

**DRAFT**

**2009**

**Internal Assessment Resource**

Subject Reference: **Education for Sustainability 2.2**

## Internal assessment resource reference number:

## **EfS/2/2\_B1**

##### Waterwatchlogo

**What’s Happening to our Lake?**

# Supports internal assessment for: 90811

# Achievement Standard:

Describe the consequences of human activity within a biophysical environment in relation to a sustainable future

Credits: 4

#### Date version published: February 2008

**Ministry of Education** For use in internal assessment

**quality assurance status** from 2008.

**Teacher Guidelines:**

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Teachers will need to adapt the task and assessment schedule to suit their programme.

**Context/setting:**

Teachers will be expected to select an appropriate environment that shows evidence of the consequences of human actions. An environment refers to a definable area such as a stream, estuary, bush, urban community, national park, business, home or farm. This task is based on Lake Ellesmere/Te Waihora and its catchment.

Students will be expected to have visited the Lake and contributing streams and rivers that they are referring to and/or worked with appropriate stakeholders. On site experiences are important in order to understand the relationship between the biophysical environment and human activities.

The biophysical environment includes, but is not limited to, geological, hydrological, climatic and biological systems. Teachers would be expected to introduce students to the systems with the most significance to their selected environment in their learning programme.

Human activities are those that change the biophysical environment, for example land use, industrial development, transport, housing, waste management, recreation, tourism, establishment of marine reserves, energy production and consumption, political, fishing, water use, introduction of exotic species.

Consequences could be the result of activity taken that promote or disrupt the sustainability of an environment. Actions taken for sustainability could be preventative, mitigating or remedial.

**Conditions:**

Specific conditions must be stated on the student instruction sheet eg, time, guidelines, equipment and resources available.

This includes any specific safety requirements for visiting the site.

Whether this work is completed in class or out of school, teachers may need to include strategies to ensure authenticity. These could include digital photos, conferencing at each milestone, regular checking of logbooks and signed authenticity statements. You will need to refer to the assessment policy of your school in this regard.

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**Internal Assessment Resource**

Subject Reference: **Education for Sustainability 2.2**

## Internal assessment resource reference number: **EfS/2/2\_B2**

**What’s Happening to our Lake?**

# Achievement Standard 90811

Describe the consequences of human activities within a biophysical environment in relation to a sustainable future

Credits: 4

Student Instructions Sheet

**CONDITIONS**

You will be visiting Lake Ellesmere (Te Waihora) / Selwyn river/Hart’s creek on an all day trip on ………. . You may visit a dairy farm owned by ……………. You may also meet the education officer of WET (Waihora Ellesmere Trust) and a member of the local Rununga. You may also meet an Ecan representative to find out about the water use consent process and/ or someone expert on the bird life of the Lake. In these tasks you will need to discuss Lake Ellesmere (Te Waihora) and the consequences of a particular human activity on the future sustainability of the lake (Task 3 and 4). Select an activity from the list below to answer this task.

* A primary industry (Fishing, farming or forestry)
* Housing development
* Tourism
* Or another activity approved by your teacher

You will use material from class and your own research to complete this task. If you interview people involved in any of these activities, remember to include photos and/or written responses to your questions.

The final report for this task will be completed in class during three periods in ………

Your information is to be presented in a powerpoint or booklet format

**Lake Ellesmere**

**Task One** On the map provided, show the location and key features that are affected by the activity you will be discussing.

Map needed here

**Task two** Using the material that you have collected, describe the biophysical nature of the harbour using annotated diagrams, flow charts or paragraphs. You will need to include the ecological system such as: main foodwebs, producers and other systems that are most affected by the activity you are describing. These may include:

* + Hydrological systems such as: water flow, capacity, stream inputs and clarity
  + Geology such as : history, structure, substrate, sedimentation
  + Climate such as: rainfall, temperature
  + Ecological such as: main foodwebs, producers
  + Land use in the catchment area

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**Task Three** Describe the activity – what is it, what happens, where does it happen, why does it happen there.

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**Task Four** Using the information from tasks 1-3, present a report that;

* Identifies a range of consequences of this activity on the lake.
  + Discusses the consequences of this activity on the sustainable future of the harbour. This may involve justifying decisions, making judgements, stating opinions, considering implications, projecting future impacts, evaluating options, comparing and contrasting, analysing or suggesting alternatives.
* Suggest, with reasons, how some of these consequences could be

managed.

Remember your report must relate to the sustainable future of the lake.

**DRAFT Assessment schedule for: What’s Happening to our Lake?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Task** | **Evidence/Judgements for achievement** | **Evidence/Judgements for achievement with Merit** | **Evidence/Judgements for achievement with Excellence** |
|  | **Describe consequences of human activities within a biophysical environment in relation to a sustainable future.** | **Explain consequences of human activities within a biophysical environment in relation to a sustainable future.** | **Discuss consequences of human activities within a biophysical environment in relation to a sustainable future.** |
| 1  2 | * Map shows key features related to the activity selected eg – rivers and streams flowing in to the lake, channels, moorings, main boat ramps, areas of periodic opening to the sea, areas of various types of farming, areas of rapid housing development * Ecological and at least 1 other system described eg   Hydrological – water capacity, relationship to the sea, main input from rivers and streams, water quality – clarity, pH etc | As for achieved | As for achieved  Hydrological systems: inflows may come from rivers, streams, groundwater, rainfall  Frequently any sediment with attached nutrients or organic matter in inflowing rivers/streams will settle out in a lake improving clarity compared with inflow clarity but see algal blooms below  Ecological systems: Bottom sediments may be habitat for rooted plants, given enough light and little wave action. Rooted plants (aquatic macrophytes) provide habitat for fish e.g. eels, young trout. Plant habitat is both a source of food (algae attached to plants, invertebrate animals feeding on or among plants) and protection from predators (larger fish). The types of invertebrate animals will vary according to the amount of water flow, substrate type, presence of aquatic plants and quality of the water (suspended sediment, nutrients, heavy metals etc). Sensitive species such as stonefly larvae and mayfly larvae are usually found in fast flowing clean water with a gravel base. More tolerant species in muddy lake bottoms include water boatmen, crustaceans (Daphnia, amphipods, shrimps) and worms.  Land use in catchment area: may include farming, forestry, housing or industrial development. All these may cause an increase of nutrients, mainly nitrogen and phosphorus, into the lake. This stimulates growth of both rooted plants (*Ruppia, Potamogeton)* and algae, and may resulting excessive growth (e.g algal blooms) causing low oxygen levels when the plants die back and consequent fish deaths. A greenish tinge and occasional scum may be seen on the lake under these conditions which may affect commercial and recreational use of the lake.  Farming in the catchment may also cause increased numbers of micro-organisms from stock access to water edges or faecal material attached to sediments. Trampling edges accelerates this process and destroys wetland vegetation (rushes e.g. *Baumia,* sedges e.g. *Carex*, flax, manuka) including saltmarsh vegetation  . |
| 3 | Activity is described eg dairy farming - where in the catchment area it is situated, eg Fishing  Commercial quota, species, number of boats, recreational  e.g. Commercial fishing for eel in Lake Ellesmere: quota system, reduction in yield over time  e.g. Recreational fishery: trout population decline | As for achieved | As for achieved |
| 4 | Consequences are identified and described in terms of aspects of sustainability.  eg reduction in adult breeding stocks of fish and the population is not being replenished. The increase in algal blooms related to high nutrient levels.  Consequences are loss of longfin eels and change from female to male dominated shortfin fishery, and reduced quota. Causes related to loss of aquatic plant beds (macrophytes) due to Wahine storm in 1968; lack of consistent spring opening of lake to allow regular recruitment of juvenile fish.  Causes of trout decline related to intensification of land use; reduction in aquatic plant beds by Wahine storm 1968; commercial fishing with gill nets; loss of access to upper head waters of Selwyn River and spawning habitat in stream and lake edges; also reduction in surface flows into the lake. | Consequences are fully explained in terms of aspects of sustainability, ( how or why consequences of human activity on the biophysical environment affects a sustainable future)  *The standards requires an explanation of the consequences of the activity*  A possible method of managing a consequence in terms of a sustainable Lake is explained  Eg Managing riparian zones and planting natives, fencing streams. (management of the effects of dairy farming needed here?)  Eel fishery: spring lake opening; higher summer lake levels, re-establish aquatic plant beds, increase wetland areas for spawning  Trout fishery: management of by-catch using gill nets; improve spawning habitat, restore aquatic plant beds; optimum lake opening regime (mid Oct – mid Jan), management of groundwater abstractions. | Consequences are discussed in terms of aspects of sustainability. This will include evidence of understanding the links between the biophysical environment and the human activity. It may involve justifying decisions, making judgements, stating opinions, considering implications, projecting future impacts, evaluating options, comparing and contrasting, analysing or suggesting alternatives, as appropriate.  .  The Water Conservation Order for Lake Ellesmere states that if the height of the lake exceeds 1.05m above sea level between August and March or between 1.13 m between April and July the lake must be artificially opened using bulldozers. The lake can be opened anytime between 15 September and 15 October (this has not occurred). The openings are paid for 70% by farmers and 30% by general public through rates. The lake closes naturally with a southerly storm or can be artificially closed when the lake is below 0.6m but this has never happened.  Lake Ellesmere as a resource has multiple and competing assets and therefore management objectives. For example, farmers want low lake levels to have more land. Fishers want lake openings at times for particular species to allow migration and recruitment. Maori want improved fishing and sources of traditional materials. Department of Conservation wants optimum conditions for wading birds. Recreationists want conditions suitable for shooting, fishing, bird watching, sand yachting and water sports.  The responsibility for management of this multiple use resource is therefore complex. There is shared responsibility for management of riparian area, lake bed, lake water, fish stocks etc.  *The standard requires a discussion of the consequences of the activity.*  A possible method of managing a consequence in terms of a sustainable lake is discussed  e.g. Management of riparian zones by fencing off river and lake edges from stock to prevent trampling, inflow of sediment, nutrients, organic matter, micro-organisms etc.  Fencing is expensive and other forms of management such as plantings to stabilize banks and take up nutrients may be preferable, although not with stock around.  Any effluent from dairy farms needs to be treated as far as possible and sprayed back onto the land to prevent seepage or discharge into water.  The capacity of the soil to take up the effluent will depend on the soil type and vegetation cover.  Management of any discharges from farm land or septic tanks needs to be strictly controlled to prevent any seepage into a stream or river. These discharges can encourage plant growth, of both algae and rooted plants, by high nutrient levels and may cause blockage of drains and streams or algal blooms in lakes.  This could affect young fish and spawning grounds by lowering oxygen levels. |