# Life on Fiji's Mangrove Trees

**ALISON HAYNES**

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# FOREWORD

The mangrove ecosystem is amongst the worlds richest in terms of its biodiversity. In Fiji, there are eight tree species that make up the mangrove forest.

Life on Fiji's Mangrove Trees is an Environment Science reader for school students in Fiji and other Pacific Islands.

It is hoped that it will raise children's awareness and appreciation of the different living things that live on mangrove trees and the importance in preserving stands of mangroves. It may help them develop a caring and responsible attitude to coastal environments.

# INTRODUCTION

Mangrove trees grow in sheltered coastal areas in the tropics. The mangrove stands and forests of Fiji are composed mainly of two species of *Rhizophora* (TIRI, TIRI WAI) and a species of *Bruguiera* (DOGO, LAILAI). Dogo are often large trees growing back from the sea, while tiri are most frequently found on the seaward edge.

Because mangroves live in the sea, they have special adapted roots that conserve water and leaves that are thick and waxy to help prevent water loss. Dodo trees have **buttress roots** and tiri have **arched strut-roots**. Both types of roots anchor the trees firmly in the mud.

Mangrove tree with seeds

The mangrove strip around the shore forms a natural breakwater. It protects the land from pounding waves that could cause erosion and is the first defence against tsunamis

In the quiet water amongst the mangrove roots, fish, crabs and prawns breed and feed on the decaying leaves and smaller animals amongst the leaves.

Mangroves have always provided wood for fuel and some of their parts have been used for medicines but these uses must be balanced against the benefits the mangroves give by protecting the land and by providing nurseries where fish, crabs and prawns can breed safely.

Yellow Tube Sponge

Tube Worm

# SPONGES AND TUBE WORMS

Sponges and tubeworms are found at the base of the roots and trunks of mangroves and therefore, at each tide, they are covered by the sea for a long time. They depend on the tide to bring them **microscopic organisms** for food.

Sponges are simple animals composed of a mass of cells enclosed in a skeleton of sharp ended **spicules**. Water carrying microscopic food enters the sponge by small holes and cilia, tiny threads, keep the water flowing through the sponge. Water leaves by a large hole usually at the top of the sponge.

Tube worms **secrete** the tubes in which they live. The tube is strengthened with sand or mud grains. The head is a crown of tentacles with cilia to direct food into its mouth.

**Rhizophora Species**

Oysters (*Crassostrea* species) on mangrove roots

# OYSTERS

Not far above the mud, oysters are attached to mangrove stems, roots and to one another. They are **bivalve** molluscs, but the right shell is attached permanently to the tree so that they lie on their side with the upper shell forming a lid that opens at high tide and allows particles of food to enter. The food is filtered from the water and is carried to the mouth by beating cilia.

Each oyster may have both ovary and testis. The eggs are fertilised by sperms from nearby oysters and quickly develop into swimming larvae called veligers. After a time the veligers settle as oysters on other mangrove roots.

Certain oysters produce valuable pearls when a small object such as a sand grain gets wedged between the animal and the shell. The animal secretes **calcareous** layers about the small object and in that way prevents it from harming the oyster. It also often produces a round attractive bead called a pearl. Oysters are farmed for food and for pearls.

Barnacles (*Chthamalus* species) on a mangrove root

# BARNACLES

Barnacles are crustacean like crabs and shrimps, but look very different because they attach themselves by the head to mangrove roots and remain lying on their backs for the rest of their life.

When the tide goes out, they can shut themselves inside their boxlike shells by closing a pair of top plates. When the plates are shut, the barnacle is safe from drying out and from **predators**.

When the barnacle is under water, the plates open and the legs shoot out to act as a food collecting net.

The barnacles on mangrove roots are **abundant** but very small. They are a small species of *Chthamalus*. They feed on food particles carried to them by the incoming tide.

Sperms from nearby barnacles fertilise the eggs when they are covered by the sea. The eggs develop into swimming larvae, called Nauplia, that are carried away to other mangrove trees where they grow into barnacles.

Winkles (*Littoraria* species) on a mangrove root at low tide

## WINKLES OR *LITTORARIA*

At low tide winkles, large brown **conical** snails, are found on the stems, strut roots and leaves of mangroves. There are several different species but they are difficult to tell apart unless you **dissect** them and study their reproductive systems.

The winkles that live on the mangrove leaves are more brightly coloured than those on the roots. They may have an

Winkles from mangrove leaves

orange, yellow, pink or even blue background with a few or many brown **concentric** dashes.

*Littoraria* move upwards along the mangrove roots as the tide comes in. They graze on the algal film on the roots when they are exposed to the air after the tide has **receded**. Others, if they live above the high tide mark, behave like land snails and feed at night.

Female *Littoraria*, either produce live young or else produce floating **capsules** containing only one egg

# LIMPETS

Limpets are flattened snails (gastropods) that can cling onto the hard root or branch in the roughest seas. When the sea covers them they graze on the algal film growing on the tree branches and oyster shells. As the tide goes out the limpets remain **stationary** between tide marks.

There are three species of limpets on the mangroves but they are all small and difficult to tell apart although one, *Siphonaria* has arisen along a very different pathway than the two *Patelloida* species. They have marine **ancestry** while the ancestors of *Siphonaria* have moved from the land into a marine environment.

*Siphonaria* species are sometimes called false limpets but their eggs like most marine gastropods hatch into free swimming larvae not into tiny snails as land snail eggs do.

Limpets - 2 *Siphonaria* species

Limpets - a *Patelloida* species

# NERITID SNAILS

These snails are rounder than winkles and only a few are present on one tree. They, like winkles and limpets graze by scraping the algal film from the mangrove roots using their radula, a file-like ribbon of teeth. However, neritids are truly **aquatic** and feed when covered by the sea.

They are sometimes found on the ground and therefore probably move from tree to tree. They lay their eggs on stones in small white round egg cases that may contain as many as 100 eggs.

Many species of *Nerita* are found along the sea shore but the one most often found on mangrove roots is *Nerita grayana.*

*Nerita grayana* - ventral (underside)

*Nerita grayana* - dorsal (top view)

# PREDATORS

All the animals described so far have been **herbivores** or **filter feeders**. Most of the predators on the roots are present also on the ground where the mangroves grow or some, like spiders, live above the high water mark and are not truly marine.

Crabs are found running about on the roots eating whatever has been washed up by the last high tide. They are more **scavengers** than predators.

There are a few predatory snails of the genus *Morula* that attack other snails, limpets, winkles and *Nerita* by boring a hole in their shell and sucking out the soft parts of the animal.

Reef herons (either white or grey) are seen perched on a mangrove root or wading in the water searching for prey. They more often swoop on a fish or worm living in the mud beneath the mangroves rather than on an animal living on the tree.

Reef heron *(Egretta sacra)* **BELO**

Fiddler crab (*Uca lacteal*) **TOTO**

# FINAL REMARKS

Roots, branches and leaves of mangrove trees provide a sheltered and solid environment for many invertebrates. These animals depend on each high tide to bring them food. The incoming sea water contains bacteria and microscopic algae and other **plankton** that the oysters, barnacles, sponges and tube worms filter from the water.

The inflow of water also keeps all the invertebrates on the mangrove roots from dehydration (drying out).

The stand of mangroves, of which each mangrove tree is part, provides a quiet and comparatively safe environment where many fish breed before they move into the open sea

Mangroves are also important as they protect the land from pounding waves that cause erosion and are a front line protection from destructive tsunamis.

If plastic bags and bottles that **decompose** slowly are thrown into mangroves, the mangrove roots become **clogged** with rubbish and mud and the animals on the roots die and mangrove seedlings do not survive.

# GLOSSARY

| | |
|---|---|
| **Abundant** | many |
| **Ancestry** | line of descent |
| **Aquatic** | lives in water |
| **Bivalves** | mollusc with two shells |
| **Buttress roots** | roots that support the tree trunk |
| **Calcareous** | containing calcium |
| **Capsules** | tough egg containers |
| **Clogged** | blocked |
| **Concentric** | having the same centre |
| **Conical** | shape of a cone |
| **Decompose** | decay, rot |
| **Dissect** | divide into parts |
| **Filter Feeders** | filter microscopic plants, bacteria from sea water |
| **Herbivores** | plant eaters |
| **Microscopic Organisms** | plants and animals that cannot be seen with naked eye |
| **Plankton** | small floating organisms |
| **Predators** | catch and eat other animals |
| **Recedes** | goes out |
| **Scavengers** | eat dead organisms |
| **Secretes** | makes and uses |
| **Spicules** | small supporting spikes |
| **Stationary** | not moving |
| **Strut-Roots** | supporting roots |

# EXERCISES

1. Draw a mangrove tree , including roots, branches and leaves. Draw a line where high water mark comes on the tree.

   Mark the area where each of the animals mentioned here live.

   Does each animal have a point above which it does not live?

   Is each species found in a particular zone depending on how long it can survive out of sea water during each tide?

   You can find clues to these questions in the, text or better still, ask your teacher to take you to where mangroves are growing and check the animal distribution for yourself.

2. A few Fijian names for the animals are given here, Find out what the Fijian names are for the animals where you live.

# CREDITS AND CONTACT DETAILS

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