

Big Fish, Little Fish – Survival in the Estuary

Background to the game for teachers^{1,2}:

Sediments are solid materials that are moved and deposited in a new location e.g., soil, rocks and minerals. They are a natural part of an estuary and come from land erosion in the surrounding catchment, such as slips and exposed soils. However too much can damage an ecosystem and even kill mahinga kai. The aim of this game is to teach students about the impact that excess sediments can have on an estuary by looking specifically at fish living in it.

The students will experience the impact sediments can have on one of the senses that fish use to locate their kai – sight! If they can't see well enough they can't move well enough or feed. There are plenty of other questions for students to think about too, for example 'what happens if the fish can't move well or eat?' and 'what are the other impacts that sediment might have on the fish?'. Sediments are also known to damage the gills of fish (which are used to extract oxygen dissolved in the water) and smother the fishes' habitat.

This is a great example when thinking about 'ki uta, ki tai' and how our practices on land can negatively affect our aquatic and marine environments.

Objective:

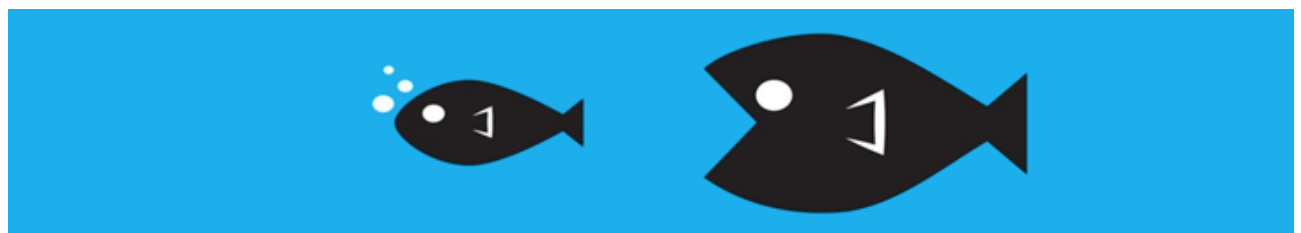
To understand the impact of excess sediment in an estuary on the fish population.

Materials:

- Field or playground where the students can run around;
- 4 markers placed in a square to define the estuary (cones, jackets, extra adults);
- Size of the playing area depends on number of students (more students, bigger area).

Rules:

- Students work in pairs, one is the big fish and one is the little fish.
- Students must remain in the confines of the estuary – if they go outside the boundary, they are dead and are eliminated from the game.
- Big fish chases little fish and must tag to capture as food.
- Once the little fish is tagged they must turn 360 degrees on the spot and they now become the big fish.
- Play until each pair has changed roles about 4 times (each student had 2 rounds as big fish and 2 rounds as little fish).



¹ https://niwa.co.nz/our-science/freshwater/tools/kaitiaki_tools/impacts/sediment

² <https://education.nationalgeographic.org/resource/sediment>

Round One

Scene: A clear and healthy estuary.

- Start the game by discussing what an estuary is.
- Discuss the types of big fish in the local estuary and little fish (e.g. he pātiki, he tīpara (juvenile grey mullet), makawhiti (yellow eye mullet), marakuha (sprat). Players can choose which fish they want to be for the game.
- Discuss what difficulties the big fish had encountered when trying to find their prey and what difficulties the little fish encountered trying to avoid their predators.

Round Two

Scene: The estuary for this round is muddy.

- Discuss what a catchment is.
- View the hills around the estuary, and the rivers and streams that drain into the catchment.
- Look at the cleared farmland and talk about what happens when it rains. Allude students to the point that sediment flows down the rivers into the estuary.
- Play the game again only this time, students will hold their hands to their eyes, using them to create binoculars. This limits their field of view/ability to see.
- Discuss what difficulties the big fish encountered trying to find their prey and what difficulties the little fish encountered trying to avoid their predators.

Round Three (optional)

Scene: In this round a housing development or logging operation is underway up stream, and it is also rainy season. The amount of sediment flowing down the river has increased and the estuary water has now turned brown.

- Play the game again only this time, students have to cover their eyes with flat palm but so they can see a wee bit through fingers. The fish now have very limited eye sight.
- Discuss what difficulties the big fish encountered trying to find their prey and what difficulties the little fish encountered trying to avoid their predators.
- Discuss how sedimentation is affecting our estuaries, ultimately fish can swim out of the estuary and away from the sediment but what about other species in the estuary? How are they affected?
- What can we do to reduce the amount of sediment going into our estuaries?

Photos of plumes of sediment from NZ Estuaries

Photographer: Pilot, Mark Frew (2022)



A braided river in Te Waipounamu



Rangitātā river mouth, northeast of Timaru. Rangitātā is one of the braided rivers within the Canterbury plains. It begins at the foot of Ngā Tiritiri-o-te-moana (Southern Alps) to Te Moana-nui-a-Kiwa (Pacific Ocean) and is up to 121 kms long. You can find more information and amazing interactive maps of the Rangitātā here: <https://braidedrivers.org/rivers/rangitata/>



Ōpihi river mouth, south of Te Muka. Ōpihi is a hill-fed river and drains several streams within the wider catchment. It is up to 75 km long and contains extensive land-use for farms and crops that contribute to run off containing high concentrations of nutrients and bacteria. As you can see from the photograph, there is also significant sediment run off that is then deposited into Te Moana-nui-a-Kiwa (Pacific Ocean). You can find more information and amazing interactive maps of the Ōpihi river here: <https://braidedrivers.org/rivers/opihi/>

Te Riu Hopuwai

River catchment areas of New Zealand

See “NightScape Catchment” maps by Duane Wilkins of Toitū Te Whenua Land Information New Zealand:

https://drive.google.com/drive/folders/Iw3Jn62BeqZspeoYU6rIU8up3UCQ7SYWe?fbclid=IwAR_IYYct0vFUfaFM6rSk7ImXPzQ3NW-OMQ7ZCM4ufnG_eiPwW7xd5Hk4NZQ



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