Red-footed Booby is the smallest kind of Booby bird, being about 28 inches in height with a 3 feet wingspan.

**Where do they live?**
They live in tropical coastal areas of the Atlantic, Pacific, and Indian Oceans. They especially like to live on islands, like Half Moon Caye.

**What do they eat?**
They are carnivores. They like small fish and squid that they catch by diving into the water at high speeds.

**Why do they look so familiar?**
You’ve probably seen that the Belize Audubon Society logo displays the outline of two birds in flight. One of these birds is the Red-footed Booby!

**Are they threatened?**
They are of **least concern**, which is the first step in the Red List of Threatened Species.

While the Red-footed Booby population is still abundant, it is important to note that their numbers are decreasing.

Threats include habitat destruction, egg collecting, poaching, predators who eat their eggs and young, and tourism.

**How can we protect them?**
Half Moon Caye is a crown reserve bird sanctuary, which provides the protection of the habitat of the Red-footed Booby.

While the Red-footed Booby is not yet the subject to conservation efforts, it does enjoy the protection offered by Protected Areas that house their habitats.
**Crinoid: Feather Star**

**What are they?**
A crinoid is a marine invertebrate, which can either be attached to the sea bottom by a stalk (Sea Lilies) or can be unattached (Feather Stars). Another name for the feather star is “Comatulida”. Feather stars have feather-like arms attached to a tiny body. They can be found in many colours.

**Where do they live?**
Feather stars live in shallow-water coral reefs in the Caribbean Sea and the South Pacific Ocean. They may even live in Antarctic waters. They cling to corals using tiny hook-like feet. They can live on both shallow and deep waters.

**What do they eat?**
Feather stars are suspension feeders, meaning that they use their arms to strain food from the water as the current passes by. They eat plankton. Their mouths face upward.

**I heard they are fossils. How can that be?**
Fossils are the preserved remains of organisms that died a very long time ago. Most of the descendants of fossilized organisms have evolved and are now very different. Scientists estimate that the earliest version of crinoids appeared about 400 million years ago! What’s interesting is that our present-day crinoids are not too different from their ancestors! That means that the crinoids can give us clues about how their ancestors lived.

**Are they threatened?**
It is not listed in the IUCN Red List of Threatened Species.

The feather star is, however, affected by habitat degradation due to pollution.

**How can we protect them?**
Dispose of plastic trash properly and reduce the use of chemicals such as pesticides and fertilizers.
Related Links:

http://www.savethemanatee.org/info.htm
http://www.ecomarbelize.org/turtles-of-belize.html
http://www.liveaquaria.com
http://www.sunofbelize.com
http://ambergriscaye.com/animalsofthereef/u.html
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http://www.belizeaudubon.org/protected_areas/red-footed-boobies.html
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http://blog.reefcharter.com/2010/03/feather-stars.html
http://www.bgs.ac.uk/discoveringGeology/time/Fossilfocus/crinoid.html
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