**ACTIVITY: Environmental thinking and planning with   
ecosystem-based management (EBM)**

**Activity idea**

In this activity, students learn about EBM as a collaboration tool and investigate some of the components of EBM using a local marine or freshwater location as the context. The activity is readily adaptable for use with other environmental planning and/or management projects.

By the end of this activity, students should be able to:

* view and discuss the Sustainable Seas EBM infographic
* discuss some or all of the EBM principles and how this type of information helps with ecosystem management
* use frameworks to consider how some or all of the components relate to the management of a local area of their choice
* develop a simple planning and/or management strategy for a local area or environmental project of their choice.

[Background information for teachers](#Introduction)

[Teacher instructions](#teacher)

[Student instructions](#student)

**Background information for teachers**

EBM – ecosystem-based management – is a broad and inclusive approach for managing an ecosystem. It differs from many other management approaches in that it includes humans as part of the ecosystem interactions. Learn more about EBM in the article [Looking at EBM](https://www.sciencelearn.org.nz/resources/2506-looking-at-ecosystem-based-management-ebm).

Developing EBM is at the core of the [Sustainable Seas National Science Challenge](https://www.sciencelearn.org.nz/resources/2512-sustainable-seas-national-science-challenge). The Challenge’s working definition of EBM is: “a holistic and inclusive way to manage our marine environments and the competing uses for, demands on, and ways New Zealanders value them”. This definition may change as it co-develops EBM with Māori and stakeholders.

This activity enables students to develop some of the thinking skills and/or information gathering that goes into developing EBM for a specific area of importance to them. It uses the seven principles of the Sustainable Seas Challenge EBM as a framework. Like EBM, this activity is quite broad. Teachers can use all of the components or select those most suited to student ability or interest. The document is in Word, so adapt the student handouts as desired.

Although this activity refers to a local marine or freshwater area, the same thinking can be used when planning for a local project such as developing a community garden or an environmental restoration activity.

Discussing and planning for environmental management provides students opportunities to present differing viewpoints. The resource [Managing classroom discussions](https://www.sciencelearn.org.nz/resources/198-managing-classroom-discussions) has suggestions for facilitating discussions to maintain a positive, safe atmosphere.

**Teacher instructions**

1. Briefly discuss EBM as a management system. Use the article [Looking at EBM](https://www.sciencelearn.org.nz/resources/2506-looking-at-ecosystem-based-management-ebm) for background information.
2. Display the [EBM infographic](https://www.sciencelearn.org.nz/images/3237-sustainable-seas-challenge-ebm). Discuss the seven principles of EBM – the titles, language and symbols used for each.
3. Ask students to choose a local marine area/waterway of interest to them.
4. Work through some or all of the EBM principles. Each principle uses Hub resources that will be helpful for background information or to help students refine their thinking about the local area and its value and/or use. Use the student instructions handouts to record ideas. If desired, edit the text to suit your programme.
5. For EBM component 3: Human activities, the activity [Fisheries role-play](https://www.sciencelearn.org.nz/resources/157-fisheries-role-play) lets students take on the role of various stakeholders in New Zealand fisheries. In these roles, students debate the statement ‘there are plenty of fish in the sea’. You can adapt the activity to fit your local situation. For example, ‘there is plenty of clean water in our local river’. Stakeholders might include water bottling industry, whitebait enthusiast, local iwi, kayaker and horticulturist/farmer using irrigation. The articles [Human impact on rivers](https://www.sciencelearn.org.nz/resources/440-human-impact-on-rivers), [Human impact on estuaries](https://www.sciencelearn.org.nz/resources/1231-human-impact-on-estuaries) and [Human impacts on marine environments](https://www.sciencelearn.org.nz/resources/144-human-impacts-on-marine-environments) also provide helpful background information.
6. Create your own EBM infographic image using the [customisable EBM template](#template). This will create a concise representation of student planning and/or management strategies for a local area or environmental project of their choice (optional).
7. If students are using this activity to plan for a local environmental project, use the [action planner](#planner) to organise information and begin to make plans for the next step in the project.

**Student instructions**



**EBM component 1: Collaborative decision-making**

This EBM principle is about encouraging engagement and participation from the various groups/stakeholders who have an interest in the ecosystem.

Consider and record your ideas and answers to the following questions. If you don’t know the answer, how or where might you find the information?

1. Who owns or manages the area at present?
2. Who uses the area?
3. Are there groups who use this location for:

* business/industry?
* recreation?
* conservation?
* other purposes?

1. Who are the local iwi and what are their thoughts, stories and history of the area?
2. Do the local, district and/or regional councils have regulations regarding this area?
3. How might you contact the groups/stakeholders identified in the above questions?

**EBM component 2: Tailored**

Every ecosystem is unique, so it will need to be looked after or managed individually. This component explores the functions and values of various ecosystems. Having this information may help tailor how you want to manage your area.

These articles highlight some of the valuable functions various ecosystems offer to the wider environment and to humans. Read through the relevant information and to help you answer the questions that follow.

Marine

* [Valuing estuaries](https://www.sciencelearn.org.nz/resources/1232-valuing-estuaries)
* [Marine habitats](https://www.sciencelearn.org.nz/resources/145-marine-habitats)
* [Habitats in the Bay of Plenty](https://www.sciencelearn.org.nz/resources/1123-habitats-in-the-bay-of-plenty) (includes information on rocky and sandy shores)

Freshwater

* [Wetlands – the river’s kidneys](https://www.sciencelearn.org.nz/resources/426-wetlands-the-river-s-kidneys)
* [River ecosystems](https://www.sciencelearn.org.nz/resources/439-river-ecosystems)
* [River islands](https://www.sciencelearn.org.nz/resources/427-river-islands)
* [Peat bogs in the Waikato](https://www.sciencelearn.org.nz/resources/716-peat-bogs-in-the-waikato)

These activities highlight some of the unique and valuable functions of various ecosystems.

Marine

* [Hubbub Estuary](https://www.sciencelearn.org.nz/resources/1239-hubbub-estuary)
* [Estuary metaphors](https://www.sciencelearn.org.nz/resources/156-estuary-metaphors)
* [Where do I live?](https://www.sciencelearn.org.nz/resources/1152-where-do-i-live)

Freshwater

* [River connections](https://www.sciencelearn.org.nz/resources/460-river-connections)

**Questions**

What is unique about our location?

What part, if any, does it play in a larger ecosystem? Is this important to consider? Why?

What value does it have as an ecosystem?

What value does it have to humans?

How does your community of stakeholders view or value this ecosystem?

What aspects should we include as we draw up our EBM?

**EBM component 3: Human activities**

EBM differs from many other environmental management approaches in that it recognises human interactions as part of an ecosystem. Groups/activities may be competing with each other – or with non-human users/activities (such as fish eating kelp or filtering the water in estuaries) – for resources within the ecosystem.

After the Fisheries role-play activity, consider and record your ideas and answers to the following questions. If you don’t know the answer, how or where could you find the information?

1. What are the human activities that are part of the ecosystem in your chosen location?

* Business and/or industry
* Māori connections
* Recreational uses
* Conservation activities
* Other

1. How might these activities affect the area?
2. Are there competing needs for the resources?

**EBM component 4: Adapts**



Ecosystems are dynamic. They are connected to other parts of the environment and are subject to change. The ways in which we use the land connected to our chosen area may have significant impacts. Other impacts can come from natural occurrences such as floods, drought or climate change.

What changes might happen to this area in the future? What are the causes? What may happen? What would you like to happen?

The [Futures thinking toolkit](https://www.sciencelearn.org.nz/resources/2439-futures-thinking-toolkit) is a framework that will help you develop a scenario for your area. Think about your chosen area and answer the following questions.

**Existing situation**

What happens in your local area now and why?

**Trends**

Are there changes to the area? Are they desirable? Are they beneficial to everyone?

**Drivers**

What is causing the changes and why?

**Possible futures**

What might happen to your area in the future?

**Probable futures**

What is most likely to happen to your area in the future?

**Wild cards**

What unlikely events might occur that would have a big impact on your area?

**Preferable futures**

What do you want to happen and why?

**EBM component 5: Knowledge-based**

Management decisions should be based on strong science and mātauranga Māori.

Before you can make decisions about how to manage your area, you need to know what is there. Sometimes, this type of knowledge is held by those who manage the area – such as a regional council or by local iwi as mātauranga Māori. If not, you may need to get some of the baseline data yourselves.

**Science knowledge about your area**

These articles showcase how students and community groups have gathered information about a local area of importance to them. Read through the articles and make notes about actions they took to gather data. Include any ideas about how you might be able to use similar processes or techniques.

* [Project Hotspot](https://www.sciencelearn.org.nz/resources/1595-project-hotspot-using-citizen-science-to-better-protect-coastal-threatened-species)
* [Sediments and seashores](https://www.sciencelearn.org.nz/resources/2319-sediment-and-seashores-monitoring-otago-harbour)
* [Restoring mauri to the Oruarangi Stream](https://www.sciencelearn.org.nz/resources/1688-students-help-restore-mauri-to-the-oruarangi-stream)

These activities explain how you can gather baseline data about your local area. Make notes about their usefulness and/or how you might use them.

* [Making and using a quadrat](https://www.sciencelearn.org.nz/resources/2318-making-and-using-a-quadrat)
* [Using a quadrat](https://www.sciencelearn.org.nz/videos/655-using-a-quadrat) (video for recording samples of marine life in an estuary)
* [Observing freshwater invertebrates](https://www.sciencelearn.org.nz/resources/1821-observing-freshwater-macroinvertebrates)

What questions do you have?

Who do you think you could ask?

Where do you think you could find the information?

Notes:

**Mātauranga Māori and your area**

To be successful, EBM for Aotearoa must be founded on mātauranga Māori as well as science. These articles showcase examples of mātauranga Māori in action. Read through them and make notes about how you might be able to obtain mātauranga from local kuia and kaumātua.

* [Reviving toheroa](https://www.sciencelearn.org.nz/resources/1048-reviving-toheroa)
* [Kaitiakitanga and mana whakahaere](https://www.sciencelearn.org.nz/resources/449-kaitiakitanga-and-mana-whakahaere)
* [Estuaries – a Māori perspective](https://www.sciencelearn.org.nz/resources/1241-estuaries-a-maori-perspective)

What questions do you have?

Who do you think you could ask?

Where do you think you could find the information?

Notes:

**EBM component 6: Sustainability**

In its most basic form, sustainability is learning to think and act in ways that safeguard the wellbeing of people and the planet ([NZC Education for sustainability](http://seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability)). People can have very different views about sustainability. This component explores the relationships between people and the environment.

There are four aspects of sustainability to consider: environmental, social, cultural and economic. [Aspects of sustainability – teacher resource](https://www.sciencelearn.org.nz/resources/461-aspects-of-sustainability-teacher-resource) gives a brief explanation of each aspect and concept as they relate to the context of the Waikato River. Read through the resource to gain a better understanding of each aspect. Then fill in the table with concepts and examples relevant to your chosen area.

|  |  |  |
| --- | --- | --- |
| **Aspect** | **Concept(s)** | **Example(s)of actions to support this aspect** |
| **Environmental sustainability** Maintaining and enhancing the natural systems that sustain ecosystem life. |  |  |
| **Social sustainability** Equity within and between generations and within and between ethnic and social groups. It’s based on the fair distribution of natural resources. |  |  |
| **Cultural sustainability**  The nourishment and sharing of attitudes and values that represent diverse ways of viewing the world. Citizens have the opportunity to express their views freely and participate in decision-making. |  |  |
| **Economic sustainability**  Using resources to provide necessary and desirable products and services without compromising the ability of future generations to do the same. |  |  |

**EBM component 7: Co-governance**



We live in a bicultural country. The Treaty of Waitangi underpins the relationship between Māori and the Government. Treaty principles include partnership, protection, equity and participation.

Co-governance, simply defined, is shared decision making between all stakeholders, including public authorities, iwi and the wider community. Co-governance aligns with the Treaty principles.

EBM recognises that co-governance of marine management should take into account three specific factors:

* Treaty of Waitangi
* tikanga and
* mātauranga Māori.

**Treaty of Waitangi**

Knowledge of, and responses to the Treaty of Waitangi are most-often covered in the social sciences. Transfer knowledge that you’ve gained about the treaty to aid your planning and decision making. How is this different to Collaborative decision – making?

Notes:

**Tikanga**

Tikanga are Māori customs and traditions that have been handed down from tupuna (ancestors). The following articles provide insight regarding aspects of tikanga. Read the articles and make notes about the role tikanga plays in the decisions or actions of the individuals or groups featured in them. Then consider the role of tikanga in your planning.

[Tikanga](https://www.sciencelearn.org.nz/resources/450-tikanga) (Waikato-Tainui perspectives regarding their relationship with the Waikato River)

[Ahi Pepe and tikanga](https://www.sciencelearn.org.nz/resources/2619-ahi-pepe-and-tikanga) (how students balance mauri with scientific investigations)

Notes:

**Mātauranga Māori**

[Mātauranga Māori](https://www.sciencelearn.org.nz/resources/2545-matauranga-maori-and-science) refers to a Māori knowledge system made up of intergenerational beliefs, values and practices. Consider the importance of local mātauranga Māori knowledge to enable a greater understanding of the impacts of possible actions.

Notes:

**Summary table**

As a group decide on the most important points from each of the above EBM aspects, summarise in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **EBM themes** | **Identify the most important ideas/information for your project/location** | **Summarise them in two short sentences** | **What other questions do you need to ask?** |
| Human activities |  |  |  |
| Collaborative decision-making |  |  |  |
| Knowledge-based |  |  |  |
| Sustainability |  |  |  |
| Adapts |  |  |  |
| Tailored |  |  |  |
| Co-governance |  |  |  |

**EBM for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (add your location and project)**

Use the information from your planning sheets to create an EBM infographic



Collaborative decision-making

Tailored

Adapts

Knowledge-based

Sustainability

Co-governance



Human activities



**Action planner**

Action Planner

What is our vision?

What are we going to do?

How will our actions lead to our vision?

How do we know what others think and value?

What information and resources do we need?

Who do we need to consult before making our decisions?

How should we share our plans with the community?

Who do we need to involve?

What is our timeframe?

How will we monitor the effectiveness of our planning and actions?