ALEP

Aboriginal Landcare Education Program

14

Perform Basic Water Quality Tests

Learning Guide

Greening Australia

CONTENTS

Thanks to the Larrakia Minbeni Rangers, Tiwi Land Rangers and Liza Schenkel (Community Engagement Officer, Water Resources NRETAS) for help with this guide.

Photos on front cover, back cover (middle) and pages 1, 16 and 21 (bottom right) by Jane Ellem from Pularumpi School.

Student name:.....

Student number:.....

INTRODUCTION

Welcome to *Perform Basic Water Quality Tests.* Water testing can provide information about how healthy your rivers, creeks and wetlands are. The health of the water is linked to how healthy all the country is, and water quality information can help with planning land management work.

You might need to be able to test water when doing revegetation or other land management work. This could be when you are working for your council, doing ranger work or when managing your own country. Training should be completed on the job, in the field, over an extended period of time.

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EQUIPMENT REQUIRED

To complete this training you will need the following:

1. Appropriate Personal Protective Equipment (PPE).
2. Safety gear including first aid kit and water.
3. Water testing equipment.

ASSIGNMENTS

There are three assignments you will need to complete.

Some of these assignments may go towards your final assessment.

Section	Assignment	Competent (C) Not yet competent (NYC)	Date Achieved
Getting Prepared	Assignment 1. Project Risk Assessment		
Testing Water	Assignment 2. Testing Water Bugs		
Finishing Up	Assignment 3. Testing Water Quality		

1 GETTING PREPARED

1A. COLLECTING INFORMATION

This learning guide will teach you some basic water quality tests (the information is based around the Top End of the Northern Territory, if you live somewhere else you will need to get extra information about water in your area). If you want to try more advanced testing, use these manuals from Greening Australia:

- *Community Water Monitoring: Top End Field Manual*
- *Central Australian Wetlands Monitoring Framework*

Suppliers of water testing equipment are listed in Resource 1 on page 25. Further information is online:

1. Greening Australia has the above manuals, and the *NT Waterwatch Education Kit* (see Part 5 for water testing). Go to the Northern Territory page and then the Education and Training link. The Publications link also has information about community based water quality monitoring.

   www.greeningaustralia.org.au

2. Waterwatch Australia has a series of seven national technical manuals (see Module 3 for water bugs and Module 4 for water quality). Go to the Publications link.

   www.waterwatch.org.au

3. The Northern Territory Department of Natural Resources, Environment, the Arts and Sport has lots of information about water in the NT and contact details for water experts.

   www.nretas.nt.gov.au/natural-resource-management/water

4. The Tropical Savannas Cooperative Research Centre has information including *A Field Guide to Assessing Australia's Tropical Riparian Zones*. Go to Publications and then Books and Reports.

   http://savanna.cdu.edu.au

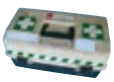
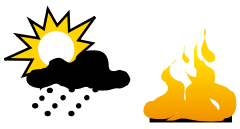
1B. TESTING WATER SAFELY

There are some dangers associated with testing water. It is important that you be aware of them so you can avoid getting injured or sick. Some of the things you can do to keep yourself safe include:

1. Wear appropriate clothes for outdoors and in wet weather wear waterproof clothing.
2. Wear protective footwear at all times, in some situations you may need rubber boots.
3. Be croc aware – crocodiles inhabit most water bodies in the Top End – do not enter water to take samples – use an extension pole or use a boat on larger water bodies.
4. Never work alone – work with other people.
5. Let someone know where you are and how long you intend to be out testing. Check the weather, road and fire reports before leaving.

6. Be very careful near the edges of water bodies, beware of slippery rocks and banks.
7. In case of an emergency always carry a mobile phone, in remote locations use a satellite phone or vehicle UHF radio.
8. Learn how to maintain and use testing equipment properly and keep your vehicle properly maintained.
9. Know where your first aid kit is stored and make sure someone has a first aid certificate.

Before you begin, use this checklist to confirm you have followed good safety procedures and have all the right resources.

SAFETY CHECKLIST ACTIVITY		✓
Long trousers, shirt and boots		
Waterproof clothing		
Hat and gloves		
Sunscreen, insect repellant and sunglasses		
Water		
First aid kit		
Notified others and have phone/2 way radio		
Checked weather, road and fire reports		
Permits (if required) and maps		
Compass or GPS		

REMEMBER

We should never take our water for granted – we must learn to respect and care for our water so it can continue to give us life.

1C. ABOUT WATER?

Water is one of our most precious resources – life on earth depends on it. Water places are very important, they are often sacred sites with great cultural significance. They may be places for ceremony, camping, hunting and collecting bush food and medicine as well as drinking water.

People have relied on permanent water bodies for survival in dry times. Many animals and plants depend on water bodies, and many animals, like fish, frogs and insects, live in them. Especially in dry areas, they often have rare plants or animals living around them.

NOTE

Water testing can help tell you about changes that are happening in your area. Your work might be the trigger to documenting an important pollution incident or land management change.

1D. WHY TEST WATER QUALITY?

Testing water quality can tell you how healthy the water in your rivers, creeks and wetlands is. Many things can change the water's health:

- Land clearing, overgrazing, roadworks and maintenance, erosion and changed fire practices can lead to soil entering the water.
- Farming plants and animals can put fertilisers, pesticides and manures into the water.
- Pollution can come from mining, factories, service stations, septic tanks and sewage systems.
- Weeds and feral animals can impact on water bodies.
- Disposal of rubbish and community landfills can pollute water.
- Development of towns and roads can lead to erosion and pollution.

NOTE

Before you start make sure you have the permission of whoever owns the land. For some projects you will need written permission and/or permits.

1E. WHERE AND WHEN TO TEST?

WHERE

You should sit down and talk with the landowners and other interested people before deciding where to test. Think about why you are testing and what the information will be used for. You might think about areas that could be affected by pollution or different types of land use.

- Use maps to select sites that appear to meet your needs.
- Go to each site and check that it is easy to get to and safe.
- If you need to cross private or Aboriginal land, first seek the landowner's permission, you may need a permit.
- Leave all gates as you found them.

WHEN

It is best to test water in the dry season because wet season water quality varies a lot. It is also a lot easier to get to sites in the dry season. It is best to test at the same time of day each time you test, because some things (like temperature) vary naturally over the course of the day.

You might want to carry out water testing regularly (like water quality monthly and water bugs yearly) over a long period of time to see if any changes are happening over the years. For yearly testing make sure you test at the same time each year. An event like a pollution spill might prompt you to do additional testing.

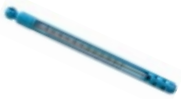
1F. EQUIPMENT

Getting the right equipment for your water testing is important. A list of suppliers is found in Resource 1 on page 25.

Tick off the items you will need to test water.

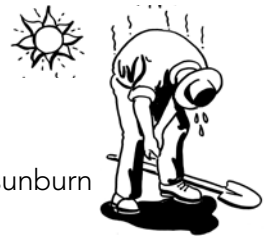
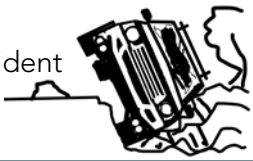
ACTIVITY ✓

Measuring tape and depth measure		
Camera		
Dip net (the best is a D-frame with 500-600µm mesh)		
Buckets		
White sorting trays (like a cat litter tray) or white bucket		
Spoons and pipettes		
White ice cube trays		
Magnifying glass		
Water bug identification books		

Thermometer		
Turbidity tube		
Clean sample bottle		
pH kit		
Conductivity meter		
Clipboard		
Data sheets A, B, C and D (use waterproof paper if you have it)		
Pencils and pens		
Large box to store everything		

PROJECT RISK ASSESSMENT

- Stop and think before starting work.
- What needs to be done so you can work safely?
- Complete the **What to do about it?** column – we have written one thing in each box – try and think of some others.
- Fill in all of the last row by adding a new hazard.

HAZARD **and what can happen = the risk**	**What to do about it?**
SUN EXPOSURE Risk of: Heat exhaustion, deyhydration and sunburn 	• Wear a hat • • •
WET SLIPPERY AREAS Risk of: Injury from slipping over 	• Walk slowly and carefully • • •
CROCODILES Risk of: Injury from attack 	• Don't enter the water • • •
BITING INSECTS Risk of: Bites and stings 	• Use insect repellant • • •
ROAD TRAVEL Risk of: Injury in vehicle accident 	• Don't speed • • •
	• • • •

2A. ABORIGINAL CULTURAL VALUES

Before starting your water project you should talk to the traditional owners and custodians at the water body. You should talk about your project first and then work through the questions below. You can either write the answers here (you might need more paper), or they might like to write the answers themselves, or you could tape them talking, or take a video.

SHEET A: ABORIGINAL CULTURAL VALUES

Site name			
Tester's name		*Date*	

1. Check that the traditional owners and custodians are happy about the project:

Who are the traditional owners/ custodians for this water body?				
Are they happy for you to do this project at this water body? (circle the answer)	**Yes**	**No**	**Maybe**	**Don't know**
	Talk to your trainer about these answers			

2. Interview the traditional owners and custodians and ask them to answer these questions:

What did people used to do here?					
What do people do here now?					
What animals live in the water?					
Would you fish here?	**Yes**	**No**	**Would you eat what you caught?**	**Yes**	**No**
Do you think this water is healthy?	**Yes**	**No**	**Why?**		
How do you decide if the water is healthy?					
How has the land and water changed here over the years?					
What do people do here to look after this water?					
What else can we do to make water healthier?					
What would you like to see happen here?					

ACTIVITY

With your group go to two sites – one that you think is healthy (like a nice freshwater stream), and one that seems unhealthy (like a waterhole being used by feral animals). Interview the traditional owners and custodians using **Sheet A**.

2B. SITE INFORMATION

GENERAL INFORMATION

The first time you test a site you should fill in **Sheet B** to record the site information (see opposite). After this, each time you test the site you should use the same site name and site code. Once a year you should fill out a new **Sheet B** to see if any changes have happened.

Information about the items on **Sheet B** is below:

Water body type: River, Creek, Wetland, Waterhole or Rockhole. See page 10 for pictures of water body types.

Location: Write as much as you can to make sure you can find the site again, draw a mud map if needed.

Site access: Describe the access including whether a four wheel drive is needed.

Landowner name and contact details: Write these details down.

GPS reading: The *Technical Manual for Weed Data Collection in the Northern Territory* has good information on using a GPS. Go to the Weeds website at www.nt.gov.au/nreta/natres/weeds.

Photos taken: Record how many photos and where you took them.

Current land use: Describe what you see or know, uses might include cattle grazing, fishing or conservation reserve.

ENVIRONMENTAL INFORMATION

Width: Measure with a measuring tape, if it is a large water body you may be able to read the width off a map.

Depth: Tie a weight to some string, drop the weight to the bottom of the water in the middle of the water body, then measure how much string went in the water. You might be lucky and have a proper depth measure.

Bank slope: Describe as not steep, steep or very steep.

Water flow: Describe as still, slow or fast.

Native vegetation: Write down the type of native vegetation you can see and how much there is. If you know the species names write them down.

Weeds: Write down any weeds you see.

Native animals: Write down any native animals you see, or footprints or droppings.

Stock/feral animals: Write down any stock or feral animals you see, or footprints or droppings.

Fire: Describe any evidence of fire that you can see.

Erosion: Describe any erosion you can see and how bad it is.

Other: Make general comments about the site. Note anything else you see including any bridges, dams or boat ramps.

SHEET B: SITE INFORMATION

GENERAL INFORMATION

Site name			
Tester's name		*Site code*	
Date		*Time*	
Water body type			
Location			
Site access			
Landowner name and contact details			
GPS reading			
Photos taken			
Current land use			

ENVIRONMENTAL INFORMATION

Width		**Depth**	
Bank slope		**Water flow**	
Native vegetation			
Weeds			
Native animals			
Stock/feral animals			
Fire			
Erosion			
Other			

WATER BODY TYPES



River



Creek



Wetland


Waterhole

ACTIVITY

With your group go to two different types of water body. Work through **Sheet B** at each one.



Rockhole

2C. WATER BUG TESTING

The water bugs living in your water body can tell you about the water quality and how healthy the water is. Water bugs include lots of different insects as well as shrimps, worms, mussels and snails. Water bugs are a very important part of the food chain.

CATCHING THE WATER BUGS

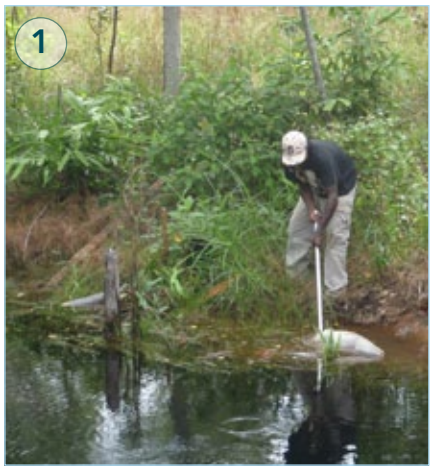
Use a dip net to catch the water bugs. You should try and catch bugs from deep, still areas with plants near the edge and shallow, rocky areas with fast flowing water. This will get you a good variety of bugs.

1. Stay on the bank and walk upstream holding the net close to the edge of the water (only get in the water if you know it is safe!).
2. Sweep the net backwards and forwards trying to catch the most bugs but not too much dirt.
3. Work over a distance of about 10 metres and spend up to 10 minutes catching bugs.
4. Before you empty the net, hold it upright so the bugs stay inside, then rinse it in the water to remove some of the dirt.
5. Turn the net inside out over a bucket and tip the contents into the bucket.
6. Wash water over the net to make sure all the bugs go in the bucket.

NOTE

Water bugs are also called ***aquatic macroinvertebrates:***

- ***macroinvertebrates*** *are animals without backbones that are large enough to see without a microscope*
- ***aquatic*** *means they spend all or part of their life in water*



SORTING OUT THE WATER BUGS

Once you have caught the bugs work in the shade so everyone is comfortable and the bugs stay alive in your trays. Use a sorting tray and ice cube tray to sort out the bugs.

1. Pour the water containing the water bugs from the bucket into the sorting tray.
2. Use spoons and pipettes to remove each bug from the sorting tray and put it in a section of the ice cube tray.
3. Try and catch each different type of bug that is in the sorting tray.
4. Put the same type of bugs together in each section of the ice cube tray.

WORKING OUT WHAT BUGS YOU HAVE

1. Compare the bugs in the ice cube tray to the pictures on pages 14 and 15 to work out what they are.
2. Use a magnifying glass to get a better look.
3. Some insects spend only a part of their life in the water - you may be seeing the larvae or nymph stages of the insect's life.
4. Fill in **Sheet C** (opposite) by circling the number next to each bug you found. Then put the bugs back in the water body.
5. Add up all the numbers you have circled.
6. Read the **What did you score?** section to check your water quality.

TIP

Use the Water Bug Identification pictures on pages 14 and 15 to work out what bugs you have (make a laminated copy to use in the field).

This method has been developed for the Top End of the Northern Territory – you should seek some local advice if you live somewhere else as the bugs might be different.

Some good water bug books will help with identification

- ***Colour Guide to Invertebrates of Australian Inland Waters*** (1997) by John H Hawking and Felicity J Smith (published by the Co-operatvie Research Centre for Freshwater Ecology).
- ***Freshwater Invertebrates*** (1996) by Ralph Miller (published by Gould League).
- ***The Waterbug Book: A guide to the freshwater macroinvertebrates of temperate Australia*** (2002) by John Gooderham and Edward Tsyrlin (published by CSIRO Publishing).

SHEET C: WATER BUGS			
Site Name			
Tester's name		*Site Code*	
Date		*Time*	
GROUP	**BUGS**	**CIRCLE THE BUG'S SPECIAL NUMBER IF THE BUG IS PRESENT**	
Group 1	Mayfly nymph	7	
Group 2	Damselfly nymph	6	
	Dragonfly nymph	6	
	Caddisfly larvae	6	
	Freshwater shrimp	5	
	Water mite	5	
	Riffle beetle and larvae	5	
Group 3	True bugs	4	
	Yabby	4	
	Prawn	4	
	Mussel	4	
	Beetle larvae	4	
	Beetle	3	
	Snail	3	
	Leech	3	
	Flatworm	3	
Group 4	Fly larvae	2	
	Mosquito larvae	2	
	Midge larvae	1	
	Freshwater worm	1	
TOTAL (add up the circled numbers)			

What did you score?

20 or less = Poor water quality 21 to 35 = Fair water quality

36 to 50 = Good water quality 51 or more = Excellent water quality

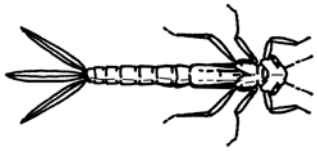
WATER BUG IDENTIFICATION

(Drawings are NOT to scale)

GROUP 1: We are very special, we need really healthy water

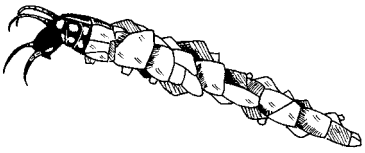
Mayfly nymphs

GROUP 2: We only live in healthy water

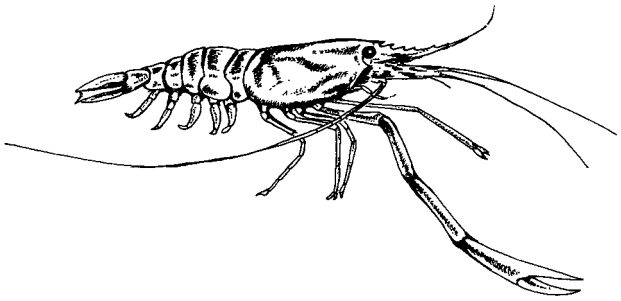


Damselfly nymph

Dragonfly nymph

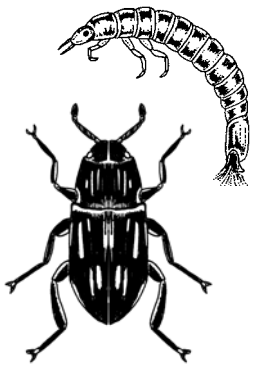


Caddisfly larvae



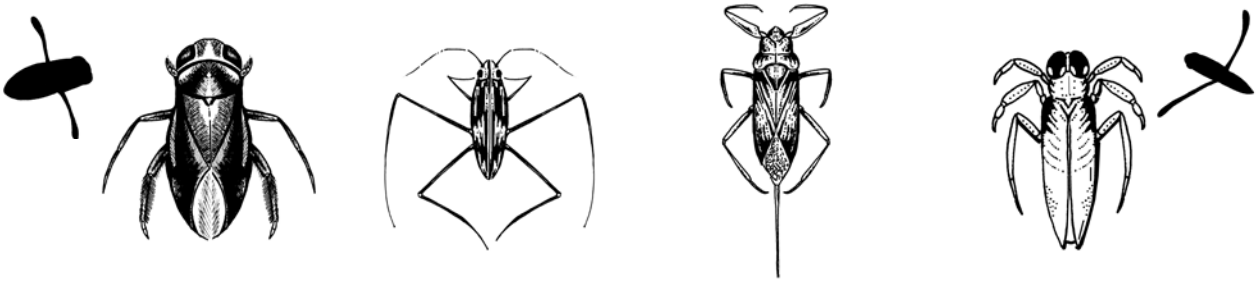
Freshwater shrimp

Water mite



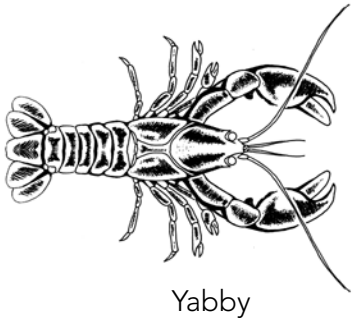
Riffle beetle and larvae

GROUP 3: We can live in OK water

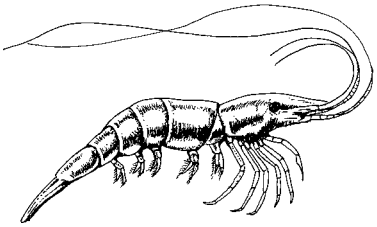


Waterboatman Waterstrider Waterscopion Backswimmer

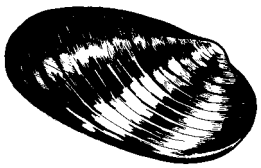
TRUE BUGS



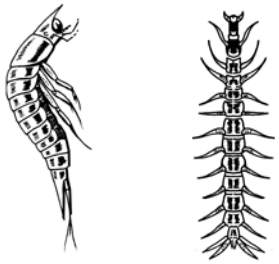
Yabby



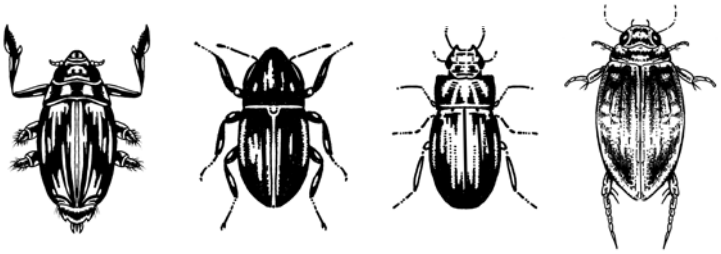
Prawn



Mussel



Beetle larvae



Beetles

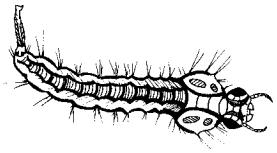
Snails

Leech

Flatworm

GROUP 4: We're really tough, we can live in terrrible water

Fly larvae



Mosquito larvae

Midge larvae

Freshwater worm

2D. WATER QUALITY TESTING

This section covers water temperature, turbidity, pH and salinity. If you are testing where there might be crocodiles use an extension pole to do the test or to collect a sample to test.

WATER TEMPERATURE

What is water temperature?

Water temperature is how hot or cold the water is.

Why is water temperature important?

- If the water temperature changes from what the plants and animals are used to, they can get sick, sometimes they might die.
- Warmer water can be more salty and hold less oxygen – this can affect water animals and how they live.
- Warmer water can make plants grow faster.
- Warm waters can be at risk from a build up of nutrients that can lead to algal blooms and then lowered oxygen levels.

What causes water temperature to change?

Water temperature can be changed by:

- The air temperature.
- The amount of shade from trees on the riverbanks.
- Soil in the water which can warm it up.
- Warm water entering from factories and power plants.
- Stormwater flowing over hot land surfaces and into drains.
- In deep slow rivers the temperature can be quite different from the top to the bottom.

How to measure water temperature

You can use a digital thermometer or glass thermometer (glass thermometers filled with alcohol are better than those filled with mercury).

1. Place the thermometer a few centimeters into the water.
2. Wait a minute until the reading stabilises.
3. Read the temperature while it is still in the water.
4. Record the result on **Sheet D** (page 20).
5. Rinse and dry the thermometer and put it back in its container.

Units for water temperature

Water temperature is measured in degrees Celsius (°C).

What do the results mean?

Typical temperatures in Top End rivers range between 18°C and 30°C. You should get to know what the temperature is at your site throughout the year so you can tell if there is any change.

NOTE

*Use **Sheet D** on page 20 to record your answers.*

*An filled in example of **Sheet D** is found in Resource 2 along with examples of all the data sheets (**A**, **B**, **C** and **D**).*

TURBIDITY

What is turbidity?

Turbidity is a measure of how murky or dirty the water is. It is caused by soil and other particles like algae.

Why is turbidity important?

- Murky or turbid water can stop plants getting the sunlight they need to grow. This leads to less oxygen and food for animals.
- High turbidity makes the water warmer which also reduces oxygen.
- The particles in murky water can clog up fish gills, making them sick and even killing them.
- Soil can settle on the bottom of the water body and smother animals and plants living there.

What causes turbidity to change?

Turbidity is naturally high in the wet season. Other causes of high turbidity include:

- Erosion, land clearing and road construction.
- Pollution from mines or sewage systems.
- Fires.
- Algal blooms.

How to measure turbidity

The turbidity tube is a long thin plastic tube with three black squiggly lines on the bottom and a scale on the side.

1. Collect a water sample in a sample bottle.
2. Gradually pour the sample into the turbidity tube while looking down the tube.
3. Stop pouring when you can barely see the squiggly lines on the bottom.
4. Note the number on the side of the tube where the water has come up to and record it on **Sheet D** (page 20).
5. If you fill the turbidity tube right to the top and can still see the squiggly lines, record as 'less than 10 NTU'.
6. Make sure you wash your turbidity tube well after using it so it gives good results next time (also make sure it doesn't get scratched).

Units for turbidity

Turbidity is measured in nephelometric turbidity units (NTU) from 10 (low turbidity) to 400 (high turbidity).

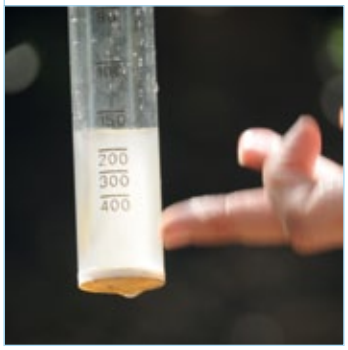
What do the results mean?

Natural turbidity levels in Top End rivers vary between 2 and 15 NTU's in the dry season. Wet season results will be naturally higher and can range from 100 to 400. Find out the normal range in your water body and get to know what you should expect.

Dry season values:

Good: Less than 15 NTU **OK:** 15 to 200 NTU **Poor:** More than 200 NTU

Low turbidity
High turbidity



NOTE

You should get to know the natural pH values for your sites so you can tell if something has changed. pH changes during the day due to plant and animal processes, which is why it is important to always test at the same time.

pH

What is pH?

pH is how acidic or alkaline the water is (battery acid, lemon and vinegar are very acidic - soap, bleach and limestone are very alkaline).

Why is pH important?

- If the pH of a water body is outside the normal range for a water animal or plant it can cause stress or even death.
- Many chemicals and heavy metals dissolve better in acidic waters, so pollution effects can be worse if the water is acidic.

What causes pH to change?

- Rainfall is naturally slightly acidic (low pH) because of carbon dioxide dissolved in it.
- Acid sulphate soils cause low pH.
- Pollution, like run off from a mine, can change the pH of a water body.
- Water running off limestone areas has relatively high pH.

How to measure pH

You can use a pH kit with pH strips to measure the pH (you may also be familiar with pH testing kits used for swimming pools). pH strips are paper strips that change colour to show the pH. Check the expiry date before using them.

1. Collect a sample of water.
2. Place the pH strip in the sample leaving a bit sticking out to hold on to.
3. Wait for a minute or so for the colour to develop.
4. Pull the strip out and compare the colours with the chart provided to find the pH reading.
5. Record your answer on **Sheet D** (page 20).

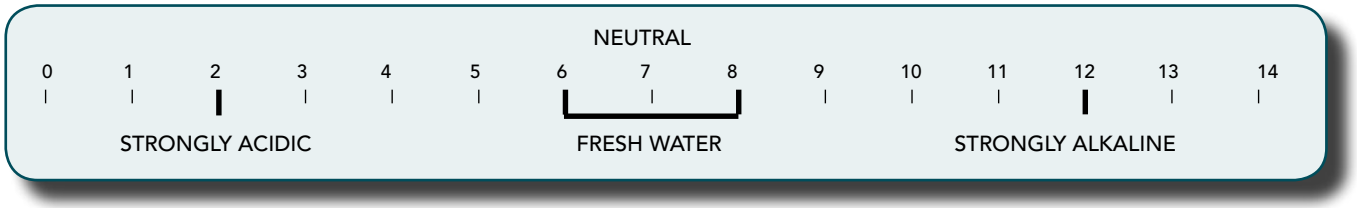
Units for pH

pH is measured in pH units which range from 0 (highly acidic) to 14 (highly alkaline).

- pH of 7 is neutral (tap water is neutral)
- pH of less than 7 is acidic
- pH of greater than 7 is alkaline

What do the results mean?

pH values in Top End rivers range between 6.5 and 8.5 pH units which is the range that animals and plants like. Many water bodies have a pH close to 7, however the range in limestone areas is greater than 7 and in non limestone areas can be less than 7.



SALINITY

What is salinity?

Salinity tells us how salty the water is.

Why is salinity important?

Different waters naturally have different amounts of salt:

- Seawater has lots of salt.
- Freshwater streams usually have very little salt.

If the water is more salty, or less salty, than what the plants and animals are used to, they can get sick and might die.

What causes salinity to change?

- The geology and soils affect the salinity of the water.
- Removing trees can increase the amount of salt because trees help keep the salt out of the soil.
- Farming, mining and urban development can all increase salinity levels in water.

How to measure salinity

Salty water conducts electricity better than non-salty water. Conductivity is a good measure of salinity: high conductivity = high salinity. You should use a conductivity meter. Put the probe in the water following the instructions for your meter and record the answer on **Sheet D** (page 20).

Units for conductivity

Conductivity is recorded in microSiemens per centimetre (µS/cm), microSiemens per centimetre are also called EC units (EC stands for Electrical Conductivity).

Sometimes other units are used:

- 1 milliSiemen per centimetre (1 mS/cm) is equal to 1000 µS/cm.
- 1 deciSiemen per metre (1 dS/m) is equal to 1000 µS/cm.

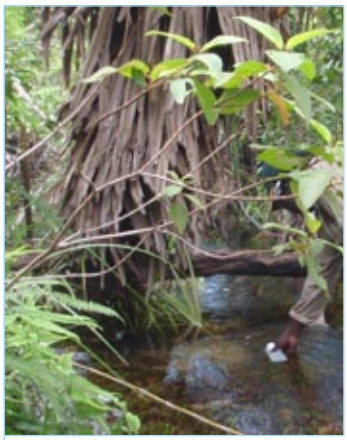
What do the results mean?

Conductivity in Top End rivers ranges between 5 and 800 µS/cm. Tap water is usually around 100 µS/cm. Water flowing off sandstone escarpments can be as low as 20 µS/cm and in limestone areas can be around the 500 µS/cm range. Get to know the normal conductivity at your sites so you can tell if things have changed.

CONDUCTIVITY	WHAT THE WATER CAN BE USED FOR
Less than 800 µS/cm	Healthy rivers, creeks and wetlands. People and animals drinking. Watering plants.
800 to 2500 µS/cm	People and animals drinking. Limited use for watering plants.
2500 to 10,000 µS/cm	Some animals can drink.
Over 10,000 µS/cm	Some cattle can drink but check first. Seawater is around 56,000 µS/cm.

SHEET D: WATER QUALITY			
Site name			
Tester's name		*Site code*	
Date		*Time*	
Equipment used			
RESULTS			
Water temperature	°C		
Turbidity	NTU		
pH			
Conductivity	µS/cm		
Comments Describe things related to water quality like: • oil • scum • foam • sediment • smells • the weather • changes since your last visit			

2E. OTHER WATER TESTS



If your water testing shows some unusual or changed results you may want to carry out other tests to find out what is going on. These tests are not covered in this learning guide - to learn more about them start with the information under 1A on page 2. You may need to ring up a water expert and get them to help you with further testing. A multi meter might come in handy for doing lots of tests at once.

Other tests might include:

- Dissolved oxygen
- Nutrients including nitrogen and phosphorus
- Alkalinity
- Heavy metals and pesticides
- Faecal coliform bacteria

ASSIGNMENT 2 A2

TESTING WATER BUGS

With your group carry out water bug testing at 3 different sites. Identify the bugs you find and fill in **Sheet C** for each site.

In your group discuss the water bug results you have recorded on **Sheet C** (page 13). Do you think your water body is healthy, or unhealthy?

Write the answers here OR tell them to your trainer.

SITE 1

What is the water quality at this site based on your bug score on **Sheet C**?

.....

What do you think is making the water healthy or unhealthy?

.....

.....

.....

SITE 2

What is the water quality at this site based on your bug score on **Sheet C**?

.....

What do you think is making the water healthy or unhealthy?

.....

.....

.....

SITE 3

What is the water quality at this site based on your bug score on **Sheet C**?

.....

What do you think is making the water healthy or unhealthy?

.....

.....

.....

FINISHING UP

3

3A. CLEANING UP

You should make sure you clean up all your equipment, dry it off and store it properly for next time.

3B. DISPOSAL OF WASTE MATERIAL

Make sure no rubbish is left at the site and dispose of any waste properly.

3C. EQUIPMENT MAINTENANCE

It is very important to keep your water testing equipment in good condition so that it works properly. Make sure you follow the manufacturer's instructions to keep your equipment maintained properly.

3D. RECORD KEEPING

After the data sheets have been filled in, it is very important they are handed over to a coordinator for storage and entry into a database. One person should take responsibility for the task of data collecting, storing and reporting.

WHAT'S NEXT?

You might be interested in improving land management and then testing again to see if the water is getting healthier. Things you might do to improve water health include:

- Increase traditional land management.
- Improve fire management.
- Fence off water bodies to stop animals entering.
- Control weeds and feral animals.
- Plant trees, shrubs and grasses along riverbanks.
- Clean out waterholes and remove dead animals and rubbish.
- Look upstream for negative impacts and address them.
- Stop pollution and educate the community.

ACTIVITY

In your group discuss the sites you have visited while doing water quality testing. Talk about what activities people could do to improve land management and make the water bodies more healthy.

ASSIGNMENT 3 A3

WATER QUALITY TESTING

With your group carry out water quality testing at 3 different sites. Fill in **Sheet D** (page 20) for each site.

For each test make some comments about each site – either write the answers here OR tell them to your trainer.

Comment on what the results mean – was it a normal reading or was it higher or lower than expected? Comment on what might be causing the result.

Examples ..... the turbidity was high because the cows had stirred up the water

..... the temperature was high because there were no trees shading the site

..... the pH was high because we were in a limestone area

..... the salinity was normal

WATER TEMPERATURE

Site 1 .....

Site 2 .....

Site 3 .....

TURBIDITY

Site 1 .....

Site 2 .....

Site 3 .....

pH

Site 1 .....

Site 2 .....

Site 3 .....

SALINITY (MEASURED BY CONDUCTIVITY)

Site 1 .....

Site 2 .....

Site 3 .....

RESOURCES

RESOURCE 1: WHERE TO BUY WATER TESTING EQUIPMENT

NORTHERN TERRITORY

MEDICAL AND LABORATORY SUPPLIES PTY LTD
Tel: 08 8947 2226
Fax: 08 8984 3114
Unit 10, Lot 3075 Makagon Road, Berrimah NT 0828
(good for pH kits and pipettes)

TERRITORY MATERIALS HANDLING
6 Swan Crescent
Winnellie NT 0820
Ph: (08) 89473077 Fax: 08) 8947 3087
Email: terrmat@bigpond.com.au
Website: www.terrmat.com

NATIONAL

AUSTRALIAN ENTOMOLOGICAL SUPPLIES PTY LTD
Tel: 02 6684 7650
Fax: 02 6684 7188
www.entosupplies.com.au
PO Box 250, Bangalow NSW 2479
(good for dip nets for water bug testing)

MERCK PTY LTD
Tel: 03 9728 5855 or 1800 335 571
Fax: 03 9728 7611
207 Colchester Road, Kilsyth VIC 3137
www.merck.com.au
(good for conductivity meters and pH kits)

THERMO FISHER SCIENTIFIC (Biolab)
Tel: 1300 735 292
Fax: 1800 067 639
PO Box 9092, Scoresby VIC 3179
www.thermofisher.com.au
(good for conductivity meters)

VENDART PTY LTD
Tel: 02 9450 0466
Fax: 02 9450 0755
1/16 Narabang Way, Belrose NSW 2085
www.vendart.com
(good for conductivity meters, dip nets, pH kits, turbidity tubes and basic community water quality kits)

RESOURCE 2: EXAMPLES OF COMPLETED DATA SHEETS

SHEET A: ABORIGINAL CULTURAL VALUES						
Site name	Gurrambai (Rapid Creek)					
Tester's name	Joe Bloggs			Date	1/6/2010	
1. Check that the traditional owners and custodians are happy about the project:						
Who are the traditional owners/ custodians for this water body?	Larrakia					
Are they happy for you to do this project at this water body? (circle the answer)	(Yes)	No	Maybe	Don't know		
	Talk to your trainer about these answers					
2. Interview the traditional owners and custodians and ask them to answer these questions:						
What did people used to do here?	Fish, collect yabbies, camp, drink water.					
What do people do here now?	Swimming and recreation.					
What animals live in the water?	Small fish, maybe yabbies					
Would you fish here?	Yes	(No)	Would you eat what you caught?		Yes	(No)
Do you think this water is healthy?	Yes	(No)	Why?	Pollution from the airport. Rubbish from creek users.		
How do you decide if the water is healthy?	Look to see what fish are in it. What's on the banks. What it smells like					
How has the land and water changed here over the years?	Water is not fresh and you can't drink it. Less fish.					
What do people do here to look after this water?	Clean up rubbish. Plant trees.					
What else can we do to make water healthier?	Education. Stop pollution. Remove dead animals.					
What would you like to see happen here?	Tell the story about how old people would have valued + looked after site.					

SHEET B: SITE INFORMATION

GENERAL INFORMATION

Site name	East Baines River, Victoria Highway Crossing		
Tester's name	Joe Bloggs	Site code	EB01
Date	28/6/10	Time	9.45am
Water body type	River		
Location	East Baines River, Victoria Highway crossing – Bulla community turn off 400m upstream		
Site access	Turn off Vic. Highway at Bulla community, travel 400m down main track, turn right + follow to creek		
Landowner name and contact details	Bulla community Tel: (08)91687306 Ngaliwurru-wuli Association		
GPS reading	S: 15 °46.10 E: 130°01.94		
Photos taken	Yes 0001 – 0007		
Current land use	Bushland, community living area.		

ENVIRONMENTAL INFORMATION

Width	50m	**Depth**	Dry season 1–2m
Bank slope	steep in places 45° angle	**Water flow**	Slow
Native vegetation	Melaleucas close to water's edge, on upper bank some large Boab trees and woodland forest		
Weeds	some Parkinsonia and Neem trees on upper bank		
Native animals	Wallaby tracks on banks, fish seen in water.		
Stock/feral animals	Cattle on surrounding property, Auvergne station		
Fire	Recent fire on right hand bank (looking downstream)		
Erosion	Some on banks where tracks go down to river.		
Other			

SHEET C: WATER BUGS

Site Name	East Baines River, Victoria Highway Crossing		
Tester's name	Joe Bloggs	Site Code	EB01
Date	28/6/2010	Time	9.45am

GROUP	BUGS	CIRCLE THE BUG'S SPECIAL NUMBER IF THE BUG IS PRESENT
Group 1	Mayfly nymph	(7)
Group 2	Damselfly nymph	(6)
	Dragonfly nymph	(6)
	Caddisfly larvae	(6)
	Freshwater shrimp	5
	Water mite	(5)
	Riffle beetle and larvae	5
Group 3	True bugs	(4)
	Yabby	4
	Prawn	4
	Mussel	4
	Beetle larvae	(4)
	Beetle	(3)
	Snails	3
	Leech	3
	Flatworm	3
Group 4	Fly larvae	2
	Mosquito larvae	(2)
	Midge larvae	(1)
	Freshwater worm	1
TOTAL (add up the circled numbers)		44

What did you score?

20 or less = Poor water quality 21 to 35 = Fair water quality

(36 to 50 = Good water quality) 51 or more = Excellent water quality

SHEET D: WATER QUALITY

Site name	East Baines River, Victoria Highway Crossing		
Tester's name	Joe Bloggs	Site code	EB01
Date	28/6/2010	Time	9.45am
Equipment used	Thermometer, pH kit, EC scan, turbidity tube		

RESULTS

Water temperature	25.4	°C
Turbidity	8	NTU
pH	8.0	
Conductivity	390	µS/cm

Comments

Describe things related to water quality like:

- oil
- scum
- foam
- sediment
- smells
- the weather
- changes since your last visit

Water is clear and clean.
Can see to the bottom.
No oils, foam or scum on the water.
Water smells OK.
No recent rain in the community.
Some rubbish on the banks but none in the water.

ALEP

Aboriginal Landcare Education Program

ALEP Learning Guides. These full colour, step-by-step guides provide practical, easy to follow instructions. Based in the Top End of the Northern Territory, they can also be adapted to other regions.

GETTING READY

1. ALEP Learning Guides – Trainer's Guide
2. Carry Out Natural Area Restoration Works

RECOGNISING PLANTS

3. Recognise Plants
4. Collect, Prepare and Preserve Plant Specimens

GROWING PLANTS

5. Collect, Treat and Store Seed
6. Maintain Properties and Structures
7. Install Micro-irrigation Systems
8. Undertake Propagation Activities
9. Pot Up Plants
10. Tend Nursery Plants

MANAGING COUNTRY

11. Treat Weeds
12. Install, Maintain and Repair Fencing
13. Plant Trees and Shrubs
14. **Perform Basic Water Quality Tests**

In this learning guide, *Perform Basic Water Quality Tests* **you will learn how to:**

- PREPARE TO TEST WATER
- PERFORM WATER TESTS
- RECORD WATER TESTS AND CLEAN UP

ISBN: 978-0-9806872-4-8 (2012)

For further information contact Greening Australia (NT) Ltd on
(08) 8947 3793 or info@nt.greeningaustralia.org.au or go to www.greeningaustralia.org.au

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