Water Quality

	Science
Name	

Students use scientific equipment to test waterbodies and use that information to help them make conclusions about the quality of the environment.

You will:

- ☐ use the correct equipment accurately and ensure consistency in measurement
- ☐ record observations accurately and ensure consistency in identification
- ☐ be able to describe conditions of tested samples using correct, accurate terminology and units of measure
- ☐ use accepted formats and conventions when presenting information and data (graphs, tables, diagrams)
- ☐ understand that an ecosystem is a community of plants and animals interacting with their community
- ☐ understand that all living things in the environment are interdependent and changing one aspect of the environment will affect other organisms
- ☐ understand that consistent units of measurement are necessary for comparisons to be made.
- ☐ be able to describe conditions of tested samples using correct, accurate terminology and units of measure
- ☐ recognise which variable is the focus of the investigation and use simple non-standard measurements
- ☐ identify the non–variable and plan to use equipment in the same way throughout (Level 3)
- ☐ understand that ecological sustainability focuses on the interdependence and balance between the living and non-living aspects of ecosystems and retaining system's biodiversity
- ☐ suggest ways to reduce human impact on the environment and preserve the quality of their local wetland.

DAINTREE RESEARCH OBSERVATORY - JCU

For this assessment task your will be investigating how humans might impact the delicate Daintree rainforest ecosystems. You will be conducting this study at the Daintree Research Observatory, which is run by James Cook University.

Location

The Daintree Rainforest Observatory is located at 40 m elevation in lowland tropical rainforest at Cape Tribulation, 140 kilometres north of Cairns in Queensland Australia (16º 06' 14.8" S, 145º 26' 58.0" E). The site is adjacent to the Daintree National Park. The Daintree rainforest has the highest biodiversity anywhere in Australia and has a unique Gondwanan flora.

In 1988 the rainforests among which the crane is situated were declared the Wet Tropics World Heritage Area. This is one of the few areas in the world where the reef meets the rainforest and the only place where two World Heritage Areas sit side by side. The site is flanked to the west by coastal ranges rising to more than 1400m and by the Coral Sea to the east.

Climate

Annual average rainfall is approximately 3500mm and is strongly seasonal with 70% falling during the wet season which runs from December to April.Summers are often hot and humid with the mean daily temperature in January around 28°C. However, temperatures up to 36°C are not unusual during the summer months. Winters are mild and dry with the mean daily temperature in July around 22°C.

Northern Australia is subject to tropical cyclones in the wet season and their occurrence is unpredictable. The impact of these severe tropical storm systems are regarded as a natural phenomenon and a key evolutionary factor in shaping the ecology of Queensland's tropical lowland rainforests.

History

The area in which this site is located was selectively logged in the late 1950's and early 1960's. There are however standing specimens of Toona ciliata (Red Cedar) in the area, which suggests that this logging was probably not intensive.

Extreme disturbance due to storm damage (tropical cyclones) is common in the area on a cycle of approximately 50 years. On the 11th of February 1999, tropical cyclone Rona (category 3) passed over the Cape Tribulation area causing widespread major damage. Wind gusts of up to 170 km/hr, local flooding and storm surges of up to 1.4m were recorded in the area. The canopy crane site was severely damaged, as approximately 10% of the trees were felled and 50% of the trees suffered complete crown loss on the research plot. The past 10 years has shown profound recovery of the forest.

http://www.jcu.edu.au/canopycrane/about/JCUPRD_046915.html

Section 1. Introduction

TASK OVERVIEW

Water quality testing is a valuable hands-on activity that can be done without a lot of specialist knowledge.

Students are able to measure:

- temperature
- pH
- electrical conductivity (salinity)
- turbidity
- dissolved oxygen
- nitrates
- phosphates.

Equipment for each group:

- ☐ Container for group's sample (500ml plastic beaker is ideal)
- ☐ Temperature, pH, Electrical Conductivity and Turbidity measuring equipment
- ☐ Nutrient testing kits (optional)
- ☐ Calibration solutions for pH and Electrical Conductivity
- ☐ Distilled water in squirt bottles or sprays for rinsing equipment
- ☐ Waste container for used calibration solutions
- ☐ Instructions for using each piece of equipment
- ☐ Datasheet

General equipment: grab pole for collecting sample (if water difficult to access); buckets.

Section 2. Procedure

1. Collect water samples. Complete background information on datasheet (e.g. weather conditions, calibration information).

2. Carry out tests; Measurements should be recorded as the test is done, with one student recording and another double-checking that it is recorded accurately.

   A recommended sequence is:
   - Temperature (do first as the temperature will change with time since sample was collected)
   - pH
   - Electrical Conductivity
   - Turbidity

   Make sure to rinse pH and EC equipment with distilled water before and after using equipment.

3. Summarise and draw conclusions about the data collected from the water sample tests.

Section 3. Discussion

Use the following questions to guide your discussion

1. Are both the tests a true indication of water quality?

2. Identify different factors that affect water quality. Establish links between the different uses of water and water quality.

3. Refer to the graphs, state your results and consider what factors may have caused the differences observed

4. Discuss and reflect on the appropriateness of the method used to collect the data. Consider the quality of data

5. What further studies could be done to test these ideas further? Discuss any potential errors, and how the method could be improved.

Section 4. Conclusion

Write one paragraph summarizing your findings.

Section 5. Reference

Adapted from:

TESTING FOR WATER QUALITY LESSON PLAN – Ribbons of Blue, Waterwatch WA. Western Australian Department of Environment and Conservation.

Helpful links

http://www.goldcoast.qld.gov.au/documents/bf/water-for-the-future.pdf

http://www.worldwatermonitoringday.org/uploadedFiles/Content/Resources/Water_Quality_Indicators_Final(1).pdf

http://water.epa.gov/learn/resources/measure.cfm