

HIDDEN TREASURE – AN EXCITING PROJECT HELPING US

SCIENCE BASED CROSS-CURRICULUM ACTIVITIES

Based on the 'Hidden Treasure' Strategic Initiative, co-ordinated by Associate Professor Dr Nicola Nelson. Visit the Allan Wilson Centre at <http://www.allanwilsoncentre.ac.nz/>



ALLAN WILSON CENTRE



Little Barrier Island – Te Hauturu-o-Toi – An unique ecosystem

TEACHER NOTES

The need for understanding and preserving our precious ecosystems is growing day by day. We know that if a species becomes extinct it affects the entire ecosystem. We now understand it is vital to maintain, not only the biodiversity of the ecosystem, but the physical environment itself.

A team of researchers co-ordinated by the Allan Wilson Centre, using modern DNA technology are carrying out research on our most unspoilt ecosystem – Little Barrier Island. The aim is to identify and catalogue all biological and physical aspects of the ecosystem and use the information to help organisations like DOC develop cost-effective conservation management tools and improve restoration projects across New Zealand. This unit is designed to give students a deeper understanding of our ecosystems and why it is so important to understand and protect them.

WHAT MAKES UP AN ECOSYSTEM?

- Use class/group research to discover what an ecosystem is at: <http://eschooltoday.com/ecosystems/what-is-an-ecosystem.html>
- Through discussion, focus on the following:
 - 'Ecosystem' is a shortened form of the name, ecological system.
 - Ecosystems are made up of two parts: biodiversity – living things such as plants, animals and organisms and the physical environment they are in including soil, land, air, water, and climate.
 - What happens to an ecosystem if a stranger (such as a rat or a possum in NZ) is introduced or a factor such as a rise in temperature happens?
 - How would these destroy the balance of the ecosystem?
 - Select 'Scales of an Ecosystem' to explore the decaying tree trunk to discover how members of this micro system relate to each other (substitute rat for the snake) and discover what can happen to an ecosystem when one part is taken out.
 - Discover names and sizes of different ecosystems and the two general classifications of ecosystems (aquatic/terrestrial).

ECOSYSTEMS IN OUR LOCAL AND WIDER DISTRICT

- Can students think of any micro or meso ecosystems in the school grounds, in the local district or wider region, eg small bush or forest areas, rivers, streams and lakes, wetlands, coastal, beaches, estuaries, alpine forests, pasture, gardens.
- Map these and 'fly' to these ecosystems using Google Earth.
- Can students think of any threats to these ecosystems?

Science and Social Science Indicative Achievement Objectives

- Students will gain an understanding of the two main parts that combine to make up an ecosystem – living things and the physical environment.
- Through research, students will discover how the diverse parts that make up a balanced ecosystem relate to each other and the consequences for the ecosystem if this balance is destroyed in some way.
- Students will study the special ecosystem that exists on Hauturu to find what it contains, how it is maintained and to understand the concept of a model ecosystem.
- Students will discover how researchers have taken a very close look at the Little Barrier ecosystem and how their results can be applied to improve and restore other ecosystems in New Zealand.
- Using the concepts discovered, students will apply these to their local area.

Best suited Yrs 6-10. Links to Technology, Sustainability, English

Visit: <http://enviropol.com/index.php/threats-to-ecosystems> Could any of these pose a threat to our local ecosystems? Can they think of any threats that humans could pose to these local and district/regional ecosystems?

INTRODUCING HAUTURU – LITTLE BARRIER ISLAND

- Using Google maps and Google Earth, have students locate Little Barrier Island (Hauturu), 80 km north of Auckland in the Hauraki Gulf.
- Did students know it is a special ecosystem and is the closest to how New Zealand was before humans and predators arrived? Tell students it is an offshore island sanctuary that is home to over 40 species of birds and over 400 species of native plants.
- Play the following Hauturu video to the students at <http://tvnz.co.nz/meet-the-locals/s2009-e7-hauturulivingjewel-video-2802924> to discover and discuss the following:
 - When did it become an island sanctuary?
 - When did it become predator free and what predators were removed from the island?
 - How is it kept predator free and what effect has this had on the bird life of the island?
 - Identify some of the animals (invertebrates, reptiles and birds) found on the island, including those not found on mainland New Zealand.



Tuatara found on Little Barrier Island

TO BETTER UNDERSTAND AND PROTECT OUR ECOSYSTEM



The endangered giant weta found on Little Barrier Island

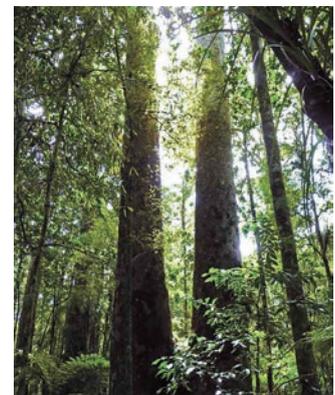
THE HIDDEN TREASURE ECOSYSTEM PROJECT

- Discuss how taking actions to remove all the predators from Little Barrier Island and not allowing humans to farm the land or clear forests or even visit Hauturu without special permission, is helping the ecosystem to recover. Introduce the idea that a 'model ecosystem' is being created.
- Remind students that all living things such as birds, plants, insects and small (microscopic) organisms, along with air, water and soil all depend upon each other to make an ecosystem. Can students think of any things we can learn from studying a model ecosystem such as Hauturu that we could use to improve or restore other ecosystems in other parts of New Zealand? eg:
 - We can find what humans have done to the ecosystem and try to restore it to how it was before we interfered.
- Tell students that because Little Barrier is such a good example of an ecosystem in recovery, a group of scientists and researchers are taking a very close look at the ecosystem to see how everything in it is related and affects each other. To do this they:
 - Marked out ten 20m x 20m plots on the island.
 - Collected samples of soil and leaf litter from each plot.
 - Used a variety of traps, nets and recorders to collect samples from all species of birds, reptiles, invertebrates (animals without backbones such as worms and insects) plants, and micro-organisms.
- Tell students that now they are using special equipment to look closely (sequencing) at the DNA from every species collected in their samples from the largest trees right through to the smallest microscopic bacteria. This will help the researchers better understand the relationship between the biodiversity and the physical environment of the ecosystem.
- See 'How to Explain DNA to kids at: <http://tfscientist.hubpages.com/hub/explaining-dna-to-a-six-year-old>
- Introduce the idea that the researchers plan to find similar ecosystems on mainland New Zealand, conduct detailed research at these sites and compare these ecosystems with Hauturu. What do the students think this will be able to tell us and how will it help us restore or improve these ecosystems better? eg:
 - Being able to identify effects that humans have had on these ecosystems.
 - We will know what is missing from these ecosystems and what we have to do to restore them to an (almost) pre-human state.
- Remind students that there are many conservation groups in New Zealand who have great success predator trapping to attract bird life back to the area. And while this is an excellent

- thing, how could their programmes include the whole ecosystem?
- Find out what to plant to attract native birds and protect lizards by giving them cover.
- Remove weeds that choke native plants.
- Picking up litter to protect waterways from pollution.
- Why do students think that the 'hidden treasure' method of looking at the whole ecosystem, including those things we cannot see, is better than concentrating on just one species?

FINDING OUR OWN HIDDEN TREASURE

- Have groups conduct bird counts at different places within the school grounds, in their home gardens and in bush and stream areas in the local district on several different days and different times. For instructions, recording forms and bird identifier sheets (pdfs) visit: www.landcareresearch.co.nz/science/plants-animalsfungi/animals/birds/garden-bird-surveys/activities-for-schools.
- Have students record results on an illustrated chart including:
 - The most counted/least counted bird at each location.
 - The ratio of native birds to introduced birds.
 - What area attracted the most birds and how that area differs from the other areas, eg the trees and shrubs it contains.
- Visit: www.nzbirds.com/more/plant.html to find an extensive list of the trees to plant to attract birds and the birds they will attract. What trees from this list can be found in the areas where the bird counts took place?
- Have groups conduct web research on the role that birds play in the eco system at: www.sciencelearn.org.nz/Science-Stories/Conserving-Native-Birds/Birds-role-in-ecosystems.
- Visit doc.govt.nz > Conservation > Native Animals > Reptiles and frogs > Lizards > select the Identifying lizards section to identify lizards commonly found in New Zealand. Have students discover the steps they can take to attract lizards to our gardens/areas.
- Take small samples of soil and leaf litter from a bush area and have groups carefully examine them (magnifying glass/ microscope/ use gloves for protection) for invertebrates – soil bugs, insects and mites. Use the identification charts at: soilbugs.massey.ac.nz/insecta.php and: soilbugs.massey.ac.nz/acari.php to find out what invertebrates are present in the soil.
- Have groups conduct research on the invertebrates found including what they eat and what preys on them. Take samples from a cultivated area and compare with bush sample.
- Invite a council rep to talk to the class about problem weeds in the area and any efforts that are being made to improve the local area. Have students find out the actions they can take to improve their local ecosystem.



Studying giant kauri trees in Little Barrier Island's relatively untouched native forest may help us keep our taonga alive as they are at risk from disease in Northland