Up the Creek

Up the Creek was developed by the Department of Conservation under the New Zealand Biodiversity Strategy.

Teachers' Guide

By focusing on the life cycle of whitebait, this website introduces concepts about biodiversity in waterways in a context that is relevant for students.

Following are some ideas for class discussions and activities that could be used when students have completed the website journey to extend their understanding of biodiversity. The activities have been developed for students working at levels 3 and 4.

Also see the schools section at www.doc.govt.nz for additional resources and activities.

CURRICULUM LINKS

The four key concepts in environmental education are:

- interdependence
- sustainability
- biodiversity
- personal and social responsibility for action.

This website also has many links to the social studies, technology, science, English, and mathematics curriculum statements at levels 3 and 4.

OTHER RESOURCES

Websites

http://nwp.rsnz.org
This is the website of the National Waterways Project. It was established to provide high-quality water-monitoring activities for schools to use in their local rivers, streams, and lakes. The website has information about school projects, resources for students and teachers, newsletters about the waterways project, and curriculum information for teachers. It has links to a number of resources for monitoring stream health and also contains databases into which schools can enter their own findings.

www.whitebaitconnection.co.nz
The Whitebait Connection is a programme that aims to help people understand and become involved in the future health of their local streams and rivers. The website includes a manual in PDF format that has activities for students.

Websites – Continued

www.nzfreshwater.org/index_wildlife.html (Animal quiz)
www.nzfreshwater.org/index_main.html (Go to "Threats" and scroll down to find the Clean and Green quiz.)
These sites contain two excellent online quizzes for students who wish to test their knowledge about native freshwater fish.

www.niwa.co.nz/edu/resources
This site has links to information and resources about estuaries and fresh water, including the Environment Watch CD-ROMs, a series of environmental education resources intended for use by community groups, environmental educators, and secondary schools. NIWA produced the series based on Environment Watch items from the TV3 programme *No. 8 Wired*.

Books and articles

For students who don't live near a whitebaiting river, having some passages from one of the following books or magazines read to them may provide an interesting introduction.

Hulme, Keri (1984). "The Bone People". Auckland: Spiral/Hodder and Stoughton.
Hulme, Keri (1993). "Bait". "New Zealand Geographic", no. 17, pp. 50–68.

Marshall, Owen, ed. (2001). "Spinning a Line". Auckland: Random House. (A collection of New Zealand short stories and poems about fishing by writers such as Keri Hulme, Brian Turner, Patricia Grace, Kevin Ireland, and James K. Baxter.)

The following books are useful references for freshwater fish:

McDowall, R. M. (1990). *New Zealand Freshwater Fishes: A Natural History and Guide*. Auckland: Heinemann Reed/MAF Publishing Group.

McDowall, R. M. (2000). *The Reed Guide to New Zealand Freshwater Fishes*. Auckland: Reed Publishing.

Video

Underwater under Threat: New Zealand's Freshwater Native Fish is a twenty-minute video that introduces our native fish, the threats to their survival, and the steps we can take to protect them. Contact your local Department of Conservation office to borrow a copy.

River Mouths and Estuaries

CLASS DISCUSSION

Start a class discussion by asking your students the following questions:

- If the group takes Dion's advice and goes for a trailbike ride, do you think they will harm the animal or plant life on the beach?
- Could they hurt fish?
- What if they rode down the beach on mountain bikes?
- Would they do any damage if they walked instead?

Background information

Four-wheel drives, motorbikes, and other vehicles driving on beaches are a big threat to molluscs and other marine life. They can increase pollution and force sediment into harbours. A discussion of this issue could lead to students researching the fall-off in numbers of molluscs such as tuatua and toheroa.

Mountain biking, while seemingly environmentally friendly, can also damage fragile flora and fauna. This point could lead into a class discussion and investigation of the tension between allowing people access to enjoy the natural environment and protecting it at the same time.

Freshwater environments

Discuss the differences, between various freshwater environments – estuaries and rural, suburban, and mountain streams. Questions could include:

› How is an estuary different from a fast-flowing river?
› Will the water be salty or fresh?
› Why is it important to have clean estuaries?

For a description of what an estuary is and a simple experiment showing the physical characteristics of fresh water meeting salty water, refer to www.niwa.co.nz/edu/resources/estuaries

Life cycle

A discussion of the īnanga life cycle will enable students to find out at what point of the life cycle whitebaiting occurs. There are many excellent descriptions of the īnanga life cycle, including one from the New Zealand Native Freshwater Fish Society at www.nzfreshwater.org

Refer to www.niwa.co.nz/rc/prog/whitebait for updates on research being undertaken by NIWA into the sustainability and enhancement of whitebait fisheries, including information on restoring whitebait habitat, research into how many whitebait are caught, and what attracts migrating fish to certain streams.

Whitebait study

Students who live near whitebait waterways could carry out further research on the whitebait season and regulations in their area. They could discuss why we have a season and what potential threats to whitebait there are (such as overfishing, pollution, and habitat destruction). They could consider why there are restrictions on the size of nets (for example, not killing very small whitebait, regulating catch size, and allowing some to escape).

Information about whitebaiting regulations can be found at www.doc.govt.nz/Explore/Hunting-and-Fishing/index.asp

Suburban Waterways

CLASS DISCUSSION

Describe the following scenario to your students and use the questions to prompt a discussion.
Imagine that you own a section that has a stream running through it. After a small landslip, you notice that a culvert is hanging over the stream. What would you do?

› Would you call the council and get them to fix it?
› Do you think one little culvert could ruin an entire fish habitat?
› Do you think there's anything you could do?

Background information

It's important to emphasise that fish passage can be obstructed by small structures, such as culverts, as well as big structures like dams, so individuals can take effective action. "Fish Passage in New Zealand Rivers" is an excellent publication from the Cawthron Institute, available at www.cawthron.org.nz/Assets/fish_passage.pdf This booklet clearly explains the issues of fish passage and how we can help freshwater fish maintain their migratory routes. The Department of Conservation has also published a guide for landowners entitled "Protecting Fish Passage in Our Waterways" (Nelson/Marlborough Conservancy, Fact Sheet No. 68, August 1998).

Water quality and invertebrates

The presence of stream invertebrates that prefer clean water and a good in-stream habitat is a strong indicator of a healthy waterway. The presence of stream invertebrates tolerant of degraded conditions indicates a less healthy waterway. Doing a bug test (counting invertebrates) in your neighbourhood stream is a fun way to get students interested in water quality. Follow this link to find out how to do a bug test: www.thoroughbrednet.co.nz/whitebaitconnection/Manual.asp and then print out pages 36–40 of the PDF file. This is an excellent website that includes a comprehensive (PDF) manual as well as information on whitebait.

Carry out the bug test using established standard methods to ensure that your class obtains repeatable and scientifically robust results. Your students can then look at trends throughout the year or compare results between classes or years.

Refer also to the National Waterways Project website for other manuals, activity sheets, databases for entering the data your students gather, newsletters detailing activities from other schools, and details of whom to contact in your regional council.

Drain strain

Many students have an "out of sight, out of mind" understanding of waste disposal. A possible classroom and/or field trip activity is to follow waste from its source to the sea. Ask your students to consider, for example, where oil goes if you pour it down a drain. You could consider what happens with detergent from washing a car and with other waste products, such as a fridge going to the dump, or waste flushed down the toilet. Have them investigate alternatives to pouring waste down drains (such as recycling, cleaning, and so on).

It's also worth noting that many drains are simply streams that have been channelled and piped underground. Many of these "drains" run through our suburbs – there may be one near your school. The class could trace the ditches and drains near the school – do they reveal themselves as streams further up? Does the class's attitude to a drain change if they discover it is really a stream?

In some places, drains leading to a stream or to the sea are marked with fish signs stencilled on the pavement. If this isn't a feature of your area, your class could initiate a project to identify and (with the appropriate permissions) mark drains to highlight where stormwater goes to.

Dirty to clean

Letting soapy water lie on grass when washing a car is far better than pouring it straight down a drain. The principle here is similar to how a wetland works. The polluted water is gradually cleaned as it passes through soil and vegetation. Sewage treatment works on much the same principle.

The waste water at petrol station car washes is treated, making this the most environmentally friendly option for washing a car.

For more activities and experiments to follow up this discussion, go to www.ew.govt.nz/forschools/teachers/classroomunits/documents/Rivers_ImpactWaterUseQual.pdf

CLASS DISCUSSION

Describe the following scenario to your students and use the questions to prompt a discussion.
Dion needs to go to the toilet urgently. Rick has brought along some toilet paper, but the long drop is 100 metres away.

- Where should he go?
- If animal manure is bad for the river, what about human waste?
- There's bushman's toilet paper – or rangiora as Dion calls it. But what if it's in full flower? Could he use another plant?

These points could lead to a wider discussion on waste management.

Background information

Rangiora (bush toilet paper) is called the "tramper's friend" and has little environmental impact compared to toilet paper. If there are no long drops available, it would be preferable to use rangiora instead of burying toilet paper. Rangiora shouldn't be used when it is in flower as the whole plant contains irritants at this time.

Although human waste is biodegradable and will eventually break down, diseases such as giardia and other organisms carried through human waste have become much more of a problem in recent years. They have got into some of our waterways through hunters and trampers defecating too close to running water. Emphasise the need to bury waste well away (50 metres) from waterways to prevent the transmission of organisms such as giardia.

For more information, see the New Zealand Environmental Care Code at www.doc.govt.nz/Explore/NZ-Environmental-Care-Code.asp

Swamps and wetlands

Swamps and wetlands are some of the most at-risk freshwater environments in New Zealand. Around 90 percent of our original wetlands have been destroyed. This fact could lead to a discussion and investigation of how useful wetlands are. Just because some areas are of little economic value to, say, a farmer or developer, does not mean that they are an unimportant part of the environment. An excellent booklet on wetlands is published by the Horizons Regional Council, which manages the natural and physical resources of the Manawatu-Wanganui region. You can download the PDF file from www.horizons.govt.nz/images/Wetlands.pdf
Most other regional councils also have resources on wetlands.

Riparian management

Riparian: of, relating to, or situated on the banks of a river.

Students could visit (or photograph) various waterways and discuss the differences in the riparian management of the waterways. They could visit farmland with little vegetation and shade, measure the level of macroinvertebrate and native freshwater fish life, and compare it with farmland with vegetation and fences. Many regional councils publish booklets on riparian management or have information available on their websites, so it would pay to consult your local regional council first as the information will be specific to your region. Two examples are:

- www.horizons.govt.nz/images/Wetlands.pdf (Manawatu-Wanganui region)
- www.trc.govt.nz/HTMLDOCS/Infoland/21_Stmbank_man-importance/21%20Why%20manage%20streambanks.html (Taranaki Regional Council)

The class could consider doing their own riparian restoration project on a nearby stream. Regional councils and the Department of Conservation can help identify streams in your area, and there is often support available, either through funding or expertise, for community restoration projects.

CLASS DISCUSSION

Describe the following scenario to your students and use the questions to prompt a discussion.
Imagine that you want to take some fish from the river but you find that the local iwi has declared a rāhui (ban).

› Will you ignore it or do what the locals want?
› What if the rāhui was declared because someone had drowned in the river just a day before?
› What if the rāhui was declared because the supply of the fish you want to catch is dangerously low?

Background information

There is considerable Māori tikanga (rules and protocols) associated with catching fish. There are many guides to tikanga available. If a kaumatua is available, it may be useful to get them to discuss tikanga with students. Much tikanga fits in with basic conservation principles. Students may wish to compare various aspects of tikanga with conservation principles and discuss why such aspects of tikanga evolved. Students may also want to compare legislation governing fish quotas with tikanga. A visit from a local Department of Conservation or Fish and Game representative could help with this.

Spotlighting

Because native fish are active at night, spotlighting is the easiest way to see them in their natural environment. For information on spotlighting, access the manual at Whitebait Connection at www.thoroughbrednet.co.nz/whitebaitconnection/Manual.asp

Don't be put off by the health and safety considerations of taking a number of students on a trip at night, but do plan carefully.

The Waitakere City Council's EcoWater website has pictures and videos of native freshwater fish and macroinvertebrates. You can see these pictures and videos at www.ecowater.co.nz/11_videopics/fset_01.htm

Introduced fish

Get your students to collect information (pictures and descriptions) of freshwater fish and put them into native and introduced categories. Discuss whether catching introduced fish will benefit or harm native freshwater fish. Ask the students to find out about restrictions on catching trout and other introduced fish. Why do these licences and restrictions apply? (A Department of Conservation or Fish and Game representative could help with this.) They could explore what the impact is of pest fish, such as gambusia and koi carp, on native freshwater fish. There are also introduced plants that harm native freshwater fish. You could have your students find out about these.

For background information on pest fish, there are two posters available from the Department of Conservation: "New Zealand's Most Unwanted Freshwater Fish" and "Ornamental Pets Can Become Monumental Pests". The latter explains the risks of releasing aquarium fish into the wild. For more information, go to www.doc.govt.nz/Conservation/002~Animal-Pests/Pest-Fish-(Freshwater)/index.asp