

Porirua Harbour
and Catchment:

A resource for teachers



*Living
Waters*

TIAKINA NGĀ TAONGA - PROTECT THE TREASURE

Contents

Page 3	Welcome	
Page 4	Important tips for teachers	
Page 6	Theme one: Ecosystem	Level 3 & 4 Science
Page 11	Theme one: Ecosystems	Level 5 Science
Page 16	Theme two: Porirua Harbour as a Taonga	Level 3 & 4 Social Science
Page 20	Theme two: Porirua Harbour as a Taonga	Level 5 Social Science
Page 24	Theme three: Human impact on the Harbour	Level 3 Social Science Level 3 Science
Page 29	Theme three: Human impact on the Harbour	Level 4 Social Science Level 4 Science
Page 33	Theme three: Human impact on the Harbour	Level 5 Social Science

Welcome

In 2011 the Pauatahanui Inlet Community Trust produced *Living Waters*, a series of short documentaries celebrating the ecology of the Porirua Harbour and catchment. To encourage use of this amazing series the Porirua Harbour and catchment Community Trust has produced a resource for teachers to encourage them to make use of the films in their classrooms. Aimed for students working from Level 2 to level 5 (senior primary school and junior secondary), the resource focuses on the Science and Social Studies areas of the New Zealand Curriculum.

Important tips for teachers

Live links

Using the resource while online will enable you to follow links to websites referred to throughout, including the online versions of *Living Waters* episodes and Ministry of Education teaching tools.

Structure

The resource is presented in three themes, each with a specific curriculum focus. Theme One: Ecology has a Science Living World focus, Theme Two: Porirua Harbour as a Taonga has a Social Studies focus, and Theme Three: Human Impact on the Harbour focuses on both Science and Social Studies.

Each theme provides significant scope to integrate other learning areas (in particular English and The Arts), as well rich contexts for exploring a number of Key Competencies and Values. The resource also promotes Inquiry approaches to teaching and learning.

Planning for action projects

Each theme encourages students to apply their learning about the issues facing the Porirua harbour and catchment by planning and implementing an action project. Taking action for the environment is one of the key aspects of environmental education and provides the opportunity for students to learn skills such as planning and decision making, working as a group, communication, and reflection.

Te kete Ipurangi has a very useful guide for planning action projects and is recommended:

<http://efs.tki.org.nz/Curriculum-resources-and-tools/Action-Planner>

Useful background reading to understand the issues

Wellington City Council, Porirua City Council, Greater Wellington Regional Council and Ngati Toa Rangatira have worked together to produce the Porirua Harbour and Catchment Strategy and Action Plan. The front end of this document is very useful and interesting reading about the social and natural history of the harbour and catchment, and the “big three” threats to its health and future. The document can be downloaded from here:

<http://www.pcc.govt.nz/DownloadFile/Publications/Harbour-Management/Porirua-Harbour-and-Catchment-Strategy-and-Action-Plan-March-2012>

Or you can contact Porirua City Council for a copy. For any questions about the strategy or action plan please contact Keith Calder the Harbour Strategy Coordinator at kcalder@pcc.govt.nz or call the council on 237 5089.

Field trips

Each theme of this resource includes a field trip that focuses on aspects of the harbour and catchment relevant to that theme. While the *Living Waters* documentaries brings learning to life for students, experiencing the harbour first hand will add enormous value to their understanding and appreciation.

Theme One: Ecosystems field trip is to the Pauatahanui Inlet, starting at Motukaraka Point and making use of the mudflats and boardwalks through the intertidal vegetation and streams.

Theme Two: Porirua Harbour as a Taonga includes a field trip to Takapuwahia Marae and surrounding area. Schools are able to contact the marae committee to book a guided visit which will include a powhiri welcome, stories about the harbour from kaumatua, and a walk around the harbour edge.

Theme Three: Human Impact includes a field trip through the catchment by train. Starting at a station nearest to your school, students can travel from Pukerua Bay through to Takapu Road and see the variety of ways that people impact on the waterways and inlets of the whole catchment.

The Ministry of Education has excellent information on Te Kete Ipurangi about planning for safe experiences in the outdoors. <http://eotc.tki.org.nz/EOTC-home/EOTC-Guidelines> A pre-visit for teachers as part of your planning is recommended.

Map of the harbour and catchment

Simple maps of the harbour and catchment can be found on the PHT website <http://www.poriruaharbourtrust.org.nz/catchment/otherresources>

This whitebait booklet produced by Department of Conservation will be very useful for literacy activities around the topic of Porirua harbour and catchment, and help to deepen understanding about life in harbours and estuaries:

<http://www.doc.govt.nz/documents/getting-involved/students-and-teachers/themes/estuaries/whitebait-education-resource.pdf>

For learning about the natural history of the harbour and catchment, we strongly recommend the book, *At the Beach – explore and discover the New Zealand sea shore* by Ned Barraud and Gillian Candler. It is a local production and is an excellent natural history reference for young people. It is particularly relevant for Theme One: Ecosystems:

<http://www.craigpotton.co.nz/store/at-the-beach-paper-back>

Interviews are with Ngati Toa elders, who share an oral history of Ngati Toa's relationship with the harbour, and the impact on Iwi from the way it has been managed in the past:

<http://www.ngatitua.iwi.nz/ngati-toa-kaumatua-interviews-te-awarua-o-porirua-3/>

Acknowledgements

The Porirua Harbour and Catchment Community Trust is grateful for funding from Mana Community Grants Foundation, Hutt Mana Charitable Trust and Wellington Community Trust.

We are grateful for support from Cheryl Cameron and the Pauatahanui Inlet Community Trust for encouraging us to do this project, and would like to acknowledge Frank Wilson, Deborah Moran and Alanah Hawke for their contribution.

Theme one: Ecosystems

Level 3 & 4 Science



*Living
Waters*

TIAKINA NGĀ TAONGA - PROTECT THE TREASURES

Theme one: Ecosystems

Level 3 & 4 Science

Achievement Objectives:

- Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.
- Use their growing science knowledge when considering issues of concern to them.
- Explore various aspects of an issue and make decisions about possible actions.

Conceptual understandings:

- The living and non-living organisms in Porirua Harbour and Catchment are inter-dependent and affected by environmental changes.
- Human decisions, including our own decisions, can affect the environmental sustainability of Porirua Harbour and Catchment, both positively and negatively.

Learning framework

Links to social inquiry approach	Activities	What to look for
Establishing what we know		
Focus of learning topic Why are food chains important?	1. Simple food chain 2. Food chains in-depth (optional)	Building conceptual understandings by <ul style="list-style-type: none"> • Identifying the various organisms that make up a food chain • Predicting how changes in a food chain can affect an ecosystem.
Experiencing the Harbour		
Selecting a context What lives in our harbour?	3. Preparing for field trip 4. Field trip 5. Observations from field trip	Gaining first-hand knowledge by <ul style="list-style-type: none"> • Observing the many plants, animals and habitats within the harbour and catchment.
Building on knowledge		
Finding information What are the issues affecting our local waterways?	6. Ecosystems 7. Human impact 8. Scientific investigation	Deepening understanding by <ul style="list-style-type: none"> • Investigating the ecosystems in the Porirua Harbour and Catchment and the impact humans have had on the food chains within these. • Conducting scientific research into the impact of their chosen issue on these

Planning for action		
Exploring values and perspectives Why do people want different outcomes? Considering responses and decisions What is the right decision?	9. Rural & Urban Catchments 10. The future	Developing critical thinking by <ul style="list-style-type: none"> Analysing different responses and decisions made regarding the Porirua Harbour and Catchment. Evaluating the consequences of changes to rules concerning this resource. Considering ways to ensure people have sustainable access to this resource now and in the future.
So what, now what		
Social action How can we bring about change?	11. Student directed social action 12. Presentation of action	Deepening sense of kaitiakitanga by <ul style="list-style-type: none"> Positively impacting the Porirua Harbour and Catchment with social action.

Establishing what we know

Activity 1: Simple food chain

In an ecosystem, plants and animals all rely on each other to live. Scientists sometimes describe this interdependence using a food chain.

Explore with the class the topic of food chains.

- Discuss what a food chain is and why it is important.
- Talk about the different foods people eat and compare these with what other animals eat.
- As they come up with ideas, record them on the board under the categories herbivore, omnivore and carnivore. Can they think of other categories? (I.e. producers, decomposers)
- Ask if they know what things a plant needs to grow. Have they ever had plants at home or in the garden die? What did they need that they weren't getting? What happened to those plants when they died?

Working in groups, ask students to create a simple food chain starting with sunlight and using a plant, a herbivore and a carnivore that might be found within the Porirua Harbour and Catchment. Ask groups to predict what would happen if a plant or animal was taken out of the chain.

Diagnostic:

If you feel that your class has a strong understanding of how human decisions can affect food chains and ecosystems of the Porirua Harbour, you may choose to go straight to the selecting a context section. Otherwise, continue with this section.

Activity 2: Food chains in-depth

- Watch the Living Waters Documentary: September: Creatures Great and Small (10 min)
- Draw a simple food chain on the board using the organisms found in the documentary. For example: stream plants, small fish, larger fish and birds.
- Ask students what might happen if a particular plant or animal, or even a whole group was removed from the food chain; repeat this for each group.
- Discuss the possible reasons why an organism may disappear from, or appear in greater numbers in, the food chain of a particular ecosystem.
- Some teachers may like to explore the Chinese Great Sparrow campaign of 1957 as an example of human impact on a food chain.

- Online games to reinforce learning about food chains:
<http://www.sheppardsoftware.com/content/animals/kidscorner/games/foodchaingame.htm>
http://www.ecokids.ca/pub/eco_info/topics/frogs/chain_reaction/play_chainreaction.cfm

Experiencing the Porirua Harbour & Catchment

Activity 3: Preparing for the fieldtrip

Explain to the class that they are going to investigate the plants and animals found in the Pauatahanui Inlet arm of the Porirua Harbour. Use the following two resources to create learning activities for your students that helps them build prior knowledge in preparation for their trip.

- *At the Beach* by Ned Barraud & Gillian Candler. Refer to the pages about mudflats to guide student's learning about the plants and animals that they could expect to find in the Pauatahanui Inlet.
- This title in the *Building Science Concepts* series is about the intertidal zone and contains activities to extend this aspect of the topic: <http://scienceonline.tki.org.nz/What-do-my-students-need-to-learn/Building-Science-Concepts/Titles-and-concept-overviews/Tidal-Communities>

Activity 4: Investigating plants and animals in Pauatahanui Inlet

The focus of this fieldtrip is to explore the natural ecosystem of the Inlet. The intertidal zone is easily accessed by students, and provides an excellent opportunity to learn about interdependence of living things, and the amazing diversity of life within the harbour ecosystem.

The easiest place to access the Inlet with students is the car park at Motukaraka Point. There are public toilets here as well as an information board. At the road end a boardwalk starts which has excellent interpretation boards that could be used as the basis of small group learning activities for your students.

To plan your field trip visit the Guardians of Pauatahanui Inlet website for suggested activities on site: <http://www.gopi.org.nz/let-s-visit-the-inlet/>

As with all field trips we strongly urge teachers to visit the site prior to taking students there. The Ministry of Education has excellent guides for safe outdoor experiences: <http://eotc.tki.org.nz/EOTC-home/EOTC-Guidelines>

Activity 5: Fieldtrip reflections

Back in the classroom encourage students to reflect on their experience. What did they see, hear, learn, enjoy? What questions do they have? This reflection could be part of a creative writing activity.

Following the reflection, explain to students that they are now going to look closer at the ways human activity has impacted on the natural ecology of the harbour and catchment. Begin by brainstorming all of the examples they can remember seeing where human activity might have had a negative impact e.g. stormwater drains, roads and buildings, farms, litter. Group these activities and write them at the top of large sheets of paper, leaving room for students to write below.

Spread these sheets around the room and ask students to move from sheet to sheet writing:

- What they noticed about this impact while on the field trip,
- The impact they think this would have on the local ecosystem, including the plants and animals they saw on the field trip.

Ask students to rank impacts using a ranking ladder from least serious to most serious. For example: Most serious – erosion, stormwater drains, litter, built structures – least serious.

Discuss why students think certain impacts are more serious than others. Which issues can be easily addressed? Which impacts cause the greatest harm? Who is responsible for addressing these impacts?

Building on knowledge

Activity 6: The ecosystems of Porirua Harbour and Catchment

Display a large map of the Porirua Harbour and Catchment, or as a class create one as a mural. Identify where the school is located, any nearby streams the students will be familiar with, and where the field trip took place. Discuss and locate the different habitats for example fresh water streams, intertidal zone, deep sea, swamp.

- Discuss with the students how streams flow into the harbour and; therefore, how the health of the harbour is affected by the health of the streams.
- In small groups, ask the students to draw pictures of each of the living things they can think of in the Porirua Harbour and Catchment. Encourage them to think of both plants and animals. They can then stick their pictures on to the map in the area they think that organism lives in relation to the habitats located earlier. (Note: use blutac or post-it notes as students will get the opportunity to move these later on as they refine their knowledge.)

Activity 7: Human impact on the food chain of the Porirua Harbour and Catchment.

- Revisit the food chain activity from the start of the topic. Build on knowledge gained so far to add layers of complexity to create a food web of plants and animals of Porirua Harbour and catchment, or just the Pauatahanui Inlet. Discuss the impacts seen and learnt about. Can they be introduced to the web? What are the impacts on living things?
- Watch the *Living Waters* episode: *Urban Catchment* 3:08-5:40. Ask students to note down changes to streams and

rivers in the Porirua and Harbour Catchment that have been caused by human activity. Ask students to predict what might happen to the food chains because of these changes.

- Hand out this booklet on whitebait to groups of students. Ask them to categorise human decisions or actions into positive or negative regarding the survival of whitebait. Students may wish to draw up a T chart to help them organise their ideas.
- Ask students to draw a picture of humans and add them to the food web. Discuss how humans change the food chain and what impact these changes would have for other species.

Activity 8: Scientific research investigation

Discuss with the class that they are going to investigate some of the different ways humans have impacted on the local ecosystem and food webs. Use the four stage research process suggested in Science Online to investigate the issues discussed in Activity 5 either as a whole class or in groups.

Stage 1: Focusing and planning. Questions relevant to the direction of the research are generated.

Stage 2: Sourcing information. Appropriate resources must be found. Using a range of different sources of information helps ensure the ideas are those commonly accepted.

Stage 3: Analysis. The information needs to be organised and then analysed to ensure that valid conclusions can be drawn.

Stage 4: Reporting. Finally the research must be reported. This can be done in various ways – for example a demonstration, a poster, a video or a report.

<http://scienceonline.tki.org.nz/Teaching-science/Teaching-Strategies/Types-of-investigation>

For example: if the class is looking at the impact of stormwater drains, water pollution may be identified as a problem. Questions might include where does stormwater come from? How can it be managed to minimise impact on the plants and animals? Where are the stormwater outlets? Are some worse than others? Why is that? Information sources could be council websites and staff, the library.

Planning for action

Activity 9: Rural & Urban Catchments

Watch the Living Waters Documentary: Rural Catchment from 5:26-9 minutes. View this section once then ask the students to answer the following questions while they watch the section again:

1. What organisms make up the ecosystem in the section of stream that is on Sam and Andre's property?
2. What changes have Sam and Andre made to their part of the stream?
3. How do these changes protect the ecosystem of the stream?
4. What impact would these changes have on the harbour where the stream comes out?
5. Why did Sam and Andre choose to make these changes?

Watch the Living Waters episode: Urban Catchment from 5:40-8:15. Watch this section once then ask the students to answer the following questions while they watch the section again.

1. What changes have Liam and Calvin made to their part of the stream?
2. How do these changes protect the eels in the stream?
3. How do these changes protect the ecosystem of the stream?
4. What impact would these changes have on the harbour where the stream comes out?
5. Why do Liam, Calvin, Mike and Joy think it's not okay to catch eels?

As a class, choose one of the two case studies above and brainstorm any stakeholders (people or groups with an interest or concern in an issue) who may be affected by these children's actions.

Sam and Andre's family (stakeholder)	Long term	Short term
Positives	<ul style="list-style-type: none"> • Have a nice place to swim and have picnics. • When the trees grow they will keep the bank from falling into the stream. 	Feel good about themselves
Negatives	<ul style="list-style-type: none"> • Have to maintain the trees. • Have to redo the swimming hole when there are floods. 	Takes a bit of time to build.

In groups, hand out A3 sheets of paper with a grid showing the long- and short-term positives and negatives for each of the stakeholders. Each group gets a different stakeholder to put in the top left corner. Allow four minutes for each group to fill out their sheet, then move the groups around so they have a different sheet. Give them two minutes to read what the previous group wrote then four minutes to add some more ideas of their own. Repeat until each group has seen each paper.

For example:

As a class, discuss how the positives and negatives differ between the stakeholders. How does this reflect the values of each group? How do these differing values and perspectives impact on decision making?

Considering responses and decisions

Activity 10: The future

Watch the Living Waters Documentary: The Future up to 6:10.

- Discuss what changes Carras Limited made and why they made them.
- Ask students to predict how these changes will help the health of the harbour.

Optional activity: In groups, have students complete the online game *Up the Creek*.

As a class decide on a problem that is affecting the ecology of the harbour and catchment. Use the POOChI model below to find a way to address this problem, and to ensure the ongoing sustainability of the food chains within the harbour.

1. Identify the Problem. This is informed by your scientific investigations and trip to the Inlet.
2. Generate Options to solve the problem. Encourage students to come up with a range of solutions that they will be able to carry out.
3. Predict Outcomes for each option, analysing both short- and long-term positive and negative outcomes.
4. Choose the best option
5. I – Ask students to consider: How am I affected by this?

Students can then repeat this activity for another issue but this time in groups. Once they have found a problem, they use the POOChI model to generate the best solution. Encourage the students to consider the outcomes for other people before they choose their solution.

So what, now what?

Activity 11: Student directed social action

Students can now try to implement their solution. Encourage students to come up with their own social action. Some ideas to help get them thinking include:

- Clean up an area of the stream
- Inform nearby businesses or homeowners how they can help the health of the stream
- Fence off stream banks
- Plant stream banks
- Build a fish ladder for grade control structures

Use the TKI action planner to help students plan and implement their action project.

Activity 12: Reflection, presentation & celebration

Ask students to discuss in pairs and then feedback to the class: what does this mean to me?

Have student's feedback findings from their social action:

- Invite guests to see presentations
- Slide show at assembly

Theme one: Ecosystems

Level 5 Science



*Living
Waters*

TIAKINA NGĀ TAONGA - PROTECT THE TREASURES

Theme one: Ecosystems

Level 5 Science

Achievement Objectives:

- Investigate the interdependence of living things (including humans) in an ecosystem.
- Develop an understanding of social scientific issues by gathering relevant scientific information in order to draw evidence-based conclusions and to take action where appropriate.

Conceptual understandings:

- The living organisms in Porirua Harbour and Catchment are inter-dependent on each other and are affected by environmental changes.
- Scientific investigations into biodiversity can indicate the health of an ecosystem and inform decision-making.

Learning framework

Links to social inquiry approach	Activities	What to look for
Establishing what we know		
How can environmental change impact on biodiversity?	1. Biodiversity	Building conceptual understandings Look for students understanding of: <ul style="list-style-type: none"> • The various organisms that make up an ecosystem. • How environmental changes can affect the balance within that ecosystem.
Selecting a context		
What do we already know about the plants, animals and habitats within the harbour and catchment?	2. KWL chart -Ecosystems within the Porirua Harbour and Catchment	This section is designed to ensure students have a good understanding of the ecosystems of the Porirua Harbour and Catchment before they select one particular area to focus their own scientific investigations on.
Building on knowledge		
Finding information	3. Consequence Wheel and discussion 4. The impact of research on decision making	This section is designed to ensure students have a good understanding of ecosystems within Porirua Harbour and Catchment prior to starting their own scientific investigations.

Experiencing the Harbour		
What lives in the harbour?	5. Student scientific investigation a. Fieldtrip, or b. Living Waters Documentaries 6. Sharing findings	<p>Developing critical thinking</p> <p>By encouraging students to think about the different values and perspectives people have, and the impact these have on decision making.</p> <p>Analysing different responses and decisions made regarding the Porirua Harbour and Catchment. Evaluating consequences of changes to rules concerning this resource and considering ways to ensure people have sustainable access to this resource now and in the future.</p>
Planning for action		
Exploring values and perspectives Considering responses and decisions	7. Perspectives on decision making 8. Finding solutions	<p>This section encourages students to think about the different values and perspectives people have and the impact these have on decision-making</p> <p>In this section, students will analyze different responses and decisions that could be made to protect the biodiversity of the Porirua Harbour and Catchment. They will evaluate the consequences of any changes they have considered before selecting one option to plan a social action around.</p>
So what, now what		
What can I do to make a difference?	9. Student social action	This encourages the students to exercise their own kaitiakitanga around the harbour, putting what they have learnt into action.

Establishing what we know

Activity 1: Biodiversity

Explain to students that they are going to be looking at a local ecosystem within the Porirua Harbour and Catchment and consider how it has been affected by environmental change.

Write the word biodiversity on the board.

- Get students to write down all that they know about this term. Students can then share with the person next to them and add more to their brainstorm. Ask each pair to contribute to a class discussion.
- Repeat exercise for the term ecosystem.

Diagnostic

Ensure students have a good understanding of the ecosystems of the Porirua Harbour and Catchment before they select one particular area to focus their own scientific investigations on.

Selecting a context

Activity 2: Ecosystems within the Porirua Harbour & Catchment

Explain to the class that they are going to look at the diversity of ecosystems within of the Porirua Harbour and Catchment. Have students complete a **KWL chart** in pairs (what I already know, what I want to know, what I learnt), considering:

1. What organisms exist in the Porirua Harbour and Catchment?
2. Where do they live and what makes them suited to that place?
3. What is interdependence?
4. How have environmental factors affected the ecosystem of the harbour and catchment?
5. What kind of scientific investigations are undertaken to indicate the health of the harbour and catchment?
6. How does this influence decisions made?

As a class, watch the Living Waters episode: Pauatahanui Reserve. Ask students to continue to fill in the W part of their KWL chart

Watch the *Living Waters Episode: Sediment* and discuss:

- Why are estuaries important?
- What two types of sediment exist?
- Why is sedimentation described as a crisis for the inlet?
- What are the causes of sediment?
- What are the effects on seagrass and cockles?
- What are some solutions?

Put a large map of the Porirua Harbour and Catchment on the

wall/board. In groups ask students to select an area that they would like to investigate. For logistical purposes the teacher may need to select the area that the class is going to look at.

Building on knowledge

Activity 3: The importance of scientific research

Watch the *Living Waters Episode: Month*. In this episode, Professor John Wells, a member of the group Guardians of the Pauatahanui Inlet, talks about the first cockle count in the 1970s in comparison with today's cockle count.

- Discuss what the cockle count shows us about the health of the ecosystem.
- Using the information that has been gathered, as a class fill out a **consequence wheel** demonstrating the interdependence of organisms within their area of the harbour.

In pairs get students to use **rally drive** technique to discuss the following questions.

1. Why is scientific research important?
2. In what way could this inform decision-making?
3. Does it really matter and who listens?
4. Ask a member of each pair to report back to their findings back to the class.

Activity 4: The impact of research on decision making

In groups, students read this monitoring report from Greater Wellington

- <http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Porirua-Harbour-low-res.pdf>

then use a fish bone diagram to record notes on the following:

1. What was the research investigating and when was it carried out?
2. What were the key findings?
3. How does the research inform us of the health of the harbour?
4. What decision-making has been made already and what can also be done to ensure the health of the harbour?
5. What did the research tell us about the effect of environmental change on their particular ecosystem?

Suggestions for other research for extension

Current work is under way with Ngati Toa, NIWA and the Greater Wellington in the Porirua Harbour Iwi Project. This should be coming up on the Ngati Toa website soon.

Drs Leigh Stevens and Barry Robertson of Wriggle Coastal Consultants do the regular sediment and habitat surveys for Greater

Wellington with Juliet Milne:

<http://www.gw.govt.nz/assets/council-publications/Porirua%20Harbour%20Intertidal%20Sediment%20Monitoring%202010-11.pdf>

Reports are also available on the PCC harbour management programme webpage as part of the list of harbour reports at the end of the page:

<http://www.pcc.govt.nz/Publications/Porirua-Harbour-and-Catchment-Management-Programme>

Jointly-funded work (PCC, WCC, GW) by Paul Blaschke et al on 'Ecorestoration Priorities for the Porirua Stream Catchment', 2009:

<http://www.gw.govt.nz/assets/council-publications/Eco%20rest%20%20for%20web.pdf>

Experiencing the Harbour

Activity 5: Student scientific investigation

The focus of this field trip is to explore the natural ecosystem of the Inlet. The intertidal zone is easily accessed by students, and provides an excellent opportunity to learn about interdependence of living things, and the amazing diversity of life within the harbour ecosystem.

The easiest place to access the Inlet with students is the car park at Motukaraka Point. There are public toilets here as well as an information board. At the road end a boardwalk starts which has excellent interpretation boards that could be used as the basis of small group learning activities for your students.

The Marine Metre Squared programme is a national citizen science project that monitors and records the health of marine ecosystems across New Zealand. Teachers could use this field trip as an opportunity to start their school's participation in this project, and it's a great way to teach students science skills:

<https://www.mm2.net.nz/home>

To help plan your field trip visit the Guardians of Pauatahanui Inlet website for suggested activities on site: <http://www.gopi.org.nz/let-s-visit-the-inlet/>

As with all field trips we strongly urge teachers to visit the site prior to taking students there. The Ministry of Education has excellent guides for safe outdoor experiences: <http://eotc.tki.org.nz/EOTC-home/EOTC-Guidelines>

If a field trip is not possible, students can gather the information they need by watching the films from the Living Waters documentary series (see below).

- Recreation: A good look at the various perspectives held by different members of the community regarding the harbour.
- Pollution: Here we see the effects of storm water and sedimentation on the Harbour. Juliet Milne Environmental Science

GWRC discusses the role of storm water in catchment. We are also introduced to scientists Leigh Stevens and Barry Robertson – Wriggle Coastal Services as they complete their annual broadscale mapping scientific investigation of the Harbour.

- Tides: This looks at the role of the estuary as a rich feeding ground for animals. Crabs, Mud Snails, Oyster Catchers, Pied Stilts, Marine Worms, Sea Squirt, White faced Heron etc.
- Rural catchment: This episode looks at the effects of deforestation, erosion, sedimentation on the harbour and catchment.

Activity 6: Sharing findings

Once students have completed their own scientific investigations, come together as a class and discuss observations and findings. Possible questions for discussion include:

1. What did you discover about the biodiversity in your particular area?
2. Were there any patterns or surprises?
3. What are examples of changes in biodiversity? How did you know these changes had occurred?
4. How might these changes have affected interdependence?
5. How do we find out the extent of the effect of environmental changes, such as pollution, on biodiversity?

Planning for action

Activity 7: Perspectives on decision making

Explain to students that not all solutions are clear-cut, as decision makers have to take into consideration many different values and perspectives.

Using the Porirua Harbour and Catchment Strategy and Action Plan:

<http://www.pcc.govt.nz/DownloadFile/Publications/Harbour-Management/Porirua-Harbour-and-Catchment-Strategy-and-Action-Plan-March-2012>

select an issue affecting the ecosystem: i.e: increase in sedimentation. In small groups, brainstorm possible solutions that decision makers could make in response to the findings. For the example given previously, a possible solution could be dredging.

In groups, construct a T chart, looking at both the positive and negative aspects of the issue. Who might be for the solution and who might be against it? Why? Debate the issues as a class.

Activity 8: Finding solutions

Remind students that as members of the Porirua community they can help bring about change.

Using examples from the previous section, choose a problem to use as a class model. Use the POOChI model to help the class decide on the best way to solve the problem:

1. Identify the **Problem**: This is informed by findings from scientific investigations. e.g. high zinc levels in the harbour.
2. Generate **Options**. Encourage students to come up with a range of solutions that they will be able to carry out.
3. Predict **Outcomes** for each option – analyzing both short- and long-term positive and negative outcomes.
4. **Choose** the best option.
5. **Consider** what does this mean to me?

Students can then use the POOChI model to generate the best solution for a problem they identified when carrying out their own scientific investigations and/or from other research. Encourage the students to consider the outcomes for various groups before they choose their solution.

So what, now what?

Activity 9: Student social action

Use the following template for planning action: <http://efs.tki.org.nz/Curriculum-resources-and-tools/Action-Planner>

Plan the action.

- Consider what exactly needs to be done to achieve the vision. This could include several smaller projects within the larger project that either the whole class is involved with or small groups within the class.
- Check that the action addresses the issue.
- Consider the skills required to carry-out the action and identify where more information can be found.
- Consider how people will think and feel about the planned action and how you will find this out.
- Make some decisions. What could influence the decision on what to do? List the options and criteria in a decision-making matrix to choose the action. Criteria should include:
 - ensuring the action addresses the issue
 - resources required
 - time and learning
- Add your own criteria as required.
- Carry out the action.
- Reflect on Change. Some questions may include:
 1. How can we make people more aware of the issue and our action(s)?
 2. Did our actions meet our vision?
 3. Did our actions impact on the issue we identified?
 4. What do we need to do next?

Students will now choose the best way of implementing their solution. Some ideas are:

- Create a petition
- Write letters to the government
- Create an awareness campaign in the community
- Clean up an area of the harbour or catchment
- Create a plan or model
- Contribute to the scientific studies. (eg, nature watch – details below)

Students set up own project to monitor the health of the harbour. Use the monitoring database <http://naturewatch.org.nz/projects/ecological-restoration> to record the survival, arrival, regeneration, growth and behaviour of species in the Porirua Harbour and catchment.

Appendix: Helpful links and resources to support student learning about estuaries

<http://www.teara.govt.nz/en/estuaries/page-1>

<http://www.gopi.org.nz/natural-history/>

'At the Beach – explore and discover the New Zealand sea shore'
Ned Barraud and Gillian Candler, 2012

Theme two: Porirua Harbour as a Taonga

Level 3 & 4 Social Science



*Living
Waters*

TIAKINA NGĀ TAONGA - PROTECT THE TREASURES

Theme two:

Porirua Harbour as a Taonga

Level 3 & 4 Social Science

Achievement Objectives:

- Explore how people view and use places differently.
- Understand how cultural practices vary but reflect similar purposes.

Conceptual Objectives:

- The cultural values held by Ngati Toa shape their perspective of Porirua Harbour.
- People's ideas about kaitiakitanga of Porirua Harbour can vary. (Kaitiakitanga means guardianship and protection. It is a way of managing the environment, based on the Māori world view.)

Learning framework

Links to social inquiry approach	Activities	What to look for
Establishing what we know		
Is Porirua Harbour something we use OR something we look after?	1. Valuing our harbour	Building conceptual understandings by <ul style="list-style-type: none"> • Considering different practices that have the purpose of caring for oceans or rivers. • Exploring ways of applying these practices to waterways in their community.
Experiencing the Harbour		
How do different people value the harbour? What is the environmental impact of our activities on the Harbour?	2. Visit to Takapuwhia 3. Using our harbour	Gaining first-hand knowledge by <ul style="list-style-type: none"> • Experiencing the harbour and the people who have close cultural ties • Observing human activity and identifying ways this may impact on the health of the Harbour
Building on knowledge		
Finding information What can we learn about caring for the environment from other groups?	4. Exploring stories 5. Exploring values and action	Deepening understanding by <ul style="list-style-type: none"> • Exploring perspectives from various cultures about the sea, Porirua harbour, and marine resource management. • Considering how the actions of one group's treatment of the environment can have adverse flow on effects for another

Planning for action		
Exploring values and perspectives Different groups, similar environmental practices. Why? Considering responses and decisions What's the benefit?	6. Creating our own legends	Developing critical thinking by • Analysing different responses and decisions made by different individuals and groups to achieve a desired outcome.
So what, now what		
Social action What is possible? What is important to me?	7. We are kaitiaki	Deepening sense of kaitiakitanga by • Reflecting on learning, exploring options and then taking action to help improve the health of the harbour.

Establishing what we know

Activity 1: Valuing our Harbour

Discuss with the class how people from their own cultural background look after rivers, streams and oceans.

- Begin by asking them how their families use the Porirua Harbour and Catchment: Do they get fish or shellfish from it? Do they collect watercress or other plants? Do they use it for recreation? If so, in what way? In what other ways is it special to your family?
- Discuss what they do to look after the waterways that they live near: Do they pick up rubbish out of the gutter? Wash their car on the grass? Other examples can be found at cleanwaterways.org.nz

Discuss and clarify the meaning of the following opinions with the class. Do students agree or disagree with these opinions?

- The Porirua Harbour is a Waahi tapu (a sacred place)
- The Porirua Harbour is our food larder
- People have mana moana (authority over the sea). If so, who?
- The Porirua Harbour is a place to have fun,
- People have a kaitiakitanga (guardianship) role over the Porirua Harbour. If so, who?
- Add any other opinions your students have thought of regarding the harbour in your class discussions.

Watch “January: Recreation” and “December: The Future” from the *Living Waters* documentaries. Draw a start chart which shows how people use or enjoy the harbour. Ask students to note down what issues are starting to appear that may prevent people from enjoying the harbour.

Continuum exercise

Make a continuum on the wall with “Porirua Harbour is something for us to use” on one end and “Porirua Harbour is

something we need to look after” on the other. Using post it notes, ask the students to write their name and one of these opinions on the post it note, and place it where they think it fits on the continuum. Using post it notes means the students can move their note if they change their mind during the unit. They could also write the names of people who featured in the two documentaries on post-it notes and put them where they think they would place themselves on the continuum.

Experiencing the Harbour

Activity 2: Visit to Takapuwahia

Takapuwahia Marae is located next to the Onepoto Arm of the Porirua Harbour and is the oldest remaining settlement in Porirua. It's people, Ngati Toa Rangatira welcome schools in the catchment to visit the wharenui, to learn about their ancestors and how life at the pa has been strongly shaped by its close proximity to the harbour. Students will be welcomed onto the marae and be hosted by kaumatua who will spend the day telling stories to and answering questions from students and teachers. This is a rich way to develop understanding of the concepts explored throughout this theme such as kaitiakitanga, taonga, mana moana and waahi tapu. Students will also have the opportunity to demonstrate their own sense of kaitiakitanga by conducting a clean-up of the foreshore near the marae. Keep Porirua Beautiful will happily help to coordinate this activity.

To arrange a visit to Takapuwahia please contact the Takapuwahia Marae Bookings Officer. The details (including email) for the booking officer are found on webpage (scroll down the list of the marae committee until you find an email for bookings) <http://www.ngatitoea.iwi.nz/ngati-toa/marae/>

To arrange a clean-up of the foreshore near the marae contact keep Porirua Beautiful who are supported by Porirua City Council

Website: <http://www.pcc.govt.nz/About-Porirua/Our-City/Keeping-Porirua-Beautiful>

Phone: 021 352 288
Email: kpbpeople@gmail.com

Activity 3: Using our Harbour

On return to class, build on the discussion from Activity 1 to consider other ways students have utilised the harbour, or have seen others utilise the harbour. Ask student to discuss with their families how they use or enjoy the harbour, draw a picture or take a photo of this activity and report back to the class.

Watch “January: Recreation” and “February: Fishing” from the *Living Waters* documentaries and note down how people use or enjoy the harbour.

In small groups, hand out the pictures of the different activities people do related to the harbour. Make sure that each group member has the picture they have drawn or taken of their family. Ask the groups to discuss what problems may prevent people from enjoying this activity now or in the future, and note these down as shown in the example below:

Use	Problem	Consequence
Fishing	Fewer fish Pollution	Less food Unsafe fish
Swimming	Pollution	Unsafe to swim there
Walking	Bad smell	Avoid going there
Sailing	Sedimentation	Limited access around harbour, strandings

Ask groups to share back the potential problems they have identified and choose one they would like to focus on as a class. Once this problem is identified, discuss with students what solution they would like to see happen, and focus on this as a positive outcome. For example, if the problem they identify is the bad smell that occurs occasionally near the harbour, the result they desire may be “The harbour will smell nice”.

Have students record their problem and desired outcome. They will use it next in the So what, now what? section.

Building on knowledge

Activity 4: Exploring stories

Gather together some traditional stories and legends about people’s relationships with the sea, either from Aotearoa or elsewhere in the Pacific. Read these with the class and discuss what impact these stories have on how people view the sea.

Watch ‘April: Pollution’ from the *Living Waters* Documentary series. How does Taku Parai describe the harbour when Ngati Toa first came into the area? How did the building of the Porirua Asylum change all this? Imagine being a child when these things happened. How would it make you feel about the sea and sea

life? What would be important for you to tell your own kids? What would you think would be the most important thing to do to protect the harbour? Write a diary entry explaining your thoughts and feelings on the changes to the harbour which was once a provider of life for your people.

Invite people from different cultures to come and talk to the class to find out what they think is important in looking after the harbour and catchment. You may have some family or staff members from your school community who you can contact, or contact the Porirua City Council Harbour Coordinator for some suggestions.

Activity 5: Exploring values and action

Revisit the continuum exercise from Activity 1. Start by brainstorming all the different individuals and groups that the class has met, watched or heard about as part of the study so far. Write the name of each person or group on a Post-It note and if possible hand them out so each student has one note.

On the whiteboard draw a long line, at each end write opposite statements that examine aspects of people’s values and actions around the harbour. Students then place their note where they think that person or group should be. Discuss as a class as you go. Examples of statements could be “Responsible for caring for the harbour” and “No responsibility for the health of the harbour”; “Actions improve the harbour” and “Actions harm the harbour” and so on.

To finish reflect on what they have learnt about the way people value the harbour and the way their actions affect not only the health of the harbour, but the lives of people who use it for different reasons.

Planning for action

Activity 5: Creating our own legends

Ask students to think back to the problem they are trying to resolve and their desired result. Revisit their list of individuals and groups and consider actions each of these could take to achieve their desired result.

Ask students to write (and illustrate) their own contemporary legend about the Porirua Harbour. The story should focus on why their characters are trying to solve the problem they identified and how they achieved their desired outcome.

The stories could be read to junior classes by the students, published online or even in the local newspaper.

So what, now what?

Activity 6: We are kaitiaki

Take some time to reflect on what the students have learnt and experienced throughout the unit. Ask them to consider what they knew about kaitiakitanga at the start, and what it means to them

now. They can discuss this as a group using a talking stick to ensure that everyone has a turn and is listened to. The reflection process should use a lot of probing questions from the teacher help the students connect what they learnt to how they feel about the harbour. For example “how did you feel when you learnt that...”, “Who do you remember the most and what did you think of their actions?’

Use the Action Planning Template below to work with the students to identify an issue that they would like to address and a process for taking action. This is from the Education for Sustainability section of the TKI website. Refer to the Porirua Harbour and Catchment Action Plan for ideas for issues to address (i.e. sedimentation, pollution and ecological restoration) and possible actions to address them. <http://www.pcc.govt.nz/DownloadFile/Publications/Harbour-Management/Porirua-Harbour-and-Catchment-Strategy-and-Action-Plan-March-2012>

Or contact the Porirua Harbour Strategy Coordinator at the council.

Use this template for [planning action: \(http://efs.tki.org.nz/Curriculum-resources-and-tools/Action-Planner\)](http://efs.tki.org.nz/Curriculum-resources-and-tools/Action-Planner)

1. Identify an issue with students
2. Look at the overall vision with students; i.e. what is it that we want to achieve?
3. Plan the action: Consider what exactly needs to be done to achieve the vision. This could include several smaller projects within the larger project that either the whole class is involved with, or small groups within the class facilitate.
4. Check that the action addresses the issue.
5. Consider the skills required to carry-out the action and where more information can be found.
6. Consider how people will think and feel about the planned action and how you will find this out.
7. Make some decisions: what could influence the decision on what to do? List the options and criteria in a decision making matrix to choose the action.

Criteria should include:

- ensuring the action addresses the issue
 - resources required
 - time and learning
 - (add your own criteria as required)
8. Carry out the action.
 9. Reflect on change. Some questions may include:
 - How can we make people more aware of the issue and our action(s)?
 - Did our actions meet our vision?
 - Did our actions impact on the issue we identified?
 - What do we need to do next?

Theme two: Porirua Harbour as a Taonga

Level 5 Social Science



*Living
Waters*

TIAKINA NGĀ TAONGA - PROTECT THE TREASURES

Theme two:

Porirua Harbour as a Taonga

Level 5 Social Science

Achievement Objectives:

- Understand how cultural interaction impacts on cultures and societies
- Explain how people's management of resources impacts on environmental and social sustainability.

Conceptual Objectives:

- Understanding of how the kaitiakitanga of Ngati Toa has influenced decision making.
- People's decisions have an impact on the Porirua Harbour and its surroundings.

Learning framework

Links to social inquiry approach	Activities	What to look for
Establishing what we know		
Focus of learning topic What makes a place taonga?	1. Taonga Aotearoa	Building conceptual understandings of <ul style="list-style-type: none"> • The concept of 'taonga' and the application of this to students own experience.
Experiencing the Harbour		
Finding information What's so special about the harbour?	2. Field trip to Takupawahia and Onepoto arm of the harbour	Developing a sense of connection through <ul style="list-style-type: none"> • Familiarizing students with Ngati Toa's view of the Porirua Harbour and Catchment, now and in the past. • Encouraging students to start shaping their own reasons for viewing the area as taonga.
Building on knowledge		
Putting it into context How have human decisions impacted on the harbour? Who is responsible for protecting the harbour?	3. The Porirua Harbour and Catchment as taonga 4. Consequence Wheel 5. What is kaitiakitanga?	Deepening understanding of How decisions people have made in the past have directly impacted the Porirua Harbour and Catchment and are still felt today. Developing critical thinking by Encouraging students to think of the reasons behind - and the consequences of - the decisions that were made.

Planning for action		
Exploring values and perspectives Who will be happy about council environmental reforms	6. Perspectives on strategies	Developing a critical thinking by <ul style="list-style-type: none"> Analysing different strategies that have been put in place to protect the biodiversity of the Porirua Harbour and Catchment. Considering the consequence of these actions.
So what, now what		
Considering responses and decisions What changes would you like to see? Social action How can I make a difference? Did I make a difference?	7. We are kaitiaki	Developing a sense of kaitiakitanga <ul style="list-style-type: none"> Thinking about how students can exercise kaitiakitanga over the Porirua Harbour and Catchment themselves. Using initiative in exercising kaitiakitanga over an area within the Porirua Harbour and Catchment.

Establishing what we know

Diagnostic

If you feel that your class has a strong understanding of taonga, you may choose to go straight to the selecting a context section. Otherwise, continue with this section.

Activity 1: Taonga Aotearoa

Ask students to think about a place that they feel linked to and have a strong connection with. Lay out a blue piece of fabric (Pacific Ocean) with a map of New Zealand in the centre. Around it place many taonga (treasures, precious objects) related to New Zealand eg shells, driftwood, rocks, plants (leaves, bark, fruit, fungi etc), animals (birds, insects, reptiles, mammals), or ask students to bring something from home. Invite students to choose one taonga and then stand in a circle around the map. Students introduce themselves by sharing their taonga and place it on Aotearoa at a place that is important to them or where they come from. Students can go further afield (outside of New Zealand) if they would like to.

- As a class, discuss what human choices could be made to improve their special place or, by contrast, impact on it negatively? What state is it in? Who has cared for this place or been responsible for it? Think about both now and in the past. Who might in the future?

Experiencing the harbour

Activity 2: Visit to Takapuwahia

Takapuwahia Marae is located next to the Onepoto Arm of the Porirua Harbour and is the oldest remaining settlement in Porirua. It's people, Ngati Toa Rangatira welcome schools in the catchment to visit the wharenui, to learn about their ancestors and how life at the pa has been so strongly shaped by its close proximity to the harbour. Students will be welcomed onto the

marae and be hosted by kaumatua who will spend the day telling stories to and answering questions from students and teachers. This is a rich way to develop understanding of the concepts explored throughout this theme such as kaitiakitanga, taonga, mana moana and waahi tapu. Students will also have the opportunity to demonstrate their own sense of kaitiakitanga by conducting a clean-up of the foreshore near the marae. Keep Porirua Beautiful will happily help to coordinate this activity.

To arrange a visit to Takapuwahia please contact the Takapuwahia Marae Bookings Officer. The details (including email) for the booking officer are found on webpage (scroll down the list of the marae committee until you find an email for bookings) <http://www.ngatitoa.iwi.nz/ngati-toa/marae/>

To arrange a clean-up of the foreshore near the marae contact keep Porirua Beautiful who are supported by Porirua City Council

Website: <http://www.pcc.govt.nz/About-Porirua/Our-City/Keeping-Porirua-Beautiful>

Phone: 021 352 288

Email: kpbpeople@gmail.com

Building on knowledge

Activity 3: Porirua Harbour and Catchment as a taonga

As a class discuss the concept of Porirua Harbour and Catchment as taonga.

- Draw a star chart and write down the different groups that would value the Porirua Harbour as taonga and list the reasons why.
- Watch the *Living Waters Documentary: April Pollution*.
 - Why did Ngati Toa choose to settle in Porirua?
 - How have the decisions of the past affected the Porirua Harbour and Catchment?

- Watch the *Living Waters* episode: *January: Recreation*. Note down on the star chart any other groups shown in the film that value the harbour and why.
 - o How does Tipene Kenny describe being on the water?
 - o What does he mean when he says the harbour is more than a landscape?
 - o What impacts can we see on the harbour from human decisions?
- Discuss as a class how people's decisions can affect the harbour and the community. E.g. how pollution and litter in the harbour affects waka ama groups.

Activity 4: Consequence wheel

Useful references for this activity include the *Living Waters* Documentaries (see suggestions below), the Porirua District plan and [The Porirua Harbour and catchment strategy](#).

As a class pick one decision that has been made in the past and fill out a [consequence wheel](#). Some examples of decisions for discussion include: Stormwater drains into the harbour, straightening the Porirua Stream, development of industry by the stream, pollution from the Porirua Hospital, reclamation of the harbour.

Ask students to write the decision in the centre wheel. As a class discuss how the different choices have affected the Porirua Harbour and its surroundings. Record answers in the next ring out. Encourage students to include plant and animal life in their consequence wheel to see how change in their habitat affects them.

Once this activity has been modelled, have students complete their own consequence wheel in groups. Allocate each group a different decision that has been made at some time in the past. Ask students to analyse how this decision has impacted the Porirua Harbour and its surroundings. Encourage students to look at a range of perspectives, why these decisions were made and who they are continuing to effect.

Display the consequence wheels on the wall and discuss as a class. Ask the class to consider the impact different decisions would have had on local Iwi. How would it impact on their ability to gather food out of the harbour? How would they feel seeing their taonga being destroyed? Were they involved with decision-making?

Suggested *Living Waters* Documentaries:

November: Industrial Catchment: This looks at the reclamation of the harbour after the 1940s. The impact that had on local Maori who used to gather their kai from the harbour. How the reclaimed land and development on the river beds have affected freshwater fish. It also looks at the impacts of the industry on the streams.

April: Pollution: Taku Parai describes when Ngati Toa first came to Porirua Harbour, the harbour as a 'provider of life' and how it provided an abundance of food sources and fisheries. The harbour was also valued for its spiritual connotations and connections. Taku Parai explains the petition to the Crown in 1888 asking them to preserve the harbour which unfortunately didn't happen with

the Porirua Asylum being built in 1897.

August: Sediment: This episode looks at the importance of the inlet as a feeding ground for the young. The biggest crisis for the harbour is sediment. (Result of development).

February: Fishing: This episode looks at the impact of reclamation and the development that has had a big impact on fish life and discusses the issue of sediment.

December: The Future: This episode looks at the various parts of the community that use the harbour and their aspirations for the future. This film addresses what we can do to improve the situation such as developing ownership and belonging. It recognises the benefits that are so close to us.

Activity 5: What is Kaitiakitanga?

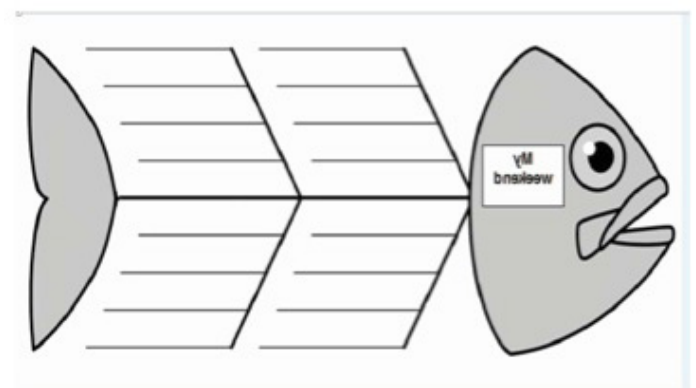
In small groups, students are to research the term kaitiakitanga.

How does this link into other closely related concepts such as tan-gata whenua, kaitiaki, customary practices and rahui. What are some challenges for the kaitiakitanga today and in the future?

Discuss with the students how understanding has grown about the importance of kaitiakitanga as decision makers have realized some choices in the past have been at the expense of environment and the people who depend on it. Kaitiakitanga has been legislated for in the Resource Management Act to ensure that we are respecting our taonga.

- Discuss how kaitiakitanga is defined in the 1991 Resource Management Act.

In the same groups, have students choose an area within the Porirua Harbour and Catchment that the Porirua City Council has demonstrated kaitiakitanga over. Analyse how the principles of kaitiakitanga are being followed and record your findings on a fishbone diagram. For more information about how to use [fishbone diagrams click here: http://ssol.tki.org.nz/Social-studies-Years-1-10/Teaching-and-learning/effective_teaching_in_social_studies/teaching_strategies/graphic_organisers/fishbone_diagram](http://ssol.tki.org.nz/Social-studies-Years-1-10/Teaching-and-learning/effective_teaching_in_social_studies/teaching_strategies/graphic_organisers/fishbone_diagram)



Examples of Porirua City Council Strategies:

- Landscape Management Strategy:

- Porirua Harbour Strategy:
- The Pauatahanui-Judgeford Structure Plan (2012): a framework for land development in the Judgeford basin. This involved runanga staff and Ngati Toa. Taonga including ancestral Pa and accessways throughout the area. The Council to incorporate this in a plan for a future walkway alongside the Pauatahanui Stream – the details of integrating this into the structure plan framework will be considered in the development of the Riparian Management Plan.
- The Heritage Management Strategy (2010): The role of the council is a formal structure that exercises kaitiakitanga. One of the achievements of the steering group was the physical protection of Te Pa o Kapo in Titahi Bay with bollards to prevent access by vehicles driven by the general public over the historic coastal pa site.

Community groups also display kaitiakitanga. Have the same groups of students investigate the different ways the principles of kaitiakitanga are being applied by community groups. Present findings to the class a star chart of power point presentation.

Examples of Community groups:

- PICT – Pauatahanui Inlet Community Trust
- PHT – Porirua Harbour and Catchment Community Trust
- PHIAG – Porirua Harbour Inter-agency Advisory Group (representing all of the contributors and signatories to the Strategy)
- Porirua Science Group
- The Porirua Harbour Environmental Education Group.
- GOPI – Guardians of Pauatahanui Inlet
- Porirua Harbour Iwi project: This a collaborative project between NIWA and Ngati Toa. NIWA is undertaking a body of research by working in collaboration with Ngati Toa. Drawing on oral histories NIWA are researching and documenting customary and ecological information about key fish and shellfish species in Porirua harbour. During 2012, historic information about these species and their habitats was gathered to assist with developing appropriate surveys to monitor and care for these species in the future. Part of this process included undertaking a number of oral history interviews with kaumatua and Iwi members. These were recorded on film and audio for preservation and are available on the Ngati Toa website.

Planning for action

Activity 6: Perspectives on strategies

The Porirua City Council strives to exercise kaitiakitanga and take a formal role in the stewardship over the Porirua Harbour and Catchment. The choices the council makes are met with mixed reactions, as people within the community have different values and perspectives.

Refer students to the Porirua Harbour and Catchment Strategy and Action Plan investigated in the previous section. Copies are available from the Porirua City Council and on the council website. Select one of the “big three” issues addressed in the strategy (sed-

imentation, pollution and ecological restoration), and ask students to create a star chart to show the different perspectives within the Porirua community towards how that particular is being addressed by the strategy and action plan. Who will be pleased with the actions and who will be will not?

Create a role-play or debate to show the various groups reactions. It may help to interview different people of the community and ask them to give their perspective on the change of rules and how it affects their lives. For example: local residents vs. developers.

Considering responses and decisions for taking action

Activity 7: We are kaitiaki

Ask students to reflect on how they feel about the harbour and catchment. Is it taonga to them? If so, why? Use a discussion circle and talking stick so students can share how their feeling about the harbour and catchment might have changed over the course of the study. Invite them to select a place within the catchment that they would like to practise kaitiakitanga. This might include a contributing stream near the school or a beach in the outer harbour. What issues exist in that area that are causing – or could potentially cause – harm to the local ecosystem. What changes would they like to see happen to help alleviate these issues?

Use this template for [planning action](http://efs.tki.org.nz/Curriculum-resources-and-tools/Action-Planner): (<http://efs.tki.org.nz/Curriculum-resources-and-tools/Action-Planner>)

1. Identify an issue with students
2. Look at the overall vision with students; i.e. what is it that we want to achieve?
3. Plan the action: Consider what exactly needs to be done to achieve the vision. This could include several smaller projects within the larger project that either the whole class is involved with, or small groups within the class facilitate.
4. Check that the action addresses the issue.
5. Consider the skills required to carry-out the action and where more information can be found.
6. Consider how people will think and feel about the planned action and how you will find this out.
7. Make some decisions: what could influence the decision on what to do? List the options and criteria in a decision making matrix to choose the action.

Criteria should include:

- ensuring the action addresses the issue
 - resources required
 - time and learning
 - (add your own criteria as required)
8. Carry out the action.
 9. Reflect on change. Some questions may include:
 - How can we make people more aware of the issue and our action(s)?
 - Did our actions meet our vision?

Theme three: Human impact on the Harbour

Level 3 Social Science

Level 3 Science



Theme three

Human impact on the Harbour

Level 3 Social Science

Achievement Objectives:

- Understand how cultural practices vary but reflect similar purposes.
- Explore how people view and use places differently.

Conceptual understandings:

- Plants and animals in Porirua Harbour and Catchment live in an environment best suited to them and are affected in many ways by changes to their habitat.
- Different values and perspectives influence the decisions people make about use of Porirua Harbour and Catchment and its resources.
- Human decisions, including our own decisions, can affect the environmental sustainability of Porirua Harbour and Catchment, both positively and negatively.

Level 3 Science

Achievement Objectives:

- Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.
- Explore various aspects of an issue and make decisions about possible actions.

Learning framework

Links to social inquiry approach	Activities	What to look for
Establishing what we know		
Focus of learning topic What is a resource?	1. Resource Concept Map 2. Our school resources	Building conceptual understandings <ul style="list-style-type: none"> • Student understanding of key concepts concerning resources such as scarcity, value, and use of.
Experiencing the Harbour		
Selecting a context What are the resources within the Porirua Harbour & Catchment?	3. The Porirua Harbour as a resource 4. Field trip – train journey through the catchment	Deepening understanding <ul style="list-style-type: none"> • Student understanding of how different people benefit from the Porirua Harbour. • The ecological values of the harbour and catchment. • The types of ways people impact on the harbour
Building on knowledge		
Finding information Who decides how we use the harbour's resources?	5. Using the harbour	Deepening understanding of <ul style="list-style-type: none"> • The different ways people use the harbour. • The issues taken into consideration when making rules regarding access to the harbour.

Planning for action		
<p>Exploring values and perspectives</p> <p>The Porirua Harbour is a resource for people to enjoy. Do you agree?</p> <p>Considering responses and decisions</p> <p>How can rules be used to protect the Harbour?</p>	<p>6. Rules for protection</p> <p>7. Using rules to solve problems</p> <p>8. Solving problems using POOChI</p> <p>9. Student POOChI activity</p>	<p>Developing critical thinking by encouraging students to:</p> <ul style="list-style-type: none"> • Look for different groups' values and perspectives around their resource. • Analyse different responses and decisions to their particular resource • Evaluate the consequences of changes to rules concerning their resource • Decide what is the best way to ensure people have sustainable access to the resource, now and in the future.
So what, now what		
<p>Social action</p> <p>What rule would I create to protect the harbour?</p>	<p>10. Our rules to protect the harbour <i>Reflection, presentation & celebration</i></p>	<p>Deepening sense of kaitiakitanga by Fostering a sense of responsibility for the harbour, through the process of:</p> <ul style="list-style-type: none"> • Identifying a problem that exists • Finding a solution to this problem • Working towards achieving their desired outcome

Establishing what we know

Activity 1: Resource concept map

Write the word Resource on the board and discuss its meaning. As a class, make a Concept definition map with the following categories: Definition, Synonym, Associated with and Examples.

Activity 2: Our school resources

In groups of three, ask students to brainstorm any resources they use in their school. Use Extended Brainstorming to help them think more deeply:

- Fluency: Brainstorm as many resources as they can. E.g: water, electricity, gardens, sports equipment, computers, books, teachers, etc.
- Flexibility: Categorise their ideas then add 2 ideas to each category. For example they may have categories of time, knowledge, technology, comfort, and relationships.
- Originality: Think of two ideas that don't fit into any of their categories.
- Elaboration: Use a ranking ladder to rank their resources from most scarce to least scarce. Use another ranking ladder to rank their resources from the most valuable to the least valuable (from their perspective)

Ask the groups to leave one defender with their paper, while the rest circulate to look at the other groups' work and ask questions of the defender.

As a class, discuss the following questions:

1. How different or similar were the groups' opinions?
2. Did all the groups agree on which resources were the scarcest or the most valuable? If not, why not?
3. Are the scarcest resources always the most valuable?

Choose one resource for each group of three and ask the students to discuss these questions:

1. Who decides how this resource gets used? For example, who gets to use it and for what purpose?
2. What does that person, or those people, consider when they make decisions about how the resource gets used?
3. What can you do if you disagree with what that person has decided?
4. What is the impact of that use on the resource?

Experiencing the harbour

Activity 3: The Porirua harbour as a resource

Explain to students that they are going to explore how the harbour is used as a resource.

Watch the *Living Waters* episode: [February: Fishing](#). Ask your students to identify the resources from this documentary. For example: shellfish, fish.

Use the Extended Brainstorming techniques from the diagnostic section to brainstorm as many resources they can think of from within the Porirua Harbour and Catchment.

Activity 4: Train journey through the catchment

Travelling by train is an excellent way to experience the harbour and catchment. It's possible to travel from Plimmerton through to Takapu Road and observe the different types of habitats in the catchment (swamp, outer harbour, Onepoto and Pauatahanui arms, and streams), as well as visible evidence of how human activity has impacted on the quality of the harbour as a natural resource. For example Porirua Stream changes a lot from Takapu Road Station through to Porirua Station. Healthy natural edges through to unhealthy looking water, litter and hard artificial edges once it gets closer to the industrial zone of Kenepuru. Students will also be able to observe a variety of human activities that would have an impact on the harbour such as roads and housing, farmland, stormwater outlets, the reclaimed land around Mana Marina and so on. Planning a scavenger hunt type activity beforehand will help focus student's attention and guide their observations. There are also opportunities to get off the train to either explore streams and waterways (e.g. Takapu Road or Redwood), or the outer harbour such as Plimmerton Beach.

As with all field trips we strongly urge teachers to visit the site prior to taking students there. The Ministry of Education has excellent guides for safe outdoor experiences:

<http://eotc.tki.org.nz/EOTC-home/EOTC-Guidelines>

Information about train timetables and costs can be found here:

<http://www.metlink.org.nz/>

Or phone 0800 801 700

Building on knowledge

Activity 5: Using the harbour

Choose one of the resources from activity 3 and answer the following questions as a class. Some teachers may wish to choose a resource that is relevant for their students, such as a waterway near their school.

1. What are the natural habitats present within this resource?
2. What plants and animals are in this habitat?
3. How are they suited to that habitat?
4. How have humans impacted this resource, either positively or negatively?
5. In what ways has the human impact affected the habitat of any plants or animals?
6. How have the plants or animals adapted to this impact?
7. Who makes the decisions about the access to or use of their resource?
8. What factors would they take into consideration before making a decision?
9. What decisions or rules have been made for their resource?
10. What problems do these rules address?

11. How are these decisions or rules implemented?

Provide students with further material to help them find the answers to these questions.

- *At the Beach – explore and discover the New Zealand sea shore* by Ned Barraud & Gillian Candler. Refer to the pages about mudflats to guide student's learning about the plants and animals that they could expect to find in the Pauatahanui Inlet.
- This title in the Building Science Concepts series is about the intertidal zone and contains activities to extend this aspect of the topic: <http://scienceonline.tki.org.nz/What-do-my-students-need-to-learn/Building-Science-Concepts/Titles-and-concept-overviews/Tidal-Communities>
- The Porirua Harbour and Catchment Strategy and Action Plan describes the big three issues facing the harbour and outlines actions from stakeholders to aid its recovery and restoration: <http://www.pcc.govt.nz/DownloadFile/Publications/Harbour-Management/Porirua-Harbour-and-Catchment-Strategy-and-Action-Plan-March-2012>

You may want to choose some of [these graphic organisers](#) or [this Inquiry Chart](#) to help students organise the information they find. This could be linked to the class literacy programme so groups can analyse further material in the guided reading sessions.

Optional extension: once the students have completed this activity as a class, they can repeat it for a harbour resource of their own choice. Some students may be able to locate information independently, others may use materials found by the teacher.

Planning for action

Activity 6: Rules for protection

Some rules are created to help protect natural resources. These rules affect different people in different ways. On the other hand, rules can also permit activity that is detrimental to the resource. These activities look at the ways rules, and subsequent use of and impact on the harbour, affect different groups, and can help students gain an understanding of how values and perspectives can differ.

Watch the Living Waters episode: [January: Recreation](#). Discuss how the Porirua Harbour is a resource for people to enjoy.

- Brainstorm with the class the different recreational activities that the Porirua Harbour and Catchment is used for. What conflicts might they have?
- Brainstorm different rules that might apply to the Harbour and Catchment; for example, rules around speed limits and fishing quotas.
- Brainstorm all the different stakeholders that may be affected by these rules. You may wish to include the plant or animal life of the Harbour and Catchment as one of the groups.

Watch **Living Waters Documentary: December – the future** and the YouTube clip produced by Ngati Toa featuring interviews with kaumatua about the history of the harbour as a resource for the people, and the impact of rules that allowed discharge of toxic contaminants on people’s use of the harbour as a resource.

<http://www.ngatitoea.iwi.nz/ngati-toa-kaumatua-interviews-te-awarua-o-porirua-3/>

- Discuss with the class the impact of urban development on the Porirua Harbour and Catchment.
- Brainstorm different rules that might apply to development in the vicinity of the harbour and catchment. For example: Stipulating that sound ecologically based designs are used for housing.
- Brainstorm all the different stakeholders that may be affected by these rules. You may wish to include the plant or animal life of the harbour and catchment as one of the groups.

Choose a rule or category of rules to analyse, for example you may choose the rules for preventing run-off of silt from construction sites.

In groups, ask students to complete a PCQ (Pros, Cons, Questions) with an extra column on the righthand side for values, for one of the stakeholders affected by this rule (see example below). Ensure that each group is analysing a different stakeholder. You may want to do this as a Hot Potato activity where the students pass the sheets of paper around to different groups and add their ideas to each sheet.

An example PCQ chart for developers on the urban development run-off regulations

Pros	Cons	Questions	Values
The environment will be nicer for the home owners living there	Takes longer to complete build as extra tasks to carry out to prevent run off	Do developers care about environmental issues?	Efficiency vs. environmentalism
Less pollution is better for the companies reputation	Incur increased costs	Who should pay for the extra costs?	Making a profit

As a class, discuss how the same rule could be a pro for one stakeholder, but a con to another. Ask students why this could be and explain that this shows they have a different perspective. These differing perspectives show us what different groups values are. Repeat this activity for another rule or category of rules to help students consolidate this understanding for example rules around the control of discharge into stormwater.

- Using the PCQ charts, brainstorm what they think the values of each group might be.

- Discuss how several groups may share values, but for different reasons. For example, developers may value sustainability to ensure their business continues to thrive, the local iwi may value sustainability to maintain a vital food source.
- Decide on the values that the class thinks should be considered when rules are made about the harbour and catchment.

Activity 7: Using rules to solve problems

As a class, discuss that rules are designed to prevent or solve problems.

- Ask students for examples of problems in their class or school that have been solved by a new rule. Then ask students why they think the rule they discussed in the previous section was put in place and what problem the rule addresses.
- Conduct a class debate in which the students’ role-play being members of a particular group (for example recreational fishers, property developers or local iwi) discussing a rule change, such as limiting the density of houses in new urban developments near the harbour.
- Ask students in groups to note down the perspectives of their group and the reasons they will give for their opinion. Choose one person who will be their spokesperson for the debate.

Activity 8: Using rules to solve problems

As a class decide on a problem that is affecting a resource within the harbour and catchment. Use the **POOChI** model below to find a way to solve this problem by changing an existing rule or creating a new one.

1. Identify the **Problem**
2. Generate **Options** (new or adapted rule) to solve the problem
3. Predict **Outcomes** for each option – analysing both short- and long-term positive and negative outcomes.
4. **Choose** the best option
5. **I –** What do I think about this? How does this affect me?

Ask students to consider who is responsible for making new rules, who will be affected by changes to the rules and in what way?

Activity 9: Student POOChI activity

Using the same process, students can now analyse the perspectives and values of the groups that would be affected by rule changes to the resource they chose in Activity 4.

Students can then research their chosen resource to decide on a problem they would like to address. Once they have found a problem, they use the POOChI model to generate the best solution. Encourage the students to consider the outcomes for various groups before they choose their solution.

So what, now what?

Activity 10: Our rules to protect the harbour

Students can now try to implement the rule change, or influence decision makers to do so. They may want to:

- Create a petition
- Write letters to the government or councils
- Create an awareness campaign in the community
- Or come up with some other way to convey their idea

TKI action planner

Activity 11: Reflection, presentation & celebration

Ask students to discuss in pairs and then feedback to the class:
what does this mean to me?

Have students feedback findings from their social action:

- Invite guests to see presentations
- Slide show at assembly

Theme three: Human impact on the Harbour

Level 4 Social Science

Level 4 Science



*Living
Waters*

TIAKINA NGĀ TAONGA - PROTECT THE TREASURES

Theme three:

Human impact on the Harbour

Level 4 Social Science

Achievement Objectives:

- Explain the different ways that events have causes and effects.

Conceptual understandings:

- Plants and animals in Porirua Harbour and Catchment live in an environment best suited to them and are affected in many ways by changes to their habitat.
- Different values and perspectives influence the decisions people make about use of Porirua Harbour and Catchment and its resources.
- Human decisions, including our own decisions, can affect the environmental sustainability of Porirua Harbour and Catchment, both positively and negatively.

Level 4 Science

Achievement Objectives:

- Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.
- Explore various aspects of an issue and make decisions about possible actions.

Learning framework

Links to social inquiry approach	Activities	What to look for
Establishing what we know		
Focus of learning topic What is Ecological degradation?	1. Ecological degradation 2. Ecological degradation – cause and effect	Building conceptual understandings of <ul style="list-style-type: none"> • Key concepts such as the cause and effect of pollution.
Experiencing the Harbour		
Selecting a context What causes pollution in our harbour?	3. What lives in the harbour? 4. Field trip – train journey through the catchment 5. Post field trip reflections	Deepening understanding of <ul style="list-style-type: none"> • What lives in the harbour • The different causes for pollution within the Porirua harbour and catchment.
Building on knowledge		
Finding information What is the effect of human action on the harbour?	6. Human actions and ecological degradation	Building conceptual understandings by Developing insight into the way human actions directly link to pollution within the harbour and catchment

Planning for action		
<p>Exploring values and perspectives</p> <p>Do we all want the same thing for the harbour?</p> <p>Considering responses and decisions</p> <p>How can rules be used to protect the harbour?</p>	<p>7. Protecting the harbour</p> <p>8. Problems need solutions</p>	<p>Developing critical thinking by</p> <p>Encouraging students to:</p> <ul style="list-style-type: none"> • Try to understand different groups' values and perspectives around their resource. • Analyse different responses and decisions to their particular resource • Evaluate the consequences of changes to rules concerning their resource • Decide the best ways to ensure people have sustainable access to the resource, now and in the future.
So what, now what		
<p>Social action</p> <p>What can I do to protect the harbour?</p>	<p>9. Our solution</p>	<p>Deepening sense of kaitiakitanga by</p> <ul style="list-style-type: none"> • Finding a solution to a problem they identified and achieving a desired outcome.

Establishing what we know

Activity 1: Ecological degradation

Write the word Ecological Degradation on the board and discuss its meaning. It may be beneficial to break the term down into Ecology and Degrade to help students understand the concept

- In groups of three, ask students to draw a T-chart and note down any things that may cause ecological degradation on one side, and any possible effects of ecological degradation on the other.
- As a class, discuss any ecological degradation they have seen in their community; for example, pollution or sedimentation.

Activity 2: Ecological Degradation – cause & effect

Watch the *Living Waters* episode: [April: Pollution](#) and [August: Sediment](#).

- Ask the students to add to their cause and effect T-chart anything else mentioned in the documentary, put a star besides ones that are mentioned that they have already recorded and to cross out any that don't apply to the Porirua Harbour and Catchment.
- Draw or copy an empty cause and effect T-chart onto 12 large sheets of paper, and give each piece the title of one of the other *Living Waters* documentaries: Recreation, Fishing, Shags, Pollution, Tides, Urban Catchment, Pauatahanui Reserve, Sediment, Creatures Great and Small, The Rural Catchment, The Industrial Catchment and The Future. Each of these titles represents a context relevant to the Porirua Harbour and Catchment. Ask students to go around the room writing in any causes or effects they think would apply to that context.

Experiencing the Harbour

Activity 3: What lives in the harbour?

Display a [large map](#) of the Porirua Harbour and Catchment, or as a class create one as a mural. Identify where the school is located, any nearby streams the students will be familiar with, and where the field trip in Activity 4 will take place. Discuss and locate the different habitats for example fresh water streams, intertidal zone, deep sea, swamp.

- Discuss with the students how streams flow into the harbour and; therefore, the health of the harbour is affected by the health of the streams.
- In small groups, ask the students to draw pictures of each of the living things they can think of in the Porirua Harbour and Catchment. Encourage them to think of both plants and animals. They can then stick their pictures on to the map in the area they think that organism lives in relation to the habitats located earlier. (Note: use blutac or post-it notes as students will get the opportunity to move these later on as they refine their knowledge.)

The following two resources will help your students to learn more about the plants, animals and habitats of the harbour and catchment:

- *At the Beach – explore and discover the New Zealand sea shore* by Ned Barraud & Gillian Candler. Refer to the pages about mudflats to guide student's learning about the plants and animals that they could expect to find in the Pauatahanui Inlet.
- This title in the Building Science Concepts series is about the intertidal zone and contains activities to extend this aspect of the topic: <http://scienceonline.tki.org.nz/What-do-my-students-need-to-learn/Building-Science-Concepts/Titles-and-concept-overviews/Tidal-Communities>

Activity 4: Train journey through the catchment

Travelling by train is an excellent way to experience the harbour and catchment. It's possible to travel from Plimmerton through to Takapu Road and observe the different types of habitats in the catchment (swamp, outer harbour, Onepoto and Pauatahanui arms, and streams), as well as visible evidence of how human activity has impacted on the quality of the harbour as a natural resource. For example Porirua Stream changes a lot from Takapu Road Station through to Porirua Station. From healthy natural edges through to unhealthy looking water, litter and hard artificial edges once it gets closer to the industrial zone of Kenepuru. Students will also be able to observe a variety of human activities that would have an impact on the harbour such as roads and housing, farmland, stormwater outlets, the reclaimed land around Mana Marina and so on. Planning a scavenger hunt type activity beforehand will help focus student's attention and guide their observations. There are also opportunities to get off the train to either explore streams and waterways (e.g. Takapu Road or Redwood), or the outer harbour such as Plimmerton Beach.

As with all field trips we strongly urge teachers to visit the site prior to taking students there. The Ministry of Education has excellent guides for safe outdoor experiences:

<http://eotc.tki.org.nz/EOTC-home/EOTC-Guidelines>

Information about train timetables and costs can be found here:

<http://www.metlink.org.nz/>

Or phone 0800 801 700

Activity 5: Post field trip reflections

When you return to the classroom, display the T-charts from Activity 2 around the room, add photos, drawings or descriptions of the human impacts found on the train journey, and discuss which context most interests the class. Teachers may want their class to choose the same context, or they may want groups of students to choose their own.

Building on knowledge

Activity 6: Human actions and ecological degradation

Watch the Living Waters episode: *January: Recreation*.

Choose one learning context from the documentary for the class to use as a model, and fill out a **consequence wheel**. This may be done with individual reading groups or as a whole class activity.

- In the centre of their wheel, ask them to write their context.
- In the next ring out, ask them to place human actions that have effects in this context.

Encourage the students to include plant and animal life in their consequence wheel to see how changes in their habitat have affected them.

Students can watch the *Living Waters* documentary for their con-

text as well as explore other areas of information, such as books, the Internet, interviewing experts and/or class field trips.

Once the modelling consequence wheel is completed, give the students another blank wheel and ask them to fill it out for their context.

When each group has filled out their consequence wheel, they can use this information to decide on the issue they want to consider for their social action.

Planning for action

Activity 7: Protecting the Harbour

The causes and effects generated in the consequence wheel will affect different stakeholders in different ways.

- Discuss this with the students and brainstorm all the different stakeholders that may be affected by their chosen issue. You may wish to include the plant or animal life of the harbour and catchment as one of the groups.
- Brainstorm different rules that might have been put in place to protect the harbour from this issue; for example, rules around speed limits and fishing quotas. Choose a rule or category of rules to analyse, for example you may choose the rules for paua gathering.
- In groups, ask students to complete a PCQ (Pros, Cons, Questions) with an extra column on the righthand side for values, for one of the stakeholders affected by this rule. Ensure that each group is analysing a different stakeholder. You may want to do this as a Hot Potato activity where the students pass the sheets of paper around to different groups and add their ideas to each sheet.

An example PCQ chart for drivers if a rule was that every tyre sold included a \$5 fee for managing heavy metal runoff from tyres

Pros	Cons	Questions	Values
Heavy metal pollution in harbour would be decreased		Would it really make much difference?	The harbour is an ecological treasure
	Makes it more expensive to buy tyres	Would the increased cost make people replace their tyres less often?	We want value for money
The harbour would look nicer		How long would it take for these efforts to make a difference?	The harbour gives us nice views

Adding \$5 to every tyre sold to go towards managing runoff

As a class, discuss how the same rule could be a pro for one stakeholder, but a con to another. Ask students why this could be and explain that this shows they have a different perspective. The perspectives and opinions of the different groups show us what their values are.

- Using the PCQ charts, brainstorm what they think the values of each group might be.
- Discuss how several groups may share values, but for different reasons. For example, commercial or recreational fishers may value sustainability to ensure their future catch, the local iwi may value sustainability to maintain a vital food source.
- Decide on the values that the class thinks should be considered when rules are made about the harbour and catchment.

Student activity

Using the same process, students can now analyse the perspectives and values of the groups that would be affected by the issue they have chosen for their context. For example if they have chosen the context of recreation, they may choose the issue of the smell noticed by the Waka Ama groups.

Activity 8: Problems need solutions

As a class, discuss how problems can be solved.

- Ask the students to identify a problem that has occurred in the school, for example, rubbish being blown around the playground.
- Discuss how this problem was solved, who was involved in the solution and how did they choose the best solution for everyone.

Use the **POOChI** model to help the class decide on the best way to solve the issue identified earlier:

1. Identify the **Problem** (chosen in the finding information section)
2. Generate **Options** to solve the problem
3. Predict **Outcomes** for each option – analysing both short and long term positive and negative outcomes.
4. To do this, use the information gathered in the Exploring values and perspectives section. You may want to have a class debate as described in the Level 3 plan.
5. **Choose** the best option
6. What do **I** think about this? How does this affect me?

Students can then use the POOChI model to generate the best solution for their issue. Encourage the students to consider the outcomes for various groups before they choose their solution.

So what, now what?

Activity 9: Our solution

Students will now choose the best way of implementing their solution, or influencing decision makers to do so. Some ideas are below:

- Create a petition
- Write letters to the government and/or councils
- Create an awareness campaign in the community
- Clean up an area of the harbour or catchment
- Create a plan or model

These resources may be of use:

- The Greater Wellington Regional Council [Take Action for Water ideas](#) for reading activities using School Journal and other publications.
- Biodiversity NZ have an interactive game called Up the Creek. Click here to go to the [site](#) with kid's activity and teacher information.

Theme three: Human impact on the Harbour

Level 5 Social Science



*Living
Waters*

TIAKINA NGĀ TAONGA - PROTECT THE TREASURES

Theme three:

Human impact on the Harbour

Level 5 Social Science

Social Studies Achievement Objective:

- Investigate how people’s management of resources impacts on environmental and social sustainability.

Science Achievement Objective:

- Investigate the interdependence of living things (including humans) in an ecosystem.
- Develop an understanding of socio-scientific issues by gathering relevant scientific information in order to draw evidence-based conclusions and to take action where appropriate.

Conceptual understandings:

- Formal and informal structures have been created to manage human impact on Porirua harbour.
- These structures are often based on evidence gathered from scientific investigation and influenced by cultural perspectives.

Learning framework

Links to social inquiry approach	Activities	What to look for
Establishing what we know		
Focus of learning topic What is a resource?	1. Our precious resources	Building conceptual understandings of key concepts regarding resources such as: finite, infinite and carrying capacity.
Building on knowledge		
Finding information What are the resources within the Catchment area?	2. The Porirua Harbour and Catchment as a resource. View: <i>April: Pollution</i>	Deepening understanding of the <ul style="list-style-type: none"> Different components which make up the resource that is the Porirua Harbour Threat of human impact on the resource.
Experiencing the Harbour		
Putting it into context How has human action changed the Harbour?	3. Human impact on the harbour View: <i>December: The Future</i> 4. Field trip – train journey through the catchment. 5. Group research project	Deepening understanding of how human action directly impacts on the Porirua Harbour and Catchment <ul style="list-style-type: none"> Key issues to understand include sedimentation, pollution and ecological degradation. Developing critical thinking by Encouraging students to think of the reasons behind - and the consequences of - the decisions that were made.

Planning for action		
<p>Exploring values and perspectives</p> <p>Who will be happy about council environmental reforms?</p> <p>Considering responses and decisions</p> <p>What changes would you like to see?</p>	<p>6. Perspectives role play looking closely at the Pauatahanui – Judgeford Structural Plan</p> <p>7. Considering options for action</p>	<p>Developing critical thinking by</p> <ul style="list-style-type: none"> Analyzing different strategies that have been put in place to protect the the Porirua Harbour and Catchment from pollution Considering the consequence of these actions. Thinking about how they can exercise kaitiakitanga over the Porirua Harbour and Catchment themselves. <p>Developing a sense of kaitiakitanga by using initiative and exercise kaitiakitanga over an area within the Porirua Harbour and Catchment.</p>
So what, now what		
<p>Social action</p> <p>How did I make a difference?</p>	<p>8. Reflection</p>	<ul style="list-style-type: none"> Looking back at what they learnt as part of the study and how their action has had an impact on the future of the harbour and catchment. What does this mean for their ongoing sense of kaitiakitanga?

Establishing what we know

Activity 1: Our precious resources

Write the word resource on the board.

- In pairs students write down all the words they can come up with for this term. Share with the class.
- Ask students to come up for a definition for the term natural resource.

Discuss the terms *finite* and *infinite*.

- Write a T Chart with finite resources on one side and infinite resources on the other.

Introduce the term *carrying capacity* and how this affects their list of resources.

- For example trees may be infinite; however, if they are chopped down faster than they can grow and are not looked after they won't be replaced.

Ask students to add a third column to their chart and note down conditions required for a resource to remain infinite.

Select a resource – such as water – and discuss its importance.

- Imagine that there has been a drought in NZ and we need to preserve the water we have in the school tank. How are we going do this?

- What formal and informal structures could we appoint to ensure that it is looked after and managed fairly?
- Look at the role different people or groups of people within the school could play, i.e. the student council, the Principal, a group of concerned students, etc.

Building on knowledge

Activity 2: The Porirua Harbour and Catchment as a resource

Explain to the class that they are going to investigate a social action they could carry out within the Porirua Harbour and Catchment. In preparation for this, they will look at how decisions have been made in the past and what could be done in the future to protect the health of the harbour.

Discuss the Porirua Harbour and Catchment as a resource:

- What are the different components that make up this resource? How does it benefit us, now and in the past?
- Is it an infinite resource? What will affect its ability to be an ongoing resource?
- What is unique about the ecosystems within of the Porirua Harbour and Catchment?
- What types of groups exist to ensure the health of the

Porirua Harbour and Catchment is well managed?

Watch the Living Waters Documentary: *April Pollution*

- Ask students to note down all the various types of human impact that are threatening the health of the Porirua Harbour and Catchment. Examples include urbanisation, stormwater, zinc from tyres.
- Discuss as a class and write findings on the board.
- What habitat types exist in the Porirua Harbour and Catchment? Why are these at risk?
- What scientific investigations are discussed in the documentary? What do the findings tell us about the (health of the) harbour?
- What suggestions does Juliet Milne give about how human decisions can impact the harbour?

Experiencing the Harbour

Activity 3: Human impact on the Harbour

As a class watch the Living Waters episode: *December, the future*.

Discuss:

- Who are the different people (or groups of people) featured in the film who value the harbour? (Stakeholders)
- How has human impact changed our harbour?

Draw a T chart of formal and informal social structures that have been created to manage the human impact.

- What is the [Porirua Harbour and Catchment Strategy and Action Plan](#)? Who is involved? Is it a formal or informal structure?
- What are the solutions going forward?

Activity 4: Field trip – train journey through the catchment

Travelling by train is an excellent way to experience the harbour and catchment. It's possible to travel from Plimmerton through to Takapu Road and observe the different types of habitats in the catchment (swamp, outer harbour, Onepoto and Pauatahanui arms, and streams), as well as visible evidence of how human activity has impacted on the quality of the harbour as a natural resource. For example Porirua Stream changes a lot from Takapu Road Station through to Porirua Station, from healthy natural edges through to unhealthy looking water, litter and hard artificial edges once it gets closer to the industrial zone of Kenepuru. Students will also be able to observe a variety of human activities that would have an impact on the harbour such as roads and housing, farmland, stormwater outlets, the reclaimed land around Mana Marina and so on. Planning a scavenger hunt type activity beforehand will help focus student's attention and guide their observa-

tions. There are also opportunities to get off the train to either explore streams and waterways (e.g. Takapu Road or Redwood), or the outer harbour such as Plimmerton Beach.

As with all field trips we strongly urge teachers to visit the site prior to taking students there. The Ministry of Education has excellent guides for safe outdoor experiences:

<http://eotc.tki.org.nz/EOTC-home/EOTC-Guidelines>

Information about train timetables and costs can be found here:

<http://www.metlink.org.nz/>

Or phone 0800 801 700

Activity 5: Group research project

Using the Living Waters documentary series, Porirua Harbour and Catchment Strategy Plan and other resources, students are to research in groups an area of the Porirua Harbour and Catchment that has been affected by human impact. A list of publications can be found on the PCC website: <http://www.pcc.govt.nz/Publications/Porirua-Harbour-and-Catchment-Management-Programme> (Scroll down for the literature review)

The main issues to investigate include: sedimentation, pollution and ecological degradation (as suggested in the Porirua Harbour and Catchment Strategy Action Plan).

Students are to locate a body of established research that has been used as evidence to show the impact of human impact on the harbour and catchment. For example the annual research done by scientists Leigh Stevens and Barry Robertson – Wriggle Coastal Services as seen on the April: Pollution Living Waters series. Research questions could include

- Who commissioned the research and what did it aim to find out?
- What are the causes behind the human activity and what are the effects on the harbour and catchment?
- What are the plants, animals and habitats of the harbour and catchment and how are they affected or otherwise?
- Discuss what social structures (both formal and informal) have been created in response to this research. e.g. informal responses such as planting days organized by the Guardians of Pauatahanui Inlet (GOPI) or PICT (Pauatahanui Inlet Trust), Forest and Bird or more formal such as the Porirua Harbour and Catchment Strategy Plan.
- How have people responded to these initiatives?
- What else could be done? Are there any further initiatives in development?

Suggested films to help with research:

August: Sediment: Discussion of the importance of the estuary

and its significance as the only one of its kind in the lower North Island. Models are also looked at which have been used to measure the amount of sedimentation and the wider implications.

October: Rural Catchment: This film outlines the joint project of WRC and PCC to work with landowners in the Pauatahanui catchment to look at the reduction of nutrients and sediment going into the inlet via streams. It also shows how the deforestation of the 1840s has caused this issue or erosion, flooding and sedimentation going into the stream.

November: Urban Catchment: Naomi Middleton explains the 'Take Charge' programme which was developed in 2004. It is an environmental audit programme that works with businesses to help them comply with the rules. Dr Mike Joy also looks at the freshwater fish and how they are continuing to decline.

April: Juliet Milne – Environmental Science GWRC discusses the role of storm water in catchment. We are also introduced to scientists Leigh Stevens and Barry Robertson – Wriggle Coastal Services as they complete their annual broadscale mapping of the Harbour.

June: Urban Catchment: Professor John Wells measures the flow and water clarity of the streams by Duck Creek. Dr Mike Joy discusses the fish life in the streams and how they are affected by human impact such as washing cars and paint brushes. He explains the importance of the streams to the lifecycle of the fish.

December: We see the clean up of the Okowai lagoon, downstream of the Aotea Block development and at the active management process for transmission gully.

Planning for action

Activity 6: Perspectives role-play

As a class look at the [Pauatahanui-Judgeford Structure Plan](#).

The Porirua City Council adopted this plan in 2012 as a framework for land development in the Judgeford basin. Here we see the results of a formal structure putting controls in place to limit the amount of sedimentation. Look at the key recommendations.

- Discuss the plan and create a star chart to show the different perspectives within the Porirua community towards this structural plan.
- Who will be pleased with the reforms and who will be will not?
- Create a role-play, imagining a TV show such as Campbell Live has come to Porirua to report on the tensions as different groups in the community clash. Different people of the community are interviewed and asked to give their perspective of the change of rules and how it affects their lives. You may choose to interview members of the community to ask them their response to the changes. For example local residents, developers.

- Students could record their TV show, or make a radio broadcast, to present to the class.

Activity 7: Considering options for action

In this section, students will analyse different responses and decisions that can be made in regard to protecting the harbour and catchment. Remind them that as members of the Porirua community we can help bring about change.

They will evaluate the consequences of any changes they have considered and decide on the best option to ensure any effects are positive.

Using the [template for planning action](#):

1. Identify an issue with students
2. Look at the overall vision with students; i.e. what is it that we want to achieve?
3. Plan the action: Consider what exactly needs to be done to achieve the vision. This could include several smaller projects within the larger project that either the whole class is involved with over time, or small groups within the class. Check that the action addresses the issue.
4. Consider the skills required to carry-out the action and where more information can be found.
5. Consider how people will think and feel about the planned action and how you will find this out.
6. Make some decisions: what could influence the decision on what to do? List the options and criteria in a decision-making matrix to choose the action. Criteria should include:
 - ensuring the action addresses the issue
 - resources required
 - time and learning
 - (add your own criteria as required)
7. Carry out the action.
8. Reflect on Change: Some questions may include:
 - How can we make people more aware of the issue and our action(s)?
 - Did our actions meet our vision?
 - Did our actions impact on the issue we identified?

Project ideas:

- Using the Nature Watch Ecological Restoration Database, students set up own project to monitor the health of the harbour. The monitoring database is used to record the survival, arrival, regeneration, growth and behaviour of species in the Porirua Harbour and Catchment.
- There are many existing restoration projects students can get involved with, including: Forest and Bird at the Wildlife Management reserve; and WRC and PCC at Kakaho stream mouth. Pauatahanui Inlet Wildlife Reserve Management Plan

and DOC's Wellington Conservation Management Strategy.
Create a petition

- Write letters to the government
- Create an awareness campaign in the community
- Clean up an area of the harbour or catchment
- Create a plan or model
- Contribute to the scientific studies.

So what, now what?

Activity 8: Reflection

Allow time at the end of the study for your students to reflect on what they learnt and what their action achieved. How has this experience shaped their sense of kaitiakitanga? What would they have done differently? How has this helped them understand the challenge of sustainable management of our natural resources? What do they know about the natural ecology of the harbour and catchment that they didn't know before?