“Le Sentier du Dodo”

Nature Trail on Ile aux Aigrettes

An immersive learning experience for students and teachers

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Content **Page**

1. Introduction to Mauritian Wildlife Foundation

The Mauritian Wildlife Foundation (MWF) is a Registered Charity Non-Governmental Organisation (NGO), established in 1984. MWF works in close co-operation with the Government of Mauritius, especially the National Parks and Conservation Service (NPCS) and the Forestry Service. It is the only NGO in Mauritius exclusively concerned with the conservation of the Mauritian nation's endangered plants and animals.

MWF is dedicated to the conservation of the native wildlife of Mauritius and Rodrigues and their habitats. We have a long-term involvement, spanning over two decades, in biodiversity conservation and the restoration of islands around Mauritius and Rodrigues. MWF recognises that islets are important tourist assets and that it is as important to protect coastal resources as it is to preserve flora and fauna. MWF has developed an eco-tourism and local awareness project on Ile aux Aigrettes that integrates tourism and education with conservation.

MWF's best known achievement is the saving of the Mauritian Kestrel. It has, in recent years, brought the Pink Pigeon, the Echo Parakeet and the Mauritius Fody back from the brink of extinction. Our expertise is also being applied to address problems caused by a degradation of habitat in Rodrigues and on Round Island, with high profile projects of global biological significance.

MWF believes that the work it is doing benefits the Mauritian nation both for present and future generations. "Le Sentier du Dodo" nature trail brings Mauritian students to Ile aux Aigrettes to experience how pristine Mauritius once was. Most of MWF's projects have international importance in biological diversity and are placing Mauritius at the forefront of the Conservation world, giving a high profile to any local restoration projects which need funding. Mauritius has a strong tourism industry and the work MWF is doing is relevant to this sector through the eco-tourism activity conducted on Ile aux Aigrettes. MWF provides employment through its activities. MWF wishes to establish long-term self-sustaining projects and remain a strong, vibrant and innovative organisation.

Our Mission

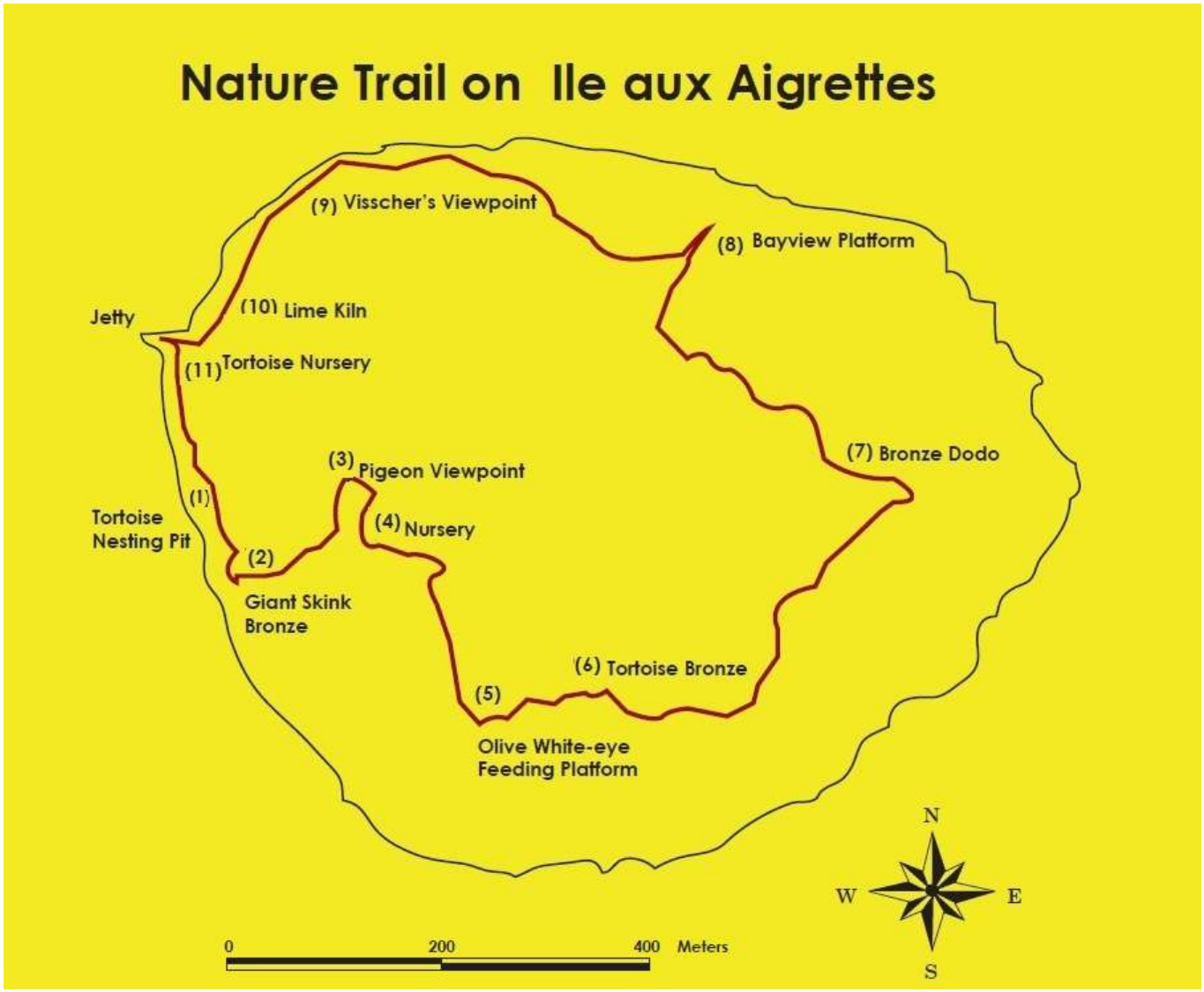
- To save threatened Mauritian species through the restoration of entire ecosystems
- To seek new information through field research, data management, captive studies and scientific collaboration for direct application of restoration methods and management
- To share knowledge gained through restoration programmes with fellow Mauritian and international conservationists
- To share the joys and benefits of native wilderness and wildlife with the Mauritian people
- To secure the future of Mauritian species through income generation and sound management of human, fiscal and capital resources

2. Objectives of" Le Sentier du Dodo" Nature Trail

To enable students to:

- develop awareness of the importance of the work of the Mauritian Wildlife Foundation and the need for the conservation and preservation of native species and natural habitats
- improve their knowledge and understanding of plants, animals and non-living resources that constitute an ecosystem
- improve their knowledge of the way biotic and abiotic elements in the ecosystem interact with one another and the conditions necessary for sustainable development
- experience a natural coastal/coralline ecosystem
- develop environmentally-friendly attitudes and behaviours
- respect natural resources including plants and animals
- develop the basic scientific skills of observing, comparing and hypothesising
- develop thinking skills through discussion, brainstorming, questioning and responding to questions
- develop communication skills through essay writing, drawing, painting, interacting with tutors, role play etc.
- develop social/life skills through group work, respect of rules and regulations

3. Notes for teachers



This information is important to you and to your students in preparing for a visit to Ile aux Aigrettes. Your health and safety are important to us. The Mauritian Wildlife Foundation holds third party insurance in case of an accident.

The trip to Ile aux Aigrettes involves a short boat journey of 800 metres. The journey takes five minutes across shallow water inside the lagoon. A Ranger is present on the boat at all times in addition to the boatman. The boat has a valid Pleasure Craft Licence and is stocked with life jackets which students are asked to wear for the journey. Students must be accompanied by at least one teacher on each boat journey.

In the event of rough seas the boat trip will be cancelled at the discretion of MWF in consultation with the National Coast Guard and Meteorological Services.

School parties will be divided into smaller manageable groups of around 15 - 20 students each, to take “Le Sentier du Dodo” nature trail around the island. Each sub-group must be accompanied by the Ranger and a teacher at all times.

Students should stay together to avoid going off-track. Instructions will be given by the Rangers on procedures before the beginning of the trail. In the unlikely event that a pupil is off-course and astray, he/she MUST remain where he/she is. MWF will organise a search.

A First Aid kit is kept on the boat and on the island. Teachers are informed that Rangers have received basic first aid training. MWF will organise for external assistance if required.

MWF will organise evacuation from the island in the event of an emergency (this eventuality is most unlikely to happen).

It is the role of every student to take reasonable care for the health and safety of himself/herself and/or other persons who may be affected by his/her actions during the visit.

4. Briefing of Students by the Teacher

Teachers will be responsible for the proper behaviour of their students during the visit. They are kindly invited to brief the students at school before the visit about the following issues:

4.1 Behaviour

Students are advised to:

- remain grouped around the Ranger/teacher all throughout the visit. Under no circumstances should a student or a group of students leave the group and wander off.
- go to the toilet before they start the trail
- refrain from making excessive noise in order not to disturb the birds on the island
- observe carefully (see, hear, smell etc.) all the abiotic and biotic elements they will come across during the trail
- avoid touching animals and plants unless permitted by the Rangers
- avoid walking on young seedlings of endemic plants and to watch out for skinks or young tortoises
- watch out for sharp corals

Students are NOT allowed to:

- throw away any solid waste including plastic, paper or any remains of food or drink
- smoke or play music during the trail
- eat on the trail

Students may:

- take pictures with their mobile phones or camera without disrupting the group
- take down brief notes in a small notebook
- ask the Rangers questions in line with their science, history and geography syllabus at school

4.2 Materials and Food

Materials to bring:

- A light rucksack in which they will place their materials and water (their hands should be free when they walk)
- A small notebook and a pencil or a pen
- Sunglasses and sun lotions (optional)
- A hand lens (optional)
- Camera (optional)

Students are advised to:

- bring plenty of drinking water
- leave food in the bus to eat before or after the trail
- take a good breakfast in the morning before taking the bus to the island
- wear clothing that is neither too tight nor too loose - cotton is recommended for staying cool and long sleeves and trousers will protect against insects and thorns
- wear comfortable sports shoes that will allow them to walk on the rough surfaces on the island
- bring along a light rain coat in case it rains
- wear a cap to protect them against the sun
- wear a name tag on their chest with their first name clearly written; this will help the Rangers to address them personally (optional)

5. Pre- visit Activities in Schools

Teachers should brief their students properly about Ile aux Aigrettes well before the visit (please avoid complicated and technical details). Students should have an idea of what they would expect to see and experience during the visit. Please visit the MWF website for additional information: www.mauritian-wildlife.org

This visit should be an opportunity for students to experience what they have learnt at school in their science, geography and history curriculum.

Students should be prepared to ask questions, brainstorm and discuss. We expect students to behave properly in group and display a responsible and environment-friendly attitude and behaviour.

6. Lesson Plan

Class size: up to 45 pupils
Grouping: groups of up to 15 students per group
Grade: Form II, but adaptable to other classes
Duration: 2.5 hours (including boat trips)
Time: 9.30 – 12.00 hours weekdays, only on reservation.
Le Sentier du Dodo: about 1.2 km.

Learning Areas: Biology, Ecology, Geography, Geology, History, Travel and Tourism

Session Title: "Le Sentier du Dodo" Nature Trail

Topics:

- Mauritian Wildlife Foundation: its roles and importance as a conservation charity Non-Governmental Organisation (NGO)
- Human effects on the environment - deforestation, soil erosion, pollution (water, air, land), introduction of exotic species
- Conservation - endemic plants, endemic birds, reptiles, natural habitats
- How humans can act to protect nature and save the environment

Aim of Session:

- Students will learn about the important roles of the MWF in the conservation of endemic flora and fauna on the island
- They will interact with their peers, their teacher, the Rangers and the resources on the island to consolidate their knowledge and understanding of Biology, Ecology, Geology, and the Geography and History of Mahebourg Bay
- To develop a more environment-friendly attitude and behaviour

Learning Objectives: At the end of the visit, pupils should be able to:

- Demonstrate an appreciation of the roles of the Mauritian Wildlife Foundation in the conservation of endemic flora and fauna
- Describe how animals depend on plants for food and shelter (habitat)
- Describe the roles and importance of plants and animals found on Ile aux Aigrettes
- Explain the problems linked with human effects on the environment
- Adopt environment-friendly attitudes and behaviours

Presentation - Main Points	Reference
Preparation In-school Students briefed by the teacher about MWF and Ile aux Aigrettes - teacher should access MWF website and consult Teachers' Resource Pack for background information. Teacher to introduce the topics (from MWF website) in classroom lessons in preparation for the visit. Teacher to deliver the safety briefing including behaviour on the boat, the way to dress and to behave, the materials and the food and drink to bring along with them.	Web and computer access http://www.mauritian-wildlife.org/application/index.php?tpid=4&tcid=28 DVD may be viewed via same link Teacher Resource Pack

Arrival at Jetty Welcome by Ranger Recap on behaviours and health and safety by Ranger Students divided into groups of up to-15 students **Set the scene**. Refer to view of island: How green? What the first sailors would have seen hundreds of years ago? MWF is working to restore the island to undo the damage that humans have done over the centuries. Question: What damage has been done by humans to Mauritius and Ile aux Aigrettes? We are going back in time – about four hundred years and we will see some amazing animals on the way. Show some Fact sheets here, so that students are familiar with the animals they will be seeing.	MWF Ranger Teacher Fact Sheets
" Le Sentier du Dodo" nature trail **1st Stop - Tortoise Nesting Pit** (5 minutes**)** Briefly explain importance of the nesting pit and conditions necessary for successful nesting. **2nd Stop - The Giant Skink** (5 minutes) **Conservation Topic** Allow pupils to observe the model of the Giant Skink. Ask pupils to guess why it has become **extinct.** Introduce the Telfair's Skink **- conservation work of MWF** On the way, allow pupils to observe the headstarting facility for Telfair's Skink. Link this with the first thing the pupils saw on the island – the tortoise pen. **3rd Stop - Pigeon Viewpoint** (10 minutes) **Conservation Topic** Allow pupils to observe the birds and describe their characteristics. Provide information on the Pink Pigeon and other endemic birds on the island. Draw attention to the Pink Pigeon nest in the tree	Tortoise Nesting Pit Giant Bronze Skink Telfair's Skink Nesting Pit Pink Pigeon Observation Point

Consolidate the concept of **endemic** and **exotic** birds.	
4th Stop – The Plant Nursery (10 minutes) Briefly explain the conservation work of MWF Allow pupils to handle some of the seeds Link nursery to the concept of plant **conservation and work of MWF.** Explain the layout of the nursery: the seed preparation, potting and moving according to shade and watering**.** On the way from the plant nursery ask students to observe the Bois de Fer (approximately 170 years old and one of only five adult trees left on the island). Ask them to guess why it is called Bois de Fer.	Plant Nursery with shading structure Seeds of endemic plants Seedlings and cuttings of endemic plants (e.g. Bois de fer)
5th Stop – Olive White-eye Feeding Station/ Phenology Point (15 minutes) Rest in the shade on the benches. Introduce the nests and relate to bird species and the availability of plant materials for nesting. Pass round nests of Olive White-eye when available Ask students if they could make a nest like this. Give each student a picture of a plant or animal at random. Ask them to form two groups: one for **endemic** and another one for **exotic** species. Phenology Activity done here. Hand phenology booklets around and give explanations on the activity to be done by students divided into groups not exceeding 5 in number under ranger supervision.	Olive White-eye Feeding Point **Activity 1:** Endemic and exotic plant and animal species. Bois de Fer Ebony plants - male and female.
6th Stop – Tortoise Bronze (10 minutes) Allow the pupils to observe the tortoise bronze. Mention about adaptation to its environment and mass killing of tortoises by early settlers. Remind students of the concept of **extinction.**	Bronze Tortoise

Recap on heterophylly – link the browsing height of the tortoise and heterophylly.	Examples of heterophylly
7th Stop - Approaching the Dodo (10 minutes) Group the pupils to view the Dodo in the forest. Ask pupils to identify it and to relate what they already know about it.	Dodo Bronze
Give brief information about the Dodo and introduce the concept of **extinction** and hence **conservation.** Link it to the work of **MWF** on the islet – to conserve nature Hand out Tambalacoque seeds and discuss seed dispersal and priming for germination On the way, pupils will observe other plants displaying heterophylly	Ebony fruits, seeds etc. Plants showing heterophylly e.g Bois de boeuf, Bois de rat
8th Stop - Bayview Platform (15 minutes**)** Allow pupils to rest and to have some drink. Remind pupils to use the bins for waste disposal Let pupils read the sign boards while drinking. Discuss the content of the sign boards. Currently not available: *Take students on the platform.* *Observe Mahebourg Bay, with the mountain range on one side and the islets on the other side.* *Test the students' knowledge of geography and history by asking them to identify the mountains, the islets, the cardinal points, the landing of the Dutch, the battle of Grand Port.* *Explain how the islets are used for conservation by MWF* On the way, point out examples of heterophylly	Sign boards inside Bayview platform. Mountain ranges, islets, displays on the platform.
9th Stop – Visscher's Viewpoint (10 minutes) **Environment Topic** Allow students to sit in the kiosk Ask students to keep total silence and to listen for the noises	Visscher's Viewpoint Natural and man-made materials around the kiosk **Activity 2**: biodegradable and non- biodegradable material

that they can hear and identify; distinguish between noise coming from nature and man-made noises. Introduce the concept of resources and distinguish between man-made and natural resources. Ask the pupils to give as many examples as possible of natural and man-made materials. Ask students to try the same activity back at school and compare. Introduce the concept of **biodegradable** and **non-biodegradable** materials (decomposition and recycling in nature). Hand round materials, ask pupils to sit on the benches starting from the most degradable to the least degradable material. Let students decide on theirown before intervening. Allow students to distinguish between them and guess how long it takes for some items to decompose. • The message is that materials produced by nature are biodegradable and are good for nature. • Man-made materials are often non-biodegradable and bad for nature. • Use less non-biodegradable materials and do not litter. On the way - ask students to observe and to compare the male and female ebony plants; the fruits and the seeds arrangement. **Plant diversity** Talk about the ebony plant ecology, history, economic value. Hand out the ebony fruits and relate to tortoises and seed dispersal. Big fruits and seeds need big animals to digest and spread seeds! Hand out ebony and talk about hardwoods and the history of deforestation.	Some biodegradable materials Some non-biodegradable
10th Stop – Lime Kiln (5 minutes) **History Topic** Short introduction to History – refer to sign. Dutch and the French period - origin and purpose of the lime kiln.	Lime kiln
11th Stop – Tortoise Nursery (10 minutes) **Conservation Topic** Pupils are shown the baby tortoises – explain their **conservation** role on the island and the work of **MWF** *If available, hand round some tortoise eggs (post hatching) or*	

a carapace. Introduce the concept of **food chains** using tortoise as an example of an herbivore.	
Walking with Nature - Plenary (10 minutes) When all students are back, use the exhibition in the "Nid des Aigrettes" to review the key topics covered along the trail. Encourage the students to read the display boards.	Display boards in le "Nid des Aigrettes" **Activity 3:** Food Chain Game. Done at Nid des Aigrettes

7. Post-visit Activities in Schools

As most of the time on the island will be taken up by "Le Sentier du Dodo", teachers are invited to undertake some in-school follow-up activities after the visit.

Students may:

- collectively set up an exhibition in their school on Ile aux Aigrettes for the benefit of students who did not visit.
- undertake project work along the same lines
- on an individual basis, make a drawing of a plant or animal that has impressed them on the island for an exhibition at school
- write a poem or a song relevant to their experience on the islet.
- assume that they were the first visitors to land on the islet some 400 years back and write an essay on what they would have seen then.
- set up a role play to highlight the destruction of the endemic forest on the island and its rehabilitation by the Mauritian Wildlife Foundation
- organise a fund raising activity at school to help in the rehabilitation of Ile aux Aigrettes etc.

8. Flora and Fauna

Flora

The island has a typical Mauritian coastal plant community, but this has become degraded through partial clear-felling and invasion by exotic weeds, and browsing by goats from around 1953 to 1965. Exotic reptiles and mammals were also introduced. Although nominally a Nature Reserve since 1965, the island was poorly policed until 1985, and many native trees on the island were cut for firewood; almost every large tree on the island had damage caused by woodcutters cutting off branches. Since rats were removed in 1991, regeneration of the endangered Ile aux Aigrettes Ebony (*Diospyros egrettarum)* has been spectacular. The rats ate the seeds and slowed regeneration. Carpets of seedlings can now be seen beneath the parent plants. The seeds are also dispersed by the tortoises through their excreta.

Ile aux Aigrettes has the largest and best remnant of Mauritian dry coastal ebony forest, and many of the plants found on the island are endemic to Mauritius. It has the largest population of some of the surviving species. In 1997 the forest in the central third of the island was in good condition, and with a canopy of about 8 m. A further 30-40% of the island was degraded forest and the rest badly degraded. The native plant species on the island include rare endemic species. Although the vegetation was in better condition than any other coastal remnant, it was impoverished in the number of species. Early Dutch maps showed the island covered with palm trees which have long since disappeared.

From 1986 to the end of 1997 about 60% of the island was cleared of weeds at least once and much of it several times. After the first weeding, successive clearing became progressively easier as the amount of weeds decreased. By 2005, with about 90% of the island weeded, the rate of clearing decreased. Only the most degraded areas of the island, and a shelter belt around the coast, still needed clearing. By 2007, all areas on the island have been weeded at least once.

The two worst weeds are Prune malgache *Flacourtia indica* and Acacia *Leucaena leucocephala.* These are highly invasive, grow quickly when cut, and suppress the regeneration of native plants. Much work remains before Acacia and Prune malgache can be eradicated, although both are under control. The other invasive species have been easier to deal with. Aloès *Furcraea foetida* and Filao *Casuarina equisetifolia* have been eradicated, and Tecoma *Tabebuia pallida* have been cut down, but emerging seedlings are still weeded out.

As palms were an important part of the coastal community, three species have been re-introduced from Round Island: 'latanier bleu' *Latania loddigesii*, 'palmiste bouteille' *Hyophorbe lagenicaulis,* and most importantly, 'palmiste blanc de l'île Ronde' *Dictyosperma album* var *conjugatum*. The 'palmiste blanc de l'île Ronde' has been grown from seeds from the two last surviving wild individuals on Round Island (one of which has since died) and 46 have been planted on Ile aux Aigrettes. Other species typical of coastal palm-rich forest which have been planted are 'Bois buis' *Fernelia buxifolia, Gagnebina pterocarpa,* 'mazambron' *Lomatophyllum tormentorii*, and 'Bois cabris' *Clerodendrum heterophyllum*. A further 21 species not currently occurring on the island but typical of lowland coastal vegetation community have been identified to enhance species diversity. These, including 'Café endemique' *Coffea myrtifolia* and 'Bois poupard' *Poupartia pubescens* will be planted across the island.

Fauna

Mammals - Mauritius has only three surviving native mammals: the Mauritius Fruit Bat *Pteropus niger* and two small insect eating bats: the Mauritian Tomb Bat, *Taphozous mauritiana* and the Natal Free-tailed Bat *Mormopterus acetabulosus*. On Ile aux Aigrettes, there are frequent visits of the Mauritian Fruit Bat and occasionally the insect eating bats are also seen. Subfossil remains of the smaller extinct fruit bat *Pteropus subniger* have been found on the island.

Birds - Presently there are four species of native birds that breed on Ile aux Aigrettes: the Little Green Heron *Butorides striatus and* three endemic species: Pink Pigeon *Nesoenas mayeri,* Mauritius Olive White-eye *Zosterops chloronothos* and Mauritius Fody *Foudia rubra.*

Pink Pigeons were released from captive stock bred at the Gerald Durrell Endemic Wildlife Sanctuary, Black River, Mauritius. Thirty five birds were released between March and September 1994. The population on Ile aux Aigrettes fluctuates around 50 birds. Before the clearance of the lowland forest, it is likely that all of the native land birds lived in the lowlands and it seems likely that many also would have originally lived on Ile aux Aigrettes. A former lessee of the island notes that the Grey White-eye 'Pic Pic' *Zosterops mauritianus* was present on the island around 1960 and is still common on the mainland.

The name of the islands of the Mahebourg Bay and early records indicate that Ile aux Aigrettes once held populations of Dimorphic Egrets *Egretta dimorpha,* Wedge-tailed Shearwaters 'Fouquets'

Puffinus pacificus, and Lesser Noddies 'mariannes' *Anous tenuirostris.* Sub-fossil bones of Wedge-tailed Shearwaters and White-tailed Tropicbirds *Phaethon lepturus* have been found on Ile aux Aigrettes. These seabirds also nest on the nearby Ile de la Passe, Ilot Vacoas, Ile aux Fouquets, and Ile Marianne, where Lesser Noddies occasionally roost. These birds are sometimes heard or seen flying near Ile aux Aigrettes, particularly after stormy weather.

Reptiles - The reptile fauna of Mauritius is much impoverished due to the introduction of alien exotic predators, such as Cats (*Felis cattus*) the Ship (Black) Rat *Rattus rattus*, Brown rat *Rattus norvegicus* and the Asian Musk Shrew 'rat musqué' *Suncus murinus,* and habitat alteration. Many species that are extinct today on mainland Mauritius exist on offshore islands, free of exotic predators. The most important of these is Round Island, to the north of Mauritius. Like Ile aux Aigrettes, Round Island is also managed by MWF as a Nature Reserve. Native reptiles found on Ile aux Aigrettes today are:

- The Ornate Day Gecko *Phelsuma ornata* which can be seen easily all over Ile aux Aigrettes
- The Telfair's Skink *Leiolopisma telfairii* which was extinct on the island and has been reintroduced from Round Island by MWF since 2006
- The Günther's Gecko *Phelsuma guentheri* which was extinct on the island and has been reintroduced from Round Island by MWF since 2010

Fossil evidence indicates that a small native skink, thought to be Bojer's Skink *Gongylomorphus bojerii* and the now extinct Mauritian Giant Tortoises *Cylindraspis inepta* and possibly *Cylindraspis triserrata* once inhabited the island. It follows that the other species found on Round Island, other islands and the mainland may once have been found on Ile aux Aigrettes.

With the Mauritian tortoises now extinct, MWF are using the Aldabra giant tortoise *Aldabrachelys gingantea* to replace them. The giant tortoises on Ile aux Aigrettes were originally from the Seychelles and brought to Mauritius with the help of Darwin in the late 1800s to reduce their risk of extinction. Research is showing that these introduced tortoises are fulfilling the role that the extinct Mauritian tortoises once occupied and are helping restore the island.

Invertebrates - Little work has been carried out on the invertebrates of Mauritius and much remains to be discovered, with only the land snails, butterflies, ants, beetles and crickets having been described in any detail. Sub-fossils of land snails were discovered on Ile aux Aigrettes during an excavation of the limestone cave in 1991. This revealed a total of 53 native species of non-marine shells, which would make Ile aux Aigrettes one of the richest sites in the Mascarenes. At present, there are 14 known species of native snail and seven exotic species. Many of the snails that are locally extinct

on Ile aux Aigrettes are now found in the wet upland forest, suggesting that either the island was once a wetter habitat or that the snails show a broader ecological tolerance. The exotic African Land Snails *Achatina panthera* and *A. fulica* are currently found on the island. A large number of their empty shells are used by hermit crabs. The limestone cave also harbours a very unique cricket that can run over the water and is found nowhere else on earth.

There is a wide variety of invertebrates recorded from the island, with at least 119 species recorded, but these require further studies. Fifteen species of native butterfly have been recorded on Ile aux Aigrettes.

Marine Life - In 1994 a survey of the marine fauna and flora within 500 m of Ile aux Aigrettes was carried out. There are two significant stands of live coral to the north-west and to the south-west of the island. Within the study areas 36 coral species and 116 fish species were identified. The Crown-of-thorns Starfish *Acanthaster plancei* was observed within the study area and at some survey sites it was present in high numbers. Damage to the coral by this starfish was visible and fresh damage could be seen on a daily basis. This species eats live coral and one of its most common predators, the Triton *Charonia tritonis*, is over-harvested for human consumption. This is causing an imbalance in the food chain resulting in high numbers of starfish. Several species of fish have been observed in the pond at the bottom of the cave on the island.

Seabirds

In the lime kiln cave on Ile aux Aigrettes, we have found the bones of seabirds that used to nest on the island in the distant past. These bones are from the White-tailed Tropicbird *Phaethon lepturus* and the Wedge-tailed Shearwater *Puffinus pacificus*. MWF is now in the process of bringing back these seabirds to the island. Young birds are collected on Round Island and reared and released on Ile aux Aigrettes. It is hoped these young will form a new breeding colony on Ile aux Aigrettes when they are adults. Other seabird species including Common Noddies *Anous stolidus*, Lesser Noddies *Anous tenuirostris,* Sooty Terns *Onychoprion fuscatus* and Red-tailed Tropicbirds *Phaethon rubricauda* are also being reintroduced.

Introduced Fauna - At some point during Ile aux Aigrettes' past, a wide diversity of exotic animals such as Cats *Felis catus,* Black Rats *Rattus rattus,* Goats *Capra hircus*, Tenrecs *Tenrec ecaudatus* and Indian House Shrews *Suncus murinus* have been present. Goats were introduced to control Acacia *Leucaena leucocephala* between 1953 and 1964. Of the above pests only shrews remain today.

There are also seven species of exotic birds on Ile aux Aigrettes: Madagascan Turtle Doves *Streptopelia picturata,* Spotted Doves *Streptopelia chinensis,* Ground Barred Doves *Geopelia striata,* Red-whiskered Bulbuls *Pycnonotus jocosus,* Mynah Birds *Acridotheres tristis*, Madagascan Fodies *Foudia madagascariensis* and Grey Francolin *Francolinus pondicerianus.* Spice Finches *Lonchura punctulata,* Sparrows *Passer domesticus* and Common Waxbills *Estrilda astrild* have also been recorded as being present during the 1960s.

A number of exotic reptiles also live on the island:

- The Wolf Snake *Lycodon capucinus,* introduced from India, but is kept at low numbers by the recently reintroduced Telfair's Skink
- The Agamid Lizard *Calotes versicolor*
- House Gecko *Hemidactylus frenatus*
- Stump-toed Gecko *Gehyra mutilata*
- Indopacific Gecko *Hemiphyllodactylus typus*
- The Indian Blind-snake *Indotyphlops braminus*

9. Telfair's Skink Scinque de Telfair *Leiolopisma telfairii*

The History

The Telfair's Skink is a large lizard that is endemic to Mauritius. It was once part of the large reptile community that included many types of endemic lizards and snakes. Mauritius is unusual, as it had more endemic reptile species per unit area than most other places in the world.

Movement of people since the 1500s led to the introduction of many plants and animals previously not found in Mauritius such as rats, cats and monkeys. One of the first and most damaging animals to arrive was the rat which has been responsible for the loss of many reptile species. Wherever rats invaded, reptiles like the Telfair's Skink disappeared. By the mid 1800s the Skinks could only be found on Round Island located north-east of Mauritius. With the only Telfair's Skink population in the world found on one island, the risk of extinction was very high. The same is true for other reptile species that had become restricted to offshore islands around Mauritius.

The Mauritius Reptile Recovery Programme

Since the 1990s rats and several other introduced predators have been removed from many of the islands. The removal of rats and cats and restoration of the natural vegetation on Ile aux Aigrettes

has allowed us to bring back the Telfair's Skink and Günther's Gecko, thus it is no longer restricted to Round Island. Between December 2006 and February 2007, 260 Skinks were collected from Round Island and released on Ile aux Aigrettes, with a further 500 released in 2010. Nine captive Skinks that were already present on the island were also released.

Present Work

Each Skink has a small electronic 'Passive Integrated Transponder' (PIT tag) inserted under the skin that emits a number code unique to that Skink. This is similar to reading a bar code in the supermarket. When a Skink is captured we use a scanner to obtain its number to identify the individual. Skinks are expertly found across the island by MWF researchers on a daily basis to obtain information on their body size, weight and condition. This allows us to determine whether the individuals are growing well. We also record the location where each individual is found to track the movement of individuals and discover what types of habitat they prefer on the island.

Between January and March particular effort is given to searching for new young Skinks on the island. Telfair's Skinks lay an average of twelve eggs, which are buried in the ground from October to December. Approximately 66 days later the eggs hatch.

Telfair's Skinks are omnivorous, feeding mostly upon invertebrates and fruits and small vertebrates, such as other small reptiles. They will also scavenge on dead animals and food items dropped on the ground. The Skinks have proved to be effective in controlling the introduced populations of certain animals, such as the shrew, the African Land Snail and the Indian Wolf-snake. Skinks are also dispersing the seeds of endemic plants in the same way as the tortoises do. However, shrews remain a problem and eat the baby skinks as they hatch. For this reason adult female skinks are collected between October and December each year so that they can lay their eggs in artificial nests. The young then hatch in the safety and are then grown on in nurseries that are protected from shrews. Once the young skinks reach a body length of more than 10cm they are safe from being eaten by shrews, they are fitted with a PIT tag and released on the island. As the adult skink population grows we expect to see the shrew population decline, thus permitting young skinks to survive on the island without the need to help them.

In March 2010, 50 Günther's geckos (30 females and 20 males) were reintroduced onto Ile aux Aigrettes. The Günther's gecko used to be found throughout mainland Mauritius and several of the offshore islands. The remains of their large eggs can still be found in caves on the mainland. The Günther's gecko is one of the largest geckos in the world, but despite their size they are very difficult to find. To monitor the gecko population the reptile team search for and monitor their eggs within the breeding season between September and April, which are easier and more accurate

than searching for the geckos. Two eggs are laid and glued into position upon the chosen site. A female can lay up to three clutches within a season that is usually between September and February with most hatching by May. One or more females will lay their eggs at the same site to produce large nesting sites. The number of eggs found and their hatch rate within a season indicates the health and growth of the population. Finding which plant species the geckos like to lay their eggs upon informs us of what plant species should be planted back on Round Island, which lost most of its hardwood species. Since the Günther's geckos were released on the island the reptile team have detected a decline in the introduced house gecko, which is a competitor of the native Ornate day gecko.

10. Aldabra Giant Tortoise *Aldabrachelys gigantea*

History

Giant tortoises reach sizes of 1.2 m in length, 250 kg in weight and can live for over 200 years. There were once two species of giant tortoises endemic to Mauritius: a large domed shell tortoise that grazed close to the ground and a large saddleback tortoise that would have also browsed up to a height of approximately 1.2 m. Both of these tortoises were over-exploited by sailors who visited the island for their meat and oil. They became extinct by the mid 1800s. Live tortoises were stored on board ships to provide a supply of fresh meat during the voyage. The oil extracted from the dead animals was used in cooking and as medication. They were known to have occurred in

huge numbers throughout the lowlands and coastal regions. Here they would have had an important role in maintaining open grassland habitats.

In 1875, Charles Darwin and other notable naturalists of the time recognised that the Aldabra Giant Tortoise found on the islands of Aldabra (Seychelles) could face a similar fate to the Mauritian tortoises. Following their suggestion, individuals were brought to Mauritius to establish a new population and to avoid the total extinction of these tortoises in the event the original populations died out in the Seychelles. The Aldabra Giant Tortoise therefore became one of the first animals ever to be protected by law for conservation purposes, initiating one of the first active conservation strategies to save a species from extinction. The populations in Aldabra, Seychelles and the descendants of those brought to Mauritius in the late 1800s still survive to this day.

The MWF Recovery Programme

Ile aux Aigrettes currently supports the only wild breeding population in Mauritius. The tortoises lay their eggs in soft sandy soil and nesting pits have been specially dug on the island to help females find suitable places to dig and lay their eggs. When the eggs hatch, the baby tortoises are found by the researchers and kept in an aviary where their health and growth can be closely monitored during the first few vulnerable years of life. After three to five years, the tortoises are large enough to be released back into the wild. This process is known as head-starting and the first batch of youngsters was released on Round Island in May 2008.

Many endemic coastal plants are adapted to the presence of giant tortoises; they are trample resistant and have flexible stems to withstand being trampled by a tortoise; small delicate plants and grasses are spiky and coarse to protect themselves from being eaten by tortoises. Several plant species unique to this region also display heterophylly where the leaves of juvenile plants are different in shape and colour to the leaves of adult plants. The leaves change shape and colour at a height of about 1.2 m. Those below that height are thought to be undesirable to a tortoise and those above are outside the reach of the browsing height of the extinct saddleback tortoise.

Present Work

The Aldabra Giant Tortoises follow the behaviour of their extinct Mauritian cousins by avoiding juvenile heterophyllous leaves, even though they will consume adult leaves when offered. The tortoises eat the fruits of many endemic plants. The seeds pass through their digestive systems and are then deposited throughout the island. In this way, tortoises are the main dispersers of endemic fruiting plants on the island, such as the critically endangered ebony. Many of the introduced plants are not adapted to tortoise grazing and are eaten by tortoises. This is an

advantage to the growth of native plants that are adapted to living with tortoises. The Aldabra Giant Tortoise is therefore considered as an ecological replacement, to the tortoises that once roamed Mauritius. With the release of tortoises on Round Island, we are expecting that they will help control persistent introduced weeds and favour the growth of endemic plants. Aldabra Giant Tortoises are therefore helping to naturally restore islands.

NATIVE ANIMALS REINTRODUCED TO ILE AUX AIGRETTES

11. Mauritius Fody (Cardinal de Maurice) *Foudia rubra*

The History

The Mauritius Fody is a small song bird which is endemic to Mauritius. Unfortunately the Mauritius Fody declined by 60% between 1974 and 1993, when only around 120 pairs remained in the wild. This was due to drastic losses of their native forest habitat and also the introduced predators which arrived when humans colonised the island. Predators such as the Black Rat *Rattus rattus* and monkeys (Crab-eating Macaques *Macaca fascicularis*) ate the birds' eggs from their nests. Drastic measures were needed in order to save this species from extinction and MWF believed on

historical and ecological grounds that Ile aux Aigrettes was a suitable place to release some birds as there are no mammalian predators.

The MWF Recovery Programme

Chicks and eggs were rescued by MWF researchers from the upland forests of the Black River Gorges National Park. These eggs and chicks were incubated and reared by highly skilled hand-rearers at the Gerald Durrell Endemic Wildlife Sanctuary in Black River. Some of the fledglings were used in the first successful captive breeding programme for this species and around 90 birds were released onto Ile aux Aigrettes between 2003 and 2006.

The release of Mauritius Fodies onto Ile aux Aigrettes was highly successful, and in a short time the birds had formed pairs and started breeding. In just four years after release over 140 fledglings had been produced in the wild on Ile aux Aigrettes. The population has now stabilized at around 200 birds, which is believed to be the carrying capacity of the island.

Present Work

The Mauritius Fody population on Ile aux Aigrettes is monitored very closely by a team of MWF scientists. Work involves taking a daily attendance register in the morning at the aviaries, where the birds have access to supplementary food in order to ensure their survival. Every bird on the island has a unique leg-ring combination which allows for their identification using binoculars. In this way it is possible to monitor the population size on the island.

Breeding activity during the months of July to March is the busiest time of the year for the Fodies and scientists! An attempt is made to find and monitor all nests built on Ile aux Aigrettes. The nests are closely watched through the various stages of nest building and incubation, which lasts 14 days when the eggs hatch. At this time the nests are accessed and the chicks are ringed at around 8-9 days before they fledge. The chicks fledge at around 16 days old, each with their own identity. By knowing the parentage of each bird that fledges on Ile aux Aigrettes it is possible to monitor the genetic diversity of the population.

Additionally, important information is collected on the ecology of the Mauritius Fody. Feeding observations are recorded, as well as other observations on bird behaviour. This provides vital information on the health of the birds and also for planning future translocations to other offshore islets, in terms of what the birds feed on and where they nest.

The success of the Ile aux Aigrettes population of Mauritius Fodies is such that it can now be used as the basis for further translocations to other predator-free offshore islands. This will ensure that the Mauritius Fody will be here for all to see for generations to come.

12. Mauritius Pink Pigeon (Pigeon des Mares, Pigeon rose) *Nesoenas mayeri*

The History

The Pink Pigeon is a beautiful bird of the Mauritian forests. It is endemic to Mauritius and is an endangered species. When Mauritius was first colonised, the Pink Pigeon was found all over the island. It declined because rats and monkeys took the eggs and killed the nestlings. Adults were killed by cats and monkeys. The Pink Pigeon's habitat also declined as forests were cleared for agriculture and settlement. As a consequence, the species is thought to have been rare for over 150 years. In 1990 only nine wild birds still survived in the wild and these were living in the Black River Gorges National Park. It was clear that the species would soon become extinct.

The MWF Recovery Programme

Luckily there were some birds in captivity and it was possible to breed from these and to release over 300 individuals by 1997. This work was done by the Mauritian Wildlife Foundation working closely with the National Parks and Conservation Service and with the help of international expertise from Chester Zoo, UK and the Durrell Wildlife Conservation Trust, Jersey Channel Islands.

Birds were released on Ile aux Aigrettes in the mid 1990s and these have done well. We now have a population varying between 40 and 60 birds on the island. There are no cats, rats or any other predators on the island, so the birds are relatively safe. The birds feed on the fruits and seeds of the native plants. They are offered supplementary food to help them raise their young successfully.

There are also other populations of Pink Pigeons that have been reintroduced into the Black River Gorges National Park and in total there are now around 400 Pink Pigeons in Mauritius.

Present Work

The Pink Pigeons on Ile aux Aigrettes are carefully looked after and scientists ensure that they have enough food and clean fresh water. The birds are monitored and can be individually identified by coloured rings that they have on their legs. By keeping careful notes on the birds, we can calculate how long they live and how well they breed. Pink Pigeons can live for more than ten years and exceptionally up to 20 although most do not live that long. The birds breed throughout the year but with a peak in the dry months. The Pink Pigeons nest in the trees on the island and the eggs hatch after 14 days. The young are called squabs and they leave the nest after about three weeks.

Some of the squabs do not survive since they have a disease called Trichomoniasis that they catch from the exotic (introduced) doves that also live on the island. The scientists are monitoring the disease and treating sick birds when possible.

13. Mauritius Olive White-eye Oiseau à lunettes *Zosterops chloronothos*

The History

This is the rarest of the Mauritian birds, found in a few upland areas where around 100 pairs are still to be found. Like many other Mauritian birds the eggs and babies are eaten by rats and monkeys. As a result of this, the birds breed very poorly and the population is declining.

The MWF Recovery Programme

Since Ile aux Aigrettes does not have rats and monkeys, and following the successful adaptation of the Mauritius Fody on the island, it was felt that the Olive White-eye might do well on the island. To obtain Olive White-eyes chicks for the island we rescued eggs and young from nests that were in danger of being destroyed by rats and monkeys. These were hatched and reared at the Gerald Durrell Endemic Wildlife Sanctuary in Black River. The Olive White-eye is a very small bird only weighing about 10 g. The newly hatched birds are tiny, about the size of a peanut and weighing less than one gram. These were reared by hand on a diet of insects and nectar mainly and when old enough, the young were released on Ile aux Aigrettes. In 2008, these birds started breeding and producing young. They make a neat cup-shaped nest and lay two or three eggs that they

incubate for about 12 days. They breed in early summer and eggs may be laid in any month from August through to December. The young stay in the nest for another two weeks before they fledge.

The release of Mauritius Olive White-eye onto Ile aux Aigrettes has been successful although it took a number of years for the population to grow. The birds are very territorial and this seems to limit the number of breeding pairs that the island can support. The population has now stabilized at around 50 birds which is believed to be the carrying capacity of the island.

Present Work

This is one of the most challenging projects that MWF has ever been involved with. The Olive White-eye feeds on insects, the nectar from flowers and some fruits. During certain periods of the year they have difficulty in finding enough food. To help them, we put out fruit and a special feeding formula. In the long term we want to make Ile aux Aigrettes more suitable for the Olive White-eyes and so we are planting extra plant species on the island that will provide nectar and attract insects.

14. History of Ile aux Aigrettes

Ile aux Aigrettes is a small island (27 Hectares) located in the Mahebourg Bay in the south east of Mauritius. It holds one of the last viable areas of a coastal lowland forest making it one of the most important islands around Mauritius and is of international importance. Its flora and fauna has been drastically altered over four centuries of human interference. However, compared to the other islets, Ile aux Aigrettes still has many of its original elements.

Ile aux Aigrettes was formerly called Visschers' Eyland (Fishermen's Island) by the Dutch, who first landed in the region in 1598. The island probably takes its name from a colony of graceful white, long legged fishing bird *Egretta dimorpha* which once inhabited the island but which has since disappeared.

It is thought that the hardwood ebony forest on the island was cut down by the Dutch, as this wood was highly prized for furniture making in Europe. The French then started exploiting lime as early as 1727. Remains of a lime kiln are present on the north-west of the island. No historical records are known as to its operation, but it is believed that the trees were cut down to fuel the lime kiln.

Until World War II, the island's vegetation was largely untouched. However, the successive exploitation, culminating in the opening of large tracks during World War II and large amounts of people, food and equipment, resulted in the invasion of exotic plants and animals with only the more resilient species managing to survive. The history of the occupation of the island is based on the oldest record in the Mauritius Archives, dating back to 1830. The island was given in concession for private use to a Mr. Bretagne. This document, however, refers to an earlier concession holder, the Chevalier de Cherval. The concession was later turned into a permanent lease. A coral building was erected at some stage in the pre-World War II period and was used as the store for the lime kiln.

From 1939 to 1945 the island was used as a British military base. Large tracts of the native forest were cleared to install a garrison of soldiers. The remnants of over 20 buildings erected during that period and two World War I naval guns can still be found on the islet.

During the following private lease (up to 1965), Acacia *Luecaena leucocephala* quickly spread over large parts of the island. The lessee wanted to turn the island into a bird sanctuary and kept some of the cleared areas open. He tried to control the acacia by introducing goats. He introduced a variety of plants including grasses.

The island was declared a Nature Reserve in 1965, but up to 1985 the vegetation was degraded by illegal wood cutting. In 1985, the MWF proposed a habitat rehabilitation and management project for the island and obtained the lease for the islet in 1987. Wardens and researchers have been living on the islet ever since 1985. MWF carried out several conservation initiatives and

management activities with support from local organisations, private companies and sister organisations throughout the world. The following activities were undertaken:

- Eradication of weeds by manual uprooting and some herbicide trials
- Re-plantation of some nursery grown endemic species
- Eradication of pests (cats and rats)
- Introduction of endemic bird and reptile species

In 1995, the World Bank funded a Biodiversity Restoration project for Mauritius under the Global Environmental Facility (GEF) Fund. The aim of the programme was to restore the coastal forest and palm-rich communities on the island and to re-introduce missing elements of the fauna. To make the project viable MWF developed a strategy for eco-tourism and public awareness. Ile aux Aigrettes is the show-case in island ecosystems restoration.

15. Geography of Ile aux Aigrettes

Ile aux Aigrettes is a 27 ha inshore island off the south-east coast of Mauritius in the Mahebourg Bay lagoon, at latitude 20^{o} 25'00''S and longitude 57^{o} 43'43''E. It is located about 600 m from Pointe D'Esny, the nearest point on the mainland and at a minimum distance of about 1500 m from the fringing reef.

The island has a climate typical for the south-east of Mauritius. Average monthly rainfall varies from a high in January of 240 mm to a low in September of 60 mm. With the exception of July (110 mm) average monthly rainfall remains below 100 mm from June to November. Average monthly temperatures range from 16°C in July and August to 28°C in February. As with the rest of Mauritius, Ile aux Aigrettes suffers from the seasonal annual battering received from tropical cyclones. Also due to its location on the south-east coast of Mauritius, the island feels the effect of the prevailing south-easterly trade winds and the harsh wave action that has, over many hundreds of years, undercut the coral base of the island, giving it its distinct 'mushroom' form.

The surrounding sea water influences the coastline and causes considerable salt sprays around the island. Due to the nature of the bedrock, there are no substantial areas of standing water on the island. Any water collecting in hollows and depressions after rain will only be temporary. In the cave area there is the presence of brackish water.

The island consists of raised coralline limestone having a highest point at 13 m. The surface of the island is heavily pock marked, the ancient and now eroded coral formation giving rise to relatively deep holes and jagged pinnacles of limestone. The south-east part of the island is particularly heavily pock marked. A small cave from which sub-fossil remains of past fauna of the island have been unearthed, is present near the Research House to the north of the island.

The soils are shallow over the whole island, rarely exceeding 15 cm in depth, with much bare rock being exposed. The shallow soils are cited as being the main factor restricting the canopy height of the forest. Within the intact ebony forest the surface soil is very rich in organic matter (40%) with low levels of calcium carbonate. At 10 cm depth, the organic matter is much reduced with fragments of coralline limestone contributing two third of the volume. The shallow organic rich layer and free drainage of the soil could mean that water is a limiting factor for plant growth. The soils under the degraded areas are less moist and also contain less organic matter.

Limestone Caves

Ile aux Aigrettes has one of the three limestone caves of Mauritius. This cave is a natural formation which has been explored by researchers. The most important finds were tortoise shells and non-marine molluscs.

Glossary

Abiotic factors- all nonliving things in the environment e.g. light, temperature, wind , rocks, soil, pressure, etc.

Air pollution- the contamination of air by smoke, dust and harmful gasses

Analogue species- a species that can replace another species in its ecological function

Aquatic- living in or on water

Aquatic habitats- a water body where an organism lives e.g lagoons, rivers, wetlands, ponds, estuaries etc.

Biotic factors- all living things in the environment e.g virus, bacteria, algae, fungi, plants and animals

Browser- An animal that eat shrubs and tree parts

Canopy- The zone of the highest foliage and branches of a forest

Carnivores - an organism that feeds on animals. e.g. the kestrel

Climate change- the change in climate as a result of global warming

Community – all the organisms living in a habitat

Conservation- the protection, preservation and careful management of resources

Consumers- organisms that do not produce food but feed on other organisms or their products

Decomposers- organisms that feed on the remains of dead animals and plants e.g. fungi

Deforestation- the clearing of forest land

Detritivores- organisms that feed on decomposing materials e.g. earthworms

Dimorphic- occurring or existing in two different forms

Ecosystem- a system that includes all living things (biotic factors) as well as all the nonliving things (abiotic factors) interacting with each other in an area.

Endangered species- A species which is in danger of becoming extinct

Endemic- native to or confined to a certain region

Environment- all of the biotic and abiotic factors that surround and affect the survival and development of a living thing or population.

Exotic- not native to a given area; either intentionally or accidentally transplanted from another region.

Extinction- the death of every member of a species

Fledge- the stage in a young bird's life when the feathers and wing muscles are sufficiently developed for flight

Fledging- A young bird which has just developed its flight feathers (notably wings)

Food chain – a sequence comprising a producer and one or more consumers

Food web- a web comprising several interlinked food chains.

Fossil- The mineralized remains of an animal or plant

Genetic diversity- level of biodiversity that refers to the total number of genetic characteristics in the genetic makeup of a species

Global warming- a process by which more heat is trapped by the atmosphere

Grazer- An animal that eat grasses

Habitat - a place where an organism or a biological population normally lives or occurs.

Herbivores - an animal that feeds on plants e.g. land tortoises

Invasive species- Any species that has been introduced to an environment where it is not native, and that has since become a nuisance through rapid spread and increase in numbers, often to the detriment of native species.

Invertebrate- An animal without vertebrae, i.e. backbone

Land pollution- the contamination of land by various pollutants e.g. solid waste, pesticides etc.

Man-made resources- resources produced by Man e.g. plastic, houses, cars

Native species- a species that normally lives and thrives in a particular ecosystem; this can include any species that developed with the surrounding habitat, and can be assisted by or affected by a new species.

Natural resources- resources available in nature e.g. air, water, rocks, plants, animals

Nature reserve- An area of land managed to conserve wildlife or plant habitat or other natural features.

NGO- non-governmental organization

Non-renewable resources- resource that cannot be replenished by natural processes

Omnivores- an animal that feeds on both plants and animals to survive e.g rat

Organism- a living entity

Parasites- plants or animals that obtain their food from other plants or animals

Photosynthesis – the process by which plants manufacture their food (sugars) using water and carbon dioxide as raw materials and light energy from the sun. It is crucial for life on earth.

Pollutants- unwanted substances in the environment

Pollution – any process that leads to the presence of unwanted substances in the environment

Population- a group of living things that live in the same place at the same time (e.g. pink pigeon population)

Producers- green plants that trap light energy from the sun and convert it into chemical energy in food (sugar)

Renewable resources – resource that can regenerate quickly and that is replaceable.

Resources- living or non-living things present in the environment and which are useful to us

Scavenger- An animal that feeds on decaying matter such as carrion

Soil erosion- a process whereby the topsoil is removed mainly by water or wind or human activities

Species- A group of plants or animals having similar appearance; a rank in the classification of organisms, below genus and above subspecies

Terrestrial- living on land

Terrestrial habitats- a place on land where an organism lives e.g. forests, grasslands, caves, mountains etc

Under storey- the area of a forest which grows in the shade of the forest canopy

Vertebrate- An animal having a backbone

Water pollution- the contamination of water bodies e.g. rivers, lagoons, by pollutants