

GEOGRAPHY BULLETIN

Investigating the world: Geographical inquiry, fieldwork and differentiation



The
Geography Teachers' Association
of New South Wales Inc.

Volume 48 No 3 2016

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Geography Teachers' Association
of New South Wales Inc.

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Front cover: High in the Rocky Mountains of Canada where the Bow River catchment begins. Source: L. Schaffer

Back cover: Old wharf and buildings at the historic Port of Echuca, Murray River Victoria. Source: CSIRO Science Image 4618, Wikimedia Commons

GEOGRAPHY BULLETIN

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The Geography Bulletin is a quarterly journal of The Geography Teachers' Association of New South Wales. The 'Bulletin' embraces those natural and human phenomena which fashion the character of the Earth's surface. In addition to this it sees Geography as incorporating 'issues' which confront the discipline and its students. The Geography Bulletin is designed to serve teachers and students of Geography. The journal has a particular emphasis on the area of the Pacific basin and its near neighbours and a specific role in providing material to help meet the requirements of the Geography syllabuses. As an evolving journal the Geography Bulletin attempts to satisfy the requirements of a broad readership and in so doing improve its service to teachers. Those individuals wishing to contribute to the publication are directed to the 'Advice to contributors' on the preceding page. Articles are submitted to two referees. Any decisions as to the applicability to secondary and/or tertiary education are made by the referees. Authors, it is suggested, should direct articles according to editorial policy.

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STUDENT
CONTENT



Lorraine Chaffer, Editor

EDITORIAL

Welcome to the third issue of the GTA NSW bulletin for 2016. In this issue support for implementation of the new Geography K–10 Syllabus in 2017 continues with all articles linked to existing and /or new syllabuses for K–6 and 7–10.

Primary teachers and students across the state have been learning the skills needed to undertake fieldwork for geographical inquiry. In a new section titled WHAT'S HAPPENING IN OUR SCHOOL?, the *Kindergarten love geography* article by Rebecca Pierpoint showcases the fieldwork activities of kindergarten students at Waverley Public School. These activities were integrated into the unit **People live in places** attached to the article.

Differentiating the curriculum is a key thread in two of the articles in this edition.

- In *Differentiating geography fieldwork to address student needs* Louise Swanson and Darika Pose examine strategies for differentiating fieldwork activities to cater for students with a range of learning difficulties.
- In the *Bow River Waterscape* visual resources are the basis for three different inquiry activities that examine the way water connects people, places and environments and the importance of water management to reduce water scarcity. This has been written for the Stage 4 Unit **Water in the World**. In a mixed ability class, students can undertake an independent inquiry, a guided inquiry based on a set of questions or a class inquiry with strong teacher direction. Alternatively, different stage 4 classes within a school could choose one of the three learning activities to suit the needs of students. This is the final in the series of four articles titled *Canada: Beautiful, liveable but vulnerable* by Lorraine Chaffer in which Canada is used to teach components of the content of the new Geography K–10 syllabus, Stage 4 and 5 topics. Comparisons can easily be made to Australia.

Invasive species in Australia's aquatic environments written by Lorraine Chaffer is an interesting case study for those choosing inland water environments such as wetlands or rivers for the option study in the Stage 5 Unit **Environmental Change and Management**. The study offers a springboard for an investigation into invasive species in marine environments or a comparative study of another country.

Teachers looking for new ideas for integrating fieldwork into Stages 4 and 5 topics might find the article *Year 7 Fieldwork: Investigating the environment* by Grace Larobina a useful starting point. With a focus on observing, measuring and recording primary data and representing relevant secondary data the activities are easily adapted to studies with a biophysical geography focus such as **Landforms and Landscapes, Water in the World, Sustainable Biomes** and **Environmental Change and Management**.

GTA activities

Throughout term 3 GTA NSW has continued to provide support for teachers unpacking the new syllabus as well as the teaching and learning of geography from Kindergarten to the HSC.

GTA NSW councillors Susan Caldis, Louise Swanson, Catherine Donnelly and Lorraine Chaffer have provided after school professional learning activities to introduce the new syllabus to primary schools in Sydney, Newcastle and the Central Coast. This support will continue throughout term 4 when and where possible and on the request to GTA NSW.

The HSC student lecture series was taken “on the road” with lectures presented to HSC students at Lindisfarne Grammar School in Banora Point and John Pauls College, Coffs Harbour. With feedback from these events a revised version of the HSC lecture series will be investigated by Lorraine Chaffer for 2017 with possible implementation in regions lacking access to HSC support events.

A special **HSC edition of the bulletin** is still planned for term 4 but will rely on member contributions to be a success by supporting teachers with new or updated material for their HSC 2018 classes.

GTA NSW members are encouraged to attend the AGTA conference in Melbourne in January 2017. The conference offers a wonderful range of speakers and topics for Geography teachers across all states and territories based on the Australian curriculum. Several GTA NSW councillors will present at the conference.



**AGTA 2017
CONFERENCE**

**Geography for an
inter-connected world**

9–12 January 2017 – University of Melbourne, Parkville Campus

We invite Australasian and international geography teachers and academics to attend the four day AGTA 2017 Conference to be held from Monday 9 to Thursday 12 January 2017 at the University of Melbourne, Parkville Campus. The conference organisational arrangements are being undertaken by the Geography Teachers Association of Victoria.

The organising committee are delighted to announce the following outstanding keynote speakers for the AGTA 2017 Conference — Dr Rachel Carey, Professor William Cartwright, Professor David Lambert, Dr Michael Solem and Professor Bruce Rasmussen.

Conference delegates will have the opportunity to participate in a stimulating education program of presentations, hands on workshops and field trips as well as a preconference study tour to western Victoria.

CONFERENCE LOCATION

The University of Melbourne – Parkville campus offers a variety of unique cultural, architectural and landscape features which play an important part in the history of the City of Melbourne and the story of Victoria.

Visitors to campus can download a self-guided walking tour map which provides you with a plotted history of campus architecture and other landscape features.

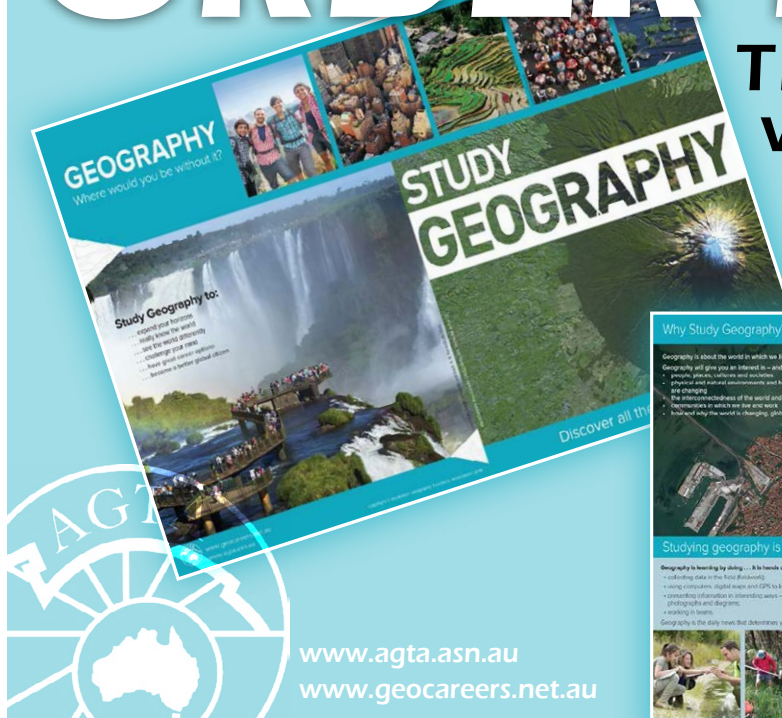
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EDITORIAL

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WHAT'S HAPPENING IN OUR SCHOOL?



Students created posters on the theme "Take 3 for the Sea"

Kindergarten love geography

"Kindergarten are very keen geographers who cheer when Geography is on the daily timetable. They love learning about the world, reading maps, learning about other cultures and referring to the globe when we talk about other countries or read stories".

Rebecca Pierpoint
Waverley Public School

Professional Learning

During Terms 2 and 3, staff at Waverley Public School undertook professional learning activities to assist them with programming the Geography Syllabus K–6. These activities included attendance at workshops during the CoSiES (Community of Schools in the Eastern Suburbs) Conference in Term 2 and a full day on programming essentials with Geography Education Consultant, Lorraine Chaffer for Term 3 Staff Development Day. Collaboration between classroom teachers and school leaders at these events resulted in the sharing of ideas and resources between schools and the development of an air of confidence and excitement about teaching Geography as a stand alone subject for the first time. With an understanding of geographical inquiry skills and tools, including fieldwork and simple spatial technologies Waverley Public School had its first Geography teaching programs ready for implementation in Semester 2.

Kindergarten love geography



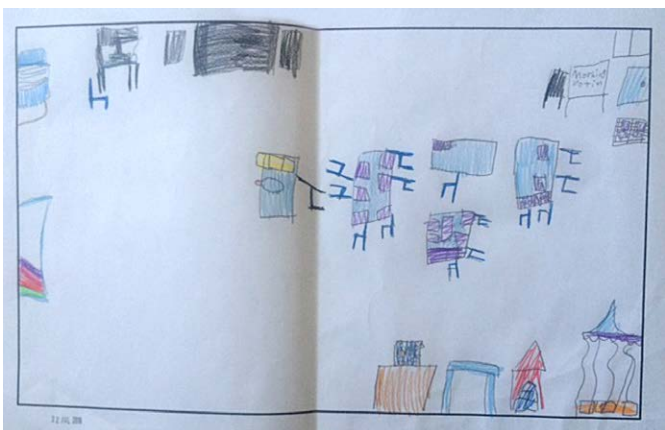
A nice day for kindergartens first fieldwork activity

Geography lessons

The kindergarten students at Waverley Public School have been participating in Geography lessons based around place and the importance of places. Student activities have included:

- Creating pictorial maps of our classroom and the local area
- Exploring the area around the school via Google Earth, maps and fieldwork
- Walking around the school's locality to identify the natural and human features of the environment including places they could see further away such as Centrepont Tower and planes arriving at and leaving Sydney airport. Where possible places were named correctly.

First map: The classroom



Students represented objects in the classroom on a map. Yes this room has a tent. Note: It is difficult for young students to create bird's eye view maps

Fieldwork and post fieldwork activities undertaken by students included:

- Observing features of places
- Field sketching on a template attached firmly to a clipboard

- Discussing the Aboriginal heritage of the area and what the land might have looked like many years ago
- Identifying North, East, South and West using compasses
- Talking about the importance of the places they visited and sketched and answering questions about why we should care about them.
- Creating "Take 3 for the Sea" posters

Aboriginal history and culture was integrated through fieldwork and art / mapping based activities.

First fieldwork activities: Field sketching



"Kindergarten has been learning about Aboriginal life and culture including how Aboriginal people recorded information such as in the form of rock art and rock engravings. We discussed what rock art could be around our local area. As we are a school that is very close of the ocean, we decided to draw fish and other sea creatures that were a major source of food for the local Aboriginal people."

Armed with clipboards and a pencil kindergarten investigate their world



Kindergarten love geography

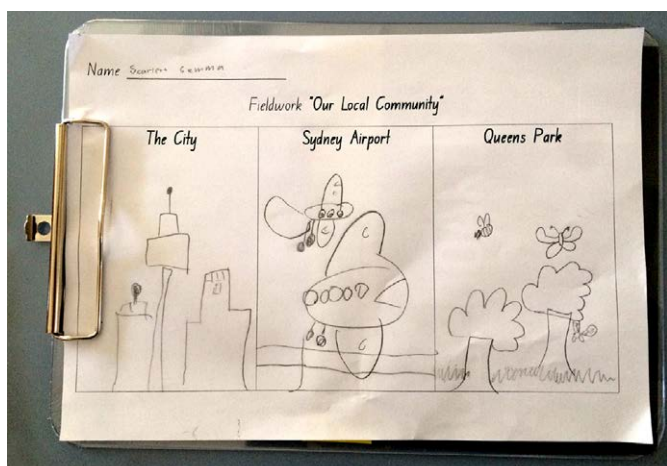
Note from the editor

Rebecca has agreed to share the trial teaching program developed for the kindergarten unit "People live in places". Now that the unit has finished I am hoping Rebecca will be able to update us on revisions the kindergarten teachers will make in light of their experience teaching Geography in term 3

Thank you Rebecca for sharing your experiences with GTA NSW bulletin readers. It is exciting to see Geography engaging young students with the real world through fieldwork and inquiry and to see them using geographical tools to represent the places they have investigated and issues such as ocean pollution.

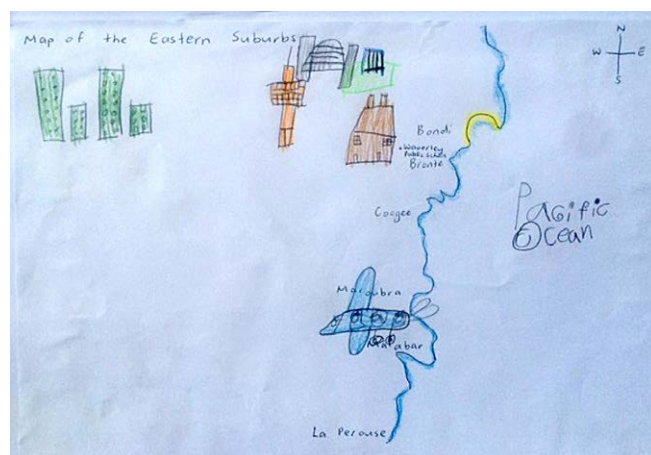
Lorraine Chaffer

First field sketch: Places observed during fieldwork



You have to love the little additions – such as bees

Pictorial map of places observed during fieldwork



Students added drawings of places observed from their eastern suburbs school onto a labelled base map

Mapping and art using Aboriginal drawings



Unit of work – People Living in Places

Unit description		Key inquiry questions	Content Focus
<p>Students explore the places they live in and belong to. They develop an understanding of what makes a place special and how this may differ for different people. Students learn about the importance of looking after places. Students explore how the location of places can be represented.</p>		<ul style="list-style-type: none"> • What are places like? • How can we look after the places we live in? • What makes a place special? 	<ul style="list-style-type: none"> • Explore the places they live in and belong to • Develop an understanding of what makes a place special and how this may differ for different people • Learn about the importance of looking after places • Explore how the location of places can be represented
Outcomes	Geographical concepts	Geographical inquiry skills	Geographical tools
<p>GEe-1: identifies places and develops an understanding of the importance of places to people</p> <p>GEe-2: communicates geographical information and uses geographical tools</p>	<p>Place: <i>the significance of places and what they are like</i></p> <p>Space: <i>the significance of location and spatial distribution, and ways people organise and manage the spaces that we live in</i></p> <p>Environment: <i>the significance of the environment in human life, and the important interrelationships between humans and the environment</i></p>	<p>The following geographical skills have been integrated into the unit:</p> <p>Acquiring geographical information</p> <ul style="list-style-type: none"> • Pose questions and make observations (ACHGS001) • record geographical data and information (ACHGS002) <p>Processing geographical information</p> <ul style="list-style-type: none"> • Represent data using charts or graphs (ACHGS003) • Draw conclusions based on discussions of observations (ACHGS004) <p>Communicating geographical information</p> <ul style="list-style-type: none"> • Present information (ACHGS005) • Reflect on their learning (ACHGS006) 	<p>The following geographical tools have been integrated into the unit:</p> <p>Maps – M</p> <ul style="list-style-type: none"> • Pictorial maps, online maps <p>Fieldwork – F</p> <ul style="list-style-type: none"> • Observing and recording data <p>Graphs and statistics – GS</p> <ul style="list-style-type: none"> • Tally charts, pictographs <p>Spatial technologies – ST</p> <ul style="list-style-type: none"> • Virtual maps <p>Visual representations – VR</p> <ul style="list-style-type: none"> • Photographs, illustrations, story books, multimedia

GEOGRAPHY – ES1 PEOPLE LIVE IN PLACES

Week	Content	Lesson	Resources	Reg
Week 1,2,3	<p>Important Places:</p> <ul style="list-style-type: none"> – investigate the importance of places they live in and belong to – identification of places they live in and belong to – discussion of why places are special and how people care for them – explanation of why people need to take care of places <p>Locating Places:</p> <ul style="list-style-type: none"> – investigate how the location of places can be represented – location of familiar and local places on maps – description of the location of places <p>Aboriginal and Torres Strait Islander places:</p> <ul style="list-style-type: none"> – investigate the countries / Places important to Aboriginal or Torres Strait Islander Peoples – identification of an Aboriginal or Torres Strait Islander site, Country or Place – discussion of why the site, Country or Place is important 	<p>Inquiry 1 – What are places like?</p> <ul style="list-style-type: none"> • Students develop a pictorial map of the classroom to represent furniture and objects in the room – directed drawing. • Using a stimulus such as <i>My Farm</i> by Alison Lester, students identify a special place and why it is important to people by posing and responding to questions: <ul style="list-style-type: none"> – Why is the farm special? – How did people take care of the farm? – Why did people need to take care of the farm? • Students reflect on their own special place and present information about: <ul style="list-style-type: none"> – Where they live and the family members who live with them – Special belongings at home eg toys, bedroom, pet etc – How they and other people take care of this place eg cleaning, gardening, painting etc. • Students discuss what makes their place special. They group reasons into categories and present the information in a chart. • Fieldwork – Walk around the local community (back of WPS): <ul style="list-style-type: none"> – Locate the city (Centrepont Tower), Sydney airport, Queens Park / Centennial Park. Students record these locations by drawing the landmarks. – Discuss the importance / significance of these landmarks – Observe and identify the natural and human features of the area. “Why is it special?” “Why should we care?” – Explain this area is Gadigal Land – talk about what it would have looked like, and how the Aboriginal people used it before colonisation. “Why is it special?” “Why should we care?” – Using a compass identify North, East, South, West. – Photograph the area using the iPad – At the conclusion of fieldwork, locate this area/special place using Google Earth and on a local map. 	<p>HSE book, paper, pencils</p> <p><i>My Farm</i> by Alison Lester http://alisonlester.com/</p> <p>Post-it notes, cardboard, pencils</p> <p>Clipboards, pencils, paper, compasses, iPads, worksheet with boxes to draw the landmarks</p>	

GEOGRAPHY – ES1 PEOPLE LIVE IN PLACES

<p>Week 4, 5, 6</p> <p>Important Places:</p> <ul style="list-style-type: none"> – investigate the importance of places they live in and belong to – identification of places they live in and belong to – discussion of why places are special and how people care for them – explanation of why people need to take care of places <p>Locating Places:</p> <ul style="list-style-type: none"> – investigate how the location of places can be represented – location of familiar and local places on maps – description of the location of places 	<p>Inquiry 2 - How can we look after the places we live in?</p> <ul style="list-style-type: none"> • Discussion about litter *Have photos displayed of places that are littered: <ul style="list-style-type: none"> – Who do we need to put litter in the bin? – What is the impact of litter on the environment? – How does it make you feel? – How can we reduce litter in our environment? – Why should we care? – Discuss Clean Up Australia Day, Reduce/Reuse/Recycle, Take 3 • Take 3: <ul style="list-style-type: none"> – Explore the Take 3 website http://www.take3.org.au – Discuss the great idea of taking 3 pieces of litter from the ocean, lake or any waterway. Why is it important to stop litter entering the waterways? – Show images/video of the Great Pacific Garbage Patch – Why should we care? – Create a poster to promote 'Take 3' • Fieldwork – Litter data: <ul style="list-style-type: none"> – Plot litter on a map of the playground – Sort litter, place litter on the ground to create a 3D pictograph – Discuss the location of litter in relation to uses of places to develop understandings of cause and effect. – Brainstorm impacts of litter eg aesthetics, birds feed, washes into drains. – Discuss connection between the roles of multiple participants in the maintenance of the area. – Why should we care? 	<p>Photographs of littered places (local and global)</p> <p>Australia Day, RRR, Take 3 images/posters</p> <p>Take 3 website, map of the Pacific showing water currents, Cardboard, pencils, glue, craft</p> <p>Map of the playground, pencils, clipboards, chalk to draw a pictograph outside, images of impacts of litter, iPad to photograph</p>
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GEOGRAPHY – ES1 PEOPLE LIVE IN PLACES

Week 7,8,9	Important Places:	Inquiry 3 – What makes a place special?	
	<ul style="list-style-type: none"> investigate the importance of places they live in and belong to identification of places they live in and belong to discussion of why places are special and how people care for them explanation of why people need to take care of places 	<p>Inquiry 3 – What makes a place special?</p> <ul style="list-style-type: none"> Aboriginal and Torres Strait Islander special place is 'country'. We can identify these places by looking at paintings, middens and rock engravings.: <ul style="list-style-type: none"> Introduce the local Aboriginal group – they lived on the Coast – discuss how they may have used the resources? What types of food would they have eaten (seafood). Have a 'virtual' tour of Aboriginal sites – information at the csiro website. Have a giant map of the eastern suburbs and draw (pictograph) where the Aboriginal sites are. http://www.atnf.csiro.au/people/Ray.Norris/SydneyRockArt/sites/Tamarama/index.htm Fieldwork – Bondi to Bronte coastal walk: <ul style="list-style-type: none"> Identify direction by using a compass. Explore Aboriginal rock engravings – what do you think they represent? What does it tell us about the area? Share the local dreaming story that goes with the rock engravings (the whale and the star fish) Discuss the similarities in the story and what happens in this area (whales migrating, star fish in the rock pools) Why is this area special for Aboriginal people? Close to food, sea, shelter Identify the local Aboriginal language group. Complete the 'observing and collecting data' worksheet. Using senses to record information about the area. Once back at school: <ul style="list-style-type: none"> Locate the coastal walk on a map of Australia, on google earth and a local map. What do you notice about the vegetation? Compare an old map and recent map – what has changed? Why do you think this happened? Draw a 'now' and 'then' chart and identify changes. Go to http://www.wildaboutwhales.com.au/whale-watching and see where the latest whales have been tracked. On a map of the east coast, draw a pictograph of where whales are located. Brainstorm why the rock engravings are an important place? 	<p>Images of paintings, middens, rock engravings.</p> <p>Giant map, pencils/ crayons</p> <p>Photographs of the rock engravings</p> <p>Compass</p> <p>Dreaming story "The Arrival of the Darawal"</p> <p>Observing and collecting data worksheet, clipboards, pencils, compass</p> <p>Maps of the East Coast of Australia, old maps of the area, google earth, 'now' and 'then' chart.</p>
	<p>Locating Places:</p> <ul style="list-style-type: none"> investigate how the location of places can be represented location of familiar and local places on maps description of the location of places <p>Aboriginal and Torres Strait Islander places:</p> <ul style="list-style-type: none"> investigate the countries / Places important to Aboriginal or Torres Strait Islander Peoples Identification of an Aboriginal or Torres Strait Islander site, Country or Place discussion of why the site, Country or Place is important 		

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Geography
by the
Assoc
exper

- 1** **Inquiry, questioning, investigating**
 - Inquiry
 - Interrogating in geography
 - What kinds of inquiries do geographers make?
 - The link between inquiries and skills
- 2** **Geographic inquiry – the stages**
 - Observing, questioning and planning
 - Collecting, recording, evaluating and representing
 - Interpreting, analysing and concluding
 - Communicating
 - Reflecting and responding
 - Organising data in an inquiry
 - Mind mapping
 - Concept diagrams
- 3** **Thinking Skills**
 - A list of thinking skills
 - A classification of skills
 - A hierarchy of thinking skills
 - Creative thinking
 - Future thinking
 - Thinking skills in inquiry
- 4** **The elements of maps**
 - Map symbols
 - Direction and bearings
 - Scale
 - Distance
 - Locating features with grid coordinates
 - Latitude and longitude
 - Time zones

- Contents related to the inquiry and skills-based requirements of *Australian Curriculum: Geography*
- An engaging, easy to navigate design
- A student friendly approach with step-by-step explanations, descriptions and worked examples
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- A wealth of stimulus material including a diverse range of maps, graphs, aerial photographs, satellite images, diagrams and photographs
- Examples drawn from each Australian state and territory with additional international material
- Key terms explained in embedded glossary boxes

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**Louise Swanson – Head Teacher Teaching and Learning,
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A challenge in conducting fieldwork can be catering for all of the members of the class. Over time organising excursions has become increasingly difficult due to risk assessments, staff training requirements, increasing costs, medical and health plans, and student allergies. In many cases schools are opting for regular, school-based fieldwork over whole day fieldwork excursions to avoid some of the administrative tasks. Differentiation of fieldwork can be quite challenging compared to differentiating a classroom activity. In class based activities teachers are required to develop more focused and personalised learning for students by providing different approaches and resources, or graduated tasks where everyone is expected to complete different sections. Most teachers do this regularly, but trying to apply the same concepts can be quite daunting when trying to apply it to fieldwork.

A range of student needs need to be taken into consideration when planning your excursion. This includes the needs of gifted and talented students, lower ability students, EAL/D students (formerly ESL), students with mobility issues, those hearing or sight impaired and students on the autism spectrum. These students should be given the opportunity to enjoy the many benefits of planned fieldwork, however, you may feel unable to fully cater for them due to resource limitations, time constraints, safety issues and the competing needs of other students. The Commonwealth Disability Standards for Education 2005, Standards for participation, mandate that all students are entitled to reasonable adjustments to ensure access to the curriculum and participation. In Department of Education schools this has been reinforced by the "Every Student, Every School" Learning and Support Framework. As such, it is not only unfair to exclude students from fieldwork, but it is actually not legal.

Lower ability students

Lower ability students may require fieldwork resources to be adjusted. Adjustment can take the form of using simplified language, relatively simple vocabulary, short, simple sentences, extra scaffolding or giving different tasks to different groups of students. Prompting for student answers can take the form of sentence stems or cues such as the beginning letter of an answer. It is important to ensure that students aren't overwhelmed by the amount of text on the fieldwork handout. Be sure to include white space on the page and enlarge images and text font to build student confidence. Use a plain, lower case font, and avoid italics or words in capital letters to enhance students' ability to recognise words. Allow students to just focus on one or two sources of information at once, whether it be the actual fieldwork or supporting data table, graphs or newspaper articles. You may allow lower ability students to complete fewer questions than more able students. If these strategies still don't provide enough structure, prompt cards could be provided for students to copy from.

Differentiating geography fieldwork to address students' needs

Below: A small section of a fieldwork booklet for an excursion to the Blue Mountains designed for mainstream students.

Human interactions with the environment

1. How have people mainly used this area in the past?

2. How do people use this area now?

3. Count the number of visitors taking the Scenic Railway. _____
4. What impact might visitors have on the environment?

Below: The same questions have been redesigned to suit lower ability students.

Human interactions with the environment

1. How have people mainly used this area in the past? Circle the relevant activities.

Hunting; mining; horse riding; bushwalking; scientific research; tourism; housing; education
2. How do people use this area now? Circle the relevant activities.

Hunting; mining; horse riding; bushwalking; scientific research; tourism; housing; education
3. Count the number of visitors taking the Scenic Railway. _____
4. What impact might visitors have on the environment?

Differentiating geography fieldwork to address students' needs

EAL/D

For EAL/D students the key is to ensure that they recognise and understand the key terms used on the fieldtrip. Depending on their level of English proficiency you may choose to allow students to write some of the information in their first language and to then translate it into English. Although this may sound as though it will take the student a long time, it should result in the information that they record being more accurate and enable them to focus on the geographical information as opposed to grappling with language proficiency. Obviously you want to encourage the student to embrace using English as soon as possible. This can be encouraged by providing simplistic definitions of metalanguage and directing students to underline key terms and defining them themselves. If the student is recently arrived, you may choose to assist the student by using Google translate to incorporate their first language into the handout. It is always best if you can then get a person who speaks the language to double check the translation.

Mobility issues

Students with a physical impairment or disability that may hinder their movement may not be able to participate in all activities. If this is the case, appropriate



Photo L Swanson

alternatives need to be provided which meet the same outcomes. This may be replicating the fieldwork technique in a more accessible area or completing virtual activities that model the same technique and replicate similar results. As a last resort a student may watch a video or listen to a sound recording of the technique, but this is not ideal and does not actively involve the student. As much as possible the student should be given the opportunity to actively engage in all activities.

Below: A small section of a fieldwork booklet with adjustments for Korean, EDL/D students.

Human interactions with the environment

1. How have people mainly used this area in the past? Circle the relevant activities.

Hunting; mining; horse riding; bushwalking; scientific research; tourism; housing; education
수렵 ; 채광 ; 말 타기 ; 부쉬 워킹 ; 과학적 연구 ; 관광 여행 ; 주택 ; 교육

2. How do people use this area now? Circle the relevant activities.

Hunting; mining; horse riding; bushwalking; scientific research; tourism; housing; education
수렵 ; 채광 ; 말 타기 ; 부쉬 워킹 ; 과학적 연구 ; 관광 여행 ; 주택 ; 교육

3. Count the number of visitors taking the Scenic Railway. _____

4. What impact might visitors have on the environment?

Differentiating geography fieldwork to address students' needs



Photo L Swanson

Gifted and Talented

Fieldwork resources designed for Gifted and Talented students should have more complex text, advanced language and reference to a greater number of sources. Questions should require greater breadth and depth of understanding and knowledge and higher levels of skills. Students may enjoy being involved in the planning of the day's activities and should be encouraged to shape the fieldwork activities that will take place. Some fieldwork providers actually offer different types of experiences for different students. So if you use an external provider you may use a standard option for most of your students where they are actually led through completing research and fieldwork on a topic, while another group of your gifted and talented students may have more flexibility, choice and challenge in how the fieldwork operates. Students may be provided with extension cards to complete throughout the day. Twice exceptional students (students who are gifted and talented and have a disability for example a sensory processing disorder, ASD or OCD) may also benefit from some of the strategies outlined in other sections.

Autism Spectrum Disorder

Planning should begin before the field trip commences. Teachers should plan in collaboration with parents/caregivers and students about adjustments can be made for the individual student in the form of an Individual Education Plan (IEP). This would include considerations such as how the students are getting to the excursion, if there needs to be a School Learning Support Officer who needs to support the student, whether there is medication that needs to be given to the student, if there are any sensory issues which need to be taken into consideration and if a buddy system would work.

Teachers and parents create a "count down" until the trip both in class and at home. Provide parents with information about the trip so that they can talk to their child and help prepare them for what will happen in the excursion, if there are people who are not teachers, what their role is during the excursion, behaviours expected from the student, who will be there to assist the student. Parents can assist by planning ahead for lunches and snack breaks by adding favourite snacks and lunches and plenty of water for the student. Teachers should inform parents as early as possible about proposed excursions so that planning can occur.

Talking about what will happen on the trip far ahead of time will prepare all students not just the ones with ASD. Many excursion sites have websites with virtual tours and other information to help the student to become orientated with the area. This may occur in the form of a project to learn about the excursion and what they are expected to learn during the excursion. Try to ensure that your information is as accurate as possible so the student develops realistic expectations about what will happen on the day.

Teachers can create a written or picture schedule of the day of the field trip for your child. This way your child can know which parts of the regular school day will be disrupted or altered. Depending on the excursion itself and the student needs, the schedule needs to be quite detailed. The schedule should include breaks and how time will be spent during this time, include how the student will get home after the excursion and that the next day will be as usual.

Students with high level ASD will need to have the activities of the day clearly explained and an itinerary of the day, which includes a list of equipment and clothing that might be needed for their safety. A social story might be created to assist the student with activities for the day and behaviours which are expected to keep them safe. For example, "Victor will attend the excursion with all members of the class. Victor will get on the bus and sit with Tom. Victor will stay with Ms X who will help him during the excursion." You may like to include visuals to assist the student understand what the excursion entails. The story needs to use words like wait, take turns, and the need to be flexible if the plan gets disrupted.

It is advisable to gain the attendance of your School Learning Support Officer (SLSO) for assistance with the student on the day of the fieldwork. Ask the SLSO who ordinarily assists the student to attend, as they would be able to identify signs of anxiety and assist the teacher in alleviating behaviours. Have a plan in place if the student has a meltdown, this should be included in your

Differentiating geography fieldwork to address students' needs

Risk Assessment for the excursion. Be sure to review safety rules and take safety precautions.

Special Education teachers or Learning and Support Teacher (LaST) can assist with modifying activities, fieldwork handouts and follow up activities. Teachers can create worksheets, targeted to each student's level, to help students prepare for the trip. The worksheets can include pictures and words which can be eliminated if applicable or not applicable to activities.

Teachers or aides can use a point chart or reward system to help motivate a student throughout a field trip. Provide frequent positive reinforcement in advance of the trip and throughout the special day.

Vision and hearing impairment

In many cases students with vision or hearing impairments will still be able to participate in fieldwork activities, but may require a range of modifications to the planned activities. Students with hearing impairment should be placed as close as possible to the presenter, or the presenter should be given a transmitter microphone which feeds to the students' headset. You could also give the student the option to record the information given verbally.

Written material and instructions should be given to supplement verbal instructions and information.

Vision impairment may result in students having difficulties scanning and tracking, with depth perception, peripheral vision, difficulty discerning fine detail or narrowed field of vision. From a fieldwork perspective this may result in issues with orientating maps, writing notes, perceiving features of the landscape, trip hazards and uneven ground and recording field data. Activities like landscape sketching are not really possible for vision impaired students and often the instructions to use fieldwork equipment can be too small. Safety issues can come into play if students are expected to climb or cross a river. You should place a barrier around any dangerous sites, or choose sites with fencing. Student handouts should be enlarged, or the student may be given a copy of the handouts on a tablet so that they can zoom in to enlarge details. Modifications to activities can be made, for example "observations" can be replaced with "nearby considerations" which may be made by smelling, hearing, tasting and feeling the environment, rather than looking at it. The students have experienced the site by walking through it so you may ask questions regarding the slope they have walked over, whether it is even, rocky, etc. If you have access to high levels of support or funding you may consider braille labelling of objects, tactile maps, embossed worksheets and braille compasses. Students should be provided with

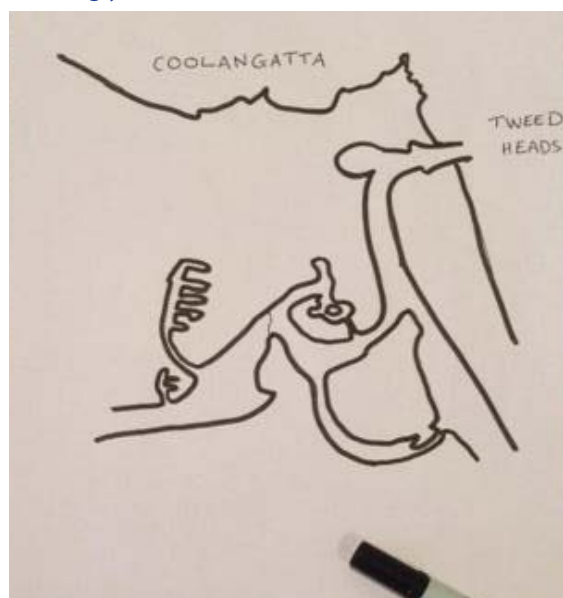
magnification devices and additional time to read text. Tactile experiences are encouraged.

Creating tactile fieldwork maps for vision impaired students

Maps for visually impaired students can be very hard to come by. If you have a good relationship with staff in your TAS faculty, you may be able to create a 3D printed map, but this will involve a fair bit of planning in advance. If you are short on time and would like to provide some additional support for your visually impaired student on a fieldtrip you may like to try creating your own 3D map of the site.

Below: Creating a tactile map for vision impaired students

Create a basic outline of the area where you will be conducting your fieldwork.



Add some basic colour to your map. Ensure that you maintain high colour contrast. If you use colours that are similar to each other it will be hard for the student to differentiate between different features.

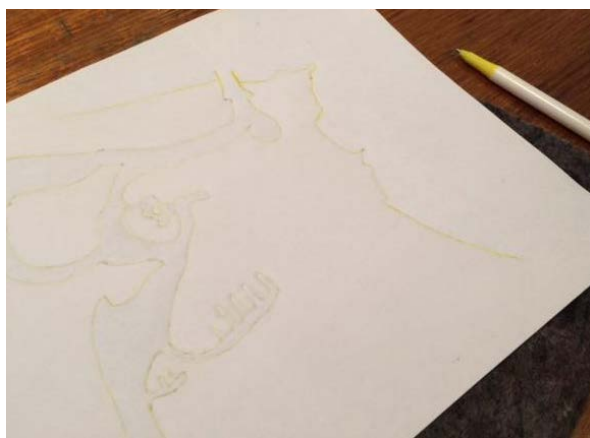


Differentiating geography fieldwork to address students' needs

Use some foam and a light coloured ballpoint pen. If you are super keen you can actually buy something called an embossing tool from a craft store, but it works the same way. (You can use a blue or black ball point pen, but I would suggest covering up the drawing of the reversed image to ensure that you don't confuse the student.



Turn the map over and trace the map outline with the pen while leaning on the foam. This will create a raised impression of the map on the "right side up".



The student will be able to run their finger over the map to feel]



To accentuate particular features on the map, use stickers. Ensure that you can actually feel them when you run your finger over them. You may need to layer a sticker several times to create a raised effect.



In this example red dots have been layered several times to show where field sites are located. Raised jewel-like stickers have been used to show where the sea walls are located.



Photographs L Swanson

Resources:

- <https://www.det.nsw.edu.au/media/downloads/about-us/how-we-operate/national-partnerships-program/every-student-every-school/learning-and-support.pdf>
- <http://techloversblog.com/blind-now-3d-printed-maps/>
- <http://cityminded.org/4-ideas-from-4-continents-helping-the-blind-navigate-cities-14771>
- <https://www.carautismroadmap.org/supporting-students-with-asd-on-field-trips/>
- <http://www.perkinselearning.org/scout/tactile-maps-and-teaching-maps-skills-blind-visually-impaired>

Studies of Canada for Geography 7–10

Canada: Beautiful, liveable, but vulnerable

Lorraine Chaffer, Vice President GTA NSW
Geography Education Consultant
Author: Geography teaching resources

The Bow River on its journey from the Rocky Mountains to the sea. Photo: L Chaffer

Part 4: THE BOW RIVER WATERSCAPE

Part 1 in this series of articles “Canada: beautiful, liveable, yet vulnerable” investigated Canada’s landforms, landscapes and biomes and its vulnerability to natural hazards.

Part 2 was a study of selected Canadian landforms, the geomorphic processes responsible for their formation, associated values and the protection of those values.

Part 3 investigated Canada’s water resources and its vulnerability to atmospheric and hydrologic hazards such as storms, drought and flood.

Part 4: contains three approaches to geographical inquiry into the Bow River catchment using geographical skills and tools

Geographical inquiry three ways

SYLLABUS LINKS

CONTENT: Water in the world

- How the operation of the water cycle connects people and places
- The quantity and variability of water resources
- The economic, cultural, spiritual and aesthetic values of water for people
- The nature of water scarcity and ways of overcoming

CONTENT: Life skills Water in the world

- The importance of water for sustaining life a
- The extent to which fresh water is available and accessible.
- Sources of water for human use and the
- Different ways people use water.
- Factors that affect access to fresh water
- Strategies used to preserve water.
- The value of water to different people across the world.

(<http://syllabus.bos.nsw.edu.au/hsie/geography-k10/content/1185/>)

Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River



The Bow River flowing through the city of Calgary in Alberta, Canada
<http://www.theglobeandmail.com/news/national/protecting-the-health-of-albertas-bow-river/article26767720/>



The Bow River at Banff Photo: L Chaffer

GLOSSARY (<http://syllabus.bos.nsw.edu.au/hsie/geography-k10/glossary/>)

Catchment area: The area drained by a river or water body. Also known as river basin.

Groundwater: Water located beneath Earth's surface filling the spaces between grains of soil or rock.

Precipitation: Forms of water falling from the atmosphere to the Earth's surface

Spatial distribution: The location and arrangement of particular phenomena

Water cycle processes: Physical changes to water that change its state and geographical location.

Climate change: A long-term change in regional or global climate patterns eg. annual precipitation, frequency of weather events



The location of Calgary. Screen Capture from Google Earth

Geographical inquiry three ways

1: Independent inquiry

Students analyse SECONDARY SOURCES to answer an inquiry focus question about the challenges to water security in the Bow River catchment.

2: Guided inquiry

Students will answer sets of questions based on syllabus headings to discuss an inquiry focus question about water resources in the Bow River catchment.

3. Class inquiry: Life skills

The class interpret and discuss visual sources to draw conclusions about water resources in the Bow River catchment and create a visual presentation based on syllabus content and outcomes

1. INDEPENDENT INQUIRY

Inquiry focus question

Why do the water resources of the Bow River catchment need careful management to reduce water scarcity in the future?

Activities

1. Develop a set of “I need to know” questions (contributing questions) to learn about water resources, their use and management in the Bow River Catchment such as: What is the location of the catchment? What are the main sources of water?
2. Interpret and analyse Sources A – N and use to the weblinks to develop your knowledge and understanding and answer your contributing questions.
3. Communicate your answer to the inquiry focus question in a digital presentation.

Students are encouraged to use spatial technologies as part of their presentation. This could take the form of an elevation profile for the Bow River between Bow Lake and Calgary constructed using **Google Earth** (see Weblinks) OR a digital tour of the Bow River catchment created using **Google Tour Builder**.



Bow Lake at the headwaters of the bow River catchment Photo: L Chaffer

2. GUIDED INQUIRY

Inquiry focus question

Why do the water resources of the Bow River catchment need careful management to reduce water scarcity in the future?

Activities

1. Refer to Sources A to N to answer the designated questions under each syllabus heading
2. In groups discuss the answers, collaboratively mind map key ideas and contribute to a class discussion.
3. Teacher models writing an explanation that includes evidence and visual materials.
4. Students answer the inquiry focus question

GUIDED INQUIRY ACTIVITIES

Water resources

Students investigate the characteristics and spatial distribution of water resources in the Bow River catchment by identifying different forms of water used as resources and examining the spatial distribution of water resources

Refer to Sources A – C, Source G

1. Describe the location and dimensions of the Bow River and its catchment using mapping concepts such as latitude, longitude, direction, area and distance.
2. Identify the types of water resources found in the Bow River catchment
3. Identify evidence that the amount of water in the Bow River varies over time
4. List the Google earth satellite image and sources A and B from the largest to the smallest scale. Why is it important for a study of the Bow River catchment to study maps at different scales?

Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River

The water cycle

Students investigate how the water cycle connects people and places in the Bow River Catchment by explaining how water flows within the catchment. They examine of factors influencing water flows and water availability.

Refer to Sources C, D and Google Earth

5. Use Google Earth tools to create an elevation profile for the Bow River between Bow Lake and Calgary (see Weblinks). Identify the different landforms along your elevation profile.

Refer to sources D – F

6. Bow River water flows from the mountains to the sea. Explain what this means by tracking the path of the river from its source to its mouth.
7. Suggest factors that would influence flows of water in the catchment such as topography.
8. Discuss factors that could influence the availability of water in the city of Calgary in one year.

The value of water

Students investigate the economic, cultural, spiritual and aesthetic values of water for people in the Bow River catchment by describing ways water is used by people.

Refer to sources H, I and the photographs

9. Identify and rank the main uses of water in the Bow River catchment
10. List examples of economic, cultural, spiritual and aesthetic values of water for people living in the catchment. Explain two of these values.

Water scarcity and water management

Students investigate the nature of water scarcity and ways of overcoming it by describing causes of water scarcity in the Bow River catchment in Canada. They assess of strategies used by governments, individuals and communities to overcome water scarcity by managing water sustainably and propose individual actions that can contribute to water management

Refer to sources J–L

11. As a class discuss the concept of water scarcity and the general causes of water scarcity. Create a mind map to summarise key ideas.
12. Describe THREE potential causes of water scarcity in the Bow River Catchment

Refer to sources M and N

13. In small groups explain how the actions of either an individual, a community in the Bow River Catchment OR the government of Alberta can

cause water scarcity but also contribute to the better management of water resources.

14. Class debate: Which actions would contribute most to future water scarcity?

Which actions (individual, community or government) would have the greatest impact on the sustainable use of water resources to reduce water scarcity in the future?

3. CLASS INQUIRY: Life Skills/ Learning Difficulties

Classes complete introductory activities to locate the Bow River catchment and discuss the flow of water within it. The following activities can then be completed as a class, in small groups or individually. Use discussion to clarify knowledge, understanding and skills.

Introduction

1. Complete the following activities as a class using Google Earth and Sources C, D and E:
 - Use Google Earth to locate Canada, the city of Calgary, Lake Louise and Banff.
 - Compare the location of Canada and Australia
 - Observe and describe the landscapes around Calgary that can be seen in the satellite image eg. Mountains, valley and plains
 - Discuss whether water flows from Lake Louise to Calgary or from Calgary to Lake Louise
 - Study the diagram of the Bow River and its catchment Source E.
 - Explain a catchment and discuss where water from the Bow River catchment ends up.
 - Examine the climate graphs in Source C. Discuss the link between precipitation and amount of water in the Bow River at each place.)

Water availability

Students investigate sources of water in the Bow River catchment and examine the water cycle. They explore how water is a renewable resource and compare the availability of water as a resource in different places.

Refer to Source F

2. Use the illustration to discuss the movement of water in the water cycle through different locations
3. Students draw a simple diagram to show the movement of water and name water cycle processes
4. Explain why water is a resource and identify some uses of water in Source F.

Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River



Ice skating on frozen River in Calgary Bowness Park (Sluice Gate, an arm of the Bow River. Source: <https://commons.wikimedia.org/wiki/File:Dilmaghanian00711.JPG>)

Water for human use

Students investigate the importance of water in sustaining life and explore different ways in which water is used eg at home, for recreation or in farming. They investigate sources of fresh water for human use.

Refer to Source I

5. Students work in pairs to describe three ways water from the Bow River is used by people.
6. Refer to the graph in Source H to rank the main uses of water from highest to lowest

Factors affecting water accessibility

Students explore how people's activities and actions affect access to fresh water eg water storage and pollution and ways natural hazards affect access to fresh water eg drought. They recognise that access to fresh water is limited.

Refer to source J

7. Study the diagram to identify FOUR ways that people make it easier to get water for farming, industry and towns.
8. Students recognise what happens to the water after it is used for human activities in this diagram?
9. Mind map some problems that could be caused by people's use of water in the Bow River catchment and how this could affect future water supplies?
10. Discuss if these problems would be the same in other catchments.
11. In small groups students suggest how droughts and floods could affect access to water along the Bow River.

Refer to Source L

12. As a class discuss the purpose of the illustration
13. Students identify three changes to water resources that could mean less water available for human activities in the future (water scarcity).

Water as a valuable resource

Students explore the cultural value of water, investigate the economic value of water eg cost of using water within the home and explore the spiritual value of water.

14. Teacher explains the different values of water.

15. Students identify examples of values using the photographs and selected sources

Water management

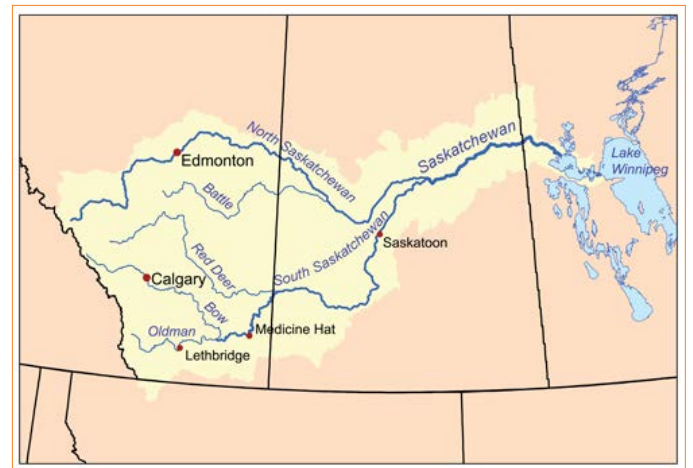
Students examine reasons why water needs to be preserved and investigate strategies to manage water.

Refer to sources M and N

16. Student groups study either rural or urban water management to identify the ways water is used badly and carefully. They put these ideas into a table and contribute to a class discussion.

17. Students create a poster that encourages people to use water wisely to avoid problems in the future.

SOURCE A: Location of the Bow River within the Saskatchewan River Catchment



https://en.wikipedia.org/wiki/Bow_River#/media/File:Saskatchewanrivermap.png

SOURCE B: Journey of the Bow River



<http://www.theglobeandmail.com/news/national/protecting-the-health-of-albertas-bow-river/article26767720/>

Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River

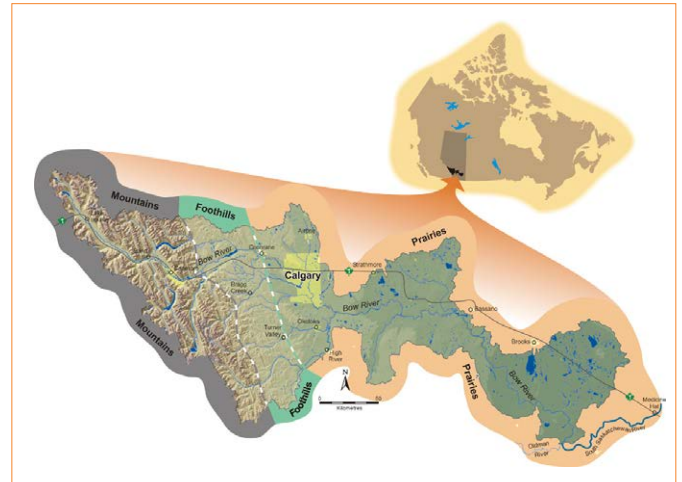
SOURCE C: Facts and statistics

a. Basic facts

Feature	Facts
Country	Canada
Province	Alberta
Source	Bow Glacier (Altitude 1,960 metres)
Mouth	South Saskatchewan River (Altitude 700 metres)
Length	587 kilometres
Catchment	26, 200 square kilometres
Discharge	129 cubic metres per second (Average)
	1,640 m ³ /s maximum discharge
	3 m ³ /s minimum discharge

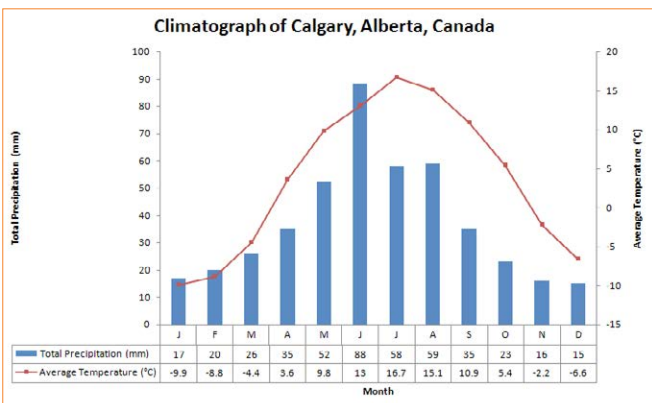
<http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/d8fb41f0-8893-11e0-92bb-6cf049291510#distribution>

SOURCE D: Topography of the Bow River catchment (Drainage Basin)

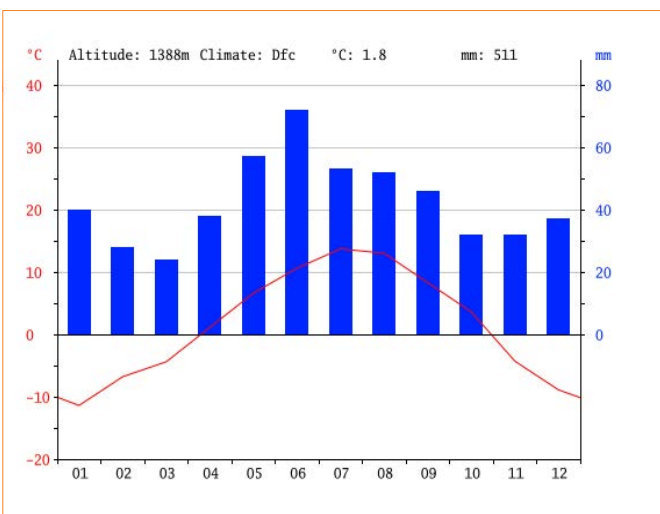


http://www.thebowriver.com/bow_river_basin_waterscape.htm

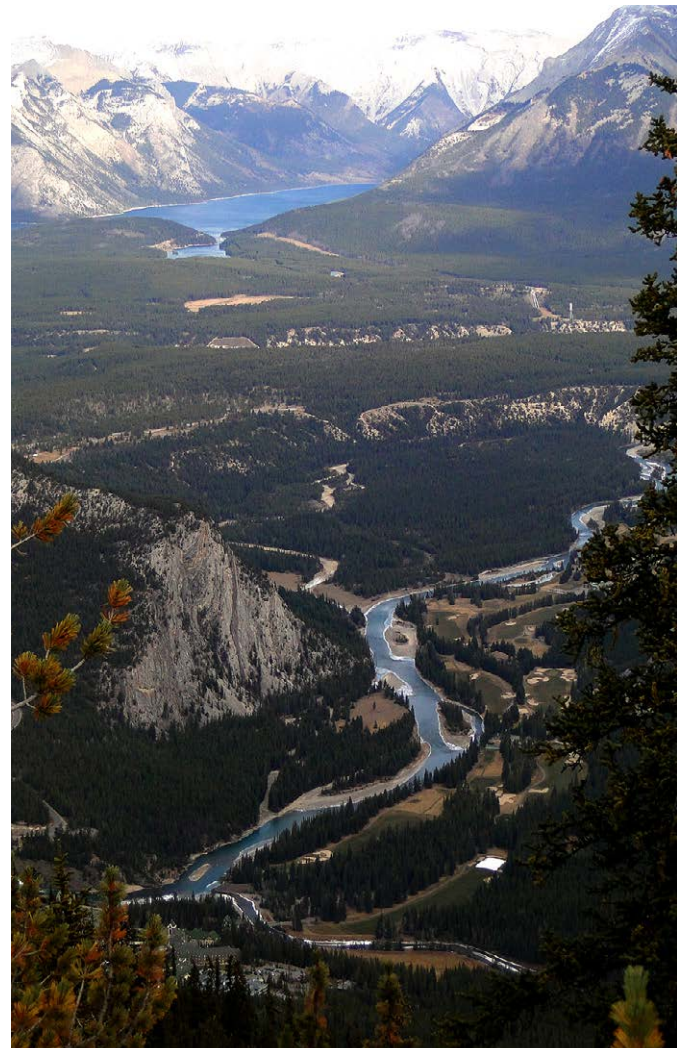
b. Climatic graphs for Calgary and Banff



Calgary: https://ecozoneexperts.wikispaces.com/file/view/Calgary_Climate.png/125443907/Calgary_Climate.png



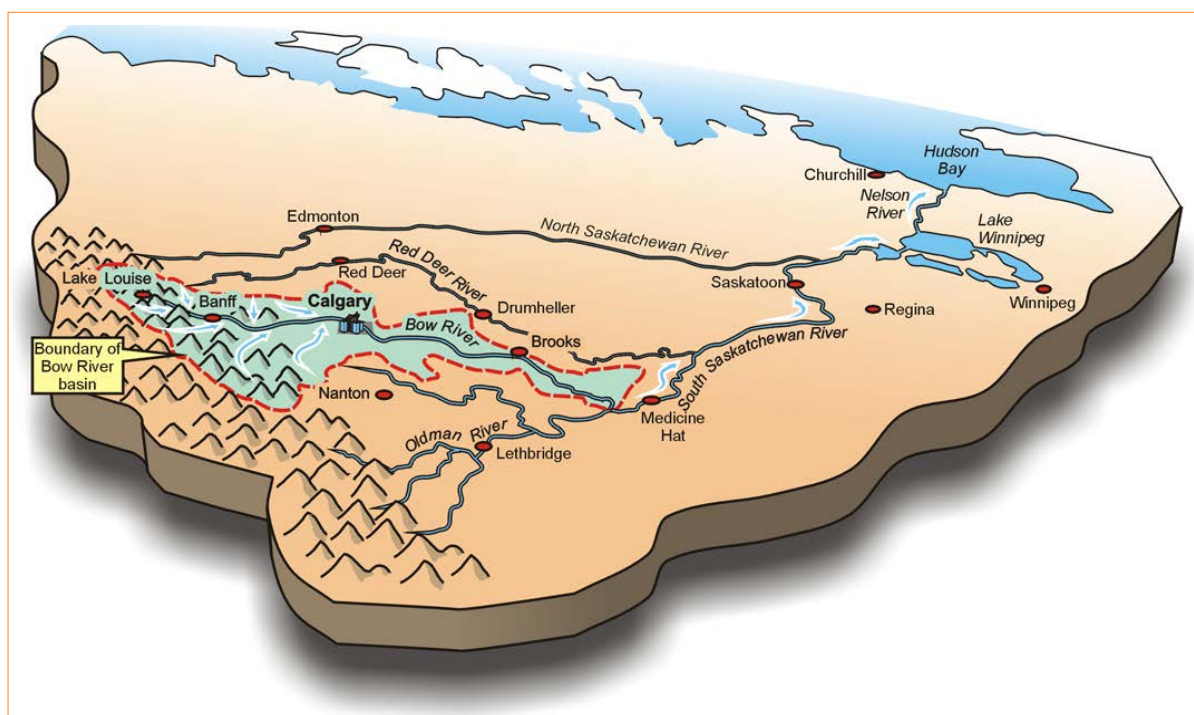
Banff: <http://en.climate-data.org/location/9245/>



https://upload.wikimedia.org/wikipedia/commons/6/63/View_over_Bow_River_Valley_from_Sulphur_Mountain_Summit_-_Banff_-_Alberta_-_Canada.jpg

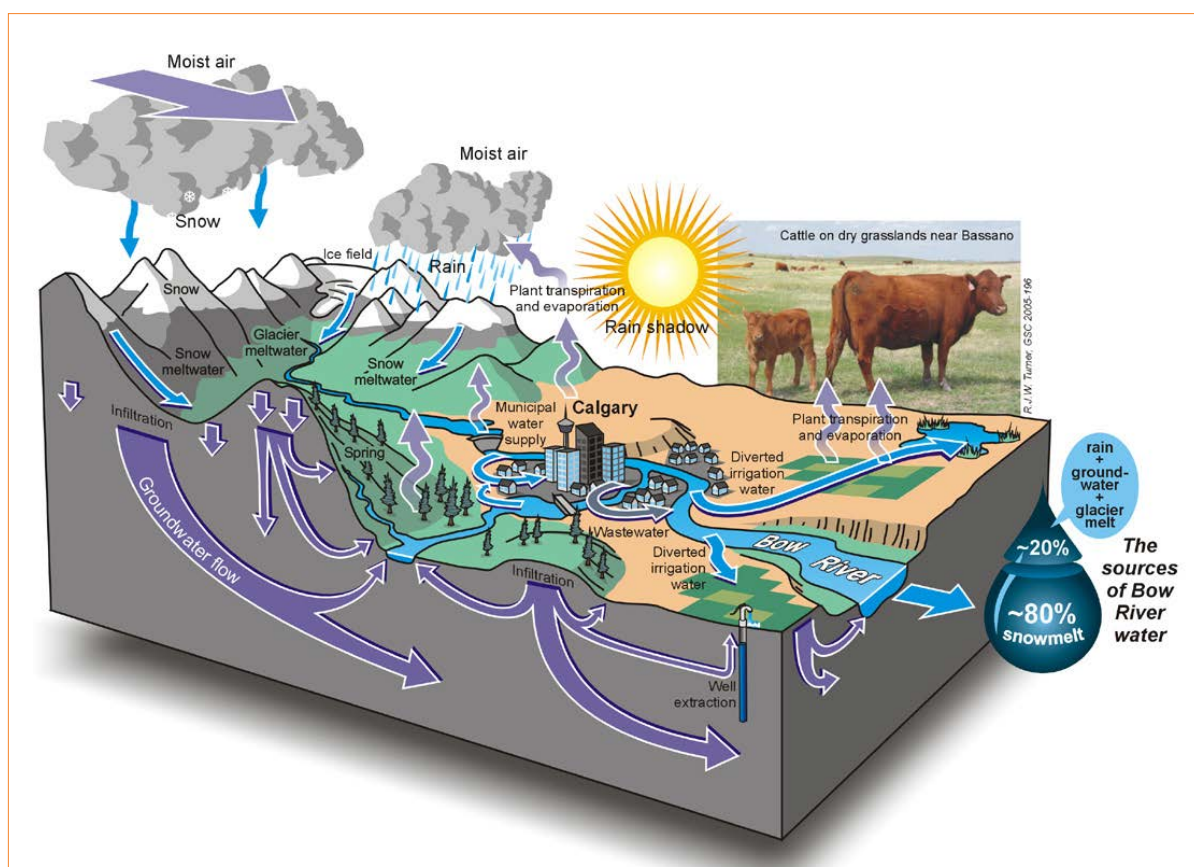
Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River

SOURCE E: Journey of the Bow River



http://www.thebowriver.com/bow_river_basin_waterscape.htm

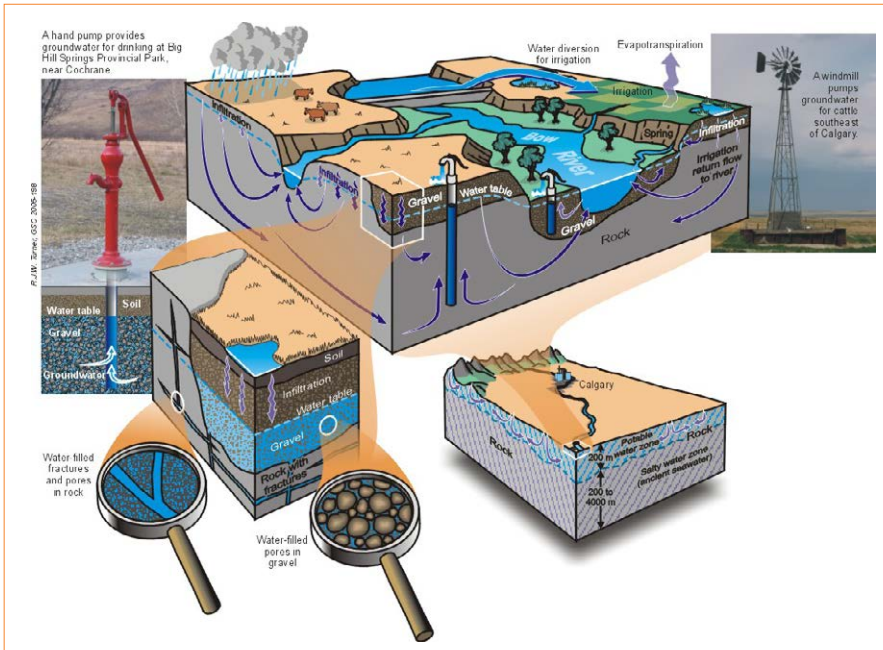
SOURCE F: Bow River Catchment water cycle



http://www.thebowriver.com/bow_river_basin_waterscape.htm

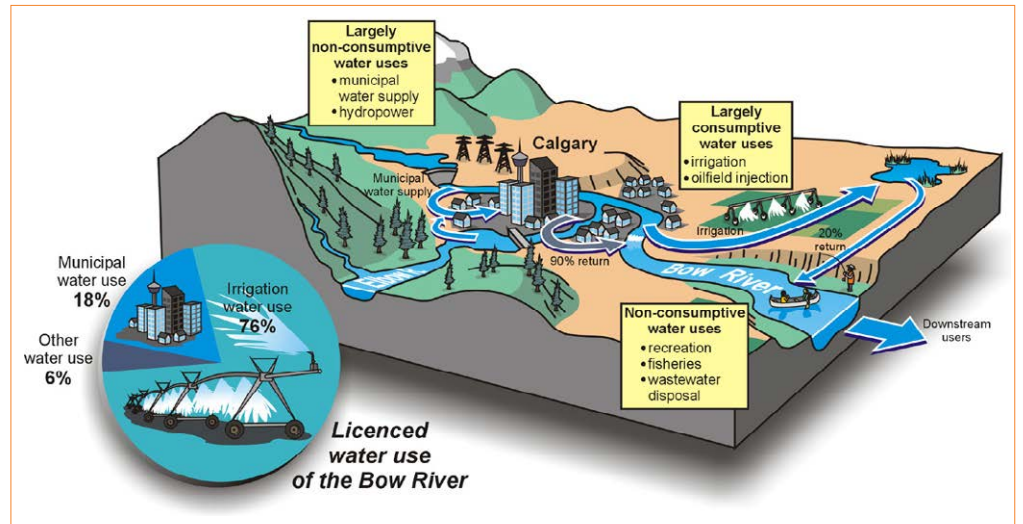
Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River

SOURCE G: Groundwater resources

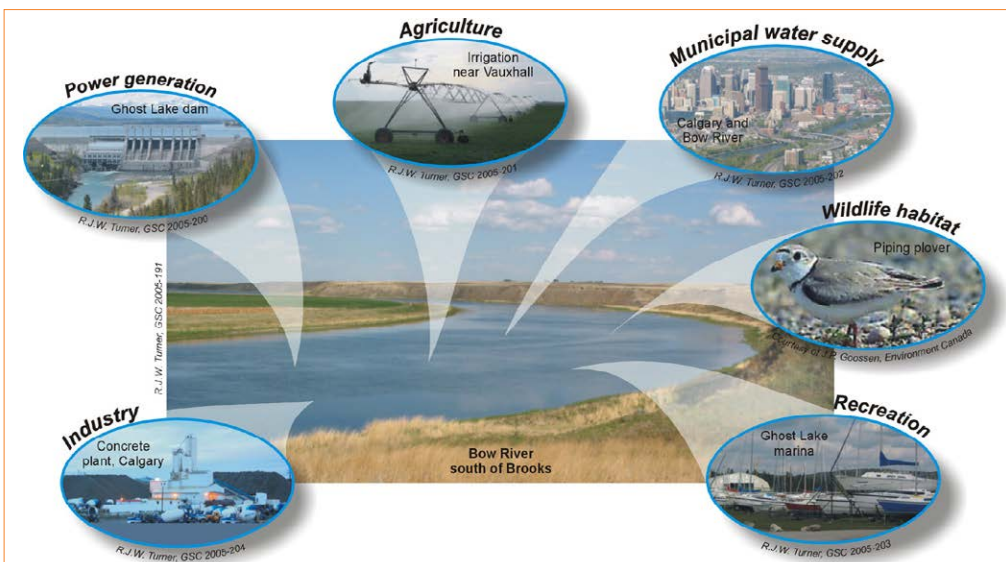


http://www.thebowriver.com/bow_river_basin_waterscape.htm

SOURCE H: Water use



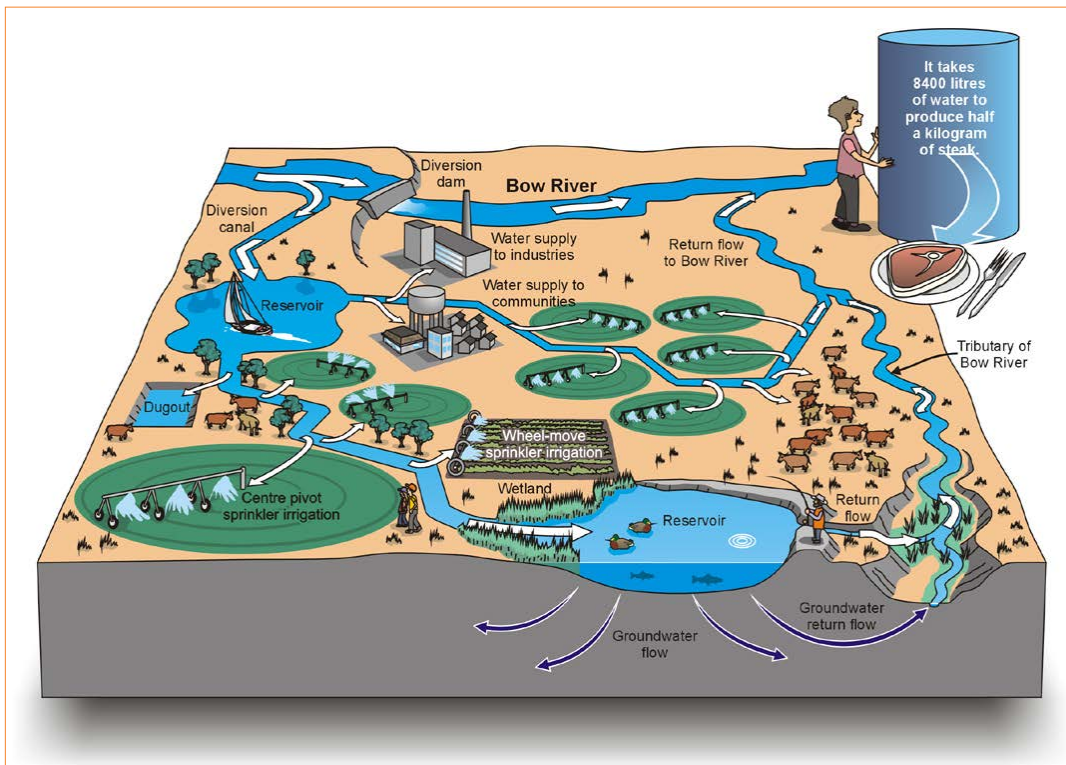
SOURCE I: Competing water uses



http://www.thebowriver.com/bow_river_basin_waterscape.htm

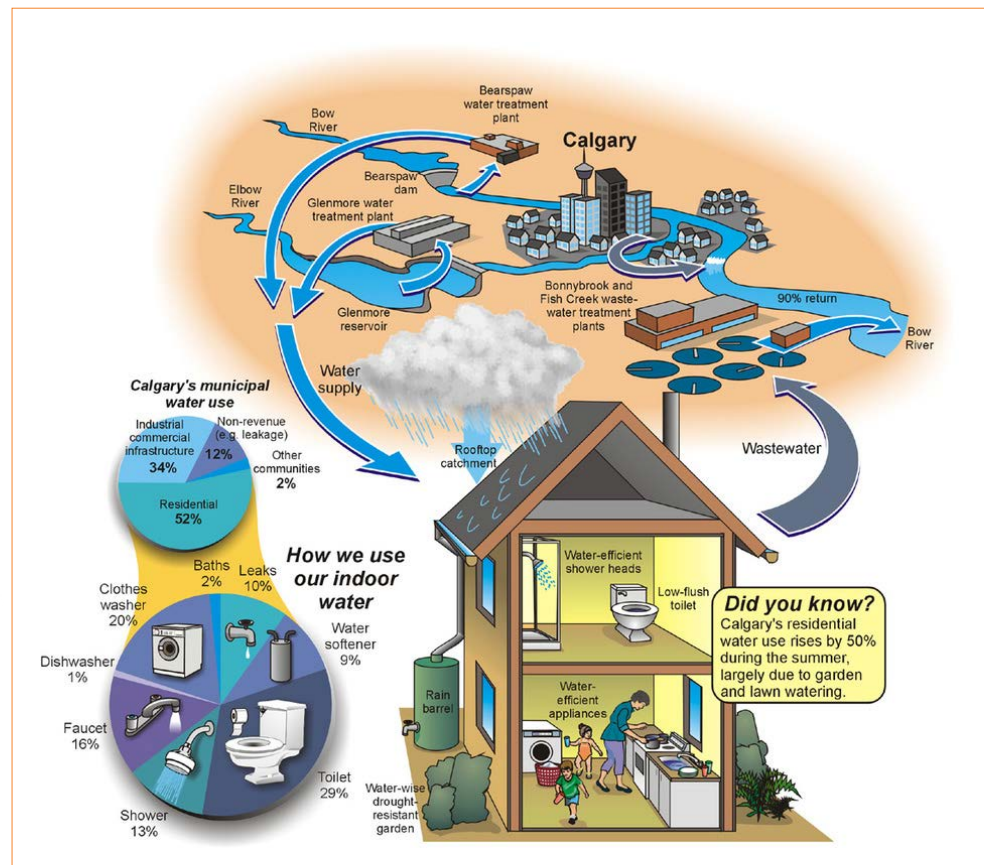
Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River

SOURCE J: Making water available for human use



<http://www.cgenarchive.org/bow-river-clean.html>

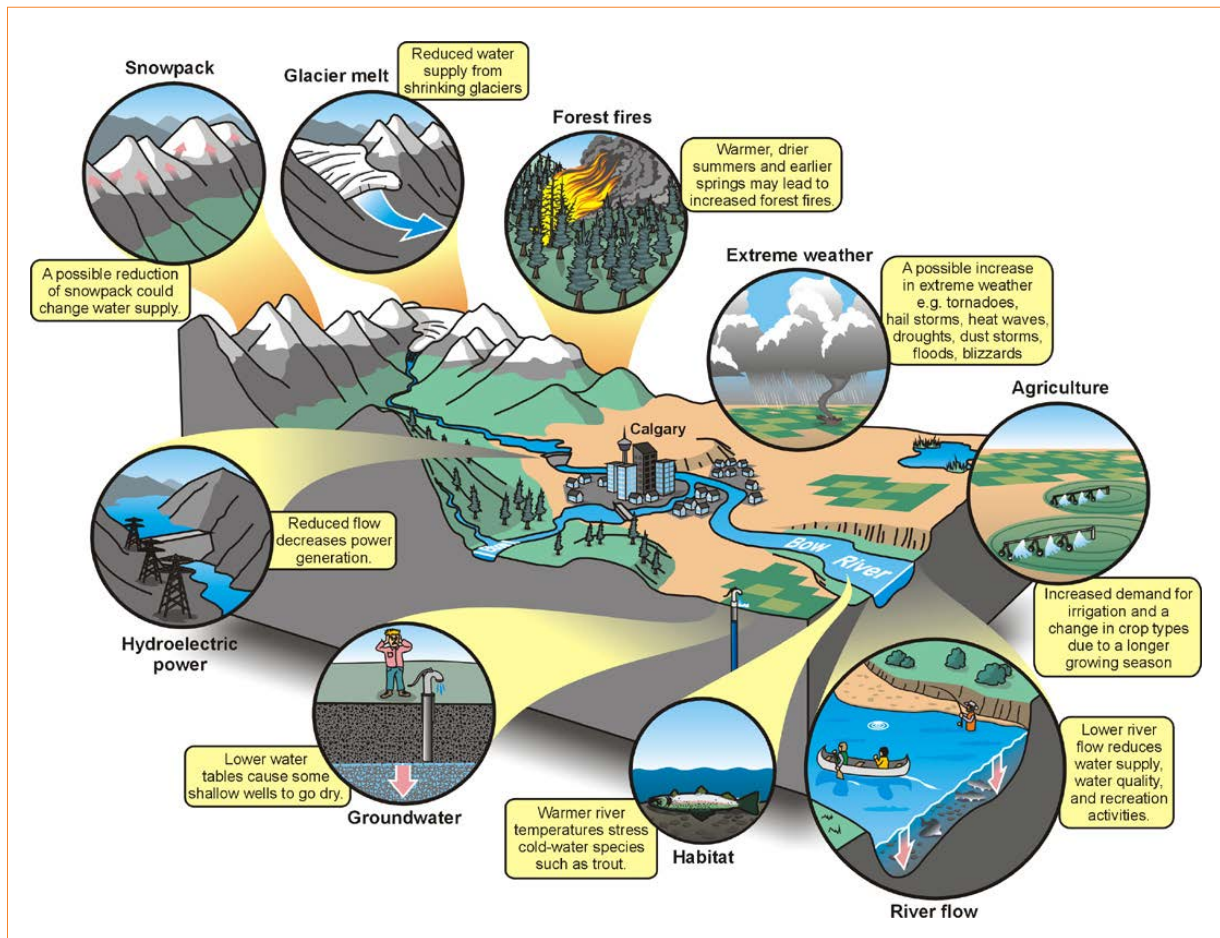
SOURCE K: Urban Water use



<http://www.cgenarchive.org/bow-river-clean.html>

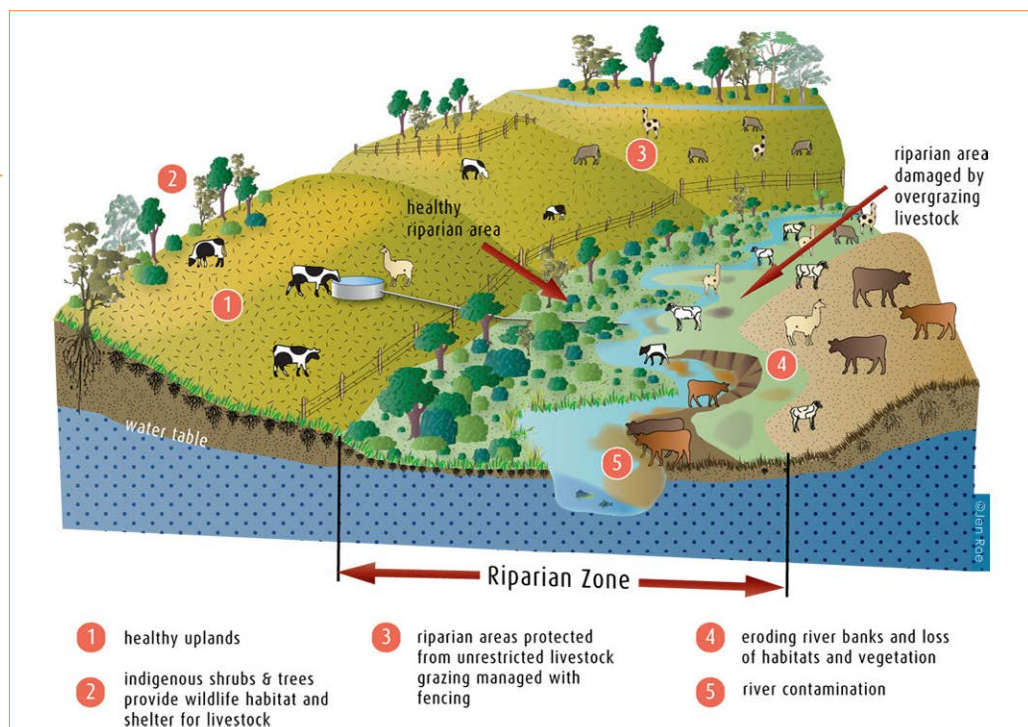
Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River

Source L: Climate change threats



http://www.thebowriver.com/bow_river_basin_waterscape.htm

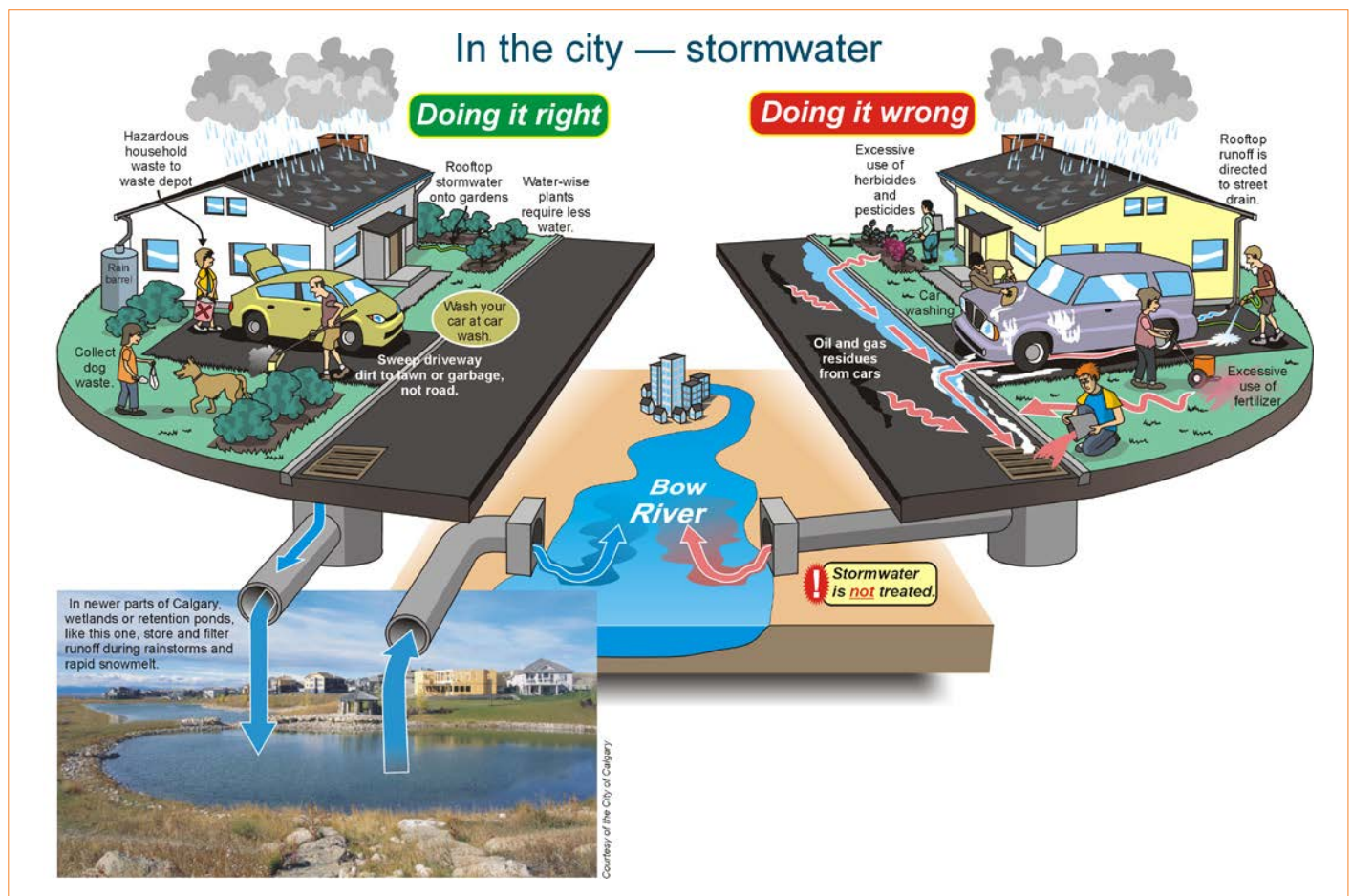
SOURCE M: Rural water management



<http://theriparianproject.com.au/about> and <http://www.cgenarchive.org/bow-river-clean.html>

Canada: Beautiful, liveable, but vulnerable. Part 4: Bow River

SOURCE N: Urban water management



<http://www.cgenarchive.org/bow-river-clean.html>

Weblinks

The Bow River Catchment

The Bow River: Where does it come from? Where does it go to? http://www.thebowriver.com/bow_river_basin_waterscape.htm

Waterscape: Bow River Basin

<http://www.cgenarchive.org/bow-river-watercycle.html>

POSTER: PDF file

<http://www.cgenarchive.org/uploads/2/5/2/6/25269392/bowriverwaterscape.pdf>

POSTER: Picture file – http://www.cgenarchive.org/uploads/2/5/2/6/25269392/bowriver-poster1_e.jpg

Alberta's Bow River: Climate change and human impacts – <http://www.sciencemediacentre.ca/smc/docs/SMCC-BowRiver.pdf>

Video Series: The Bow River

Bow River "Settlers wanted" – <https://www.youtube.com/watch?v=NjwVdVgsXNo>
<https://www.youtube.com/watch?v=5e00c1IJHL8>

Bow River water management

<https://www.youtube.com/watch?v=cpL11ROPoPE>

Eastern irrigation district

<https://www.youtube.com/watch?v=GcR2xJlhPik>

Bow River Irrigation District

<https://www.youtube.com/watch?v=4vKWXAiNNdU>

Western irrigation district

<https://www.youtube.com/watch?v=lr7p-XM-2Uk>

Bow River Irrigation and food

<https://www.youtube.com/watch?v=t0J28uJkyTQ>

Future of water in the Bow River

<http://caringforourwatersheds.com/canada/southern-alberta/watershed-information/>

Spatial technologies

Creating an elevation profile in Google Earth

<https://www.youtube.com/watch?v=TZZ-dKOp8NY>

ESRI global elevation – <http://esriukeducation.maps.arcgis.com/apps/Profile/index.html?appid=f0a2a2a3e1964129b22c715e31282f6c>

Google Tour Builder – <https://tourbuilder.withgoogle.com>

ATTENTION – ALL GEOGRAPHY TEACHERS



Geography Teachers' Association of NSW **ARTHUR PHILLIP AWARDS**

TIME TO PREPARE FOR THE 2016 GEOGRAPHY FIELDWORK COMPETITION

The Geography Teachers' Association of NSW (GTANSW) organises an annual competition for students and schools to foster an enthusiasm for Geography through engagement and rewards. The emphasis of the competition is fieldwork and the gathering of primary data as part of authentic research in geography.

The competition is open to all primary and secondary schools, both members and non-members of GTANSW.

All categories of the competition are based on the research action plan outlined on page 17 of the Years 7–10 Geography syllabus. The steps of this research plan have also been applied to the senior Geography course for the purposes of this competition and fit neatly with the Senior Geography Project.

COMPETITION ENTRIES CLOSE FRIDAY 25 NOVEMBER 2016

COMPETITION CATEGORIES:

1. The GTA Fieldwork and Visual Presentation Competition for Years K–9
Sub-categories: Primary – Stage ES1-1 (Years K, 1 & 2), Stage 2 (Years 3 & 4), Stage 3 (Years 5 & 6). Secondary – Stage 4 (Years 7 & 8), Stage 5 (Year 9 only))
2. The Global Education Research (Fieldwork) Competition for Years 7–12
Three categories: Stage 4, Stage 5, Stage 6
3. The Dr Don Biddle Issues in Australian Environments Fieldwork Competition for Year 10 only
4. The Brock Rowe Senior Geography Project Fieldwork Competition for Year 11 only

2016 Arthur Phillip Geography Fieldwork Competition information and student entry forms are available for download from:

www.gtansw.org.au

YEAR 7 FIELDWORK:

INVESTIGATING AN ENVIRONMENT

Grace Larobina, The Hills Grammar School



http://1.bp.blogspot.com/-HSQ5ap96UPQ/Uah0vRMPXtl/AAAAAAAAAQv0/JUTC_VXcouQ/s1600/Screenshot_31_05_2013_10_51.png

Fieldwork activities engage students with their real world surroundings and develop practical investigation skills.

Developed for the current syllabus topic **Global environments**, this activity is easily adapted to the new Geography syllabus 7–10 Stage 4 **Landforms and Landscapes** and **Water in the World** as well as Stage 5 **Sustainable Biomes** and **Environmental Change and Management**.

Syllabus links

Fieldwork is an integral and mandatory part of the study of Geography as it facilitates an understanding of geographical processes and geographical inquiry.

Fieldwork involves observing, measuring, collecting and recording information outside the classroom. Fieldwork can be undertaken within the school grounds, around local neighbouring areas or at more distant locations.

Fieldwork enables students to:

- acquire knowledge about environments by observing, mapping, measuring and recording phenomena in the real world in a variety of places, including the school
- explore geographical processes that form and transform environments
- use a range of geographical tools to assist in the interpretation of, and decision-making about, geographical phenomena
- locate, select, organise and communicate geographical information
- explore different perspectives on geographical issues.

Students must undertake and participate in fieldwork in each Stage of learning.

Geography K–10 Syllabus 2015

NAME: _____

AIMS OF THE GEOGRAPHY FIELDWORK REPORT

1. Use a variety of **fieldwork methodologies** to collect data about THGS
2. Introduce students to new **Geographical concepts** as well as reinforce known concepts.
3. Develop **literacy skills** through the preparation of a fieldwork report.
4. Develop **ICT skills** – converting statistical data into graphs.
5. Promote **active citizenship** and understanding of the processes occurring at our School



Fig. 1 Oblique Aerial Photograph THGS, School Archives

FIELDWORK EQUIPMENT

Equipment includes:

- **A trundle wheel** to measure distance between observation points
- **A compass** to determine direction and orientate maps.
- **A thermometer** for temperature
- **A clear grid** to determine % tree cover / cloud cover
- **A handheld GPS** to determine latitude, longitude and altitude (elevation).
- **A ruler** to measure the size of leaf
- **A digital camera (phone)**

GEOGRAPHY TOOL BOX

- Clipboard, lead pencil, ruler, colour pencils/pens

FIELDWORK DATES

PART ONE: INTRODUCTION – ORIENTATION [5 MARKS]

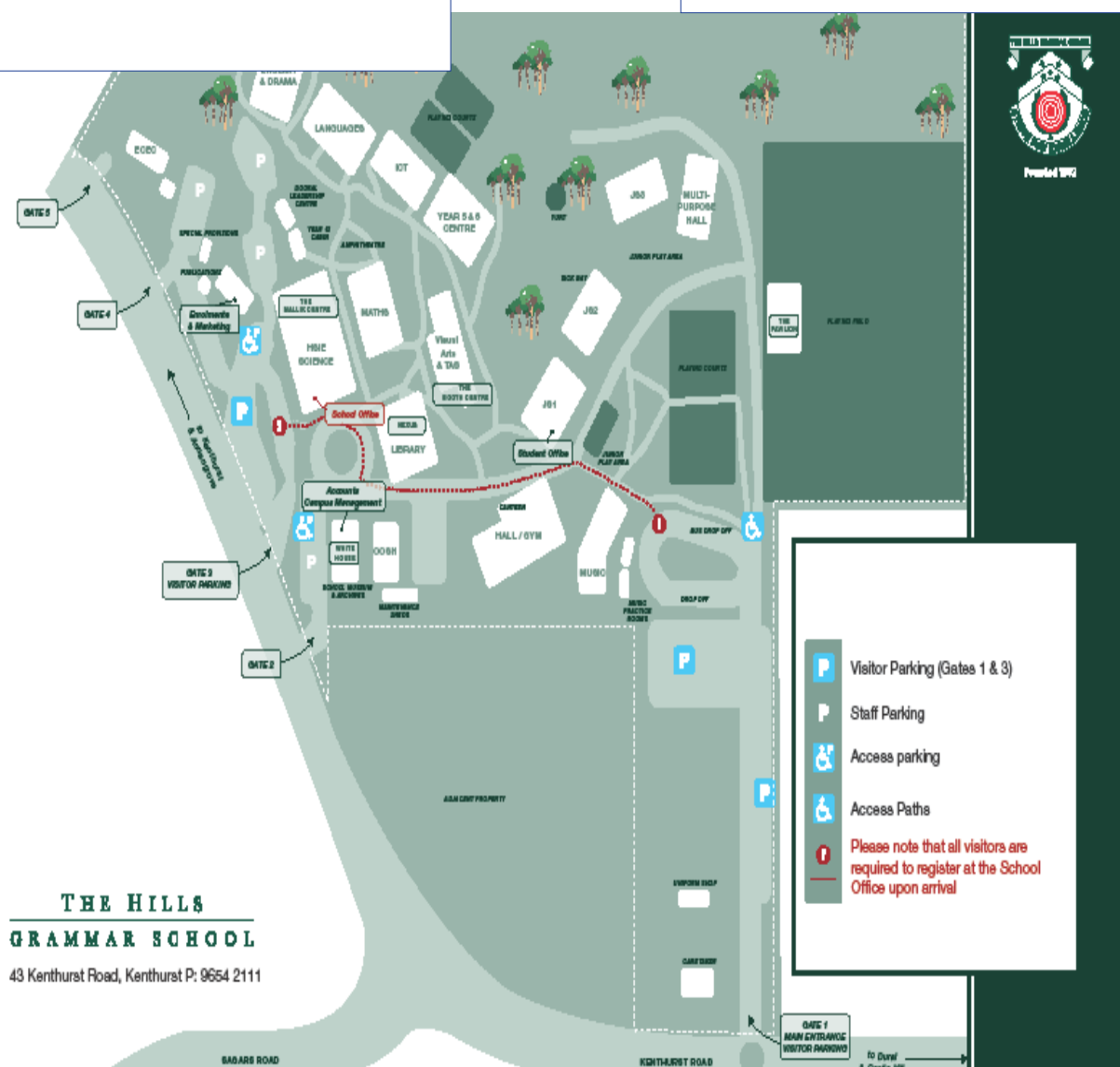
INSTRUCTIONS

1. Use a compass to determine NORTH
2. Orientate the map so the top of your map is facing NORTH

Draw the NORTH POINT here. 1 Mk

Latitude _____ 2 Mks

Longitude _____ 2 Mks



PART TWO: MEASURING THE LITHOSPHERE

[29 Marks]

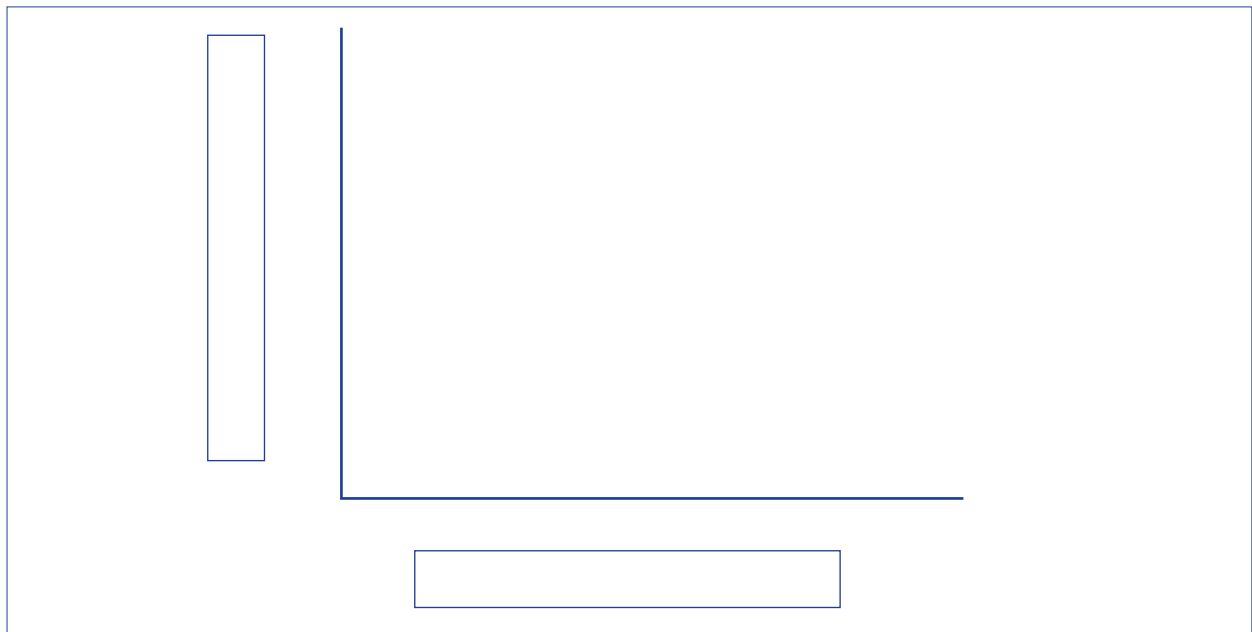
A. Comparing the Lithosphere

INSTRUCTIONS

1. Use a handheld GPS (Phone App) to complete the following table
2. Use a Trundle Wheel to measure distance

	STOP 1: Grass Area in front of MP1	STOP 2: Huts Technology Building	STOP 3: Bridge over Creek
ALTITUDE	[1Mk]	[1Mk]	[1Mk]
DISTANCE	NA (Start here)	[1Mk]	[1Mk]
OBSERVATIONS of the lithosphere: Include references to: slope, visibility of rocks and pebbles, moisture on rocks/soil. Describe TWO ways in which the surroundings have changed between STOP 1 and STOP 3. [4Mks]			

Using the Topographic Map of O'Hara's Creek provided, construct a cross section between points B & C [10 Mks]



Using the cross section, describe TWO features of the topography of THGS.

[4Mks]

B. Collect Soil Samples

INSTRUCTIONS

- 1. Using the small bags provided & digging equipment, collect a soil sample from STOP 1 and STOP 3
- 2. Compare the sample in the box below. Look at colour, grain size and presence of plant matter.

SAMPLE 1:
STOP 1 Grass Area in front of MP1

SAMPLE 2:
STOP 3 Bridge over Creek

Compare the soil at STOP 1 and STOP 3.
(Refer to colour, grain size, and presence of plant matter.)
[6 Mks]

COLOUR

GRAIN SIZE

PLANT MATTER

PART THREE: MEASURING THE ATMOSPHERE & HYDROSPHERE

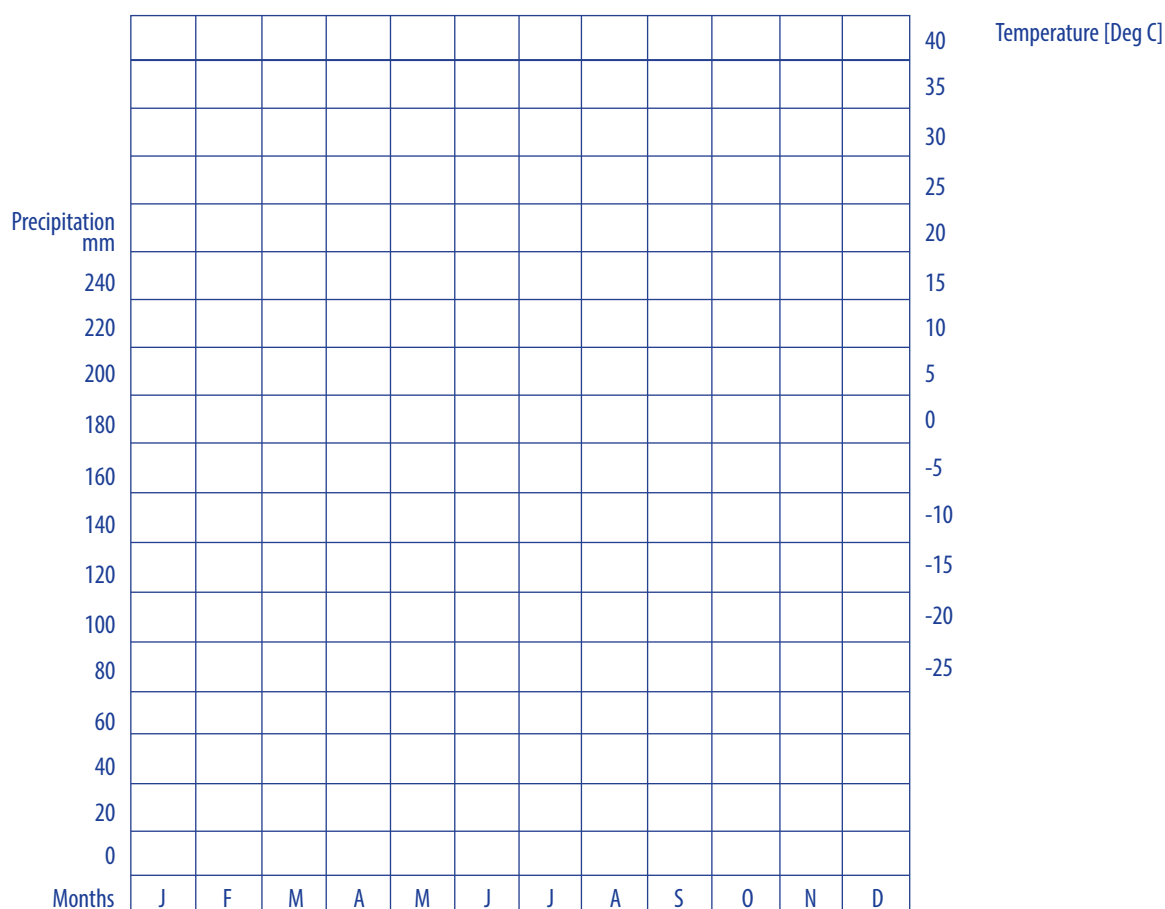
[19 Marks]

INSTRUCTIONS

1. Draw a Climate Graph using the Kenthurst statistics. 6 Mks

CLIMATE STATISTICS KENTHURST NSW

TEMP (C)	27	27	25	22	19	16	15	18	20	23	25	27
PRECIP (mm)	99	115	121	104	82	110	82	64	56	70	78	93
MONTH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SEASON	Summer		Autumn			Winter			Spring		Summer	



2. Identify the **WETTEST Month** _____ 1 Mk

3. Calculate the **Temperature Range** _____ 2 Mks
(Highest temperature minus the lowest temperature)

4. Calculate rainfall for **AUTUMN** _____ 2 Mks
(Add all the precipitation statistics for the summer months)

YEAR 7 FIELDWORK: Investigating an environment

5. Go to the BOM website <http://www.bom.gov.au/>

Find the Synoptic chart for today, paste this in the space provided.

2 Mks

PLACE SELECTED SYNOPTIC CHART HERE

6. Include the providence of this secondary data.

2 Mks

Date Retrieved	
Source	

7. Explain why we are experiencing todays weather by making reference to the synoptic chart you have included. Give **TWO** reasons.

4 Mks

A. Determine the Canopy Cover

At STOP 3, walk over to the Creek, take the clear grid sheet and hold it directly above your head. Determine how many of the grid squares are filled by the treetops. There are 25 squares on your grid. Multiply that number by 4 to give you a score out of 100. This gives you the % of sky covered by tree tops (the canopy of the forest).

1. Calculate the tree cover as a % 2 Mks

B. Sketch and identify plant features

1. Sketch the leaf and flower of **ONE** native shrub / wildflower in the space below 2 Mks
2. Annotate your drawing – Measure the size of leaf and flower and add to your diagram. 2 Mks

YEAR 7 FIELDWORK: Investigating an environment

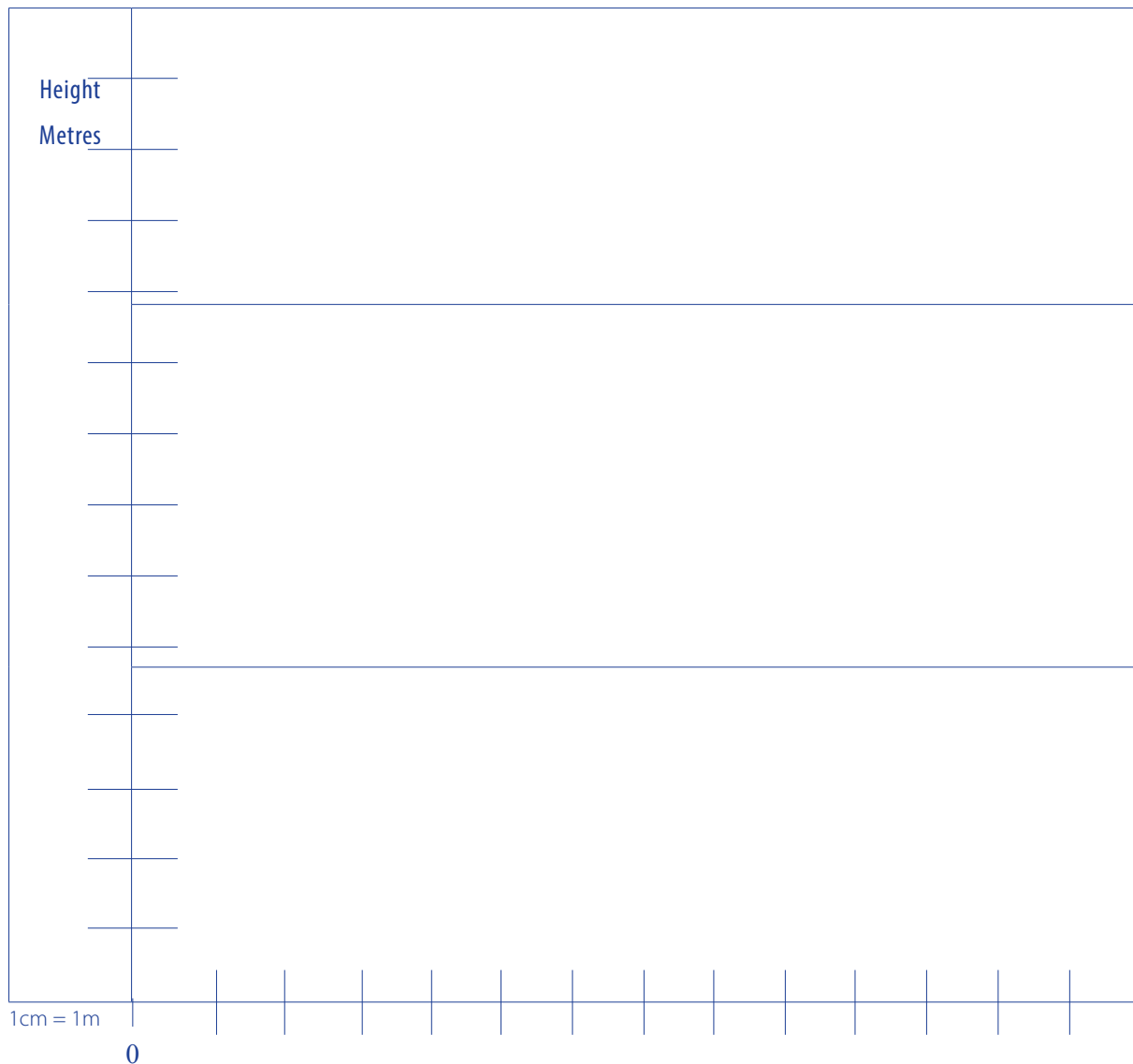
C. Draw a Vegetation Profile

INSTRUCTIONS

You will draw this profile looking at the plants identified (A-E) in the Maths Amphitheatre.

STEP 1: Estimate the height of the tallest tree _____ 2 Mks

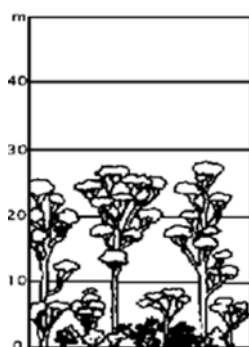
STEP 2: In the table below, draw each layer of plants checking to determine the average height of that layer before you draw. 4 Mks



Compare your profile with **SOURCE ONE**

3 Mks

(Refer to height of trees, width of trees, and density of trees)

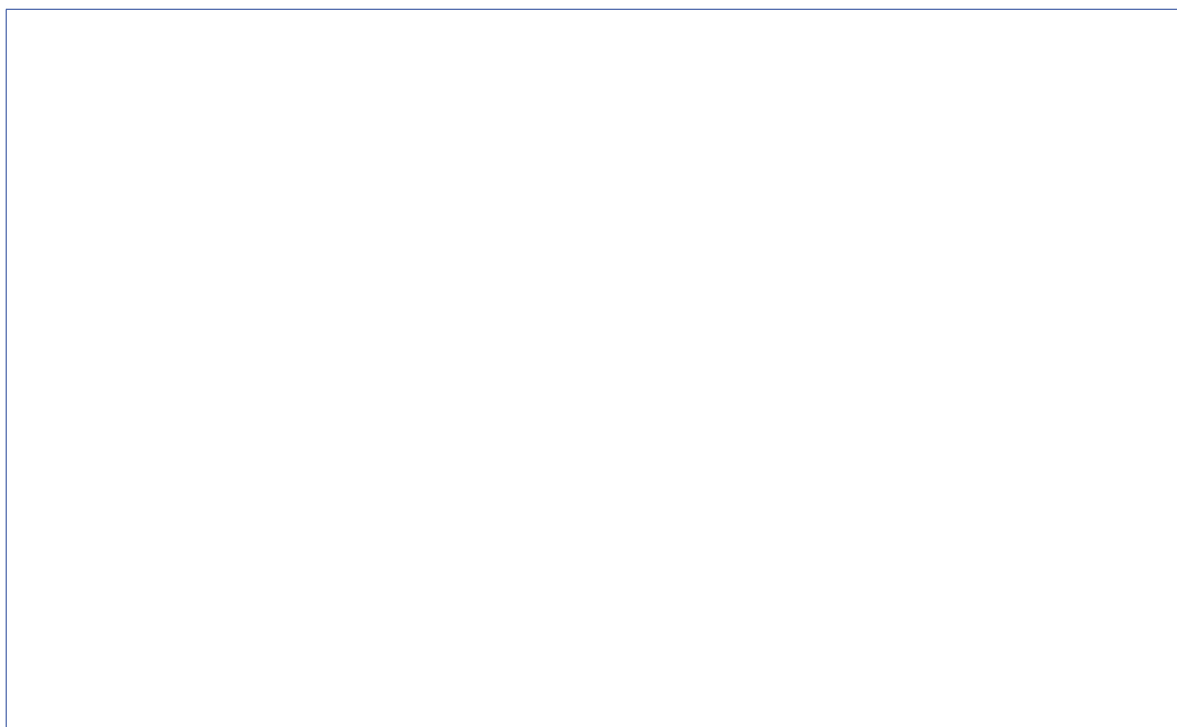


SOURCE ONE: Dry Sclerophyll Forest

PART FIVE: CITIZENSHIP

[12 Marks]

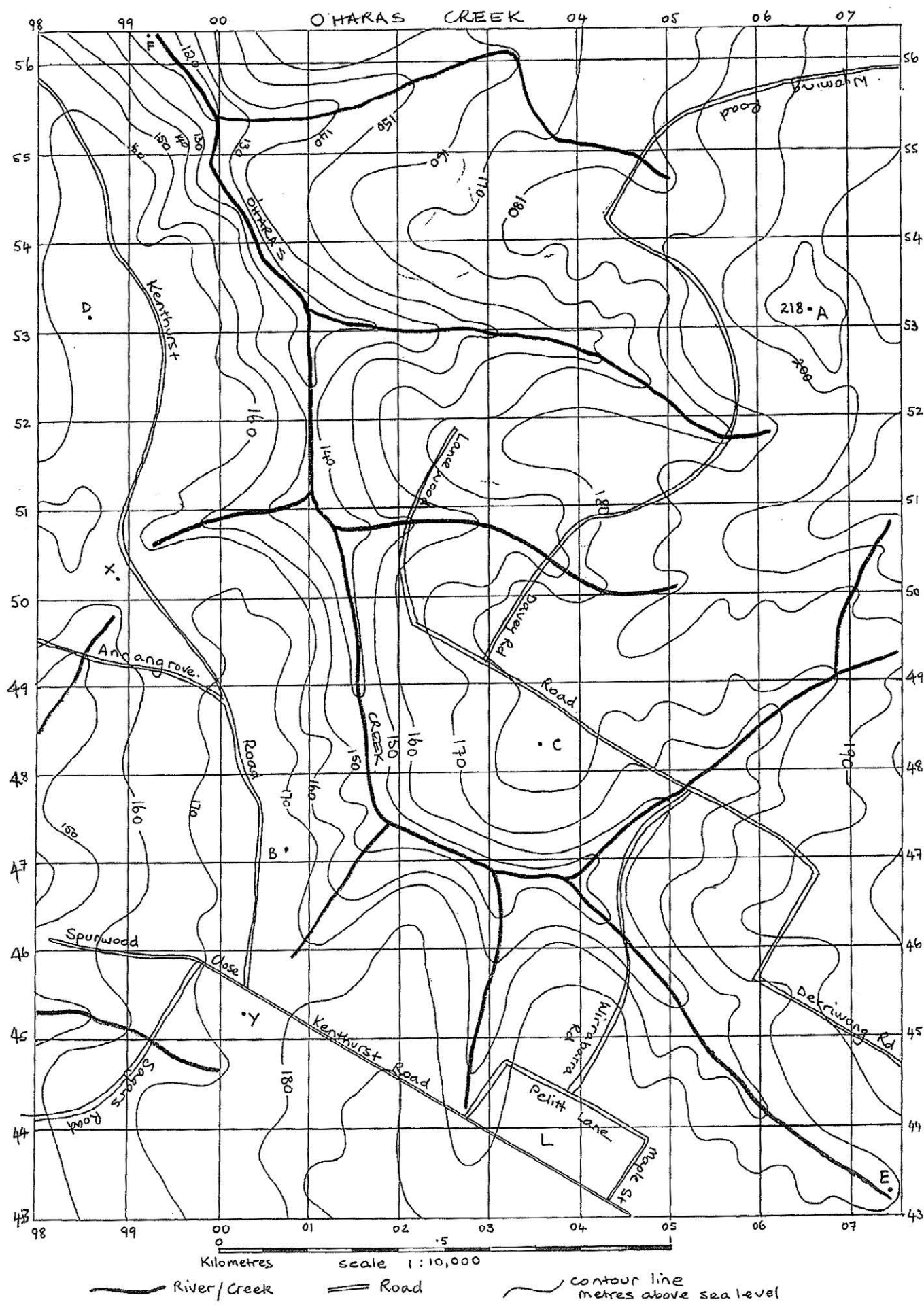
1. Identify ONE way the School is sustainable. _____
_____ 1 Mk
2. Take a photo that shows a sustainable strategy and insert in the space provided. 1 Mks
3. Annotate the photo (write a brief description of **THREE** features describing how the strategy makes our School sustainable) 3 Mks



4. Explain **ONE** way in which strategy you photographed makes our School more sustainable. 4 Mks

5. Suggest **ONE** way that we can further protect our School environment in the future?
Justify your answer. 3 Mks

YEAR 7 FIELDWORK: Investigating an environment



YEAR 7 FIELDWORK: Investigating an environment

MARKING CRITERIA	Marks
<p><i>A student performing at this grade typically:</i></p> <ul style="list-style-type: none"> displays sophisticated skills to select, gather and organise complex geographical information and uses an extensive range of written and graphic forms to communicate it effectively. exhibits extensive skills to select and proficiently apply geographical tools demonstrates extensive knowledge and understanding of THGS environment. displays extensive knowledge of civics and analyses links between civics and informed and active citizenship in relation to geographical issues. 	65–80
<p><i>A student performing at this grade typically:</i></p> <ul style="list-style-type: none"> displays high level skills to select, gather, organise and communicate complex geographical information in a broad range of written and graphic forms. exhibits high level skills to select and apply geographical tools. demonstrates high knowledge and understanding of THGS environment. displays thorough knowledge of civics and explains links between civics and informed and active citizenship in relation to geographical issues. 	49–64
<p><i>A student performing at this grade typically:</i></p> <ul style="list-style-type: none"> displays sound skills to select, gather, organise and communicate geographical information using a range of written and graphic forms. exhibits sound skills to select and apply geographical tools . demonstrates some knowledge and understanding of THGS environment. displays broad knowledge of civics and describes links between civics and informed and active citizenship. 	33–48
<p><i>A student performing at this grade typically:</i></p> <ul style="list-style-type: none"> displays basic skills to select, gather, organise and communicate geographical information using a range of written and graphic forms. exhibits some skills to select and apply geographical tools demonstrates knowledge and understanding of THGS environment. displays some knowledge of civics and identifies links between civics and citizenship. 	17–32
<p><i>A student performing at this grade typically:</i></p> <ul style="list-style-type: none"> displays very limited skills to select, gather, organise and communicate geographical information using a limited range of written, oral and graphic forms. exhibits very limited skills to select and apply geographical tools demonstrates some knowledge and understanding of THGS environment. identifies some aspects of civics and recognises some links between civics and citizenship. 	1–16

Teacher Feedback

Teacher_____

Date_____



Invasive species in Australia's aquatic environments

Lorraine Chaffer
Vice president GTA NSW
Geography Education Consultant

SYLLABUS LINKS

Stage 5: Environmental change and management

Students investigate:

- human-induced environmental changes across a range of scales
- environmental management, including different worldviews and the management approaches of Aboriginal and Torres Strait Islander Peoples

Select ONE type of environment in Australia as the context for a comparative study with at least ONE other country

(Inland / freshwater water environments are the selected option for this article)

Students investigate:

- the causes, extent and consequences of the environmental change
- the management of the environmental change



Invasive species in Australia's aquatic environments



A creek infested with alligator weed
<http://www.scienceimage.csiro.au/image/784>

Invasive species are exotic or native species of animals, plants and other organisms introduced by humans to places they do not naturally belong. The introductions of pest species into aquatic environments can be:

- **Intentional** like the Asian water buffalo introduced into northern Australia as a meat supply, European Redfin Perch introduced into NSW for recreational fishing and the Nutria (swamp rat) brought to the USA for the fur trade.

OR

- **Accidental** such as the spread of South American alligator weed into 30 countries around the world through global trade and shipping and the escape of aquarium fish such as goldfish and Koi carp.

Once pest species invade inland water and marine environments such as riparian zones, floodplains, wetlands, rivers and estuaries they can cause environmental change to:

- Water flows
- Water quality
- Riverbank stability and soils
- Native biodiversity

These changes have economic and social consequences for agriculture, fishing, navigation and tourism industries and for traditional landowners and result in a loss of aesthetic, social and cultural environmental value.

Australia's aquatic invaders

Nine invasive plant species are considered serious threats to Australia's inland water ecosystems including aquatic species such as alligator weed and salvinia and those that invade riparian zones and floodplains such as mimosa, blackberry and willow. Salvinia often covers entire water surfaces in a thick mat, reducing sunlight penetration and oxygen exchange resulting in stagnation and fish kills.

Exotic fish compete for food and space with native fish and frogs, prey on eggs and juveniles, alter food webs and change habitats. Over 25% of fish species in Southern Australian and New Zealand river systems are non-native and native fish face high risks of extinction making it an invasion hotspot.

Aquatic pest species can establish in freshwater environments via deliberate stocking, recreational activities (live bait), stocked farm dams and aquarium escapees, or accidental transport.

<http://wetlandinfo.ehp.qld.gov.au/resources/static/images/ecology/aquatic-ecosystems-natural/riverine/murray-darling/threats/wpbn-introduced-aquatic-fauna.png>

European Carp (Figure 1) are the dominant invasive species in the Murray Darling Basin and throughout NSW rivers (Figures 2 and 3) where their bottom feeding habit contributes to increased turbidity, nutrient levels and bank erosion resulting in aquatic plant loss, declining native fish numbers and algal blooms in response to eutrophication.



Carp in the Maribyrnong River, Avondale Heights, Victoria, Australia. 2007
https://commons.wikimedia.org/wiki/File:Carps_in_River.JPG

Invasive species in Australia's aquatic environments

Management of aquatic pests

The control or eradication of invasive species from Australia's inland water environments relies on the actions of individuals, community and industry groups, governments and Traditional landowners. Examples include The Northern Territory Department of land Resources, the Invasive Species Council, a not for profit charity (NGO) and the government funded CSIRO and Weeds Australia.

The aims of management are the prevention of new invaders and eradication or control of existing pests but opinions vary and conflict often occurs between stakeholders with different perspectives. The latest attempt to manage carp numbers in NSW centres on the introduction of a herpes virus that will kill the feral species without harming others but some believe this approach will only damage the aquatic environments further. Different perspectives on this issue are illustrated in **Figure 4**.

Successful management depends on the timing of action – once an infestation has occurred the effectiveness of strategies decreases while costs increase as shown in the table from the Invasive Species Council in **Figure 5**.

Water buffalo, pigs and Arnhem wetlands

Originally introduced into the Northern Territory in the 1800's as working animals and a source of meat for early settlers, water buffalo (*Bubalus Bubalis*) populations have multiplied and the species has become a serious feral pest on the floodplains of Australia's top end. Despite past eradication and control attempts such as culling, game hunting and harvesting buffalo meat for pet food and a protein source for remote indigenous communities, water buffalo continue to cause serious environmental damage, particularly in Arnhem Land. See **Figures 6, 7 and 8**.

Water buffalo compact soil, inhibit plant growth and erode riverbanks, resulting in increased erosion and turbidity that impacts on aquatic species. Saltwater intrusion occurs through buffalo 'swim channels' impacting on freshwater species such as red water lilies that are valuable food sources for native animals such as Magpie Geese as well the traditional owners. The loss of paperbark forests on the Mary River floodplains and the spread of weeds such as mimosa are attributed to saltwater intrusion. Buffalo rubbing up against mimosa also help spread the seeds. The tuberculosis carried by buffalo is a biosecurity issue that threatens Australia's beef cattle industry and exports.



Mimosa pudica with mature seed pods on plant, growing at Cairns, Queensland, Australia. Feb 2014.

https://commons.wikimedia.org/wiki/File:Mimosa_pudica_seed_pods.jpg

In 2015 the cull of feral water buffalo by rangers on the floodplains and wetlands of northern Arnhem Land was doubled to deal with an increase in buffalo numbers to almost 20,000. Traditional landowners, who today rely on the animals for protein, approved the increased cull to restore their damaged country and prevent further environmental change. Aerial and ground level culling is taking place year round to deal with the scale of the operation.

Pigs were originally introduced into Australia as domesticated farm animals. Their escape resulted in significant feral populations in inland environments where, like water buffalo, they compete with native species for food such as plant bulbs and expose riparian land and waterways to erosion and infestation by invasive noxious weeds such as mimosa.

Willows, riparian health and water quality

Throughout Australia willow tree are declared noxious weeds and are being removed from riverbanks and other aquatic environments such as the Yarra River in Victoria and throughout the ACT. Once used to stabilise riverbanks and reduce erosion various species are now condemned for their impact on water volume, flow and quality, native habitats and biodiversity caused by:

- A dense canopy
- Invasive roots
- Autumn leaf fall
- Heavy water use

The removal of 230 ha of willows from rivers in Victoria and NSW is estimated to have returned 1200 megalitres of water to the rivers each year. Figures 9 and 10

The herb Lippia was an introduced as an ornamental 'no mow' lawn but is now is smothering Murray River floodplains, destroying habitats and reducing native biodiversity.

Invasive species in Australia's aquatic environments



Murray River, Albury NSW. https://commons.wikimedia.org/wiki/File:CSIRO_SciencImage_4568_Bridge_over_the_Murray_River_at_Albury_NSW_1989.

STUDENT ACTIVITIES

1. Draw a flow diagram to illustrate one way an invasive species can cause environmental change.
2. Create a poster to educate people about the role they can play in minimising the number and impact of invasive species in Australia in the future.
3. Why was it important for the traditional landowners in Arnhem Land to play a role in water buffalo management?
4. Refer to **Figure 2**. Explain why carp numbers spiraled out of control in NSW rivers.
5. Refer to **Figure 3**:
 - a. When did carp become a major issue in the Murray Darling Basin?
 - b. Write an addition to the timeline for the introduction of the herpes virus.
6. Refer to **Figure 4**:
 - a. Mind map the different perspectives outlined in the article
 - b. Create an argument to support one point of view.
7. Comparative study: **Asian carp in USA waterways**
 - a. Read the information on the following website. – <http://www.watershedcouncil.org/detailed-timeline.html>
 - b. Develop an inquiry question that involves a comparison of invasive carp species in Australia and the USA.
 - c. Present your findings as an oral report supported with visual sources.
8. Refer to **Figure 5**:
 - a. When is the most effective time to introduce management strategies to eradicate invasive species?
 - b. What is the biggest barrier to the effective control

of invasive species in the proliferation and impact stages? Explain why?

- c. Do you think the statement “Prevention is better than cure” is relevant to managing invasive species? Explain.

9. Refer to **Figure 6**:

- a. Describe the change in feral buffalo densities between 1980 and 2015
- b. State when culling operations began.
- c. Suggest an explanation for the change since 2000.
- d. Explain how and why the graph will change after 2015?

10. Describe the damage caused by water buffalo to inland water environments in northern Australia with reference to Figures 7 and 8

11. Refer to **Figures 9 and 10**:

Contrast the four features of native trees and willows that make one a friend and the other a foe of inland water environments.

Extension activities

Choose ONE of the following

1. Discuss the statement “When it comes to invasive species, prevention is much easier and cheaper than cure”
2. Use the conceptual diagram in **Figure 11** and the key on the associated website to write a report explaining the impact of introduced fauna on inland water environments.
3. Investigate the issue of invasive species in marine waters around Australia's coast

Figure 1: European carp



<http://www.abc.net.au/news/image/7084670-3x2-940x627.jpg>

Invasive species in Australia's aquatic environments

Figure 2: The problem with carp

Is it really necessary to control carp in Australia?

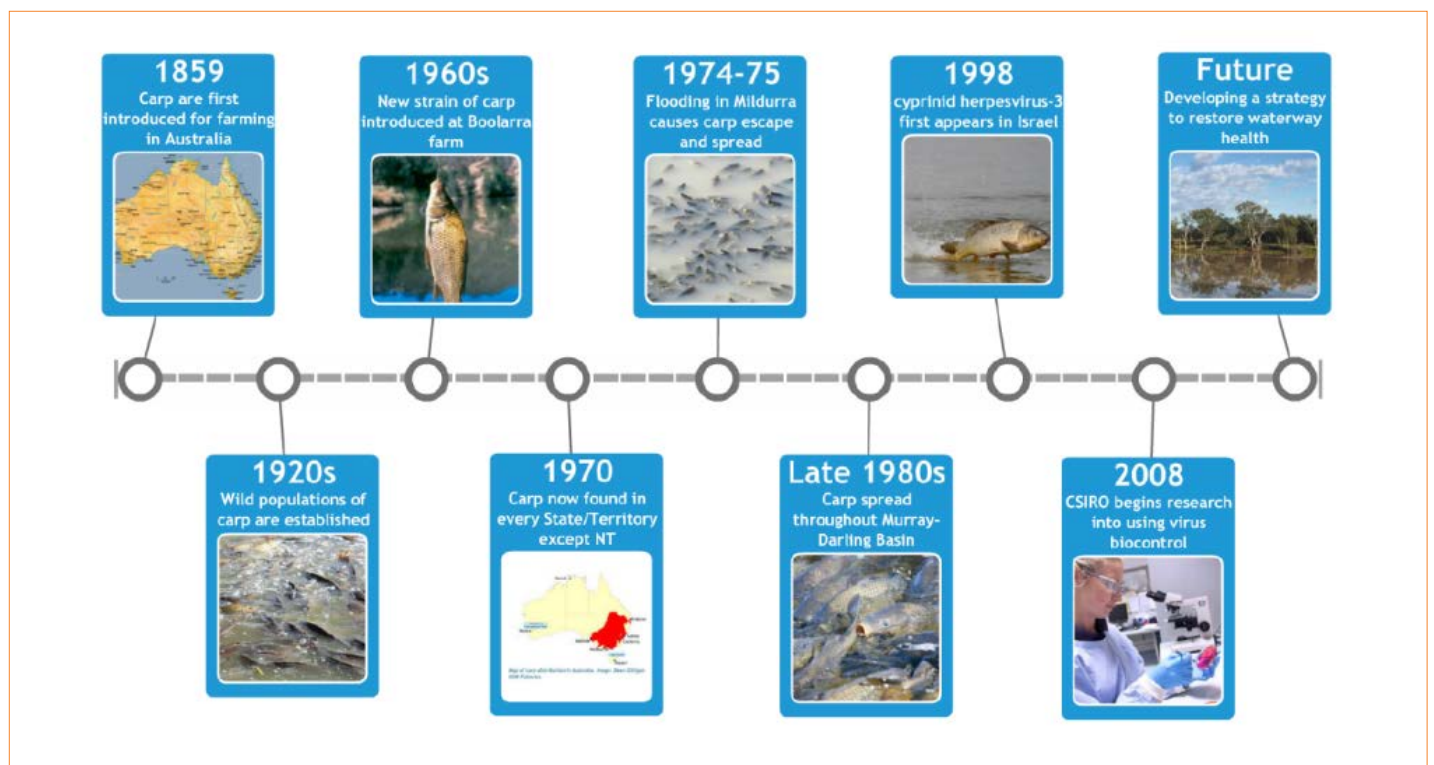
First introduced in Australia in 1859, carp became a major pest in the 1960s after the accidental release of a strain that had been adapted for fish farming. Within a few years they established themselves throughout the entire Murray-Darling Basin.

Carp now comprise up to 90% of the fish biomass in parts of the Basin. This is largely attributed to female carp producing up to a million eggs per year, and to the omnivorous fish's tolerance for a wide range of habitats including degraded water. While we may not be able to 'prove' that carp directly caused the degradation of our rivers, their dominance must certainly contribute to the problem. It is unlikely that the Murray-Darling Basin could ever return to its previous glory while carp remain in such high numbers.

Our views in Australia are supported by research from the US. This showed that carp muddy their waters resulting in flow-on effects on plants, invertebrates, bird-life and native fish in shallow lakes. Researchers concluded that common carp damage the ecology of shallow lakes, particularly when carp density reaches levels similar to those in parts of the Murray-Darling Basin.

This CSIRO blog explains how and why carp became an invasive species – <https://blog.csiro.au/reclaiming-our-rivers-from-feral-carp/>

Figure 3: Timeline showing the historical rise of carp as an environmental issue



<https://i0.wp.com/blog.csiro.au/wp-content/uploads/2016/01/carp-timeline-crop.png?resize=940%2C519&ssl=1>

Invasive species in Australia's aquatic environments

Figure 4: Different perspectives

Carp herpes: Eradication program will damage environment, commercial fisherman warns

By Isabel Dayman, Thursday 5 May 2016

A dramatic plan to eradicate European carp from the Murray-Darling river system using a strain of the herpes virus may cause a pollution problem with dead fish littering waterways, a South Australian carp catcher has warned.

Key points:

- *Federal Government project aims to eradicate 95 per cent of European carp*
- *Fisherman warns it will cause a huge pollution problem*
- *Tourism operators concerned it will affect business*

Commercial carp fisherman Garry Warrick said his biggest fear over the plan was the prospect of water pollution from the dead pest. "If the numbers of carp I know, which are around thousands of tonnes of them, if they died in quick succession, then there's going to be that many dead fish around there won't be enough people to clean it up," he said. "I know the fish factory that I supply, they won't take dead carp. So I don't know what's going to happen to them."

Science Minister Christopher Pyne said the Government would find a use for the dead fish, with the prospect of turning them into pet food. "We're going to either turn them into fertiliser, or pet food maybe, or dig enormous holes and put them in there," Mr Pyne said. "But the decision's been made, the herpes virus can be released, and we'll get rid of these noxious pests." Mr Warrick said the EPA did not allow large quantities of dead carp to be buried.

Yesterday the Government announced the \$15 million project that would see a strain of the herpes virus, which was discovered in Israel, released into the river system by the end of 2018. The virus only affects European carp and is expected to kill 95 per cent of the species of fish in the river system over the next 30 years. Mr Warrick was sceptical the project would see the 95 per cent success rate as touted by the Federal Government. He said the species' numbers in Israel had rebounded since the virus was released. "It's a different environment, different water. It's untested and unproven at the moment," Mr Warrick said. "Whether it works as it did in the laboratory, in the wild, we will have to wait and see."

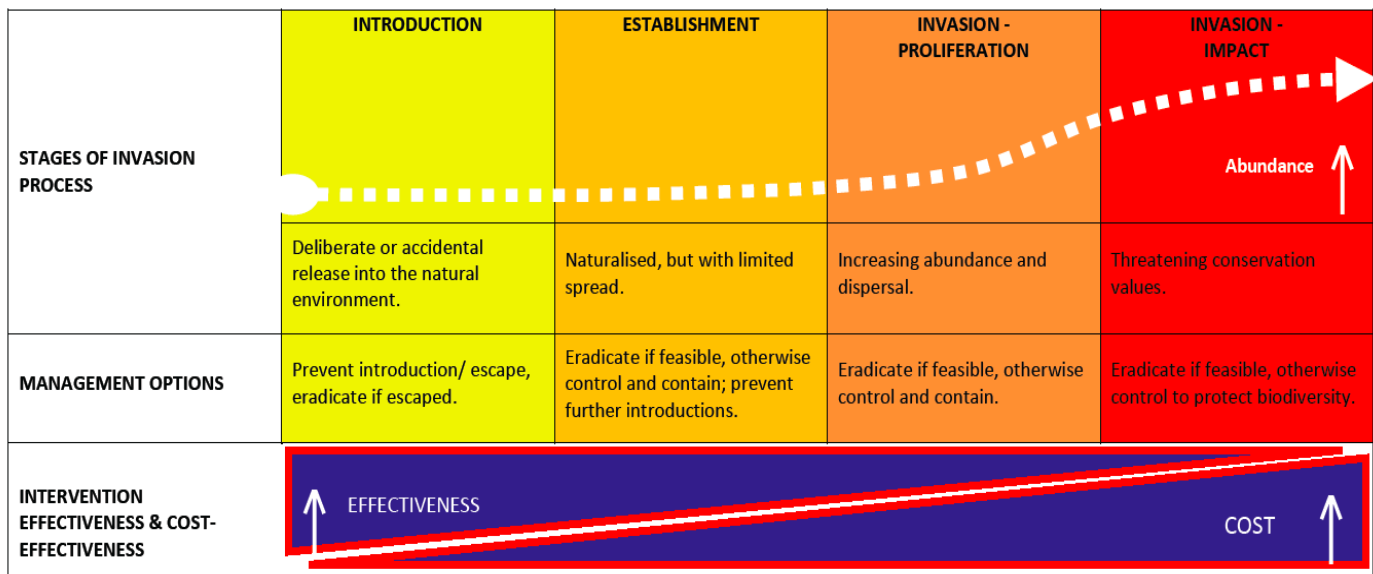
Houseboat operator Robert Hughes was also concerned the dead carp could cause problems for tourism. "I think a river full of dead carp is not going to be fantastic for business," he said.

The **director of fertiliser company Charlie Carp**, Harold Clapham, said he would be able to put the many tonnes of dead carp to good use once the eradication program was rolled out. "It won't damage the long-term prospects of our business — we think it will probably only enhance opportunities for our business," he said. "There are a huge amount of logistical and practical issues that have to be dealt with [but] we can use dead carp."

ABC NEWS – <http://www.abc.net.au/news/2016-05-02/carp-eradication-program-could-cause-pollution-problems/7374658>

Invasive species in Australia's aquatic environments

Figure 5: Management of invasive species



Invasive Species Council – <https://invasives.org.au/strategy-invasive-species-australia/>

Figure 6: Feral Water Buffalo in Arnhem Land

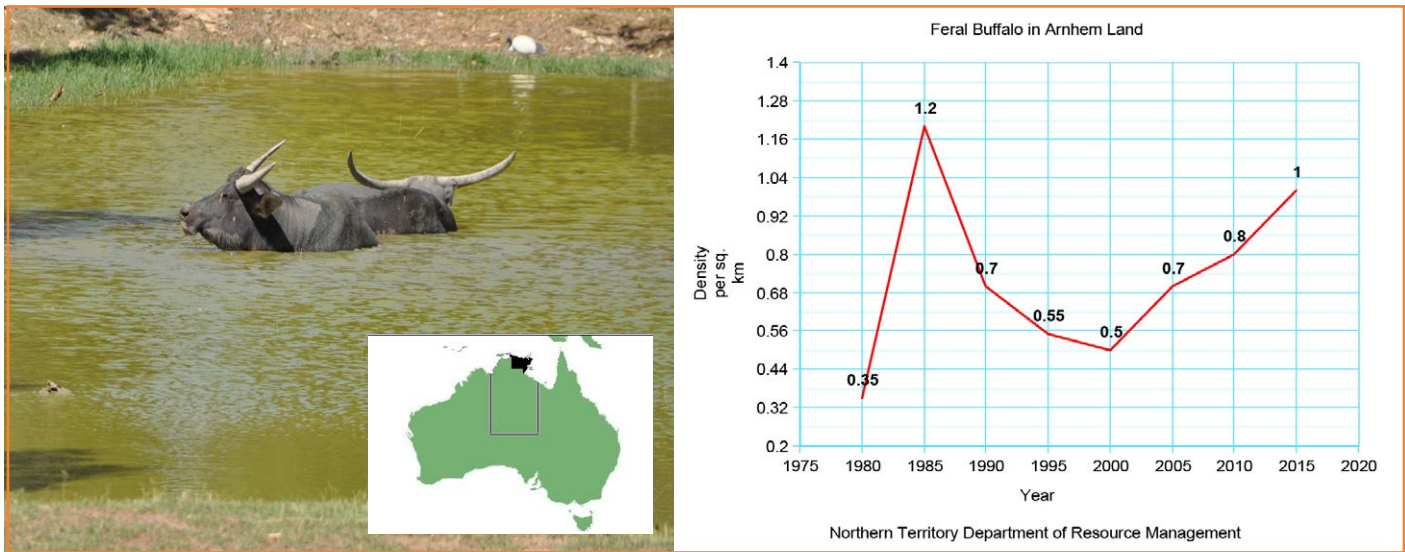


Photo and graph L Chaffer
 Data for graph from NT Department of Land Resource Management – <http://www.lrm.nt.gov.au/feral/buffalo>
 Graph created using kidszone@ed.gov



Figure 7: The impact of water buffalo

Water buffalo create compacted channels and destroy native vegetation

<http://www.abc.net.au/news/2015-08-22/arnhem-land-djulk-rangers-ambitious-feral-water-buffalo-cull/6710380>

Invasive species in Australia's aquatic environments

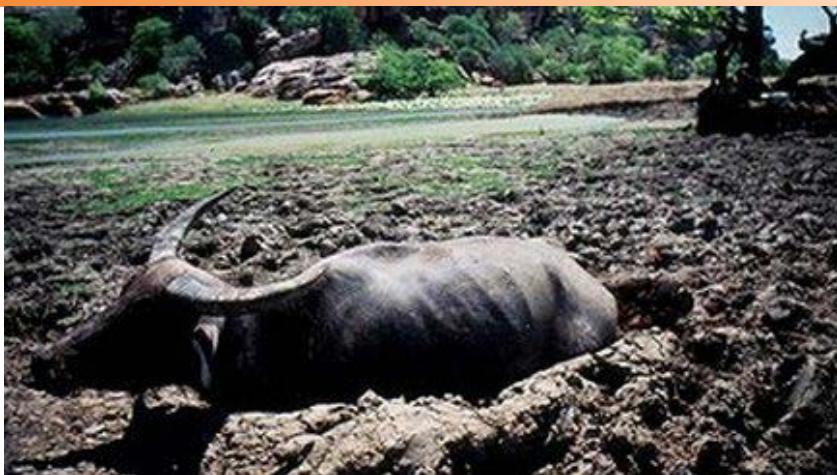


Figure 8: The impact of water buffalo

Water buffalo wallow in muddy riparian zones and wetlands

Figure 9: Impacts of willow trees on inland water environments

Melbourne water – <http://www.angfaqlid.org.au/aqp/blog/2013/06/19/landline-war-of-the-willows/>

http://3.bp.blogspot.com/-mc3a1qLwvkw/UJ9-XVwv-yI/AAAAAAAEo/I2u8mGnFjw8/s640/willow_diagram_colour.jpg

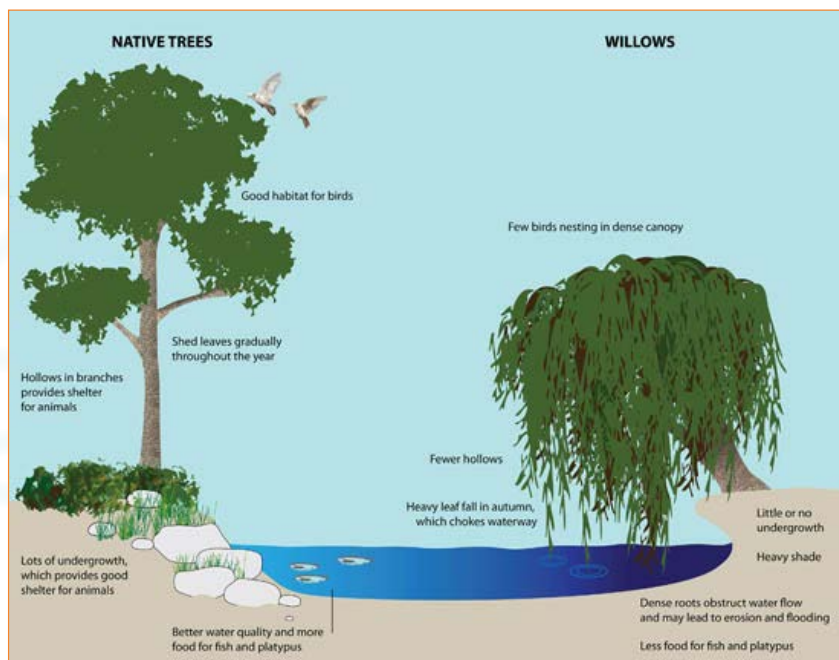


Figure 10: Impacts of willow trees on inland water environments

How willows impact on Australian waterways: Willows compared to native vegetation

Native Vegetation	Native Vegetation	Native Vegetation	Willows	Willows	Willows
<p>Evergreen trees that provide light shade and gradual leaf drop year-round have the following advantages:</p> <ul style="list-style-type: none"> Australian ecosystems are adapted to this pattern. Light shade under the canopy year round allows a diverse range of plants to grow underneath (for example, grass, shrub and tree layers), providing an ideal habitat for native animals. Continuous year round leaf fall that peaks in summer, as well as leaves that break down slowly, provide a gradual input of nutrients into the waterway throughout the year. Native invertebrates are adapted to feeding on the hardened and thickened leaves of native plants. 	<p>Non mat-forming roots and less tendency to grow into the centre of waterways means that:</p> <ul style="list-style-type: none"> Fine sediments and clays adhere to and stabilise the bank. Eucalypts consume less water than willows as their roots do not extend into the waterway and their leaves are resistant to moisture loss. 	<p>Heavy wood that breaks down very slowly results in:</p> <ul style="list-style-type: none"> Good in stream crags as shelter for fish and macroinvertebrates. Fallen trees and branches that sink, where they fall, making them more resistant to being carried downstream and affecting people and infrastructure. <p>A long flowering season and the provision of fruits and seeds and many insects on the branches, trunks and leaves has the following positive effects:</p> <ul style="list-style-type: none"> insects, pollen, nectar, fruit and seed are important food sources for native birds, spiders, insects, mammals, and fish. 	<p>Deciduous trees that provide heavy shade in summer and drop all of their leaves in autumn have the following disadvantages:</p> <ul style="list-style-type: none"> Australian ecosystems are not adapted to this pattern. Heavy shade under the canopy in spring/summer, prevents understory plants from growing, thus providing little habitat for native animals. Light to no shade in autumn/winter. Most leaves fall within a short time period in autumn and break down quickly, resulting in an influx of nutrients into the stream and a sudden change to the temperature and oxygen content of the water. Native invertebrates are not adapted to feeding on the thin, soft leaves of willows. 	<p>Mat forming moss and a tendency to grow into the centre of waterways means that willows:</p> <ul style="list-style-type: none"> Trap more coarse sediment along the river bank, leading to bank instability, reduced channel capacity and diversion of flows. May smother and fill all available rock crevices that provide important habitats for animals such as frogs. Consume more water than native eucalypts when their roots extend into the waterway – most of this water is used in summer, when water is most scarce for farmers and animals. 	<p>Very few hollows for nesting mammals and birds.</p> <p>Light wood that breaks down rapidly results in:</p> <ul style="list-style-type: none"> Fewer snags to shelter fish and macroinvertebrates. Floating branches and trees that can be carried more easily downstream, posing an increased risk to people and infrastructure. <p>Short flowering season, no fruit or large seed production and very few insects means that:</p> <ul style="list-style-type: none"> Very little food is available to birds, spiders, insects, mammals or fish. Willow flowers are only known to provide nectar for introduced honey bees.

Weeds Australia – <http://www.weeds.org.au/about.htm>

Archived resource "National Willows management Guide" – http://pandora.nla.gov.au/pan/64168/20080620-0000/www.weeds.crc.org.au/documents/wmg_willow.pdf

Invasive species in Australia's aquatic environments

Figure 11: Introduced fauna in the riparian zone

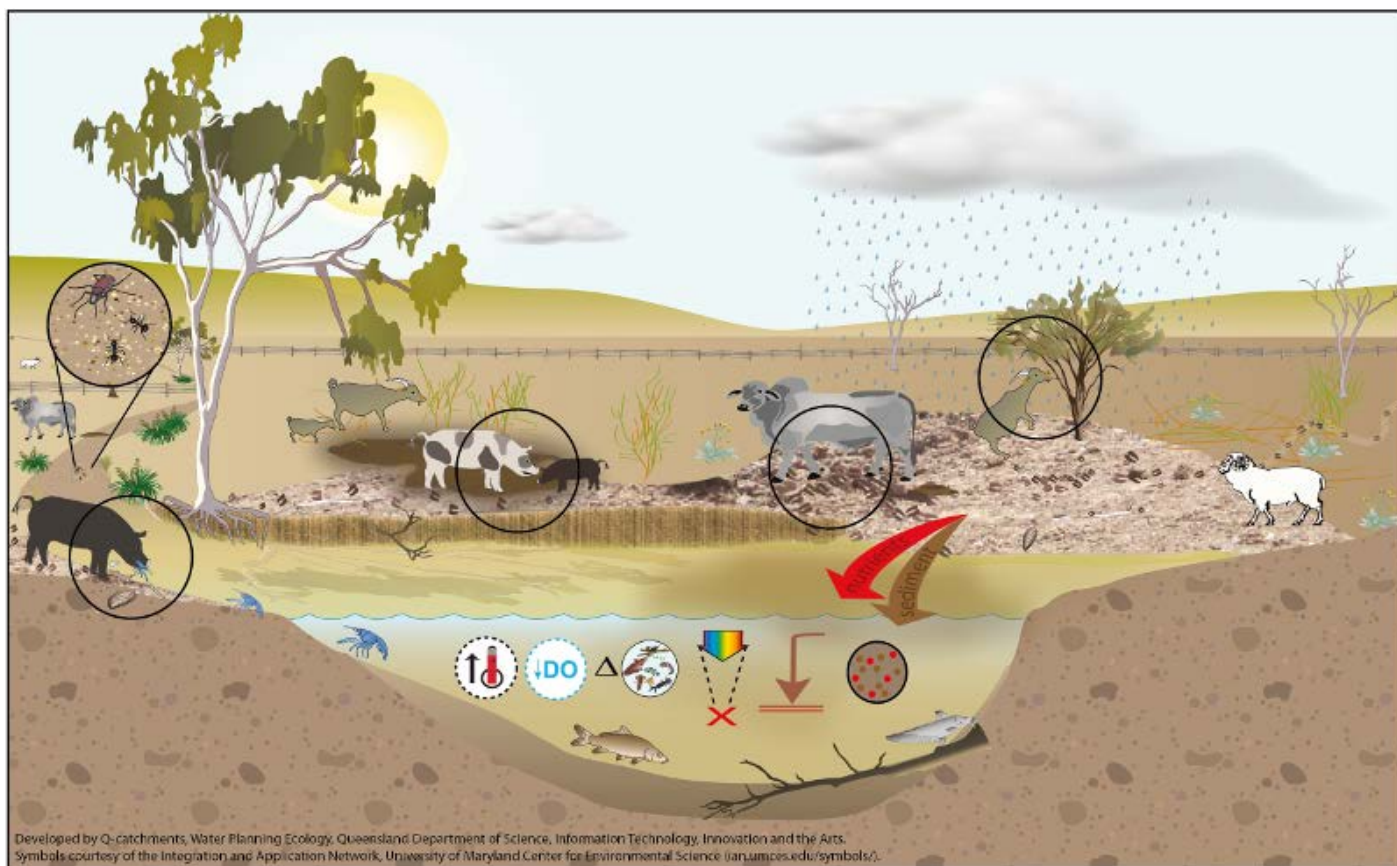


Figure 11. Introduced fauna in the riparian zone

<http://wetlandinfo.ehp.qld.gov.au/wetlands/ecology/aquatic-ecosystems-natural/riverine/murray-darling/rfauna.html>

WEBLINKS

The feral water buffalo

<http://cbhsyearfivehistory.weebly.com/water-buffalo.html>

ABC video: Buffalo cull

<http://www.abc.net.au/news/2015-08-22/buffalo-cull-in-arnhem-land/6717268>

Arnhem land buffalo cull

<http://www.abc.net.au/news/2015-08-22/arnhem-land-djulk-rangers-ambitious-feral-water-buffalo-cull/6710380>

Curbing the carp

<http://splash.abc.net.au/home#!/media/30051/curbing-the-carp-population>

Landline: war of the willows

<http://www.abc.net.au/landline/content/2013/s3782459.htm>

NT Buffalo pamphlet (graph and map)

http://www.lrm.nt.gov.au/__data/assets/pdf_file/0006/355803/Buffero-survey-Arnhem-Land-2014-pamphlet.pdf

Willows Friend or Foe brochure

http://www.weeds.org.au/WoNS/willows/docs/Willows_Friend_or_Foe_web_260609.pdf

WWF: Threat of Invasive species in the Murray -Darling

http://wwf.panda.org/about_our_earth/about_freshwater/freshwater_problems/river_decline/10_rivers_risk/murray_darling/murray_threats/

Giant Goldfish

<http://www.abc.net.au/news/2016-08-16/giant-goldfish-found-in-wa-rivers/7747824>



Hold a Hunger Banquet – here's how it works!

- 1** Organise a lunch for your class, year-level or even your whole school!
- 2** Guests draw a random ticket, assigning them to a high-income, medium-income or low-income tier...
- 3** ...and receive a lunch accordingly! This could range from a cup of rice, up to a three-course meal!



Register now with [Oxfam](https://www.oxfam.org.au) to make sure your students are at the forefront of the movement to end hunger. Your school's actions can create lasting change.

When you register Oxfam sends you an event guide for students with tips, ideas and stories, teaching materials, videos, posters and other goodies, to support you every step of the way and make sure your Hunger Banquet is a roaring success! Go to – <https://www.oxfam.org.au/get-involved/how-schools-can-get-involved/resources-for-teachers/term-four-featured-resource-eat-local-feed-global/>

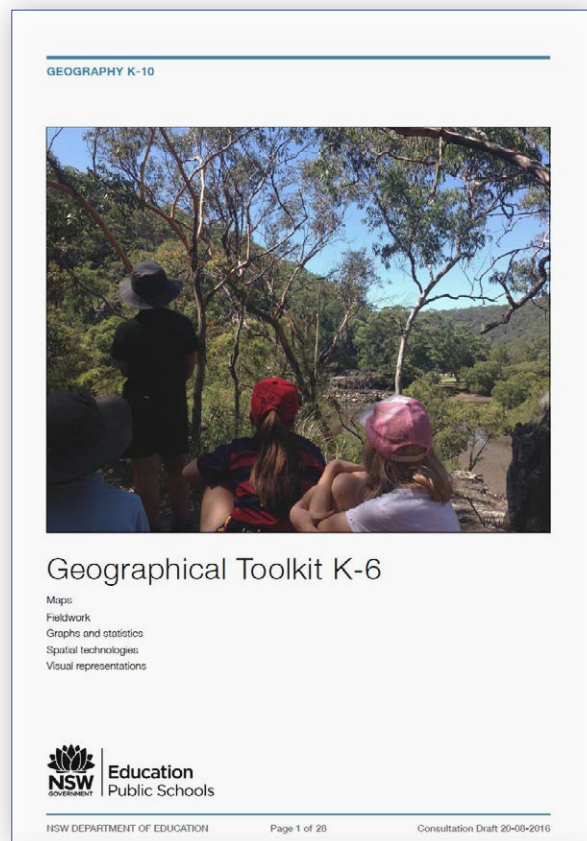
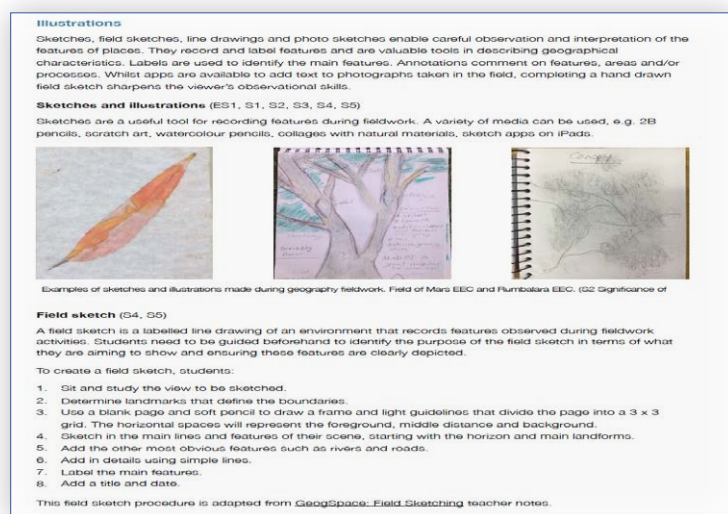
RESOURCES FOR GEOGRAPHY K-6

1. Geographical Toolkit for Primary Teachers

Downloadable from

http://fieldofmarseec.nsw.edu.au/wp-content/uploads/2013/02/geographical_toolkit_for_primary_teachers_v4sm_.pdf

Full of information and images about the TOOLS geographers use and practical fieldwork ideas for each stage of learning

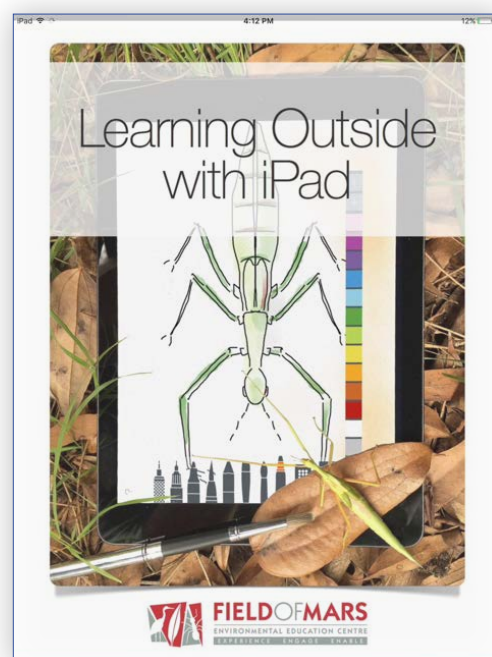


2. Field of Mars Environmental Education Centre iTunes U books

Titles include FIELDWORK K-6 and Learning Outside with iPad



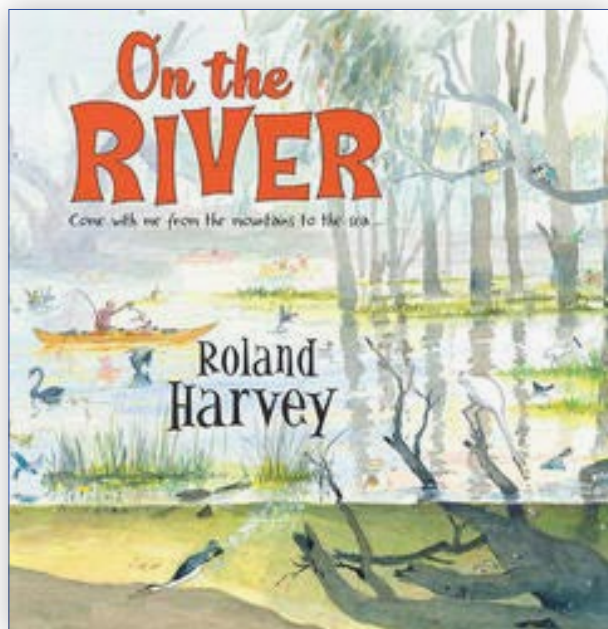
The iBook's contain a range of ideas for fieldwork activities to use with students from K – 6. Sensory activities and nature mapping are among the interesting tasks for engaging the young geographer.



RESOURCES FOR GEOGRAPHY K–6

3. Story / picture book: *On the River* by Roland Harvey. Published 2016

A book full of geographical information about the River Murray as it flows from its source to its mouth. Beautiful illustrations reveal a wealth of information about people, their activities, places and environments presented in an engaging cartoon style format against a backdrop of beautiful landscape drawings.



“Roland takes us on a journey as he travels from the top at the headwaters, through many a small riverside town, showing us what may be found and all the ways that the river is utilised, right on through to the Murray Mouth.

We see waterskiing, canoes, cricket, walking, fishing, paddle-steamers, windsurfers, houseboats and a glorious range of native animals. Roland briefly educates on the ecology, the history and the wildlife of the mighty Murray River. There is also a short note from the Murray to the Darling about how to look after river health.

The tone of the story is light and witty, with both text and pictures that will engage audiences of every age”

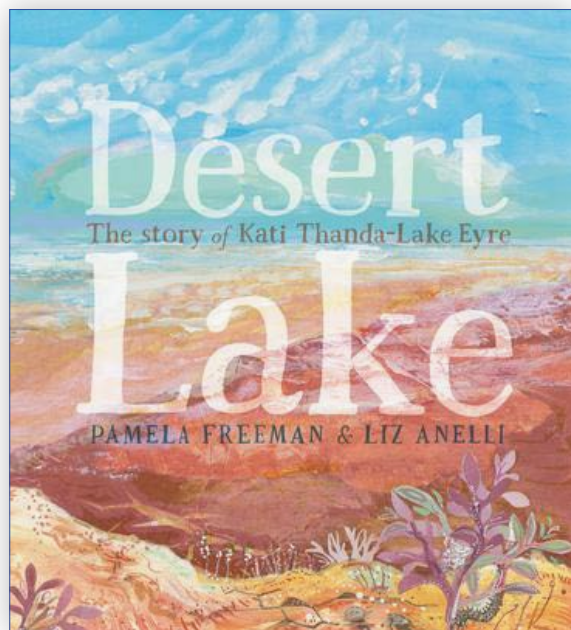
<http://bookgirl.beautyandlace.net/book-club-on-the-river>

Read more: <http://bookgirl.beautyandlace.net/book-club-on-the-river#ixzz4LRUHJRg8>

Follow us: @beautyandlace on Twitter | BeautyandLaceOnline on Facebook

4. Story / picture book: *Desert Lake the story of Kati Thanda Lake Eyre* by Pamela Freeman and Liz Aneli (Illustrator). Published 2016

This book covers the key geographical concepts of place, space, environment, change and interconnection and can be used when studying places through stages 1 – 3. The emphasis is on the cycles of change in Australia’s natural environments.



Through a beautiful combination of text and illustration, we are shown the beauty and harshness of the environment, the transience of much of the animal population and the evolutionary features that allow both plants and animals to survive in this unique place.

Whether close ups of flora and fauna or distant landscapes, the illustrations by Liz Anelli are delightful. Colour, texture and movement across large sections of sky and earth highlight the changing states of the landscape that somehow draw you into feeling the place. These images are the perfect complement to Freeman’s storytelling and both emit a strong sense of constant change.

This is essentially an older children’s informative picture book – simple enough to be accessible to junior primary grades but with enough detail, facts and related environmental issues as to extend even mature readers.

<http://readingtime.com.au/desert-lake-story-kati-thanda-lake-eyre/>

BENEFITS OF GTANSW MEMBERSHIP

The Geography Teachers' Association of New South Wales (GTANSW) is a not-for-profit, incorporated body that represents the professional interests of Geography teachers in NSW and Geographical Education more generally. The objectives of the Association are to promote the study and teaching of geography in primary and secondary schools by:

- providing professional learning opportunities for teachers of Geography;
- advocating the interests of Geography teachers on matters in the State and National interest;
- providing forums where teachers of Geography and the wider community can exchange views;
- supporting Geographical Education through the development and dissemination of geographical resources; and
- promoting geographical research and fieldwork.

The GTA seeks to address its objectives via a yearly program of activities and events, which include:

- online publication of the quarterly Geography Bulletin a quality, peer-reviewed journal designed to serve the contemporary interests of Geography teachers and students.
- delivering Teacher Professional Learning Workshops and in metropolitan and regional locations, focussing on current issues, including in Global Education, the use of technology in the classroom, research and fieldwork skills.
- conducting an Annual Conference with keynote addresses from leading geographers on contemporary and emerging geographical issues as well as more practical sessions by geographical practitioners.
- hosting School Certificate and Higher School Certificate Reviews for teachers of Geography. These reviews are held in a number of regional areas across the state.

For further information about GTANSW activities and events go to: www.gtansw.org.au



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Fax: Email:

☐ **Corporate membership \$180.00**

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School address: Postcode:

School phone: School fax:

☐ **Concessional membership \$40.00** ☐ Retiree ☐ Part-time teacher ☐ Student (verification required)

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Surname: Given Name(s):

Home address: Postcode:

Phone: (Mob) (Home) (Work)

Fax: Email:

School:

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ADVICE TO CONTRIBUTORS

Editorial policy attempts to:

- promote material which will assist the study and teaching of geography
- encourage teachers to share their ideas on teaching geography
- provide a means by which teachers can publish articles
- inform readers of developments in geographical education

Articles are sought reflecting research and innovations in teaching practices in schools. From time to time issues of the Bulletin address specific themes.

Refereeing

All suitable manuscripts submitted to the Geography Bulletin are subject to the process of review. The authors and contributors alone are responsible for the opinions expressed in their articles and while reasonable checks are made to ensure the accuracy of all statements, neither the editor nor the Geography Teachers' Association of New South Wales Inc accepts responsibility for statements or opinions expressed herein.

Books for review should be sent to:

The GTA NSW Council
PO Box 699
Lidcombe NSW 1825

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1. **Objective:** The Geography Bulletin is the quarterly journal of the New South Wales Geography Teachers' Association, Inc. The role of the Geography Bulletin is to disseminate up-to-date geographical information and to widen access to new geographic teaching ideas and methods. Articles of interest to teachers and students of geography in both secondary and tertiary institutions are invited, and contributions of factually correct, informed analyses, and case studies suitable for use in secondary schools are particularly welcomed.
2. **Content:** Articles, not normally exceeding 5000 words (no minimum specification), should be submitted to the GTANSW Office gta.admin@ptc.nsw.edu.au or by mail to: **PO Box 699, Lidcombe, NSW 1825** who will forward to the editor: Submissions can also be sent directly to the editor: Lorraine Chaffer (lchaffer@tpg.com.au)
Articles are welcomed from tertiary and secondary teachers, students, business and government representatives. Articles may also be solicited from time to time. Articles submitted will be evaluated according to their ability to meet the objectives outlined above.
3. **Format:** Digital submission in Word format. Tables should be on separate pages, one per page, and figures should be clearly drawn, one per page, in black on opaque paper suitable for reproduction. Photographs should be in high resolution digital format. An indication should be given in the text of approximate location of tables, figures and photographs. Every illustration needs a caption. Photographs, tables and illustrations sourced from the internet must acknowledge the source and have a URL link to the original context.
4. **Title:** The title should be short, yet clear and descriptive. The author's name should appear in full, together with a full title of position held and location of employment.
5. **Covering Letter:** As email with submitted articles. If the manuscript has been submitted to another journal, this should be stated clearly.
6. **Photo of Contributor:** Contributors may enclose a passport-type photograph and a brief biographical statement as part of their article.
7. **References:** References should follow the conventional author-date format:
Abbott, B. K. (1980) *The Historical and Geographical Development of Muswellbrook* Newcastle: Hunter Valley Press.
Harrison, T. L. (1973a) *Railway to Jugiong* Adelaide: The Rosebud Press. (2nd Ed.)
Harrison, T. L. (1973b) The Spatial Distribution of Macadamia Plantations on the Far North Coast of New South Wales, *Journal of Rural and Agricultural Problems*, 13, 4, Oct. pp. 347–359.
O'Donovan, M. J., *et. al.* (1980) "Animal life in the North Star District of New South Wales". In W.W. Murphy, (Ed.) *Readings in Regional Geography (Vol. 2)*, Sydney: Williams and Sons.
8. **Spelling** should follow the Macquarie Dictionary, and Australian place names should follow the Geographical Place Names Board for the appropriate state.





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