

Activity 1: Introducing estuaries



Let's start to learn about estuaries



CURRICULUM LINKS

Learning areas

Science: Levels 1–4

- Nature of Science: Participating and contributing.
- Planet Earth and Beyond
- Living World

Science capabilities: Engage with science.

Te Marautanga o Aotearoa

Pūtaiao: The natural world.

Learning intentions

Students are learning to:

- Understand what an estuary is and how it is defined.

Success criteria

Students can:

- Explain what an estuary is.
- Identify which environments are estuaries from photos and maps.

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BACKGROUND NOTES

WHAT IS AN ESTUARY?

Estuaries are partly enclosed coastal areas of shallow water that are affected by the tides. In an estuary, the fresh water of a river meets and mixes with the salt water of the sea. Estuaries are important natural resources.

NEW ZEALAND'S ESTUARIES

There are more than 300 estuaries in New Zealand representing a diverse range of locations, geologies and histories.

New Zealand estuaries are also known as harbours, lagoons, sounds, river/stream mouths, wetlands and inlets. For more information about the types of estuaries that are found in New Zealand and how they are formed, see NIWA's estuaries education resource.

 Estuaries.

STRUCTURE OF AN ESTUARY

The structure of estuaries not only varies between estuaries but can also change frequently within an estuary. However, estuaries often include large mud flats and/or sand flats that are visible at low tide and then become covered in sea water at high tide. An estuary can include saltmarshes, seagrass meadows, mangroves and/or beaches. See also  *Activity 3: Estuaries as habitats*.

Estuaries can also be part of marine reserves, information about which can be found in DOC's *Protecting our marine world* education resource.

 Protecting our marine world.

LIFE ON THE EDGE

Rivers bring fresh water downstream, which mixes with salt water from the sea in an estuary. The salinity of the estuary will change with the movement of fresh water and the tides. The tide goes in and out twice per day, changing the water levels and conditions in the estuary. As the tide comes in, more salt water enters the estuary, whereas when the tide goes out, the water becomes less salty, and the temperature and oxygen levels vary. Therefore, estuary plants and animals must adapt to constantly changing conditions.



Aerial view of mangrove margins in Kaipara Harbour, Northland. Photo: Lisa Forester



Restiad rushland at Ōkārito Lagoon showing estuarine and saltmarsh vegetation. Photo: Philippe Gerbeaux



LEARNING EXPERIENCE 1: INTRODUCING ESTUARIES

Resources for this activity

- Slideshow  Introducing estuaries
- Poster  Estuaries and marine habitats (page 8)
- Is this an estuary? game.
 - Kahoot! version  Kahoot: Is this an estuary?
 - Socrative version  Socrative: Is this an estuary?



Focus question
What is an estuary?

Vocabulary

Estuary, catchment, habitat, mud flat, native bush, sand flat, seagrass river, sea, tide, fresh water, salt water

Links

To open the links throughout this resource without losing your place in the document, follow either of these steps:

- Right click on the link and click **Open Hyperlink**. Now the link will be opened in new tab.
- Hit the **Ctrl** key while you left click the link. This will also force the browser to open the page in a new tab. Either of these methods will open the link in a new tab leaving the teaching resource open.

INTRODUCING STUDENTS TO ESTUARIES

Note: These learning experiences are suggestions only. Teachers are encouraged to adapt and change the material to suit their students' needs and interests.

Inquiry stage 1: Dive in

What is an estuary?

- Show your students the poster *Estuaries and marine habitats* on page 8.
- Using this poster as a guide, explain that an estuary is a partly enclosed area of shallow water on the coast where the fresh water of a river meets and mixes with the salt water of the sea. Estuaries are surrounded and fed by catchments, which are areas of land that are usually surrounded by hills or mountains. Water moves from the high ground down to the lower catchment by gravity, where it is collected by streams and drains into rivers, estuaries and the sea.



Estuaries and marine habitats poster.
Credit: NIWA, developed by Max Oulton



- Explain that estuaries can contain different features and habitats depending on their location, such as mud flats, sand flats, mangroves, seagrass or salt marshes.
- Use the poster to discuss where an estuary starts and finishes. The estuary includes all of the areas where fresh and salt water mix.
- Explain that a habitat is a place where a living thing usually lives. Brainstorm different habitat types with the students and discuss which of these habitats could be a part of estuaries?

For more information about estuaries as habitats, see  *Activity 3: Estuaries as habitats*.

Identifying estuaries in your local environment



- Do the students know of any estuaries in their local environment? Students can share their prior knowledge and experiences of estuaries through a teaching strategy such as ‘Think, pair, share’ or ‘Think, pair, square’

 (see *Teaching strategies in the Appendix*).

- If possible, visit your local estuary to ignite the students’ curiosity and spark your inquiry. This visit could form the basis of your inquiry in a local context.

For details about planning a visit to your local estuary, see:

 *Activity 9: Visiting estuaries* and the ‘Experiencing estuaries’ section of the DOC website at  [Experiencing estuaries](#)



The Mangemangeroa estuary at Russell Street.
Photo: CC BY SA 2.0
<https://creativecommons.org/licenses/by-sa/2.0/>

Virtual visits to estuaries

- If it is not possible to visit an estuary with your students at this stage, you can explore physical or virtual maps of estuaries using your local council’s free online mapping tools (eg GeoMaps or GIS),  Google Maps or 3D/Google Earth.
- You could also participate in a virtual trip to an estuary by following the multi-media interactive journey of a LEARNZ teacher as they learn more about estuaries.

 [Harbours and estuaries virtual field trip summary page](#)

 [Harbours and estuaries virtual field trip on vimeo](#)

 [Introduction to the Harbours and Estuaries virtual field trip.](#)

Recognising estuaries



- Students can see if they can recognise estuaries using the Socrative game *Is this an estuary?*

 [Socrative: Is this an estuary?](#)

To access this and other Socrative games, join Socrative at  [Socrative.com](#).

- Students can also practice recognising estuaries using the Kahoot! game *Is this an estuary?*

 [Kahoot: Is this an estuary?](#)

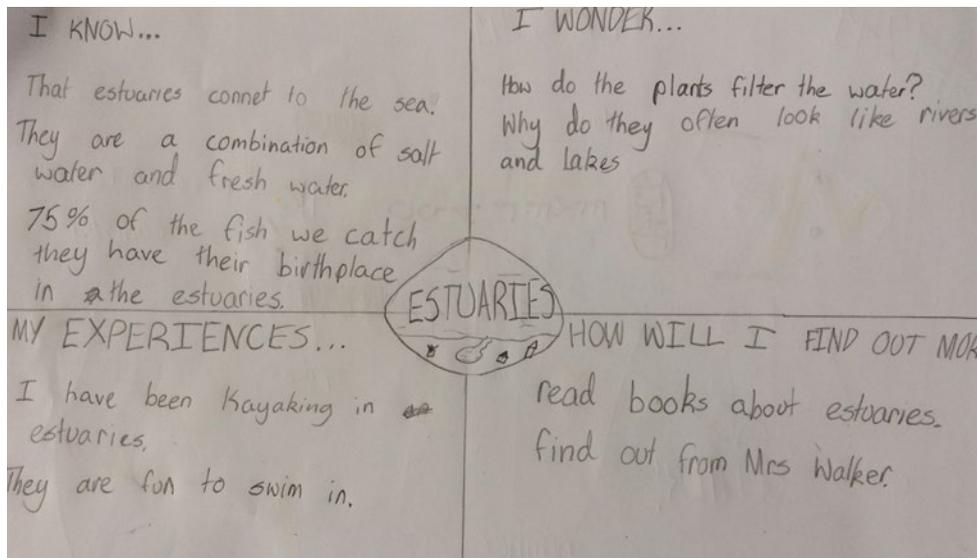
Join Kahoot at  [Kahoot.com](#).





Recording your questions

- Students could record their prior knowledge, experiences and wonderings about estuaries using a mind map or brainstorming. This information could then be used to plan your unit of study.



Long Bay Primary School student's initial ideas about estuaries.

REFLECTING ON LEARNING

- Students could write a recount or draw a map or picture to show the local estuarine environments they have investigated or experienced.



EXTENDING LEARNING

- Students can read more about the different types of estuaries and how they are formed in the Science Learning Hub article:



Estuary formation.

This article explores the different types of estuaries, including:

- bar-built estuaries, eg Tairua estuary and the Estuary of the Heathcote and Avon Rivers/Ihutai
- coastal plains estuaries, eg Whaingaroa (Raglan) and Otago harbours
- tectonic estuaries, eg Manukau Harbour
- fiords and rias, eg Milford Sound/Piopiotahi.



OTHER RESOURCES RELATING TO INTRODUCING ESTUARIES

- DOC estuaries webpages:
 - 🔗 Our estuaries
 - 🔗 About estuaries
- Science Learning Hub's *Estuaries in New Zealand* video:
 - ▶ Estuaries in New Zealand
- Science Learning Hub's *Estuaries: A context for learning* resource:
 - 🔗 Estuaries – a context for learning
- Science Learning Hub's *Using concept cartoons* to explore students' scientific thinking activity:
 - 🔗 Using concept cartoons to explore students' scientific thinking
- National Geographic's estuary webpage and slideshow:
 - 🔗 Estuary
- NIWA's *Estuaries* webpage:
 - 🔗 Estuaries
- Northland Regional Council's estuary resources:
 - 🔗 Estuaries
- Science Learning Hub's *Estuary metaphors* activity:
 - 🔗 Estuary metaphors



ESTUARIES AND MARINE HABITATS



Estuaries and marine habitats poster. Credit: NIWA, developed by Max Oulton



Activity 1: Introducing estuaries

PROTECTING OUR ESTUARIES