



MARLBOROUGH GIRLS' COLLEGE
Te Kāreti Kōhine o Wairau

SUSTAINABLE
SEAS

Ko ngā moana
whakauka

Teaching environmental sustainability through an ecosystem-based management lens

May 2024

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Acknowledgements

We extend our deepest gratitude to all who have contributed to this project.

Firstly, we thank Melynda Bentley and Heather Paterson-Shallard for their hard work and commitment. Special thanks also to Mary-Jeanne Lynch, Emily Stenhouse, Nicki Attridge, Karen Burton, Toni Adshead-Borrie, Jenny Pullin, Carol Stanley, and Duncan Bond for their unwavering support and dedication.

We are grateful to Conrad Pilditch, Simon Thrush, Kura Paul-Burke, Steve Urlich, Eric Jorgensen, Carolyn Lundquist and Julie Hall for their expert advice and encouragement.

We especially appreciate the support and collaboration of local iwi Te Atiawa and Ngati Kuia.

Thank you all for your remarkable contributions.

Cover image: Ivan Sanford

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Introduction

During the early stages of the Sustainable Seas National Science Challenge, researchers (predominantly Simon Thrush, Conrad Pilditch and Eric Jorgensen) established a mutually productive relationship with Melynda Bentley, a science teacher at Marlborough Girls' College. Melynda was focused on developing environmental sustainability courses for secondary school students that could bring a range of science subjects into the classroom through an environmental sustainability lens. Melynda was interested in the ecosystem-based management (EBM) research being produced by the Sustainable Seas National Science Challenge, including how EBM could be used as a tool for teaching sustainability. After various conversations between Melynda and the Sustainable Seas researchers, MGC has focused their environmental sustainability courses on the EBM principles developed by Sustainable Seas. The Sustainable Seas National Science Challenge has engaged with and supported Marlborough Girls' College to implement these courses¹.

This document outlines the kaupapa and philosophy behind developing courses which teach environmental sustainability through an EBM lens. The accompanying years 9/10 and 12/13 documents provide guidance for teachers on how to use the EBM principles to teach environmental sustainability that can be used to assist with course development and student learning in the classroom, including Melynda's approach to teaching these courses. This can be supplemented by Sustainable Seas National Science Challenge resources, including the Tohorā website² and 'Resources for Teachers'³ package which makes Sustainable Seas Research accessible for geography and social science teachers⁴ and have been referenced throughout.

These guidance documents were created through interviews with Melynda to capture the philosophy, teaching approaches, subjects, and alignment with secondary school curriculum. Melynda used this time to give thought to her journey of developing the environmental sustainability courses, including key learnings that she hopes will be useful to others hoping to introduce EBM to their teaching. The quotes were taken from interviews with Melynda as she reflected on her journey and the benefits of bringing EBM into the classroom. It is hoped that these guidance documents, in conjunction with 'Resources for Teachers'⁵ and other links provided here, will inspire and support teachers to develop similar courses which seek to teach environmental sustainability through an EBM lens.

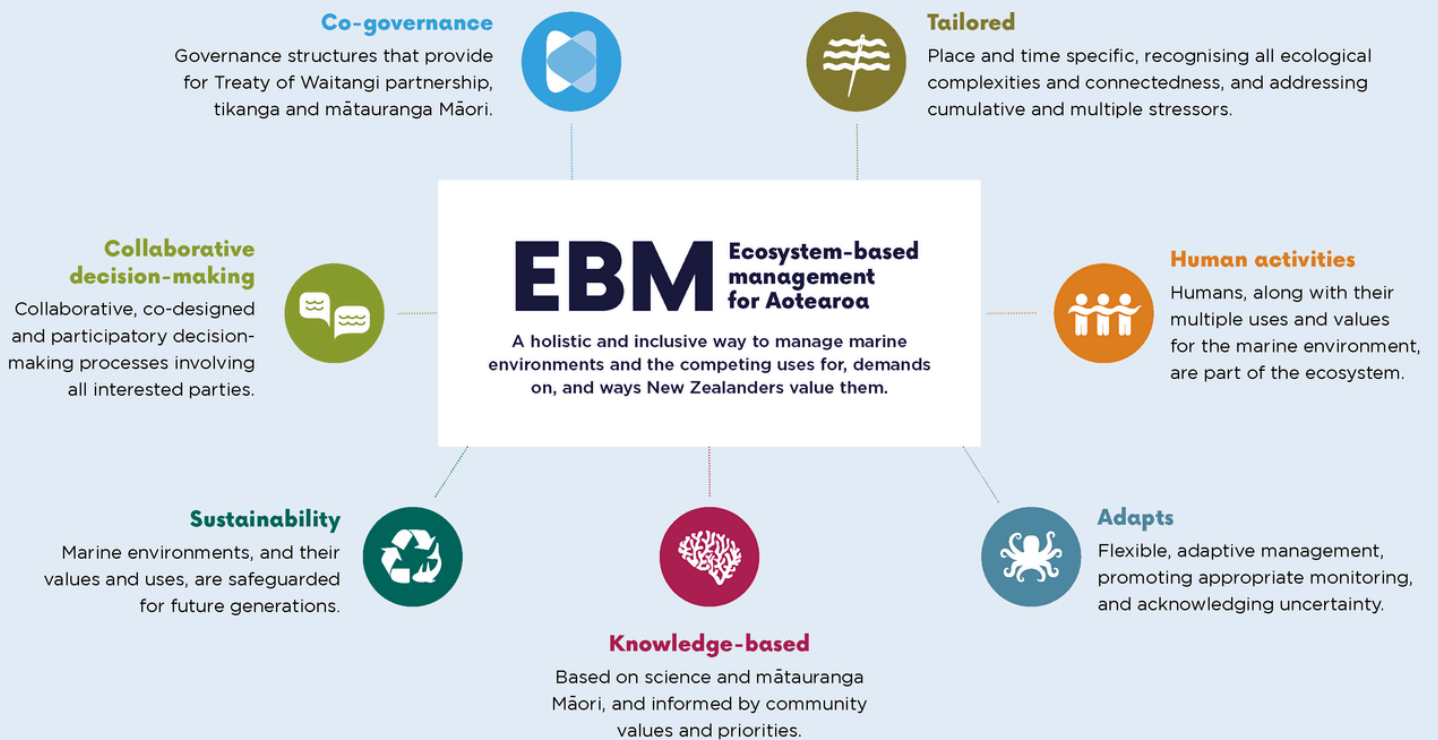


Images: Marlborough Girls' College



The kaupapa/pedagogy behind incorporating EBM in teaching

Ecosystem-based management (EBM) is a principle-based approach to managing marine spaces in Aotearoa New Zealand developed by Sustainable Seas National Science Challenge. Sustainable Seas has defined ecosystem-based management as “a holistic and inclusive way to manage marine environments and the competing uses for, demands on, and ways that New Zealanders value them.”⁶ The research undertaken by Sustainable Seas is working towards sustainable management of our vital marine environment and has been guided by seven EBM principles⁷ developed specifically for the Aotearoa New Zealand context. The principles of EBM can be applied to a range of challenges or scenarios and play a key role in addressing the current decline in biodiversity on our planet. While Sustainable Seas focuses on sustainable use of oceans, the EBM principles can be applied beyond marine environments to encourage sustainable management of other ecosystems.



“EBM is really good because it fits into anything that you do or any location, you can apply those principles.”

The principles of EBM are being used as an effective and meaningful tool in high school classrooms to teach students about environmental sustainability both in the water and on the land. Marlborough Girls' College has utilised EBM and the seven principles to develop cross-curricular environmental sustainability courses for years 9 and 10, and 12 and 13. The environmental sustainability courses at Marlborough Girls' College are contributing to a new generation of students who are inspired to think about environmental management through a holistic, interdisciplinary, and inclusive manner. Senior students are encouraged to think about complex environmental sustainability issues through the lens of the seven EBM principles⁸.

While the course focuses on restoration and protection of the environment primarily, it encourages students to think more broadly. This is important as improvement in environmental condition will have flow on benefits for meeting social, cultural, and economic needs of people. Junior students learn the basics through a combination of science, social sciences, including ecology and mātauranga Māori. This includes focusing on the EBM principle of knowledge-based and exploring human impacts and perspectives, although all EBM principles are covered to an extent.

“Kids need to actually see and understand what’s there. If they can see, hear, feel and touch their environment, they are more likely to take care of it.”

Through inquiry and place-based learning, students are given firsthand opportunities to learn about and explore their local environment. Students are encouraged to learn about the special characteristics of the environment and habitat in their local area. The Marlborough Girls’ College courses are focused on what is special and unique in the Marlborough region, inspiring students to engage with what is special to them personally in their local area. For some students, this is a new experience, and they develop new connections with their local community and environment.

The courses encourage students to engage with and build connections to the local environment and community that cannot be achieved through classroom-based teaching approaches alone. Place-based learning and a wide range of fieldtrips offers an in-person experience where students are exposed to the environment in their local area. The physical experience of being immersed in the environment is enabling students to connect with and understand the local area more than we are able to do classroom only approaches. As students develop a deeper understanding of the environment, including functions and intricacies of their local environmental areas, an ethic of care and connection to the environment is developed.

The skills developed within the environmental sustainability courses are enduring. These experiences are developing a next generation of thinkers and learners with life skills and abilities that can be taken into future endeavours. Utilising EBM in our education system can increase knowledge and understanding of the connection between environment and people and can be used to encourage students to become socially responsible and aware. Students are gaining an understanding of EBM and its principles that can help guide future generations towards informed decisions that will benefit the environment and society collectively.

The EBM principles are used as a teaching tool to encourage students to think about best practice for managing the environment from a range of perspectives. This includes the importance of society working inclusively to tackle complex problems related to sustainable management of our vital ecosystems. They are learning to recognise and understand the interconnectivity of environment and society, including human impacts on the environment. Students develop skills which help them to make informed decisions that are adaptable, flexible, and suited to the context of environments. This includes teaching students how to make informed decisions to manage the impact of human activities on land and water. Opening students to these skills and life experiences at an early age is important for developing their knowledge and understanding of the environment that will have life-long benefits. The everyday decisions that our students make as adults will have an impact on the state of our environment for future generations.

Understanding perspectives – “It’s about encouraging them to be informed and use their information to talk to the people directly. That’s our kaupapa.”

Teaching sustainability through an EBM lens has an array of benefits for students and their educational journey. Although the course content differs between years 9/10 and years 12/13, the impetus behind using EBM principles as an educational tool remains the same. These benefits extend to teachers, as well as more practical benefits that extend to the community and the physical environment.

The engaging activities and teaching techniques used are helping educate students to make collaborative informed decisions that enable the protection of our environment both on the land and in waterways. Through the EBM principles students learn about the different expertise required to contribute to decisions. These are lifelong skills that are necessary for people to assist with halting environmental decline and sustainability issues.

Students are offered a unique learning experience which is taught from multiple perspectives, including biophysical, social sciences and cultural. By using the EBM principles as the foundation of the course, students are gaining imperative knowledge of a range of disciplines and concepts. The EBM principles incorporate science, social science, Te Tiriti o Waitangi, mātauranga and kaitiakitanga.

“It was about creating a course that anybody could take. It has to be student-led, it has to be local, place-based and using our community.”

There is a place in the classroom for all children. The Marlborough Girls' College environmental sustainability courses have no pre-requisites, welcoming students with a wide range of interests, experience, and abilities. Teaching strategies and assessment content is altered to suit the needs of individual students, enabling students to succeed despite personal circumstances or learning difficulties. A student-led approach is used to increase engagement, as students are given the opportunity to guide their own learning and develop or follow passions in environmental sustainability. By using the EBM principles, there is something in the classroom for all students to connect with or be passionate about. Each of the seven principles encapsulate a wide range of topics and issues that relate to environmental sustainability – whether it be an interest in or connection to mātauranga Māori, social science, science, ecology, history, governance and decision-making or human behaviours. The principles require different expertise to contribute to decisions, encouraging students to recognise the value of their interest and skillset in relation to sustainability.

Using EBM as a teaching tool is helping students to learn skills beyond just sustainability. Developing an understanding of EBM principles, including how to apply them to decision-making, is helping students to develop 'big picture' thinking. Students are learning to see the interconnection between factors and key actors in decision-making, including rationale for decisions being made. Students build an appreciation of how knowing and understanding all factors in a decision-making process can lead to more robust decisions. This provides students with practical experience that can be taken into future employment and life experiences.

The EBM principles are integrated into the environmental sustainability courses in a variety of ways. The EBM principles are the foundation of the course, with exercises and assignments designed to develop student's understandings and knowledge of the principles. However, they are also applied and experienced everyday via teaching and activities in the classroom. At Marlborough Girls' College, teachers have observed students not only growing an understanding of the principles but utilising and developing aspects of the principles within their own behaviours.

Students have developed key competencies and skills that relate to the principles. Students are seen to develop interpersonal and collaboration skills from the learning experience. This includes developing proficiencies in collaborative decision-making, learning how to collaborate with others, listening to and viewing other people's perspectives, and utilising a wide range of knowledges to inform decisions. Students encounter different views in the classroom and on fieldtrips through guest speakers, encouraging them to listen and compromise when necessary. Collaboration with local community members provides an opportunity for students to connect with local people and develop skills in working with a wide range of people from various backgrounds. This also provides an opportunity for students to learn from the skills and expertise of a wide range of people with diverse backgrounds. Students often find immense inspiration from listening to people talk about their interests or field of work. Working in group-based assessment scenarios motivates students to be more empathetic with their peers.

Meeting curriculum requirements

Using EBM in the classroom is effectively meeting New Zealand curriculum requirements and building students' capabilities in the classroom and beyond. A key benefit of utilising EBM in teaching is the ways in which the EBM principles relate effectively to the New Zealand curriculum. The Marlborough Girls' College environmental sustainability courses are proving to be an effective technique to keep up with evolving curriculum in New Zealand.

EBM fits well with the New Zealand Curriculum Principles⁹ and incorporates the five New Zealand Curriculum key competencies¹⁰ into the learning environment. Teachers from Marlborough Girls' College found EBM as an easy yet effective tool to teach with, successfully enabling teachers to bring in cross-curricular science and social science.

“EBM is the perfect tool for bringing in Māori worldviews because when you look at those principles and how they work, you can tie all that into it really easily.”

Marlborough Girls' College environmental sustainability course is meeting the changing New Zealand educational curriculum, including requirements under the NCEA curriculum for the senior course. The course meets requirements for a bicultural curriculum, focusing on the inclusion and understanding of the Treaty of Waitangi (Te Tiriti o Waitangi) and mātauranga Māori. Using a tool like EBM is an easy way to create effective teaching approaches which brings in mātauranga Māori in a meaningful, relevant way through the context of environmental management. Teaching through an EBM lens enables teachers to connect to Te Tiriti o Waitangi in lessons. Students develop a cultural awareness as content is linked to cultural artefacts, tikanga and mātauranga Māori. Further students are encouraged to incorporate Treaty of Waitangi, mātauranga Māori and other key Māori principles in their thinking. The environmental sustainability courses provide an opportunity to show the strong connection between mātauranga and science and help develop student's knowledge and understanding of mātauranga at both junior and senior levels.

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Year 9 and 10 course

Marlborough Girls' College has designed year 9 and 10 courses around the principles of EBM. The courses are co-taught with science and social science. The courses encourage students to think about the interconnected nature of the environment through the outlook of *ki uta ki tai*, from the mountains to the sea¹¹. They learn about the sustainability of human actions through EBM, *mātauranga Māori* and *kaitiakitanga*. The year 9 course follows the theme “on the land”, with a significant focus on conservation and human impacts on the environment. The year 10 course follows the theme “under the water”, focusing on the ecology and chemistry of the marine environment.

“The junior course is designed around EBM. EBM is the focus and it's about teaching EBM, what the principles are and applying it to making decisions.”

The EBM principles are the foundation of the year 9 and 10 courses. There is specific emphasis on the principles of ‘knowledge base’, ‘sustainability’, and ‘human activities’, although all principles are relevant.

The courses teach key concepts such as ecology, environment, habitat, and niches. Students also learn about animals and plants which can be tailored to the local context, such as understanding how adaptations can determine where species live. In both year 9 and 10 students are taught about human activities and associated impacts, including environmental, social, and cultural impacts.

“EBM is really good because while it is designed in the marine space, you can use it on land, you can use it anywhere. And it's got Te Tiriti in it as well which links in beautifully with New Zealand and with what we are trying to teach. It's a great way to bring in *mātauranga Māori*, great way to bring in *tikanga*, great way for kids to understand ecosystems, and the fact we need them intact for a sustainable future. That's what that year 9 and 10 course is about.”

Through learning about the EBM principles, students are learning about how to make good decisions that maintain the ecosystem. The students are taught about environmental decision-making, thinking through the lens of decision makers to make informed decisions for local environmental management.

The courses also focus on understanding *mātauranga Māori* and *tikanga* and linking these concepts to the environment. This aspect of the course focuses on creating awareness within the year 9 and 10 students. In year 10, the students learn about the value of *mātauranga Māori*, with emphasis placed on the need to use science in conjunction with *mātauranga Māori* for strong decisions. Students are taught the connection between *mātauranga Māori* and science and how these can be used together. While the junior students do not work directly with *Iwi* as much as the seniors due to time limitations in the course, students are taught the importance of the role *Iwi* must be allowed to play in environmental decision-making. In particular, the students are taught the importance of *Iwi* involvement in discussions and consultation from the outset. Other key cultural considerations are also highlighted, such as cultural artefacts.

The knowledge from the year 9 and 10 courses provides a building block for students into the year 12 and 13 course. Many of the junior students aspire to take the year 12 and 13 courses, hoping to work with the community and develop their own projects in the senior courses. The year 9 and 10 course provides the foundations for the senior courses, utilising the EBM principles to understand environmental sustainability challenges, how and why these should be managed, and who should be involved in decision-making.



Scenario exercise

An example of the depth of understanding gained by students through the year 9 and 10 courses comes from the scenario exercises. At the beginning of the year, students are given a scenario which they then revisit after a range of fieldtrips and taught content in class based on the EBM principles.

“The main benefit for students using EBM is to give them an understanding of how everything links. Sometimes things are taught in isolation, or they don’t see the big picture, or they don’t see how a decision is made... whereas if they’ve got the tools that they need behind them to help them make those decisions, their rationale and reasoning behind decisions are more in-depth, makes a lot more sense, and their understanding is greater.”

The year 9 scenario is forestry and the year 10 scenario is salmon farming. Students are given limited information and using that information must decide where a new forestry or salmon farming site should go out of three options. In groups, the students must explain which site they have chosen and provide justifications as to why that site was selected. Over the course of the year, the year 9 students are then taught the rest of the curriculum, including the EBM principles, perspectives, human-impacts, ecology, ecosystems, adaptations of plants and animals, mātauranga Māori and tikanga. The year 10 students are taught content on human impacts, perspectives, chemistry of water, ecology under the water, mātauranga Māori and tikanga.

At the end of the year, the scenario exercise is repeated with the students having gained new knowledge to aid their decision-making. Students are given a perspective of a key actor/stakeholder to consider (for example, Iwi, community, farmer). Taking into consideration the EBM principles and their newfound knowledge from the course, the students must explain how they would come up with a decision while considering the key people around the table that are impacted by a decision. Students participate in a roleplay exercise to demonstrate their decision for the forestry or salmon site. In the roleplay exercise, the students must set the rules for how the group will work and act out their roleplay and discussions. They must come up with a site for the forestry or salmon farm, and present their site, providing justifications for why they have chosen that site. The students must take into consideration controversial issues such as ecological concerns and cultural considerations that might be important factors for their stakeholder perspective.

The scenario exercise helps to develop students’ ability to make robust and informed decisions in environmental management. Through the scenario exercises and taught content across years 9 and 10 at MGC, students can see the reason and rationale behind decisions which helps them to understand and accept decisions more. Students learn the value of considering multiple perspectives and how this can lead to more effective decisions. In the classroom, it encourages discussion amongst students as they discuss their different opinions and provide justification for these opinions. This encourages students to listen and acknowledge different opinions, be more understanding of others and to build empathy.

Alongside the scenario exercise, students develop a mural relevant to their year level topic. Year 9 complete a 2D paper wall mural for the theme on the land, and year 10 students complete a 3D under the water lego display. This shows the connections between key aspects of the environment, starting with land features and then using rivers to demonstrate the concept of ki uta ki tai, from the mountains to the sea. As part of the mural exercise, students explore and discuss habitats and key sites of importance. Students create ecology posters to identify living organisms from their habitat and explore human activities and associated impacts. The ecology poster and human activities/impacts are displayed with the mural to show the various connections between humans, environments and ecology.

Year 12 and 13 course

The Marlborough Girls' College year 12 and 13 environmental sustainability courses focus on using EBM as a tool for exploring and understanding environmental sustainability issues. The topics of conservation, farming, marine, school, and viticulture are used to demonstrate the interconnections between humans and nature and the challenging environmental issues that the world is facing. Students participate in a range of field trips and hear from guest speakers from the local community who are trying to solve some of the sustainability issues the region is facing. They investigate local challenges and select a local issue to focus on, including collecting information firsthand. Students develop connections with the local community, engaging with specialists as stakeholders and/or mentors to undertake a meaningful action of their choice in relation to their chosen sustainability issue.

“The year 12/13 course is really about using EBM as a tool to make decisions in relation to the issues and the actions that they decide to take on. It helps them create awareness of who they need to talk to, what research they need to find out, how do they understand the area or rohe and the issues associated with it, the people, and its uses. That’s where EBM is really cool.”

The year 12 and 13 course builds on the skills and knowledge from the junior courses. While the year 9 and 10 courses provide the foundational understanding of the EBM principles, in the year 12 and 13 course, students start to get a better understanding of how the principles work together and are interconnected.

The year 12 and 13 course at MGC uses the Education for Sustainability standards that are under the social studies curriculum, but the teaching is done under science. The course brings a range of disciplines together, including social science and traditional sciences such as biology and chemistry, to teach students about environmental sustainability. The course is a combined year 12 and 13 class; however, it is tailored to the year levels when necessary due to the education standards that students must meet. However, this provides a great opportunity for the year 12 students to collaborate with and learn from the year 13 students. The course is suitable for a range of student abilities and can be tailored where necessary. Within the same classroom teachers can cater to those that might need additional support, while still encouraging others to extend themselves and aim for higher achievements.

“They learn so much more than getting NCEA credits in this course. They learn lifelong skills.”

The year 12/13 course includes a wide range of field trips and guest speakers with vast knowledge and experience in the relevant topic. This exposes students to local people and knowledge of the local environment. The field trips and guest speakers based around the 5 areas of conservation, farming, marine, school, and viticulture are varied each year to limit repetition of trips and speakers, and to foster continued engagement of students that are completing the course in both year 12 and 13.

Student-led learning is encouraged, with students spending time choosing a topic/issue that is turned into a project. They are then given the opportunity to brainstorm and select a project that they are passionate about, working individually or in groups. This involves selecting a sustainability issue and co-constructing a strategy for overcoming that issue. Later in the year, the students work towards planning and carrying out an action to address their chosen sustainability issue. EBM is used as a tool to help students design and carry out their project, including thinking about who/what needs to be considered in their decision-making process and why.

Students are encouraged to work collaboratively with others, including working in groups, and working with mentors and organisations from the local community. The teachers are there to guide the students, using questions to prompt the students to think about aspects that might be missing from their projects. Students are experiencing collaboration in decision-making by working in groups and with the community, including having to share ideas and compromise to reach agreement. Although there is collaboration and input from community and teachers, the final decisions are made by the students who need to show that they have taken on board other people's perspectives/needs.

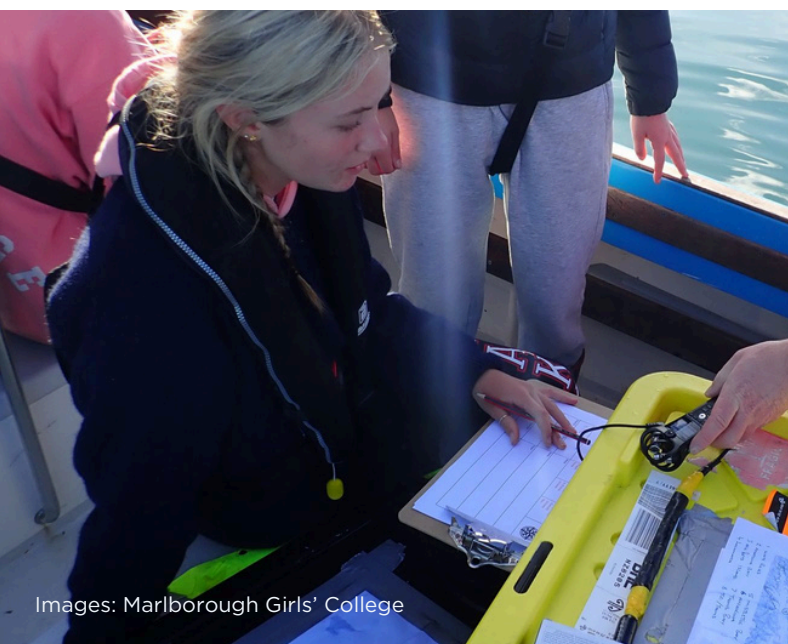
The course focuses on the local environment, including building connections with local people who are concerned about and/or impacted by the decline of local environments. Students are encouraged to build connections and relationships with Iwi, commercial/industry representatives, recreational users, and people who live in the area who care for the environment.

“We’ve got all sorts of generations that are supportive of what the students do and their projects. It brings them hope and joy that actually we’ve got this next generation who are going to have all these skills and abilities, and hopefully will be making really good decisions for environmental sustainability.”

The year 12/13 mentors have praised the environmental sustainability courses for the skills that students are able to develop. Students who have taken the course are developing key skills and competencies that are essential for success in the workplace. This includes the ability to collaborate with and be accepting of other peoples' views and opinions.

“Iwi get excited to see young people coming through with such a positive attitude and either attempting to understand the cultural side of things, or that they are understanding...It also gives an opportunity for our Māori students to follow their own Iwi and talk to their own elders.”

The EBM principles are enabling teachers to connect to Te Tiriti o Waitangi in lessons. Students develop a cultural awareness as content is linked to culture, tikanga, and mātauranga Māori. Project work at the year 12 and 13 levels enables students to develop relationships with Iwi. Students are encouraged to learn about correct protocols, including meaningful inclusion of Iwi. The place-based nature of tikanga is taught, such as the importance of knowing the histories of Iwi and how these histories might differ between various Iwi. Iwi have been very supportive of the approach that MGC is taking. While recognising time and resource constraints, MGC has had a very positive experience with Iwi engagement and involvement.



Images: Marlborough Girls' College

Appendix

Key things to consider when developing an EBM based course:

- Invest in teachers' professional development.
 - The Sustainable Seas resources are a great starting point, including the Resources for Teachers¹² on the Tohorā website.
 - Science Learning Hub has teacher resources available¹³.
- Be open with your teaching style. Teachers need to utilise different skills and teaching techniques to encourage students to achieve their best in this course.
- Invest time into getting the courses up and running and assessments design.
- Build courses around your own strengths or background.
- Know the EBM principles and how they work.
- Understand mātauranga Māori and tikanga or how to access this.
- Get to know the rohe and iwi affiliations, including who to talk to in your area. This is particularly important for year 12/13 projects that might take place within Iwi boundaries or within environments that are of cultural importance to iwi.
- Consult and talk with iwi before projects are commenced and make sure that they are supportive of the project.
- Focus on teaching the EBM principles and how they work.
- EBM is a place-based approach so the local context should be considered when designing teaching content. As a starting point, consider what is important in your local area.
- Spend time understanding the standards and what is required. If there is going to be a classroom of combined year levels it is important to know what is required for each year level as there will be more standards to navigate.
- Support from your school is important, especially for fieldtrips when additional staff are required.
- Funding is necessary, particularly for fieldtrips. Consider grants, community assistance/donations, and free activities (such as developing a project in the school grounds).
- Good relationships with the community are important. Utilise existing contacts in the community, especially if you are doing place-based learning and for student projects.
- Teacher to student ratio should be considered, especially for the year 12/13 class.
 - 20 students per teacher is ideal, and 25 would be manageable with the assistance of a teaching assistant.
 - In a co-teaching scenario 40 students is ideal for two teachers; however, there could be a max of 50 students plus a teacher aide depending on abilities in the class.
 - If the classroom size was especially large, it would be more appropriate and manageable to split the students into a year 12 and 13 classroom.

References

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12. tohora.org.nz/education
13. sciencelearn.org.nz/resources/2557-introducing-our-pld



Useful resources

Source	Details	Link	Year
Tohorā (Sustainable Seas)	Resources for teachers to assist with learning about Aotearoa's marine environment, including teaching sequences and student resources based on Sustainable Seas research.	tohora.org.nz/education	All
Tohorā (Sustainable Seas)	Introduction to ecosystem-based management and animation series introducing the issues facing our marine environments.	What is ecosystem-based management?	All
Sustainable Seas website	Webpage and video introduction to EBM.	Why do we need EBM	All
Sustainable Seas website	Animated video introducing EBM and why it is needed.	EBM: A remedy for Aotearoa New Zealand's oceans	All
Tohorā (Sustainable Seas) Resources for Teachers	<i>Unit 7. Managing ecosystems</i> <i>7d. EBM-for-Aotearoa-portrait.jpg</i> <i>7e. EBM-for-Aotearoa-landscape.jpg</i> Poster of seven EBM principles	7d. EBM-for-Aotearoa-portrait.jpg 7e. EBM-for-Aotearoa-landscape.jpg	All
Tohorā (Sustainable Seas) Resources for Teachers	<i>Unit 2. Tangaroa and moana</i> <i>2b. Ki uta ki tai - how can people make better decisions</i> Poster illustrating how people, decisions and activities can be better connected from mountains to sea. Ki uta ki tai approaches undertaken in Aotearoa.	2b. Ki uta ki tai - how can people make better decisions	Year 10, Year 12/13
Tohorā (Sustainable Seas) Resources for Teachers	<i>Unit 7. Managing ecosystems</i> <i>7j. Caring thru EBM - Oi and Grace</i> 4-page comic presenting a human and non-human view of caring for a place.	7j. Caring through EBM - Ōi and Grace	Year 9
Sustainable Seas website	Video story of a hapū implementing a rāhui on a Maitai Bay, Northland, to protect and restore.	Protecting land and sea through EBM	All
Sustainable Seas website	Poster showing key marine legislation in Aotearoa.	Aotearoa New Zealand's Key Marine Legislation	Year 10, Year 12/13
Sustainable Seas website	Video exploring how the ocean might be shared.	Sharing the Ocean through EBM	All
Science Learning Hub	Webpage introduction to EBM and Sustainable Seas.	Looking at ecosystem-based management (EBM)	All
Science Learning Hub	Links to Science Learning Hub content based on Sustainable Seas research.	Sustainable Seas National Science Challenge	All
Radio NZ	Radio NZ interview with Kura Paul-Burke on Mātauranga Māori in Aotearoa's Science Sector	Radio NZ interview - Mātauranga Māori in Aotearoa's science sector	All

Year 9 example structure from Marlborough Girls' College

Year level	Focus	Brief
Year 9	First scenario	Scenario of places to plant forestry blocks locally with pieces of information left out. Students use their prior knowledge and a series of questions to select the best site. Present back to class with reasoning.
Year 9	Mātauranga Māori	What is mātauranga Māori and examples.
Year 9	EBM	Understanding EBM principles and examples of using them.
Year 9	Perspectives	Understanding types of perspectives.
Year 9	Murals	Groupings for each section of wall mural. Focus on habitat and key icons/activities in the area.
Year 9	Ecology	Understanding the basics of ecology including food chains and food webs. Poster of a chosen native species in their habitat from the mural. This goes above the mural.
Year 9	Human impacts/activities	Focus on types of activities in each section of the mural and what impacts they have there.
Year 9	Seeds field trip	Growing seeds and planting trees for local groups.
Year 9	Final scenario	Completing the same first scenario task with all the information and task cards to role play. Students use EBM principles for site selection. Present back to the class with reasoning.

Year 10 example structure from Marlborough Girls' College

Year level	Focus	Brief
Year 10	First scenario	Scenario of places to locate a salmon farm locally with pieces of information left out. Students use their prior knowledge and a series of questions to select the best site. Also a series of questions. Present back to class with reasoning.
Year 10	EBM	Understanding principles and examples of using them (different tasks to year 9).
Year 10	Perspectives recap	Recap of Year 9 perspectives work.
Year 10	Freshwater	Freshwater systems and whakapapa of freshwater.
Year 10	Grovetown Lagoons	Field trip and planting.
Year 10	Ocean intro	Understanding types of oceans.
Year 10	Lego mural	Groupings for each section of Lego mural. Focus on habitat and key icons/activities in the area.
Year 10	Whales, dolphins, sharks	Classification and endangered species.
Year 10	Chemistry	Basic chemistry – pH/salinity.
Year 10	Impacts on oceans	Ocean acidification and plastics.
Year 10	Final scenario	Completing the same first scenario task with all the information and task cards to role play. Students use EBM principles for site selection. Present back to the class with reasoning.

Year 12/13 example structure from Marlborough Girls' College

Year level	Term structure	Focus	Curriculum and standards	Associated tasks
Year 12 and 13	Weeks 1-6 Can be extended to week 8 if necessary	Field trips and guest speakers		<p>Students learn about what sustainability is in conservation, marine, farming, viticulture and school. Students are introduced to the concept of Aspects of Sustainability and also EBM and the seven principles.</p> <p>Students write reflections after each fieldtrip/guest speaker, noting things they found interesting or uninteresting, or things they have learned. This helps to prompt student's memories when it comes time to choose a project.</p>
Year 12 and 13	Weeks 6-8 (2-3 periods)	Brainstorming for project selection		<p>When the guest speakers and fieldtrips are finished, students focus on project selection.</p> <p>Students use their reflections to write project ideas on large pieces of paper under the umbrella categories of conservation, marine, farming, viticulture, and school.</p> <p>After 2-3 periods of idea brainstorming, students decide on their topic of interest and groups are selected. Students are encouraged to join groups based on their passion and interest.</p> <p>All guest speakers and people involved in field trips agree to be mentors before the course starts and if a group selects their topic they will be contacted.</p>
Year 12 and 13	Terms 1 and 2 NB: This can flow into term 3 if necessary	Carrying out projects		
Year 12	Terms 1 and 2		<u>Human Impact Standard, Biophysical standard (4 NCEA credits) 90811</u>	Students learn to understand how humans have impacted the environment.
Year 13	Terms 1 and 2		<u>Co-construction standard (5 NCEA credits) 90832</u>	Students co-construct a strategy for their selected sustainability issue. This requires research to find out more about the issue, who they need to work with for their action, consider relevant stakeholders and mentors, and work on designing a strategy.
Year 12	Terms 1 and 2		<u>Action (6 NCEA credits) 90810</u>	<p>Students focus on addressing the issue that they have chosen. The focus is on understanding the ecology/ecosystem and coming up with an action to improve it.</p> <p>The Human Impact section might be linked to this, or it might be two separate things.</p>
Year 13	Terms 1 and 2		<u>Action (6 NCEA credits) 90828</u>	<p>Students carry out the previously designed strategy. This involves planning with mentors and carrying out an action.</p> <p>Students who have taken the year 12 course have the option of continuing a project from the previous year or starting new.</p>
Year 13	Additional		<u>Policy impact standard (5 NCEA credits) 90831</u>	Students analyse the impact that policies have on a sustainable future

Tips and tricks for running year 12 and 13 courses and projects

Place-based approach

EBM is a place-based approach so the local context should be considered when designing teaching content and assessments. Focus on dominant economic areas in your region, including environmental aspects of primary production businesses, sectors, or industries. Some students' interests will be captured by industries that their own families are involved in.

Marlborough Girls' College focused on the local context and local environment. This led to the selection of 5 areas: conservation, marine, farming, viticulture and school.

These categories can be adapted to your local areas or you might have other key industries to focus on. For instance, Marlborough Girls' College focused heavily on marine through the Marlborough Sounds; however, it might be more suitable for other schools to focus on a local waterway instead.

Project selection

To get the course started, students could focus on smaller project designs that are easier to plan and manage. Great projects can be designed using the environment right outside your doorstep, such as within the school boundary.

It is important to encourage students to select a project based on their interest and work with new people, rather than sticking with friends.

Marlborough Girls' College had some very successful school-based projects. Examples of school-based projects include solar, lighting, power, heating, rubbish, recycling, plantings.

Project group selection

Projects can be individual, or group based.

Group sizes of 2-4 are recommended. However, individual projects can be suitable for students that have extenuating circumstances, such as only being at school or in the classroom part-time. If students are very passionate about a topic, they can also work alone if they choose.

Marlborough Girls' College allowed groups with a mix of year 12 and 13 students. However, there are challenges to this as the different year levels are working on different standards. If a group is mixed levels, it is important to have multiple students of the same year level so that they are able to collaborate and discuss ideas in relation to their standards.

Community involvement

Building robust relationships with the community is imperative for the success of student projects. Connecting with and talking to local people that can help with projects is key. There are often at community groups that might be willing to be involved or consider parents/family members that have relevant businesses that could contribute.

Marlborough Girls' College connected with local people including Iwi, commercial/industry workers, recreational users, people living in and using the local environment. The guest speakers including local community volunteers, scientists, council staff members, parents of students.

Mentors

Each project group has a mentor that can support students with their projects. Mentors are generally people that have presented to the students or hosted fieldtrips.

When working with mentors it is vital that teachers develop a relationship with the mentor first. New mentors might require guidance to ensure they are assisting students adequately.

Mentors play a significant role in the project process at Marlborough Girls' College. Students are encouraged to email mentors and ask questions or for help when they need it. Often mentors will come to the classroom to support the students, giving them ideas, suggestions, information. Students can use their class time to book mentor visits.

If a mentor is unable to provide the students with the necessary information, they are likely to suggest other people for the students to contact who will be able to help them.

Students must copy teachers into all emails regarding their project, including to mentors. This is seen as an effective way for teachers to keep up with student project progress and support where needed.

Co-teaching and staffing

The staffing of the course is an important consideration to make. As students are often required to leave school grounds for fieldtrips, research and data collection, additional staffing and support is required.

Marlborough Girls' College has recently utilised a co-teaching approach. This was extremely useful for assisting students with trips for research and data collection for their projects. Having a teacher present on trips was useful for the students as the teacher often captured information differently to the students and vice versa, providing an opportunity for students to discuss the trip and project ideas with a teacher when they return to the classroom. It is also useful for the teachers as they can effectively support the students with the project, including ensuring that students are achieving the standards, while having another teacher to continue to support the remaining students in the classroom.

If Marlborough Girls' College are not co-teaching, they have used a relief teacher in the classroom while the teacher goes with students. Alternatively, other supportive colleagues have helped out.

Time and classroom planning

Ample time is needed for the projects and often flexibility is needed with due dates. While students start on the same timeline, the rigidity of assignment due dates is unsuitable for these teaching and assessment frameworks as students are likely to develop their projects and work through milestones at different paces.

You need to be willing and able to adapt to the schedule/availability of community members that are assisting with projects. Students may require extensions because of community availability. This might mean students are submitting their projects at different times throughout the year. However, the beauty of the course is that the projects are individual so the timeline can be different for each student/group depending on their circumstances.

Milestones can be used ensure students are on track to complete all required work for the year. This is especially helpful when students are working on different standards simultaneously.

Marlborough Girls' College allows students to work on different standards to ensure students continue to make progress and are completing all content for the year. If mentors are way or unable to contribute to the project, the students can move onto different parts of the assessment to ensure that they are continuing to progress towards standards. For instance, starting to work on the climate change standard.

At the beginning of the year students create a timeline for their project, although this is flexible and can shift as the year progresses. Milestones and check-in points are used to track progress. This includes what are the key things that students need to cover in their projects and when they should be achieved.

Teacher's planning

With students working on student-led projects, the planning requirements for the course are different. Teachers can use the planning time to support students with their projects.

Rather than creating a set lesson plan, teachers at Marlborough Girls' College use the planning time to provide feedback or answer student questions on Google Classroom, work with students that need help, check-in on students, and keep in contact with mentors.

International students

Some schools might have international students that are interested in taking the course. While the course can be suitable for some international students, it is important to consider how best to support these students. A teaching assistant might be required to help.

International students can adhere to the place-based nature of the course while making projects relative to their own country/place, such as a comparative case study of New Zealand and their home country.

Marlborough Girls' College has had international students participate in the course. A teaching assistant was there to provide extra support to the students. There was a prerequisite that students must be proficient in English, particularly to ensure the students comprehend instructions on fieldtrips as health and safety is paramount.

An example of a great international student project was the comparison of sustainable farming practices between Aotearoa New Zealand and Germany. This student presented back to their class to share their findings.

Classroom tools

An effective classroom tool/platform will help to ensure the course runs smoothly. A teaching tool such as Google Classroom is useful for both students and teachers, allow students to work on their student-led projects and associated assessments while enabling teachers to keep track of progress, provide feedback and mark assignments.

A classroom platform like Google Classroom is an effective way to monitor students' progress with their projects. This helps teachers know which students need support or encouragement if they are falling behind.

Marlborough Girls' College finds Google Classroom to be effective. Students complete assessments, including logbooks and assessment with evidence, in Google Classroom. It is also an effective way for teachers to support the students, as the students can put comments and questions for the teachers to answer or provide feedback on their work.

Supporting and tracking student progress

Teachers need to ensure students are well supported and progressing well as they are working on their projects. Scheduled check-ins with the class are useful to check what students are working on and as an opportunity for students to ask for help.

Marlborough Girls' College uses the beginning of the class as an opportunity to check in with the students. The teacher asks each group what stage they are at, what their focus is for the period or simply what is the next step. This is an opportunity for students to ask if they need help and helps teachers see which groups might need extra support or information/ideas that day. Students also might request to see teachers in that period. There are a variety of ways for students to ask for help, including by email, asking at the beginning of the teaching period, or by making a note next to their group/s name on the whiteboard to indicate if they need time and support from the teacher.