# **GEOGRAPHY BULLETIN**

# Creating fieldwork investigations



Geography Teachers Association of New South Wales Inc.

### Volume 52 No4 2020

IN THIS ISSUE:

FIELDWORK INVESTIGATIONS Fieldwork equipment and its use

FIELDWORK: WATER IN THE WORLD Low cost fieldwork in a pandemic

FIELDWORK: SUSTAINABLE BIOMES Investigating soils with fieldwork

FIELDWORK: ENVIRONMENTAL CHANGE Investigating environmental change on the NSW South Coast

FIELDWORK: A PEDAGOGICAL APPROACH A Geography Lesson out of every window: Fieldwork in 50

DISCUSSION PIECE 'That's not an excursion. THIS is an excursion!' Fieldwork in Denmark

CLASSROOM ACTIVITY: INTERCONNECTIONS Connecting through time: Case Study – Dating and technology

CLASSROOM ACTIVITY: URBAN PLACES Half a crossword

CLASSROOM ACTIVITY: ENVIRONMENTAL CHANGE Biospheric processes worksheet

ASSESSMENT: HUMAN WELLBEING Assessment Task

### **PROJECTS** • **REPORTS** • **RESOURCES** • **ARTICLES** • **REVIEWS**

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The Geography Bulletin is a quarterly journal of The Geography Teachers' Association of NSW & ACT Inc. 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 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' at the back of this issue.

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# GEOGRAPHY BULLETIN

Volume 52, No 4, 2020 EDITOR: Lorraine Chaffer

EDITORIAL	2
PRESIDENT'S REPORT	6
FIELDWORK INVESTIGATIONS Fieldwork equipment and its use	7
FIELDWORK: WATER IN THE WORLD Low cost fieldwork in a pandemic	13
FIELDWORK: SUSTAINABLE BIOMES Investigating soils with fieldwork	57
FIELDWORK: ENVIRONMENTAL CHANGE Investigating environmental change on the NSW South Coast	65
FIELDWORK: A PEDAGOGICAL APPROACH A Geography Lesson out of every window: Fieldwork in 50	76
DISCUSSION PIECE 'That's not an excursion. THIS is an excursion!' Fieldwork in Denmark	
CLASSROOM ACTIVITY: INTERCONNECTIONS Connecting through time: Case Study – Dating and technology	
CLASSROOM ACTIVITY: URBAN PLACES Half a crossword	
CLASSROOM ACTIVITY: ENVIRONMENTAL CHANGE Biospheric processes worksheet	
ASSESSMENT: HUMAN WELLBEING Assessment Task	
NEW RESOURCES	
REPORT Australian Geography Competition 2020	100
ADVICE TO CONTRIBUTORS	

### **EDITORIAL**

## Welcome to the Geography Bulletin, Edition 4 with many thanks to all contributing authors.

The main focus of this edition is fieldwork, particularly the creation of fieldwork activities that reflect school circumstances and local conditions. *Fieldwork Equipment and it's use* provides some guidelines for selecting fieldwork equipment to develop a fieldwork kit, using equipment and collecting data in the field using traditional equipment and apps. Many thanks to Fleur Farah for *Low Cost Fieldwork in a Pandemic*, Jen Robinson for her *Sustainable Biomes Fieldwork Booklet* on soil testing and Chris Main for *Environmental Change on the South Coast*, including the accompanying Fieldwork Booklet. These articles provide teachers with examples of fieldwork they can use to develop their own activities.

In *A Geography Lesson out of every window: Fieldwork in 50*, Susan Caldis looks at fieldwork from a pedagogical perspective framed by her teaching experience in Singapore.

In his article *That's not an excursion. THIS is an excursion*. John Collins reflects on past excursion experiences including some interesting experiences in Denmark.

Additional items include classroom and assessment activities from:

- Betty Steele, *Connecting through time: 'Dating and technology'* for Interconnections
- Katerina Stojanovski, *Half a Crossword* for Urban Places and *Biospheric processes for Sustainable Biomes*
- Drew Collins, Assessment Task for Human wellbeing

A special edition of the Geography Bulletin will focus on Stage 6 Case Studies and be the last for the year.

Lorraine Chaffer Editor

### **Coming events**

A *Digital Professional Learning Package*, Plan for 2021, provides an opportunity for schools and teachers to undertake professional learning during term 4. The cost-effective package can be used by schools at a faculty or individual teacher level as a part of the term 4 registration process and during planning for 2021. See the flyer on the following pages for details.

Registered schools will have access to all presentations from Week 2, Term 4 for the remainder of the term. Presentations can be accessed at any time of day.

The GTA NSW & ACT *Online Learning* team, Paul Batten and Katerina Stojanovski, have been busy creating new NESA accredited courses on *Topographic Mapping, Place and Liveability* and *Landscapes and Landforms.* New courses are continually being added and GTANSW & ACT members have a 'Pay for 2 get 3' offer available. These popular courses provide excellent grounding for less experienced teachers and those with no geography training. The ability to undertake courses at any time is a feature appreciated by teachers.



Lorraine Chaffer, Editor



### **GTA NSW & ACT PROFESSIONAL LEARNING TERM 4, 2020**

### WHY?

- To continue supporting Geography teachers with quality Professional Learning
- To assist the effective use of Term 4 to review teaching and learning programs and plan for 2021
- Provide a range of professional learning ideas, practices and resources in pre-recorded talks
- Broadening access to professional learning in Geography across Australia

### DETAILS

- Presentations are 30–40 minutes in length to facilitate flexible use such as:
  - Whole faculty /department viewing discussion and integration into 2021programs
  - Individual viewing teachers view, trial and make programming recommendations
  - A taster of new ideas and practices + opportunity to explore further at Annual Conference 2021
  - Trialling new ideas with classes in 2020
- Flexible delivery with access for the whole of Term 4
- The package will be accessible via a weblink but will not be downloadable
- A folder of support documents are included in the package.

### REGISTRATION

### **Member schools:**

- \$110 per school (Base price inc. GST) 1 registered person with access. This would suit schools who want to use the resource with all geography teachers at a common time throughout Term 4 (led by 1 person)
- \$11 per additional teacher (inc. GST) up to 10 teachers with individual access. This will suit schools who want to delegate responsibility to individuals OR for individual teachers to access presentations at a time that suits

### **Non-member schools:**

- \$220 per school (Base price inc. GST) 1 registered person with access
- *\$11 per additional teacher (inc. GST)* up to 10 teachers with individual access

The Digital Learning Package is open to Geography Teachers across Australia. Members of State / Territory Associations can use their membership to get members rates.

See over for package details...

www.gtansw.org.au • gta.admin@ptc.nsw.edu.au • 02 9716 0378

### REGISTER

### ABOUT THE DIGITAL PROFESSIONAL LEARNING PACKAGE

PRESENTER	PRESENTATION
Lorraine Chaffer	Welcome and organisation
Lorraine is Vice President of GTANSW & ACT and immediate past President, Annual Conference Convenor and Editor of the Geography Bulletin. Lorraine is a passionate Geographer who spends her time developing teaching resources for NSW and ACT teachers and supporting teachers at all stages of their teaching careers.	In the welcome Lorraine will outline ways the presentations in the package can be used for professional development during Term 4, 2020 and will showcase a range of Professional learning materials and events currently available through GTA NSW & ACT.
Melissa Kophamel	Virtual Fieldwork: Big Issue Classroom
<b>The Big Issue</b> Melissa is The Big Issue Classroom Program Coordinator for NSW and ACT.	The Big Issue Classroom's short promotional video provides an introduction to our most popular workshop, 'Discussions about Homelessness and Disadvantage'. We provide information about how to access our workshops via our interactive online eClassroom, along with details regarding links between The Big Issue Classroom workshops and the Australian/NSW Geography Curriculum.
Dr Karen Joyce	Map my school – Spatial technologies
She Maps I believe there's a science for everyone, you just need to know where to look! I share my experiences drawn from more than 20 years as a geospatial scientist in academia, military, industry, and small business to help people discover science beyond lab coats and test tubes.	Most of us have heard about the importance of STEM (science, technology, engineering, and maths) education and STEM in the workforce. Unfortunately, STEM is also a clique, and one in which geography is not invited. With government education investment priorities firmly nested in STEM, we need to ensure that geography and geospatial skills aren't left by the wayside. Luckily, I have the perfect geography project to initiate at your school that fits perfectly into a STEM framework. With our Map My School project, I invite you and your students to work out how cool your school is.
Summer Howarth	Design thinking in the Geography classroom – Creativity and critical thinking
Summer is founder of The Eventful Learning Co., highly regarded in the education community across Australia. An accomplished learning designer & events producer, Summer works with teachers, students and community leaders to solve learning engagement challenges and is passionate about unleashing powerful strategies through innovation methods.	Summer will share a process to unlock ideas and design engaging experiences for geography students in the classroom and the field. We will be developing a collaborative set of ideas and tools as you explore how to embed design thinking methods into your practice. Part 1: Design Thinking Part 2: Design Thinking – Interactive with a MIRO board
Khya Brooks	Creativity in Geography
<b>Elizabeth Macarthur High School</b> Relieving Head Teacher of Social Sciences at a partially selective high school in South-Western Sydney. This context has provided Khya with the skills to both extend and support students from a variety of backgrounds and abilities in an engaging and informative way.	This session will look at easy strategies that can be employed to add creativity to the Geography classroom. The session aims to provide an overview of strategies that can be easily applied to a variety of geography topics to improve student engagement, extend gifted students, support lower order students and improve all students' geographic knowledge, skills and holistic and conceptual thinking. Many of these strategies can be employed as larger problem based learning inquiries, or implemented irregularly to promote student engagement and reflective thinking skills. Resources are also provided to support teachers in their implementation.
Kris Beazley & Lynne Strong	Trans-disciplinary learning
Kris is the Principal, <b>Centre of Excellence in Agricultural</b> <b>Education, Richmond Agricultural Colleg</b> e. Kris is a passionate advocate for the sustainable futures from an environmental, agricultural/STEM/Geo and careers/ employment perspective. Lynne is the founder of <b>Picture You in Agriculture</b> initiatives, <b>The Archibull Prize and Kreative Koalas</b> which enable teachers to empower young people to reach their full potential through life-long learning and support. Ensuring location, economic status nor age should preclude individuals or their communities from fulfilling their dreams.	Kris will lead you through effective examples of trans-disciplinary learning models for primary and secondary students. Kris and Lynne are passionate advocates for the sustainable futures from an environmental, agricultural/STEM/Geo and careers/ employment perspective. Both have led successful programs that have at their core partnered learning opportunities that facilitate a deep understanding of real world issues and their alignment to core curriculum knowledge and skills, the development of creative and critical thinking skills, teamwork, communication, problem solving, research and design thinking capabilities and project management. The programs delivered have also had a strong focus on career development for students from Stage 3 to Stage 6.

### PLAN FOR 2021 ABOUT THE DIGITAL PROFESSIONAL LEARNING PACKAGE

Steven Smith and Chris Betcher	Remove the walls of your classroom with Google Earth	
<b>Google for Education</b> Steve is a former geography teacher and self confessed geo- nerd, and is based in Auckland, NZ. Steve is the New Zealand Education Lead for the Google for Education team and helps schools across the country work with GSuite, Classroom, Chromebooks, and of course Google's awesome geo tools. Chris is a passionate Australian educator with over 30 years of classroom experience. He is currently the Program Manager for G Suite Adoption with the Google for Education team in Sydney. He has presented workshops to educators around the world in the effective use of technology for teaching and learning, and in 2003 was recognised as the Australian ICT Educator of the Year.	Google Earth – Part 1: Exploring Part 2: Creating This workshop is divided into two parts. Part 1, Exploring, will teach you about the amazing features built into the new web-based version of Google Earth, including Voyages, Streetview and 3D imagery. In Part 2, Creating, you will learn to use the new Projects tool to create your own customised Earth voyages. These can be used by any grade level to tell almost any story about our world and the people in it.	
Mick Law Contour Education	Spatial technology and Fieldwork Place and Liveability, Urban Places, Environmental change	
Mick is at the forefront of geographical education in Australia with a wealth of experience implementing geospatial programs in Australian schools for more than two decades. At Contour Education we recognise the significance of geospatial technologies to geographical education through classroom teaching, developing resources, working with educators and advocating for these tools.	Learn how to represent the data that you have collected in the field in this session. We'll use noise data from around the school and water quality data from a local creek, but you'll learn how to map any data that you have collected in the field.	
Catherine Kerr, NSW Department of Planning, Industry and Environment and Lorraine Chaffer, GTANSW & ACT	Tweed Sand Bypassing Environmental change and management	
Catherine Kerr, NSW Department of Planning, Industry and Environment and Lorraine Chaffer, GTANSW & ACT Catherine is a Coastal Geographer who has worked in the fields of Coastal Management, storm tide emergency management, stakeholder engagement and science communication. She has a Postgraduate Diploma of Education in Geography, and currently works as a Climate Change Adaptation Information Delivery Officer for the NSW Government.	Tweed Sand Bypassing Environmental change and management Tweed Sand Bypassing (TSB) is a long-term coastal management solution located on the border of NSW and Queensland. This webinar will provide general information on TSB, before introducing the Schools Package – a complete unit of work for the Stage 5 topic area Environmental Change and Management. A collaborative project between GTA NSW and TSB, the package is innovative and highly visual. It contains a series of chapters on coastal change and management, before using TSB and Waikiki Beach, as detailed and highly applicable case studies. The package also contains a stimulus sheet with real world geographic information	
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# **PRESIDENT'S REPORT**

Welcome everyone to a very reflexive part of the year. Reflexivity requires us to not only contemplate that 'What?, Why? and How?' of our already-occurred practice; it also requires us to draw on such practice and its surrounding circumstances and outcomes to decide upon and enact a plan for 'What next?'. Term 4 is always an interesting time of dualistically looking forward and looking back. A time for working out what enabled and constrained our practice. A time to establish areas for possible adjustment and strategies for moving forward in the coming year.



During this year, one of the most distinctive features of Geography teaching has definitely been constrained by the pandemic: Fieldwork. The Association has received many inquiries throughout recent months about how best to proceed with fieldwork given the range of restrictions. There is no simple answer. The possible answers are context specific to time, place and resources available: virtual fieldwork, online surveys, interviews via zoom, guadrant studies, tallies or annotated field sketches around the local area or home. Regardless of the adapted COVID-safe options we choose, the magic of fieldwork has been compromised this year. Therefore, it is wonderful to see an edition of the Geography Bulletin be dedicated to fieldwork. I'm sure each article will provide ideas to use in our context and re-ignite our students' curiosity, awe and wonder about place, space and environment at a local scale.

In my previous President's report I reminded us about a Geography-specific set of standards which provide support and direction for the teaching of this subject: the *Professional Standards for the Accomplished Teaching of Geography* (Hutchinson & Kriewaldt, 2010; www.geogstandards.edu.au). There are two GEOGstandards which particularly frame this edition of the Geography Bulletin:

 GEOGstandard 2: Fostering inquiry and fieldwork – Allowing students to carry out a range of structured and open-ended inquiries; and allowing students to undertake inquiry in the field by selecting and using geographical tools;

 GEOGstandard 3: Developing geographical thinking and communication – Encouraging and supporting student understanding about spatial reasoning, conceptual interdependencies, interconnections and assemblages; Encouraging and supporting students to understand real world contexts at a range of scales and draw on lived experience as a personal geography

It is wonderful to again see contributions from the community of Geography educators together with articles from members of GTANSW&ACT Council. Thank you to all authors for generously sharing your work and experience. Also, I would like to thank Lorraine Chaffer, the journal editor, for bringing the 'by-Geographyteachers-for-Geography-teachers' mantra to life with rigour and accessibility. May you all continue to be inspired by the spirit of sharing which is so evident in our community; may you also be encouraged by the range of ideas and examples for the enactment of fieldwork.

Wishing you all a productive journey throughout the remainder of Term 4 and I look forward to our paths continuing to cross in various forms.

#### Susan Caldis

President, GTANSW&ACT | STEM Ambassador, Science & Technology Australia

### GTANSW & ACT resource sharing platforms

- GTANSW & ACT Website www.gtansw.org.au
- GTANSW & ACT Scoop.it https://www.scoop.it/topic/year-9-geographies-of-interconnections
- GTANSW & ACT Facebook page https://www.facebook.com/GTA.NSW/
- GTANSW & ACT Twitter @ GTANSWACT

# **FIELDWORK INVESTIGATIONS**



Image source: Shutterstock

### Lorraine Chaffer Vice President GTA NSW & ACT

### 'Geography is best learnt through the soles of one's feet'

Fieldwork is an essential tool for geographical investigation. Building your confidence in planning and undertaking fieldwork with students will create opportunities to integrate fieldwork into any lesson and undertake investigations within or close to your school.

### Three fieldwork investigations

The three fieldwork investigations in this edition were developed by teachers to suit their school situations and local sites. These activities use a variety of approaches to collect quantitative and qualitative fieldwork data.

Low cost fieldwork in a pandemic – Fleur Farah

Fleur steps you through a local fieldwork activity for Water in the World and generously shares the fieldwork resources she developed.

• Soil testing fieldwork – Jen Robinson

Jen's school has an agriculture plot which provided an opportunity to create a soil testing fieldwork activity for Sustainable Biomes in which students compare good soil in the plot with soil in another location using selected soil tests.

Investigating environmental change on the NSW
 South Coast – Chris Main

Chris shares a fieldwork activity he created for a local environment, and the considerations taken into account when developing the field trip.

### Developing a fieldwork kit

The equipment you buy to build a 'ready to go' fieldwork kit that will be available at all times will determine the activities you can undertake locally for each topic.

- Start with the most basic equipment and build your kit over time.
- Borrow some equipment from Science until you can build your own kit.
- Create your own ... identification charts, quadrats and maps.
- Make multiple sets to facilitate groupwork
- Create 'student friendly' instructions for pieces of equipment.
- Learn what the measurements from each piece of equipment mean eg pH of 7.
- Learn how to use the equipment and practice at school with students before using off site. *See supporting videos at the end.*

### **Basic equipment**

Clipboards – clear ones enable maps and instructions to be inserted; pencils; rubber gloves; first aid kit; camera (phones).

### **FIELDWORK INVESTIGATIONS**

### Figure 1: Equipment to measure abiotic features (quantitative data).

EQUIPMENT	PURPOSE / USE	
Thermometer	Used to measure air temperature.	
Anemometer	Measures wind intensity / strength.	
Compass	Used to determine the direction eg wind.	
Wet and Dry bulb thermometer	A hygrometer measures the relative humidity – the amount of moisture in the air compared with what the air could hold at that temperature.	
pH water test strips	pH is a measure of acidity or alkalinity measured on a scale of 0–14. The colour of the paper strips changes to indicates pH.	
Turbidity tube	Turbidity measures the cloudiness of the water caused by suspended material such as clay, silt, sand or algae. The more suspended material in water, the higher the water's turbidity and the lower its clarity.	
Refractometer or electrical conductivity metreA refractometer can be used for measuring high salt concentrations eg ICOLLS. An electrical conductivity meter is used to measure low salt concentrat freshwater using ppm units of measurement.		
pH soil test kit	The acidity or alkalinity of the soil influences the availability of nutrients to plants. Different plants have different pH range preferences.	
Light metre	Light meters measure in the visible light spectrum. The unit is Lux.	
Clinometer	A clinometer is used to measure the gradient of a slope (steepness). It can also be used to measure the height of trees.	
Soil thermometer	A soil thermometer has a spike that allows it to be pushed into the soil.	
Infrared camera	Measures the surface temperature of different places.	
Decibel metre	Measures sound levels. A <b>phone app</b> can be used for this.	
Equipment Instruction Sheets	Laminated sheets that explain 'how to use' each item of equipment.	

### Figure 2: Equipment used to observe and record abiotic and biotic features (qualitative and quantitative data).

EQUIPMENT	PURPOSE / USE
Transect line	A transect is a line along which environmental features are observed, measured and recorded. A transect line can be created using a tape measure or a length of rope.
Quadrat	A quadrat is a 1 metre x 1 metre square made from pipe, rope or coloured string. It is used to count species of plants or bare ground per sq metre to compare distribution.
Identification charts and observation checklists for plants, wildlife, clouds, canopy cover, water quality, wind strength (Beaufort scale), water quality, water burg, soil texture, soil colour	These charts are used to observe and identify features of the environment. The charts can be used to create stations for small groups of students to visit and make observations without teacher guidance. Create and laminate your own charts and checklists. See canopy cover and plant identification charts.
bugs, soil texture, soil colour	See Water Quality and Stream Condition Checklists

### **FIELDWORK INVESTIGATIONS**

#### Figure 3: Examples of charts and checklists

aterwater

WATER BUG DETECTIVE GUIDE



Stream Condition Checklist available from https://arrc.com.au/product/rivers-of-carbon-stream-condition-checklist/ Waterway Health Check available from http://nrmonline.nrm.gov.au/catalog/mql:2879



Water Bug Detective Guide posters and recording sheets https://www.nswwaterwatch. org.au/resources/water-bug-id-charts-and-posters https://www.nswwaterwatch.org.au/resources/result-sheets

> Canopy cover and plant identification chart from Field of Mars EEC website https://sites.google.com/view/virtual-fieldwork/ fieldwork#h.p\_rbTMDeoqNW\_Q





NSW Swater

Environ



Cloud identification wheel https:// www.adventurein-a-box.com/ cloud-wheel-withcloud-identificationguide-for-kids/



### Apps for fieldwork

There are now many phone and tablet Apps that can be used to collect fieldwork data. A mix of equipment and Apps can increase the diversity of data collected during fieldwork. Sometimes equipment is more accurate than an App. It is worth reflecting on when an App may be the most appropriate equipment to use.

These include:

- Apps for location data e.g. My GPS Coordinates, GPS Data, GPS Essentials
- Apps for collecting specific types of data eg sound (Decibel meter), direction (compass), temperature (Big Weather), slope (clinometer)
- Apps that collect multiple data sets eg Altitude DC
- Survey based apps e.g. Epicollect123, Survey123 (ESRI ArcGIS).

A PowerPoint Presentation – Apps in fieldwork will be added to the GTA website with this edition of the bulletin.



### Figure 4: Selected PPT slides showing apps used for fieldwork

Source: Apps in Geography PPT Presentation AGTA Conference 2019 by L Chaffer – https://www.agta.asn.au/files/Conferences/conf19/presentations/Thursday/Workshop%204a/Apps%20for%20Geography.pdf

### Learning to use fieldwork equipment: Support materials

NSW Waterwatch YouTube videos - https://www.youtube.com/user/NSWWaterwatch



### **NSW Environmental Education Centres**

Many EEC's produced virtual fieldwork activities during COVID-19. Many of these explain the use of fieldwork equipment. Examples:

**Field of Mars EEC** – https://sites.google.com/view/virtual-fieldwork/fieldwork#h.p\_rbTMDeoqNW\_Q An excellent resource on fieldwork equipment plus instrument use videos



**Rumbalara EEC** – https://sites.google.com/education.nsw.gov.au/stage-5-environmental-change-m/fieldwork-the-ruins-1

Fieldwork instruments and equipment for studying coastal environments.



Stage 5 Wind Speed & Direction at 'The Ruins' / Wamberal Beach YouTube | Rumbalara EEC (1.14 sec) Iranscript



Stage 5 Sand Sieving at 'The Ruins' / Wamberal Beach YouTube | Rumbalara EEC (1.52 sec)  $\underline{Transcript}$ 

### Soil health – The RASH Approach

Healthy soil is critical to food production. The RASH Approach was designed for farmers to assess soil health. The techniques are simple, well explained and totally appropriate for school use.

An excellent resource about soil, *The Rapid Assessment* of *Soil Health Manual: Landholders Guide*, can be downloaded from here https://drive.google.com/file/d/1 d8zTBYjg5j6tTsWqdjYBjEobommsFoo3/view

NQ Dry Tropics NRM produced a series of seven short videos to support the RASH Approach. The videos focus on different elements of soil health, and how to test them.

- Rapid Assessment of Soil Health (RASH) approach. https://www.facebook.com/nqdrytropicsNRM/ videos/3418443248167076/
- Assessing Groundcover
   https://www.facebook.com/nqdrytropicsNRM/
   videos/426351118259422/

- Assessing soil texture https://www.facebook.com/nqdrytropicsNRM/ videos/625889621428651/
- Assessing Soil organisms https://www.facebook.com/nqdrytropicsNRM/ videos/762350557890463/
- Assessing Water infiltration https://www.facebook.com/ watch/?v=795026104599119
- Assessing soil pH https://www.facebook.com/nqdrytropicsNRM/ videos/356572232185881/

The Rapid Assessment of Soil Health Manual: Landholders Guide and fieldwork equipment https://drive.google.com/file/d/1d8zTBYjg5j6tTsWqdjYB jEobommsFoo3/view

### Most of the equipment needed to monitor soil health using RASH are easy to source







The AGTA publication *Geography Fieldwork Unlocked* is full of advice about undertaking fieldwork and examples of fieldwork activities for K–10.



### Context

Oran Park High School is located in a master planned community in south-west Sydney. The school opened at the start of 2020 with Year 7 and Year 8. When at capacity, Oran Park High School will have 2000 students enrolled. Being a passionate geographer, I was determined to get students out in the field in Stage 4 by creating inclusive, low-cost fieldwork in the local area. As part of the planned infrastructure for the Oran Park, the Kolombo Creek catchment was developed using water sensitive design principles. This created the ideal fieldwork site for students in Year 8 Geography, studying Water in the World.

During 2020, the COVID-19 pandemic has presented a variety of challenges. This has had a significant impact on how schools conduct excursions and complete fieldwork. To ensure that my proposed fieldwork was compliant and COVID-safe, I adhered to the *NSW school advice for school students for Term 3 families* document that stated:

Day field trips to outdoor locations with no physical distancing requirements can take place (e.g. DoE Environmental Education Centres and sport and recreation facilities, trips to the local river to collect water samples).

With this knowledge I was able to conduct fieldwork safely in the local area whilst still adhering to COVID health guidelines.

### **Syllabus links**

Topic: Water in the World – Stage 4

**Syllabus content:** The water cycle – students investigate how the operation of the water cycle connects people and places.

**Geographical concepts:** Place, scale, environment, change, interconnection.

### **Geographical tools:**

- Fieldwork investigating hydrologic processes in local landscapes using fieldwork equipment
- Graphs and statistics basic data tables
- Maps topographic maps, special-purpose maps
- Spatial technologies Google Earth, Spatial Map Viewer (spatial datasets) satellite images
- Visual representations- diagrams, photographs, multimedia (presentation video).

**Key inquiry question:** What approaches can be used to sustainably manage water resources and reduce water scarcity?

### **Geographical inquiry skills:**

- Acquiring geographical information
  - Collect, select, record and organise relevant data and geographical information, using ethical protocols, from a variety of appropriate primary data and secondary information sources.
- Processing geographical information
  - Apply geographical concepts to synthesise information from various sources and draw conclusions based on the analysis of data and information, taking into account alternative perspectives.
- Communicating geographical information
  - Present findings, arguments and explanations in a range of appropriate communication forms selected for their effectiveness and to suit audience and purpose, using relevant geographical terminology and digital technologies as appropriate.

#### **Outcomes:**

- GE4-1 locates and describes the diverse features and characteristics of a range of places and environments
- GE4-3 explains how interactions and connections between people, places and environments result in change
- GE4-5 discusses management of places and environments for their sustainability
- GE4-8 communicates geographical information using a variety of strategies

#### **Expected learning:**

#### Students

- identify water cycle processes in a catchment area
- investigate how people and places impact on a catchment area and the water cycle
- describe how water flows within a catchment area

• determine effective management strategies to manage a catchment area in a sustainable way.

**Assessment:** Students complete an in-class written response with stimulus material on the management of stormwater at Kolombo Creek, Oran Park. This response is based on fieldwork data and observations taken on the fieldtrip.

### **Pre-fieldwork activity**

Before starting the fieldwork at Kolombo Creek, students needed to know the processes operating in the water cycle. Knowledge of the processes of precipitation, infiltration and surface runoff are crucial for students to understand how catchment areas work and why topography determines where water will flow and flood. Using the SES Flooding in the Hawkesbury-Nepean Valley lesson activities, students created their own catchment areas to predict where water would flow and flood. See Create a catchment: Figures 1 and 2

### Create a catchment

### Figure 1: Instructions for creating your own catchment.

#### Scrunch your paper first. Use a **brown** marker Use **black** to draw Use **blue** to draw **Predict** where you Spray the catchment or watercolour paint in one or two roads water courses in the think the water will with water to from the plains and flow to and pool if it represent rain. to colour along tops crease (valleys). 'rains'. Colour those **Observe** the flow and of the ridges. across the mountains along the ridges. areas blue. pooling of the water. Before adding water, predict what areas may flood. What happens as more water is added to the catchment? Add more water to one setion of the catchment, what happens? Why is it important to predict and model where water will run in a catchment area?

These ideas then led to discussions on where surface runoff goes and how does surface runoff (stormwater) move through a catchment area with the potential to flood low lying areas. Source for Figures 1 & 2: SES Flooding in the Hawkesbury - Nepean Valley website launch event, Richmond, 2019.

Figure 2: Catchment area using a foil tray, coloured markers, A4 paper and a small water spray bottle.



### **Fieldwork preparation**



Prior to creating the fieldwork activities, I conducted research to find out about stormwater and its impact on catchment areas. I'googled' stormwater, pollution, and the impacts of stormwater in urban areas. I contacted the local council to see if there were up-to-date stormwater management plans for Oran Park as it is a new master-planned community. I was fortunate that a brochure for the catchment was being developed by the council, resulting in me being able to use information from the brochure to supplement my fieldwork, as noted in Figure 3.

### Figure 3: Waterway walk Kolombo Creek Oran Park community brochure.

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I visited the catchment area to take photographs and assess the risk associated with conducting fieldwork during a pandemic. I used my observations to create my risk assessment and used my photographs to produce the fieldwork student booklet and presentation for pre and post excursion activities.

### Mapwork

Students needed to be able to familiarise themselves with topographic maps of the area to understand the importance of contour lines in determining topography and predicting where water will flow in the catchment. I used Spatial Map Viewer to visualise where the water moved through the catchment ensuring I selected the 'Hydo' widgets and changed to the NSW Imagery satellite image, as noted in Figure 4. These are great maps to show watercourses in an area.



Figure 4: Spatial Map Viewer with Layer List Widgets and Basemap Gallery.

Selecting the GeoPDF Download Layer List Widget, I downloaded the topographic map of the region to create a screenshot of the catchment area. With this download, I created a customised topographic map of the area, including a screenshot of google maps of the same area for the reverse side. I added additional grid squares, adding eastings and northings, so students could easily locate features on the map, using area and grid references. A class set of A4 laminated maps of the local area is an invaluable resource that can be used in a variety of Geography lessons.



Figure 5: Create customised maps of your local area

#### Figure 6: Map used in the fieldwork booklet



\*\*More streets have been added to this map. These include Lillywhite Cct, Loveday St, Richmond Rd, Rowan St and Peckham Grove.

2. Explain how storm water moves through this catchment area.

### **Fieldwork instruments**

I created simple fieldwork guides to assist students in collecting fieldwork data whilst promoting independent learning. Students moved through a rotation to collect fieldwork data at each fieldwork station (Figure 7). To ensure safety, I used large snap-lock bags to carry the fieldwork guide and equipment. Included in each bag were anti-bacterial wipes to clean equipment after each use. Working in a HSIE faculty, it was crucial to have create quick reference guides for each fieldwork activity, to take pressure off 'out of field' teachers.

### Figure 7: Fieldwork guides



The fieldwork activities asked for students to take measurements at two locations. Students were required to collect fieldwork data at Point X and Point Y. This was to determine if water quality improved after moving through the wetland area. Students entered fieldwork measurements in their student booklet (Figure 8) and could make a judgement, based on criteria (fieldwork data), to evaluate the effectiveness of the water management strategies at Kolombo Creek.

### **Background Information**

From the Editor: The Kolombo Creek strategies are an example of Water Sensitive Urban Design. The benefits can be seen in this diagram.



### Figure 8: Fieldwork data table

### Fieldwork data collection – Point X

6.Use the fieldwork equipment to complete the table at Point X. Point X is located on the map on page 1 of the booklet.

Data collection	Equipment	Explanation	Measurement
Air temperature	Thermometer	Measurement in °C	
Humidity	Hygrometer	Measured as a percentage %	
Light	Light meter	Measured in LUX	
Turbidity	Turbidity tube	Measured in NTU	
Wind speed and	Anemometer	Measured in km/h and	
direction		(N,S,E,W)	
Water pH	Universal indicator	Measured pH (6.8 - 7.4 is	
	paper	healthy water)	
Soil moisture	Soil moisture meter	Measured from level 1-10	

#### Location 1: Kolombo Creek Reserve – Point X

### Figure 9: Fieldwork activity, describing management strategies at Kolombo Creek

### Storm water management in Kolombo Reserve

There are several management strategies that have been out into place in the Kolombo Creek catchment.

8.Describe the storm water management strategies that are in operation at Kolombo Creek and how they work

Zone	How it works
	Inlet zone
	Macrophyte zone
	Open water zone

### **Students conducting fieldwork**

Figure 10: Students using the fieldwork guide and compass to determine direction.





Figure 11: Using a turbidity tube to measure turbidity of the stormwater.



Figure 12: Using universal indicator paper to determine stormwater pH level.

### Assessment

Students were required to write an extended response, using stimulus material to answer the following question:

"If left unmanaged stormwater can pollute waterways, cause erosion, sedimentation and increase flooding". **Explain** how stormwater is managed at Kolombo Creek and **evaluate** the effectiveness of the management strategies implemented in the catchment.

### Marking guidelines

CRITERIA	GRADE
<ul> <li>Clearly describes a variety of stormwater issues</li> <li>Demonstrates a comprehensive understanding of how water is managed</li> <li>Clearly determines the value of the strategies</li> <li>Integrates relevant stimulus materials provided, where appropriate</li> <li>Presents a sustained, logical and cohesive response using appropriate geographical information, ideas, terms and concepts</li> </ul>	A
<ul> <li>Describes a variety of stormwater issues</li> <li>Demonstrates a well-developed understanding of how storm water is managed</li> <li>Determines the value of the strategies</li> <li>Refers to relevant stimulus material provided</li> <li>Presents a logical response using appropriate geographical information, ideas, terms and concepts</li> </ul>	В
<ul> <li>Describes some stormwater issues</li> <li>Demonstrates a sound understanding of how stormwater is managed</li> <li>Provides characteristics and features of the management strategies</li> <li>Refers to the stimulus material provided</li> <li>Presents a structured response using appropriate geographical information</li> </ul>	c
<ul> <li>Outlines some stormwater issues</li> <li>Demonstrates some understanding of how stormwater is managed and/ or management strategies</li> <li>May refer to stimulus material provided</li> <li>Uses some geographical information</li> </ul>	D
<ul> <li>Identifies some stormwater issues</li> <li>Demonstrates a basic understanding of how stormwater is managed and/or management strategies</li> </ul>	E

### Strategies to support student learning for this task

### **Graphic organiser**

Figure 13: Concept map for students to visualise their ideas in graphic form



### Audio and video recording

I created a video presentation with annotations using maps, images and my photographs from the fieldwork site to explain key points. This was useful for any students who did not attend the fieldwork and for students to watch if they missed any key information in the field. The video was a vital tool for students who needed more time to process information as they could view the video in their own time, to prepare their response.



### Writing scaffold

PARAGRAPHS	PARAGRAPH CONTENT
Paragraph 1 Introduction	<ul> <li>What is stormwater</li> <li>Why is stormwater an issue</li> <li>Why does stormwater impact on urban areas</li> <li>Introduce Kolombo Creek Catchment (KCC) (location, features, topography)</li> <li>Outline the four issues that are associated with stormwater at KCC and the need for effective strategies to manage the catchment.</li> </ul>
<b>Paragraph 2</b> Pollution	<ul> <li>What is <b>pollution</b></li> <li>Types of pollution in stormwater</li> <li>The impact of pollution on catchment areas</li> <li>How is pollution <b>managed</b> at the KCC</li> <li>How <b>effective</b> is the management strategies in reducing pollution in the KCC</li> </ul>
Paragraph 3 Erosion	<ul> <li>What is erosion</li> <li>How does erosion occur in a catchment area</li> <li>What is the impact of erosion in catchment areas</li> <li>How is erosion managed at KCC</li> <li>How effective is the management strategies in reducing erosion in the KCC</li> </ul>
Paragraph 4 Sedimentation	<ul> <li>What is sedimentation</li> <li>How does sedimentation occur in stormwater</li> <li>What is the impact of sedimentation in catchment areas</li> <li>How is sedimentation managed at KCC</li> <li>How effective is the management strategies in reducing sedimentation in the KCC</li> </ul>
<b>Paragraph 5</b> Flooding	<ul> <li>What is <b>flooding</b></li> <li>Why does flooding occur in an urban catchment area like KCC</li> <li>What are the impacts of flooding in an urban creek environment</li> <li>How is flooding <b>managed</b> at the KCC</li> <li>How <b>effective</b> are the management strategies in reducing floods in the KCC</li> </ul>
Paragraph 6 Conclusion	<ul> <li>Conclude, bringing together all the <b>issues</b> that urban stormwater brings to a catchment area and how they are <b>managed</b>. Draw conclusions on the <b>effectiveness</b> of the management strategies that are implemented in the KCC.</li> </ul>

### Stimulus material

Stimulus was provided in the writing booklet as a visual cue to assist with recalling geographical information and to support writing development. The material proved to be an essential component providing support for poorer performing students. All students, regardless of ability experienced some success as they could demonstrate some understanding of the stimulus material in relation to the catchment area and stormwater. In addition, the stimulus material provided high performing students with the ability to apply their geographical knowledge of the stimulus and incorporate the images into their response.

### Figure 15: Stimulus material provided to support student writing



Figure A: South Creek catchment



Figure E: Waterways walk brochure educating Oran Park residents about managing local waterways



Figure B: Gross pollutant trap, Kolombo Reserve, Oran Park



Figure C: Proposed Doohan Reserve, Oran Park



Figure D: Pollution in the macrophyte zone, Kolombo Reserve, Oran Park





### References

COVID-19 Health advice for NSW Department schools – https://education.nsw.gov.au/covid-19/advice-forfamilies#School3

Google maps – https://www.google.com/maps

SES Flooding in the Hawkesbury-Nepean Valley lesson activities –

https://www.ses.nsw.gov.au/for-schools/secondary/ water-in-the-world/

Waterway walk – Kolombo Creek Guide – https://www.camden.nsw.gov.au/environment/ waterways/

Spatial Map Viewer -

https://portal.spatial.nsw.gov.au/portal/apps/ webappviewer/index.html?id=44e72c6c7ccf498cb1c82 2b740c647d3

Oran Park High School website – https://oranpark-h.schools.nsw.gov.au/gallery/year-8geography-fieldwork-excursion-.html

### **Background information**

### From the Editor: Features of a constructed wetland



Source: https://wetlandinfo.des.qld.gov.au/wetlands/management/treatment-systems/for-agriculture/treatment-sys-nav-page/ constructed-wetlands/links-and-references.html

### Kolombo Creek Fieldwork Workbook



### Student name:

### Class:

1. Label: Kolombo Creek, Kolombo Reserve, Doohan Reserve, Oran Park Drive



- \*\* More streets have been added to this map. These include Lillywhite Cct, Loveday St, Richmond Rd, Rowan St and Peckham Grove.
- 2. Explain how storm water moves through this catchment area.

### **Stormwater**

Rain that falls on urban surfaces, such as driveways, roads and footpaths, is known as stormwater. Stormwater can also be called urban runoff. Stormwater picks up litter, sediment, oils, and nutrients as it travels and washes these pollutants into our waterways. The pollutants can affect plants and animals and make the environment look unsightly. The increase in urban areas leads to more hard surfaces like concrete and asphalt which can also increase the amount of stormwater running into local waterways, affecting the water quality. Therefore, it is critical that stormwater is managed effectively in catchment areas, slowing down the movement of water in catchment areas by constructing wetlands, using Water Sensitive Urban Design (WSUD).

#### **Concrete stormwater canal**



**Constructed wetland using WSUD** 



In the past, stormwater was managed by building large concrete canals. These structures were unsightly and had many disadvantages. Innovative urban design has resulted in storm water being managed differently, encompassing water sensitive urban design principles.

3. List some advantages and disadvantages of storm water canals and constructed wetlands.

#### Storm water canals

Advantages	Disadvantages

#### **Constructed wetlands**

Advantages	Disadvantages

### Kolombo Creek Fieldwork

### **The Kolombo Creek Catchment**

The Kolombo Creek catchment (photographed) has undergone significant urban change since 2010. Kolombo Creek enters into the South Creek catchment east of Oran Park, near Catherine Field. The Kolombo Creek area is one of the lowest elevations in Oran Park. The higher land at Doohan Reserve (110 metres) drains into Kolombo Creek in the western section of Kolombo Reserve.

#### View of the Kolombo Creek catchment from Kolombo Reserve, 2020



Source: F Farah, Oran Park High School

4. Describe the catchment you can see at Point X on the map on page 1 of the booklet.

What can be seen to the north, south, east and west? What is the shape of the land? Describe the built (human) features in the area. How is the area used by people? Describe the natural features of this area.



### **Fieldwork data collection – Point X**

6. Use the fieldwork equipment to complete the table at Point X. Point X is located on the map on page 1 of the booklet.

#### Location 1: Kolombo Creek Reserve – Point X

DATA COLLECTION	EQUIPMENT	EXPLANATION	MEASUREMENT
Air temperature	Thermometer	Measurement in °C	
Humidity	Hygrometer	Measured as a percentage %	
Light	Light meter	Measured in LUX	
Turbidity	Turbidity tube	Measured in NTU	
Wind speed and direction	Anemometer	Measured in km/h and (N,S,E,W)	
Water pH	Universal indicator paper	Measured pH (6.8 – 7.4 is healthy water)	
Soil moisture	Soil moisture meter	Measured from level 1–10	

### **Gross pollution trap**

**Gross Pollutant Traps** (GPTs) are filters that catch stormwater pollution before it has a chance to enter waterways. GPTs catch most of the litter and silt and are emptied on a regular basis and sent to landfill.

### Gross pollutant trap on Tess Circuit, Oran Park, 2020



7. What does a GPT NOT catch? How can this impact on the catchment or Kolombo Creek and South Creek?

### Storm water management in Kolombo Reserve

There are several management strategies that have been out into place in the Kolombo Creek catchment.

8. Describe the storm water management strategies that are in operation at Kolombo Creek and how they work.

ZONE	HOW IT WORKS
	Inlet zone
	Macrophyte zone
	Open water zone

### **Riparian corridors**

A riparian corridor is the vegetated areas that surround Kolombo Creek. The plants in this area are tolerant of waterlogged soils and provide important local habitat for wildlife, including birds and lizards. Riparian corridors stabilise the creek bank and help to remove nutrients from the water. They provide important shade and act to cool the local area.

Riparian corridor adjacent to Kolombo Creek, Oran Park, 2020

9. Explain the importance of the riparian corridor at Kolombo Creek.

Source: F Farah, Oran Park High Schoo
#### Kolombo Creek Fieldwork

#### Raingardens

Raingardens are vegetated areas in catchment areas that capture urban runoff (stormwater) before it can reach Kolombo Creek. Raingardens have special soils that remove nutrients and heavy metals from the storm water. Heavy metals wash from car tires, car exhausts and road surfaces and can impact on water quality. When raingardens get too full, water flows into a detention basin that slowly releases treated water into Kolombo Creek.

# <image>

#### Raingarden adjacent South Circuit and Grice Street, Oran Park, 2020

10. Explain the importance of the raingardens at Kolombo Creek.

Source: F Farah, Oran Park High

#### Kolombo Creek Fieldwork

#### Fieldwork data collection – Point Y

11. Use the fieldwork equipment to complete the table at Point Y. Point Y is located on the map on page 1 of the booklet.

DATA COLLECTION	EQUIPMENT	EXPLANATION	MEASUREMENT
Air temperature	Thermometer	Measurement in °C	
Humidity	Hygrometer	Measured as a percentage %	
Light	Light meter	Measured in LUX	
Turbidity	Turbidity tube	Measured in NTU	
Wind speed and direction	Anemometer	Measured in km/h and (N,S,E,W)	
Water pH	Universal indicator paper	Measured pH (6.8 – 7.4 is healthy water)	
Soil moisture	Soil moisture meter	Measured from level 1–10	

#### Location 2: O'Keefe Drive Bridge – Point Y

12. Compare and contrast the measurements from Point X and Point Y. How would changes in these measurements impact on the environment and the water cycle at Point X and Point Y?

#### **FIELDWORK ASSESSMENT: WATER IN THE WORLD**



#### HSIE Faculty Year 8 Geography Assessment Task 1, Term 3 2020

STUDENT NAME	CLASS
DETAILS	
Topic: Water in the World	Date of issue:
Due date:	<b>8A</b> – Wednesday 2 September, Period 2
<b>8A –</b> Wednesday 16 September, Period 2	<b>8E –</b> Thursday 3 September, Period 2
<b>8E –</b> Thursday 17 September, Period 2	<b>8G –</b> Friday 4 September, Period 2
<b>8G –</b> Friday 18 September, Period 2	<b>8D –</b> Friday 4 September, Period 3
<b>8D –</b> Friday 18 September, Period 3	

#### **TASK DESCRIPTION**

This term in Geography, you have been studying the topic, Water in the World.

In this unit, you have been learning about catchment areas and how we can manage all aspects of water effectively.

**In-class task** – For your assessment task you are required to write an extended response, using stimulus material to answer the following question:

"If left unmanaged stormwater can pollute waterways, cause erosion, sedimentation and increase flooding".

**Explain** how stormwater is managed at Kolombo Creek and **evaluate** the effectiveness of the management strategies implemented in the catchment.

You have been provided with the opportunity to engage in fieldwork and visit Kolombo Creek, Oran Park. Use your fieldwork student booklet and the Kolombo Creek video presentation (in Microsoft Teams) to help you prepare for your task.

#### NESA TERMINOLOGY

Explain – relate cause and effect; make the relationships between things evident; provide why/and/ or how.

Evaluate - make a judgement based on criteria; determine the value of.

#### **MARKING CRITERIA**

You will be assessed on how well you:

- demonstrate knowledge and understanding of the management of stormwater at Kolombo Creek, Oran Park
- refer to stimulus where appropriate
- process geographical information such as maps, photographs and fieldwork notes
- present a logical and cohesive response using appropriate geographical terminology

#### OUTCOMES TO BE ASSESSED

- **GE4-1** locates and describes the diverse features and characteristics of a range of places and environments
- GE4-3 explains how interactions and connections between people, places and environments result in change
- GE4-5 discusses management of places and environments for their sustainability
- GE4-8 communicates geographical information using a variety of strategies

#### SUBMISSION INSTRUCTIONS

You are encouraged to prepare a response in advance using the scaffold provided, your fieldwork student booklet and the Kolombo Creek presentation. You will complete your task during your designated Geography lesson. **Notes will not be permitted in the assessment task.** 

#### What do I do if I am absent?

If you are absent the day of an assessment task or examination, you MUST:

- report to the teacher or head teacher of the faculty on the first day of return to school
- supply a suitable explanation e.g. letter, doctors certificate

The Head Teacher will decide and advise you whether:

- you will sit for a substitute task, OR
- can submit the task late, OR
- be given an estimate, OR
- the task will be recorded as a Non-Attempt

#### MARKING GUIDELINES \_

CRI	TERIA	GRADE
	Clearly demonstrates a variety of stormwater issues Demonstrates a comprehensive understanding of how water is managed Clearly determines the value of the strategies Integrates relevant stimulus materials provided, where appropriate Presents a sustained, logical and cohesive response using appropriate geographical information, ideas, terms and concepts	A
	Describes a variety of stormwater issues Demonstrates a well-developed understanding of how storm water is managed Determines the value of the strategies Refers to relevant stimulus material provided Presents a logical response using appropriate geographical information, ideas, terms and concepts	В
	Describes some stormwater issues Demonstrates a sound understanding of how stormwater is managed Provides characteristics and features of the management strategies Refers to the stimulus material provided Presents a structured response using appropriate geographical information	С
	Outlines some stormwater issues Demonstrates some understanding of how stormwater is managed and/ or management strategies May refer to stimulus material provided Uses some geographical information	D
_	Identifies some stormwater issues Demonstrates a basic understanding of how stormwater is managed and/or management strategies	E

#### SCAFFOLDS

A scaffold to help you set out your ideas

ISSUES	Management strategies (water sensitive urban design)	Effectiveness of the strategies
pollution		
erosion		
sedimentation		
flooding		

#### A writing scaffold to help you structure your extended response

PARAGRAPHS	Paragraph content
Paragraph 1	– What is stormwater
Introduction	<ul> <li>Why is stormwater an issue</li> <li>Why does stormwater impact on urban areas</li> <li>Introduce Kolombo Creek Catchment (KCC) (location, features, topography)</li> <li>Outline the four <b>issues</b> that are associated with stormwater at KCC and the need for <b>effective</b> strategies to <b>manage</b> the catchment</li> </ul>
Paragraph 2	– What is <b>pollution</b>
Pollution	<ul> <li>Types of pollution in stormwater</li> </ul>
	<ul> <li>The impact of pollution on catchment areas</li> </ul>
	<ul> <li>How is pollution managed at the KCC</li> </ul>
	<ul> <li>How effective is the management strategies in reducing pollution in the KCC</li> </ul>
Paragraph 3	– What is <b>erosion</b>
Erosion	<ul> <li>How does erosion occur in a catchment area</li> </ul>
	<ul> <li>What is the impact of erosion in catchment areas</li> </ul>
	<ul> <li>How is erosion managed at KCC</li> </ul>
	- How <b>effective</b> is the management strategies in reducing erosion in the KCC

Paragraph 4	- What is <b>sedimentation</b>
Sedimentation	<ul> <li>How does sedimentation occur in stormwater</li> </ul>
	<ul> <li>What is the impact of sedimentation in catchment areas</li> </ul>
	<ul> <li>How is sedimentation managed at KCC</li> </ul>
	- How <b>effective</b> is the management strategies in reducing sedimentation in the KCC
Paragraph 5	– What is <b>flooding</b>
Flooding	<ul> <li>Why does flooding occur in an urban catchment area like KCC</li> </ul>
_	<ul> <li>What are the impacts of flooding in an urban creek environment</li> </ul>
	<ul> <li>How is flooding managed at the KCC</li> </ul>
	- How <b>effective</b> are the management strategies in reducing floods in the KCC
Paragraph 6	<ul> <li>Conclude, bringing together all the issues that urban stormwater brings</li> </ul>
Conclusion	to a catchment area and how they are <b>managed</b> . Draw conclusions on the
	effectiveness of the management strategies that are implemented in the KCC.

#### FEEDBACK \_

Areas where you have performed well.

Areas where you need to improve.

Strategies to help you improve.

#### FIELDWORK ASSESSMENT: WATER IN THE WORLD



## Oran Park High School Year 8 Geography Task 1

STUDENT NAME .....

CLASS .....

#### In class writing task – 50 mins

#### **Stimulus material**

Figure 1: South Creek catchment.



Figure 2: Gross pollutant trap, Kolombo Reserve, Oran Park.



Figure 4: Pollution in the macrophyte zone, Kolombo Reserve, Oran Park



Figure 3: Proposed Doohan Reserve, Oran Park



#### **FIELDWORK ASSESSMENT: WATER IN THE WORLD**



#### Figure 5: Waterway walk brochure. Educating Oran Park residents about managing local waterways

#### Question

"If left unmanaged stormwater can pollute waterways, cause erosion, sedimentation and increase flooding".

Explain how stormwater is managed at Kolombo Creek and evaluate the effectiveness of the management strategies implemented in the catchment





#### **Fieldwork equipment**

# **Station 1**

#### What do I need to find out?

• Air temperature.

#### What equipment do I use?

• Thermometer.

#### How do I measure air temperature?

- One team member holds the thermometer upright in a stationary position for 3 minutes.
- Temperature is measured in degrees celsius °C
- Record your temperature reading in the data collection table.

# How would temperature impact on this environment?

Higher temperature = higher evaporation rates,

climate, seasons





#### **Fieldwork equipment**

# Station 2

#### What do I need to find out?

Humidity

#### What equipment do I use?

• Dry, wet bulb hygrometer

#### How do I measure air humidity?

One thermometer bulb is exposed to the air (the dry bulb) ON LEFT and the other (the wet bulb) is wrapped in a damp cloth ON RIGHT. The rate of evaporation and cooling depends on the humidity of the surrounding air. In a location with dry air, water evaporates quickly and cools the thermometer more than in humid places.

You can calculate the humidity by taking readings from the hygrometer, using some simple mathematics, and by referring to the table between the two thermometers.

Suppose the two readings from the hygrometer are:

- dry bulb temperature: 15 °C
- wet-bulb temperature: 10 °C the difference is (15 10) = 5 °C

Go to the table to the 5C along the top (for a difference of 5°C).

- Follow the numbers down the 5C column to where the dry bulb temperature is. The humidity in the air is 54%.
- Record your temperature reading in the data collection table.

#### How would humidity impact on this environment?





#### **Fieldwork equipment**

# **Station 3**

#### What do I need to find out?

Light intensity

#### What equipment do I use?

Light meter



#### How do I measure light intensity?

#### LUX: Lux is the metric unit for measuring the amount of light that falls on an object.

- Take the cover off the light sensor
- +-
- Hold the light sensor in the palm of your hand with the light sensor facing upwards.
- Turn the dial to 200. If you get an 'OL' reading, switch the dial to 2000. If you get a reading at this level, write it down in the data collection table. If you are still getting an 'OL' reading, it means that the light is too bright and you have to switch the dial up to 20,000 (x10). If you get a reading now, write it down and multiply the number by 10. Add your reading to your data table
- If you are still getting a 'OL' reading, switch to the highest dial. Record that reading and multiply it by 100. Add your reading to your data table.
- Replace the cover on the light sensor.
- Switch the dial back to OFF

#### What does this all mean?

Range display multipliers

Range	Units	Multiplier
200	Lux	Direct reading
2 000	Lux	Direct reading
20 000	Lux	Reading x 10
50 000	Lux	Reading x 100

#### **Fieldwork equipment**

For example: Here is a copy of my data collection at 4pm in the afternoon outside, but not in direct sunlight. My readings are as follows:

Dial range	Units	Multiplier	My readings
200	Lux	Direct reading	'OL'
2 000	Lux	Direct reading	1088 lux
20 000	Lux	Reading x 10	108 lux
50 000	Lux	Reading x 100	10 lux

- I turned on the light meter dial to 200 and did not get a reading (OL)
- I then switched the dial to 2000 and recorded 1088 Lux (a direct reading)
- I then wanted to check if I would get a reading at 20 000 and got 108 lux. Multiplied by 10 = 1080 lux
- I then checked the reading with the dial turned to 50 000 and got a lux reading of 10. Multiplied by 100 = 1000 lux
- My second reading is the most accurate. Making your way up the dial, go with the first reading that the 'OL' is not displayed.

#### How would light impact on this environment?

Sunlight will determine evaporation rates, photosynthesis rates, vegetation growth, vegetation type, animal habitats

#### **Fieldwork equipment**



#### What do I need to find out?

• Turbidity (how muddy the water is)

#### What equipment do I use?

Turbidity tube



#### How do I measure turbidity?

Turbidity is measured in NTU: Nephelometric Turbidity Units. NTU's measure the intensity of light scattered at 90 degrees as a bean of light passes through a water sample.

- Collect water in the bucket from the water source.
- Hold the turbidity tube upright and still.
- Use a sample jar to add water from the bucket into the turbidity tube making sure to stop at each increment. Observe the pattern on the bottom of the turbidity tube to ensure you can see it.
- Continue to poor water into the tube at each increment. Stop when you cannot see the pattern on the bottom of the tube.
- Add the reading to your data table.

#### **Fieldwork equipment**

#### What does this all mean?



#### How would turbidity impact on this environment?

Turbidity is the amount of sediment in the water. Muddy water does not allow sunlight to penetrate and stops photosynthesis from occurring. It impacts on aquatic animal and plant life.

#### **Fieldwork equipment**



#### How would wind impact on this environment?

Wind can increase evaporation rates and impact on riparian corridors

#### **Fieldwork equipment**

# **Station 6**

#### What do I need to find out?

• Water pH

#### What equipment do I use?

• Universal indicator paper



#### How do I measure pH?

The pH of water measures the acidity or alkalinity of the water. Waterways are healthy if they fall within a middle range of pH (7). If water becomes too acidic (low) or too alkaline (high), aquatic plants and animals may have difficulty surviving.

- Collect water from the water source in a sample jar
- Dip a small piece of universal indicator into the water sample. Remove immediately.
- Immediately hold the wet universal indicator strip against the colour chart to determine the pH level.
- Record the result in your data table.

#### What does this all mean?

pH range	Description	Colour
< 3	Strong acid	Red
3 - 6	Weak acid	Orange or yellow
7	Neutral	Green
8 - 11	Weak alkali	Blue
> 11	Strong alkali	Violet or indigo

#### **Fieldwork equipment**

#### How would pH impact on this environment?

**ACID 1-6** indicates hydrochloric acid, herbicides and builder's runoff. Aquatic invertebrates (with shells) are very sensitive to a pH lower than 7. This can stop their shells forming.

**ALKALI 8-14** indicates fertilisers and cleaning products such as detergents. Detergents and fertilisers can result in **eutrophication**, creating dense plant growth that decrease oxygen levels and reduces photosynthesis, impacting on other plants and animals.

A healthy waterway has a pH of 7

#### **Fieldwork equipment**

# **Station 7**

#### What do I need to find out?

• Soil moisture

#### What equipment do I use?

Soil moisture meter

# How do I measure the moisture in the soil?

Look at the soil at the fieldwork site

- What does it look like?
- What is it made up of (big/little particles)?
- What is its colour?
- Is there any organic matter in it?

Carefully insert the soil moisture meter in the ground.

What foes the reading tell us about the capability of the soil to support vegetation? Record the reading in the data table.

#### How would soil moisture impact on this environment?

The types of soils and the moisture content will determine the ability for water to infiltrate the soil and reduce surface runoff.





#### **Fieldwork equipment**

# Station 8

#### What do I need to find out?

- Find north
- Orientate to the north to draw a map

#### What equipment do I use?

Compass

#### How do I find north?



- North is wherever the red end of the needle is pointing.
- To accurately face north, hold your compass out in front of you, making sure the compass is level (horizontal). If the compass is not level, it can restrict the free rotation of the needle and give you a false reading.
- With the compass level and pointing away from you, look down the directional arrow of the compass and rotate your body slowly on the spot. Watch the needle as you rotate, it spins in the opposite direction!
- When the red end of the needle and the directional arrow line up, you're facing north.

#### How do I do orientate myself to the map?

Orientating, or aligning, the map is really easy with just 3 steps:

- Lay your map out on a relatively flat, smooth surface.
- Turn your compass dial so due North is aligned with the directional arrows.
- Place your compass on your map with the bottom of the compass (near the string) parallel to the north-south grid lines on the map. Turn the map and compass slowly together on the ground until the compass needle and directional arrows are going in the same direction as the grid lines on the map.
- You now have the map orientated to north. Try and see if you can see any of the features on the map in front of you in the distance.

Draw your map orientated to the north

# **FIELDWORK: SUSTAINABLE BIOMES**



# Fieldwork Booklet Soil Testing

#### Jen Robinson Trinity Catholic College, Goulburn



STUDENT NAME .....

TEACHER .....

#### Description

Soil is the top layer of the Earth's crust in which organic matter grows. There are many components that determine soil type and quality. The ones we will be examining include pH, Texture, Structure, Slaking and Dispersion. These factors influence the type of plant or crop that can grow in that location. The best way to determine soil quality is by conducting a series of soil tests.

#### Aim

#### To investigate the difference in composition between a fertile agricultural soil and an infertile soil.

#### **Outcomes**

- GE5-1 explains the diverse features and characteristics of a range of places and environments
- GE5-2 explains processes and influences that form and transform places and environments
- GE5-3 analyses the effect of interactions and connections between people, places and environments
- GE5-7 acquires and processes geographical information by selecting and using appropriate and relevant geographical tools for inquiry

#### Glossary

- **pH** Soil pH is a measure of the acidity and alkalinity in soils. pH levels range from 0 to 14, with 7 being neutral, below 7 acidic and above 7 alkaline.
- **Texture** An estimate of the relative amounts of sand, silt and clay particles in a soil.
- Structure The arrangement of the solid parts of the soil and of the pore space located between them. It is determined by how individual soil granules clump, bind together, and aggregate, resulting in the arrangement of soil pores between them.
- **Slaking** The breakdown of a lump of soil into smaller fragments on wetting. It is caused when clay swells and the trapped air bursts out. Organic matter

reduces slaking by binding mineral particles and by slowing the rate of wetting.

 Aggregates – Groups of soil particles that bind to each other more strongly than to adjacent particles. The space between the aggregates provide pore space for retention and exchange of air and water. Commonly referred to as a "Sod".

#### **Geographical Tools**

- 2 x Small dish
- Distilled water
- Soil pH kit
- Pen and pencil
- This booklet

#### **Field Sketch**

In the boxes below, compose a field sketch of each area you are testing – Ag Farm

#### **FIELDWORK: SUSTAINABLE BIOMES**

#### Fieldwork booklet: Soil testing

Other: \_\_\_\_\_

What is this area primarily used for? \_\_\_\_\_

#### **Soil Texture**

#### About soil texture

Texture is the 'feel' of the soil. This will depend on the various sizes of grains that make up the soil and the proportions of different sized grains. The different amounts of these particles, or grains in a soil sample are used to classify soils into a texture group. These groups range from pure sand to pure clay.

#### Soil texture affects:

- how the soil holds water
- how water can seep down into the soil (porosity)
- what happens when the soil is cultivated (ploughed)

#### Method

- Collect a sample of soil 1 (about a handful). Check the soil for any lumps, stones or organic material. Break/ remove any that are present.
- 2. Add water to the soil sample. Water should be added slowly, one drop at a time.
- 3. Whilst adding water, knead the soil to make a small ball that sticks together and is moist.

- 4. Using Chart A: "Soil texture flow chart" determine what soil type you have.
- 5. Press the soil between your thumb and forefinger to make a ribbon.
- 6. Measure only the length of the part of the ribbon that is not broken.
- 7. Use Chart B: "Soil texture Table" to determine the texture class of your sample.
- 8. Record results in the table on the 'Results table'.
- 9. Repeat steps 2-9 for soil 2.



Ribbon Test Source: https://www.youtube.com/watch?v=GWZwbVJCNec

#### **Chart A: Soil Texture Flow Chart**



#### **Chart B: Soil Texture Table**

BALL	<b>RIBBON LENGTH</b>	FEEL	TEXTURE
Will not form a ball		Single grains of sand stick to fingers	Sand
Will only just hold together	0.5cm	Gritty	Loamy sand
Ball just holds together	0.5 – 1.3cm	Sticky sand grains stick to fingers	Clayey sand ball
Just holds together	1.3 – 2.5cm	Very sandy to touch, visible sand grains	Sandy loam ball
Just holds together	1.3 – 2.5cm	Fine sand can be felt	Fine sandy loam ball
Holds together strongly	2 – 2.5cm	Sandy to touch, sand grains visible	Light sandy clay loam ball
Holds together	2.5cm	Spongy, smooth but not gritty or silky	Loam ball
Holds together	2.5cm	Slightly spongy, fine sand can be felt	Silt loam ball
Holds together	2.5cm	Very smooth to silky	Loam ball
Holds together strongly	2.5 – 3.8cm	Sandy to touch, medium sand grains visible	Sandy clay loam ball
Holds together	3.8 – 5cm	Plastic, smooth to manipulate	Clay loam

#### Soil pH

#### Summary

Soil pH is an important concern for farmers and gardeners for a range of reasons as it affects soil health and the plants and animals that live in it. The measurement of soil pH tells us how acidic or alkaline the soil is. The range used for measuring pH is a scale from 0 (acid) -14 (alkaline). A pH of 7 is neutral. pH is dependent on the activity of hydrogen ions (H+) in solution.

#### A low pH measurement in soil may result in:

- · Some minerals in the soil becoming soluble and reaching toxic levels for plants
- · Some minerals made more available to plants
- The reduction and/ or killing of some bacteria which are important for sustaining plant life
- The encouragement of some moulds

#### A high pH measurement in soil may result in:

- Some minerals being made unavailable to plants
- · Some minerals becoming more available and possibly toxic to plants
- Discouragement of beneficial bacteria
- Favouring conditions for decay-causing bacteria

#### pH 6.5 – optimum for most plant growth; neutral soil conditions; some trace elements may become unavailable.

#### pH 5.5 – balance of major nutrients and trace elements available.



#### pH Scale

#### **Materials**

- pH test kit and/or a pH meter
- 2 different soil samples
- White plates

#### **Presence of Organic Matter**

#### Slaking

Slaking is the breakdown of a lump of soil into smaller fragments on wetting. It is caused when clay swells and the trapped air bursts out. Organic matter reduces slaking by binding mineral particles and by slowing the rate of wetting. This process occurs in all soil groups of the main vegetable-growing districts. The results can be either good or bad, depending on the size of the fragments produced. Slaking is involved in the process of self-mulching, which occurs in many cracking clays. Self-mulching produces a loose surface layer of granular aggregates. Sometimes a thin, fragile crust caps the layer, but the crust is not strong enough to affect seedling emergence. Crusting or hard setting soils slake into very small fragments that run together and then set hard on drying.

#### Dispersion

Dispersion (the separation of soil into single particles) is governed by soil texture, clay type, soil organic matter, soil salinity and exchangeable cations. Slaking and dispersion are soil characteristics that will have a considerable influence on the behaviour and management of a soil. A soil that disperses on wetting has a very unstable structure. It can form a surface crust or hard clods on drying. Pores below the surface can become blocked by dispersed soil particles. Dispersive soil is likely to swell strongly when wet, further restricting water and air movement. Dispersion of soil slows down the intake of water to the root zone following rainfall or irrigation. This condition will result in poor water storage at each irrigation.



#### **Slaking Scores**

- 0 Lump remains intact.
- 1 Aggregate slumps around the edges but remains mostly intact.
- 2 Aggregate breaks into clumps 2mm or bigger.
- 3 Aggregate breaks into clumps less than 2mm. Lump may begin to resemble a cone or volcano shape.
- 4 Aggregate breaks into individual particles or grains.

#### **Slaking Test**

- 1. Take a small aggregate of soil, roughly as big as a marble.
- 2. Place it carefully in a dish of water.
- 3. Watch to see what happens.
- 4. If small bubbles appear in the water and the lump collapses, your lump has slaked. This means it has no decayed organic matter keeping it together.
- 5. When soil slakes, water rushes into the air pockets in the soil, forcing air out as bubbles. This explodes the soil aggregate. Slaking occurs when soil is cultivated without organic matter going into the soil.
- 6. If nothing happens, your soil has organic matter and is structurally sound.

#### **FIELDWORK: SUSTAINABLE BIOMES**

#### Fieldwork booklet: Soil testing

#### **How Do We Interpret This?**

#### Score of:

- 1 Soil is stable to wetting, probably due to the presence of organic matter.
- 2 Soil is stable to wetting, probably due to the presence of organic matter.
- 3 This is a score typical of self-mulching soils.
- 4 Soil contains low amount of organic matter. Soil may have surface crust or be hard setting. Very Dispersive Soil.
- 5 Soil contains low amount of organic matter. Soil may have surface crust or be hard setting. Very Dispersive Soil.

#### Based on your Findings (No more than a paragraph for each question)

What are the primary differences between your two soil samples (use your results from the table).

Based on these differences – Identify the qualities of a fertile soil.

Recommend some ways our agriculture students could improve the quality of the Ag farm soil.

#### **FIELDWORK: SUSTAINABLE BIOMES**

SOIL SOURCE	NOTES	Chart A)	Chart B)	SOIL 177E (Student assessment)	pH TEST	SLAKING TEST
Ag farm and other (please specify location)	Gritty, sticky and silky. Ribbon 2.5cm etc	Clay/ Sand/ Loam	Clay/ Sand/ Loam	Judgement based on results of both soil type tests.	pH 4.5. Acidic Soil etc	10 mins – 1 hour – Overnight –
Ag Farm						10 mins –
						1 hour –
						Overnight –
Other: Please specify location.						10 mins –
						1 hour –
						Overnight –

# Fieldwork booklet: Soil testing

RESULTS

# Fieldwork: Investigating environmental change on the NSW South Coast

Chris Main Head Teacher Humanities, Broughton Anglican College, 1991–2018

This field study was developed in response to the opportunities offered in the Environmental Change and Management topic within the Stage 5 syllabus.

The study is intended to be a summative activity, a chance for students to confirm, apply and display their understanding – although it could be moved earlier in the topic with some modification.

#### **Fieldwork location**

North Wollongong – Stuart Park/ Fairy Creek Lagoon/Puckeys Bush and Wollongong Harbour.

#### Figure 1 & 2: Site location





The selected sites offer, in close proximity, contrasting management challenges and responses;

- a bush regeneration location on the north bank of Fairy Creek
- a heavily modified park location on the opposite (south) bank
- These are the same environment, managed in distinctly different ways.
- an 'industrial' location at the harbour. If time is limited, the harbour can be omitted.

Breaking the group into three cohorts would help the interaction of students with each environment.

There are opportunities to integrate each outcome listed ... and, with adaption, the Life Skills outcomes: *GELS-2, GELS-3, GELS-4, GELS-5, GELS-7, GELS-7, GELS-8*. This adaption is not included.

#### **Stage 5 Outcomes**

- explains processes and influences that form and transform places and environments GE5-2
- analyses the effect of interactions and connections between people, places and environments GE5-3
- accounts for perspectives of people and organisations on a range of geographical issues GE5-4
- assesses management strategies for places and environments for their sustainability GE5-5
- acquires and processes geographical information by selecting and using appropriate and relevant geographical tools for inquiry **GE5-7**
- communicates geographical information to a range of audiences using a variety of strategies **GE5-8**

Geography K–10 Syllabus p.p. 76, 77

#### The following Key Inquiry Questions can be addressed through this investigation.

- How do environments function?
- How do people's worldviews affect their attitudes to and use of environments?
- What are the causes and consequences of change in environments and how can this change be managed?
- Why is an understanding of environmental processes and interconnections essential for sustainable management of environments?

There is only limited reference to First Nations in the sources available for these locations.

#### Pre fieldwork preparation

- Use Google Maps and Street View, or other GIS-type sources to familiarise students with the layouts of the localities. This can be tied to topographic map work.
- Pose some speculative questions about each location.
- Use websites such as these to gain insights into each location.
  - Wollongong Council https://ro.uow.edu.au/ ihsbulletin/917/

- Wikipedia: Puckeys Estate Reserve https:// en.wikipedia.org/wiki/Puckeys\_Estate\_Reserve
- Forgotten Illawarra https://forgottenillawarra. wordpress.com/2016/06/19/puckeys-estate/ accessed 5/12/2019
- Ensure students bring adequate protection from the elements and both food and water.
- The sandbar crossing must be inspected and avoided if necessary.



#### Figure 3: Puckeys Bush

#### **Puckeys Bush**

- Students can be dropped off safely on the eastern, southbound side of the road.
- Students should orient themselves and be challenged about the local environment.
- The **signage** is significant as indicators of management and environment.

#### Figure 5: Bushcare sign



#### Section 1

- This is in a riparian zone, marked by reeds, mangroves and casuarina species capable of tolerating wet feet.
  - There are invasive plants e.g. kikuyu.
  - The boardwalk is a management strategy in itself.
- The boundary of this zone is a clear change in vegetation.
  - Test students to see if they notice it before you tell them!

#### Section 2

- This is largely hind dune, marked by larger vegetation growing in relatively sheltered, but drier conditions.
  - The nature of erosion protection and failure is notable.

#### Figure 4: Puckeys Bush



• Some plants are labelled, and again, the signage is particularly important in showing management.

#### Section 3

- The third section involves the dune association and the effects of salt and wind.
  - Effects of foot traffic should be considered.
  - Contrasts between the seaward and landward aspects.
- If safe students can cross the sandbar to Stuart Park.

#### Figure 6



Photographs. CRM

#### Figure 7: Management.



#### **Stuart Park**

This is part of the same catchment, but starkly different in appearance.

- This is a highly modified environment with the emphasis on public recreation.
  - Modified vegetation
  - Drainage
- Students might 'contest' here or later which bank is better managed.

NO.

GONG

HAR

BOUR

- This is an opportunity to lunch and use facilities.
- This is also a convenient place to meet the bus.



#### Catch to kitchen

In the 1950s, Geoffery Passlow operated a fishing travlet from Belmore Basin. The business was a family affair with Maisie Passlow, Geoffery's wile, and other family members enlisted to help clean and self fish and other seafood at the old quay.

On one fishing trip in 1954, the trawler hir more than just a few waves. Two amateur fishermen had a narrow escape when their rewing beat was struck by Mr Passlow's trawler about a nule off Nurth Wallongong. The impact hurled both men into the sea.

One man managed to grab a rope hanging from the side of the fishing vessel and climb aboard, the other had to swim about for 10 minutes until Pasalow had turned the trawler around to renable the traumation angler to be hauled ab Figure 9 & 10: Information signage relating to historic sites within the precinct of Wollongong Harbour.

#### Figure 8: Bitou bush



Photographs: Bitou eradication/control CRM



#### **Wollongong Harbour**

- There are a number of historical markers in this area.These should give a sequent occupance of the area.
  - Transport/navigation
  - Military
  - Fishing
- Students should look at evidence of significant physical modification of the area such as vegetation modification, erosion control, rock walls and rock platform modification and
  - speculate on environmental issues arising
  - fitness for the activities in the area ... remnant fishing, recreation etc.
- This should be the 'lightest' of the three areas.

### Year 10 Geography Field Study Environmental Change and Management

North Wollongong -

Stuart Park/Fairy Creek Lagoon/Puckeys Bush and Wollongong Harbour

#### Activities

You will conduct **two** surveys.

- 1. Stuart Park/Fairy Creek Lagoon including Puckeys Bush
- 2. Wollongong Harbour



Scale: approximately 33 000:1 (1 cm to 330 metres)

#### Year 10 Geography Field Study

The following information is to help you complete the table on the next page

#### Stuart Park/Fairy Creek and Puckeys Bush

You are to complete:

- Field mapping of the site
- Identify the
  - Underlying environments
  - Modifications to environments
  - Describe and assess the management strategies for these two environments

#### When you alight from the bus

- 1. Locate where you are on the topographic and mark it on the map
- 2. Look around you and record elements that might influence the environment between you and the beach.

	EXAMPLE 1	EXAMPLE 2	EXAMPLE 3
Atmosphere			
- Sources of wind			
– Air pollution?			
Lithosphere			
– Soil types			
<ul> <li>Slope of the land</li> </ul>			
Biosphere			
- People and houses?			
Vagatation			
lots or little?			
Hydrosphere			
- Are the sources of			
water pristine?			
#### Year 10 Geography Field Study

Near the bridge is the entry to a path to the beach.

You will walk this path, observe and record on the next page.

- The nature of the landform: is it elevated, flat, steep ...?
- The nature of the vegetation ... with you around I doubt you will see much wildlife!
- Indications of influences on the environment: including who is responsible... look at the symbols on the signs.
- The signs recording changes and management strategies

The lagoon separates two visually distinctive areas.

North of the lagoon is a comparatively 'natural' area;

- She-oak and eucalypt forests
- Heath vegetation behind fore dunes
- Grassy vegetation near the beach, with foot traffic damage and fencing, removal of weeds such as
  - \* bitou and lantana
  - \* and invasion of grasses.
  - \* There are also some prominent pines that are non-native.
- Mangroves

There is signage indicating restrictions, history (including indigenous) and community/government involvement, a boardwalk as management

**South** of the lagoon is a highly-modified environment; non-native major plants, grassed areas and facilities This is a **'typical'** cross-section ... use it as a guide to compare what you see.



Mills, K, The natural vegetation of the Wollongong area, Wollongong

Studies in Geography No.13, Department of Geography, University of Wollongong, 1980

As you walk down to the beach, pause and look around you and complete the table.				
DISTANCE FROM START *	LANDFORM?	LAND USE?	STRATEGY?	

\* You can count your steps!

#### Cross the bar towards Stuart Park *if the opening is clear of water*.

In Stuart Park, sit and *compare* the appearance of Stuart Park to Puckeys Bush.

Use these ideas to help organise your thoughts:

Place: the significance of places and what they are like

**Space:** the significance of location and spatial distribution, and ways people organise and manage spaces that we live in

**Environment:** the significance of the environment in human life, and the important interrelationships between humans and the environment

Interconnection: no object of geographical study can be viewed in isolation

Scale: the way that geographical phenomena and problems can be examined at different spatial levels

**Sustainability:** the capacity of the environment to continue to support our lives and the lives of other living creatures into the future

Change: explaining geographical phenomena by investigating how they have developed over time

LANDFORM?	LAND USE?	STRATEGY?

Create a sketch map or field sketch to:

- Describe the environment and
- Note the influences, strategies and comments on sustainability

Location:
Aspect:
Date:
Creator:

### **Wollongong Harbour**

This is a highly modified environment where the proximity of urban areas, the creation of the basin and its maintenance require major interventions.

This is an area where the location itself has been reshaped

- Sea walls and moles added
- Fishing connections
- Extensive grassed areas with retaining walls and roads/drainage
- There are historical signs that are useful

#### On the map below, identify and record ...

- Where you are based
- The lighthouses
- At least three land uses in the immediate area
- Signs of human intervention
- A description of the vegetation



In groups of up to four, with your teacher's knowledge, walk towards the harbour.

- There are a number of interpretive signs ... **read them**. Take photos or record what they tell you about this environment.
- There is evidence of **management** ... look for signs of pollution, maintenance, modifications and change.
- ... in particular

Return to your teacher

Remember; this is a public space and vehicles are around.

**Do not approach** the water's edge!

Record answers to the following questions:

How well does this environment function?

How have people's worldviews affected their attitudes to and use of this environment?

What are the causes and consequences of change in this environment?

How are these managed?

Why is understanding this environment essential for sustainable management?

.....

Has this understanding been achieved here?

## **FIELDWORK: A PEDAGOGICAL PERSPECTIVE**



Shutterstock: Panoramic view of Singapore Public Housing Apartments in Punggol District, Singapore.

## A Geography lesson out of every window: Fieldwork in 50 – Lessons from Singapore

#### Abstract

This article emphasises the importance of Geography educators having their own pitch or geographical identity to drive pedagogical practice in the Geography classroom. In this instance, the pitch drives practice into inquiry and fieldwork. To make sense of pitch and practice, I draw on my experience in Singapore as the 2019 *Outstanding Educator In Residence (OEIR)* for geographical education. As the OEIR, I taught Geography to local students in neighbourhood schools using the Singaporean syllabus and then delivered a series of Master Classes for teachers about geographical inquiry and fieldwork. An evidence base from the geography education literature and the *Professional Standards for the Accomplished Teaching of School Geography* (Hutchinson & Kriewaldt, 2010; Kriewaldt & Mulcahy, 2010) underpins the sharing of ideas about pitch and practice (inquiry and fieldwork) for the Geography classroom.

#### A Geography lesson out of every window: a pitch

#### Why is a pitch for Geography important?

It is inevitable that at least once in our career (if not each year!) we will be asked a question to the effect of 'What is so important about Geography?' or 'Why do we have to study Geography?'. Often such questions are posed by students. Sometimes the questions come from our colleagues. It is our responsibility, as the identifiable Geography educator, to have a resonating and meaningful response.

As Geography educators, we need to identify the distinctiveness and relevance of Geography to ourselves. However, we also need to draw on such understanding to show students and colleagues what it is that makes Geography distinctive, relevant and therefore powerful.

To do so, it is important for us to have clarity about:

- how Geography is defined in policy documents such as the syllabus;
- our own interpretation of Geography our pitch or geographical identity;
- how our understanding of Geography becomes enacted in pedagogical practice.

In drawing from the British geography education literature, it is evident that as Geography educators we need to develop our skills of 'curriculum-making' (Lambert, 2015) and be clear about our personal geographical identity (Brooks, 2017). In so doing we

### **FIELDWORK: A PEDAGOGICAL PERSPECTIVE**

are able to bring content knowledge to life for our students through the way in which we teach this subject. Difficulty in being able to concisely yet meaningfully define Geography can lead to lack of clarity in the conceptualisation, development and enactment of teaching, learning and assessment programs. Therefore, it can become difficult for students to connect with and embrace Geography because the distinctiveness and relevance of the subject is not obvious.

Our knowledge of Geography in terms of what it is as a subject, key aspects of its content, and how it should be taught is best encapsulated and communicated in a pitch. We need to have a hook; a reason to sell tickets for our lessons; a quick one-liner that prompts curiosity, awe and wonder from those who asked 'why?'; an elevator pitch from which we can leverage this subject and from which our pedagogical practice is driven to enable us to become a curriculum-maker (Burgess, 2015; Lambert, 2015). Developing a pitch is not easy. Considering the dynamic nature of Geography and our teaching contexts it may be that we need more than one pitch, or that our pitches change over time. The important thing is to have a pitch and a geographical identity. To have our own buy-in to our subject of Geography. If we don't, who will?

### Can we find our own point of resonance to develop a pitch?

In Singapore there is a Subject Chapter of Geography teachers, coordinated through the small team of Master Teachers for Geography at the Academy of Singaporean Teachers. The pitch of the Subject Chapter is "Every Geography teacher a Geographer". Simple. Meaningful. A statement that drives their classroom practice and their communication to peers and students about the usefulness and application of Geography beyond the school context. A signal that all Geography teachers are specialist practitioners who hold a deep understanding about the discipline of Geography. It is the specialisation of study in the discipline of Geography which forms a particular point of resonance and therefore shapes the pitch and geographical identity of Singaporean Geography teachers.

#### So what is my pitch?

Many of you reading this article may have heard it already: "A Geography lesson out of every window". For me, the window can be literal or metaphorical. The literal window can be the starting point for primary research – a short fieldwork activity such as initial observation notes. The metaphorical window can be a sample of secondary research such as a graph or visual representation. The literal and metaphorical windows become points from which student pose further questions, thus an inquiry



Singapore. Photo credit: Susan Caldis, author

approach becomes front and centre of practice, and the opportunity to conduct a geographical investigation through the use of primary and secondary research methodologies also becomes apparent.

A Geography lesson out of every window signifies and drives what I prioritise in my pedagogical practice in a Geography classroom: inquiry-based learning and fieldwork. The windows bring Geography back to the personal and local scale in the first instance, to help students interpret and make sense of the world around them.

My point of resonance is connected to the rationale from the K–10 Geography syllabus (NESA, 2015):

Through the study of Geography, students are encouraged to question why the world is the way it is, reflect on their relationships with and responsibilities for the world and propose actions designed to shape a socially just and sustainable future... Engagement in fieldwork and the use of other tools including mapping and spatial technologies are fundamental to geographical inquiry, including understanding and observing ethical practices (p. 9).

My other point of resonance is connected to the Professional Standards for the Accomplished Teaching of Geography (Hutchinson & Kriewaldt, 2010; Kriewaldt & Mulcahy, 2010). Alternatively known as the GEOGstandards, such standards identify the specialised and distinctive elements of Geography teaching developed from and within an Australian secondary education context. The GEOGstandards are designed to be used for reflection on and self-assessment of teaching practice (Hutchinson & Kriewaldt, 2010). Standards 2, 3 and 4 are of particular importance to the shaping and enactment of my pitch, geographical identity and practice. See Table 1 for an overview of the GEOGstandards.

### Table 1: The Professional Standards for the Accomplished Teaching of School Geography(Hutchinson & Kriewaldt, 2010; Kriewaldt & Mulcahy, 2010)

STANDARD	OVERVIEW
1. Knowing Geography and the Geography Curriculum	As the teacher: understand the discipline including concepts and skills; understand the curriculum; understand geography draws from the social sciences, physical sciences and humanities; and make connections with other curricula and learning areas
2. Fostering geographical inquiry and fieldwork	Allow students to carry out: a range of structured and open-ended inquiries; and undertake inquiry in the field, selecting and using geographical tools
3. Developing geographical thinking and communication	Encourage and support student understanding about spatial reasoning; conceptual interdependencies, interconnections and assemblages; real world contexts at a range of scales; and lived experience as a personal geography
4. Understanding students and their communities	Use local community contexts and personal geographies to connect, enhance and enrich conceptual and perspective-focused learning
5. Establishing a safe, supportive and intellectually challenging learning environment	Facilitate students becoming active participants in their own learning by creating a need to know and creating conditions for students to question complex geographical ideas
6. Understanding geography teaching – pedagogical practices	Teachers: have extensive understanding about pedagogical content knowledge; encourage students to gather information from a variety of sources; use fieldwork; introduce a range of tools to students
7. Planning, assessing and reporting	Plan, monitor and assess geographical learning through a range of formal and informal methods; recognise achievement and provide direction for improvement; use diagnostic assessment to inform teaching practice
8. Progressing professional growth and development	Engage with professional learning communities; Recognise geography is an evolving subject requiring regular updating of content knowledge
9. Learning and working collegially	Actively engage with professional community; share expertise; build a culture of professional improvement; promote geographical education

#### Considering your pitch

There are several distinctive areas of Geography that may become evident in your pitch and geographical identity. Not all pitches need to connect to inquiry and fieldwork although the pitch for Geography should connect into a unique and specific area of Geography – how else will we obtain a geographical Geography lesson?

Figure 1 below, taken from a 2019 Annual Conference session and article (Caldis, 2019a) about a geographical Geography assessment provides a starting point for determining an area of pitch. Each item will have resonance with parts of the geographical education literature, syllabus, and GEOGstandards. So, I ask you to pause for a moment and consider the following questions:

- What is your personal pitch and identity for Geography?
- What are the key areas of resonance for your geographical pitch and identity?
- How does your pitch shape and drive your teaching practice in the classroom?



#### Figure 1: What are the distinctive features of a Geography lesson geographical? (Caldis, 2019a)

#### Fieldwork in 50: from pitch to practice

In Singapore, the Year 9 Geography classes in neighbourhood schools are large, often between 34 – 40 students. A geographical investigation is typically conducted as a separate unit towards the end of the school year. The geographical investigation unit will often be the only exposure students have to fieldwork.

As the OEIR, it was my role to design and teach a lesson using the Singaporean Geography syllabus that demonstrates how to incorporate inquiry and fieldwork into 50 minutes. In so doing, it reinforces the importance and relative ease of a geographical investigation being embedded into 'everyday lessons' within class time and around the school grounds rather than being completed in isolation.

The syllabus unit was Urban Living, part 1, Introduction – How and where do people live? The lesson focus

was about housing. The lesson was audio-visually recorded and formed the foundation for several Master Classes with Geography teachers, and Dialogues with representatives from the Ministry of Education and also from the National Institute of Education. Having studied the Singaporean syllabus and participated in an observation day at the neighbourhood school, I knew the content description (Housing) and the type of inquiry question I'd be hoping the students would develop related to 'How and where do people live?'. I knew there was a large classroom window with a view straight out to the Housing Development Board blocks of units and communal areas. I also knew there would be access to a class set of ipads and the free apps, Skitch and Weather tracker. Obviously, there would only be a short timeframe (50 minutes) in which to conduct the lesson.

#### A Geography lesson out of every Singaporean window enacted as Fieldwork in 50

I wanted students to be active participants in the lesson. I knew they had not yet completed the geographical investigation unit so the fieldwork component of the lesson would be a new experience. Overall, the following fieldwork activities would be most appropriate and had to be specifically introduced:

- recording tallies/counts (students to decide what to tally in response to the co-constructed question);
- developing observation notes (in response to what can I see, hear, smell and how do I feel);
- annotating photographs using skitch or drawing field-sketches;
- recording data from the weather app;
- developing interview questions to ask friends or family.

Although the inquiry question from the syllabus was clear, I wanted students to arrive at an inquiry question in this general 'area' as a group rather than me tell them 'this is what we are investigating'. Therefore, I had to set up the lesson to model and encourage thinking and the sharing of ideas.

During the lesson my role was to facilitate geographically distinctive learning through inquiry and fieldwork. The lesson is fast-paced and relies upon student interaction and co-operation, the provision of clear instructions and questioning, and an ability to keep to time.

The broad format for Fieldwork in 50 is below:

- 3 5 mins: asking students to share their observations from the (literal) classroom window about housing and communal areas (e.g. What do they see?, What are they not seeing? What questions do they have when they look out of the window?) and capturing their responses on the whiteboard (or equivalent)
- 5 7mins: encouraging students to contribute their observations from the window and draw on their lived experience and knowledge of the local area as a prompt for co-constructing a number of inquiry questions within the 'area' of Housing How and where do people live?;
- 5 7 mins: guiding students as part of whole class discussion to decide upon the most researchable question within the parametres of time, minimal equipment, and the need to conduct fieldwork activities such as tallies and observation notes; encouraging students to determine what a possible hypothesis might be;

- 3 5 mins: general organisation of students into groups of 5 students, distribution of equipment, outline of fieldwork activities, outline of expectations (location around school grounds, timeframe, each student to choose a fieldwork activity so that within each group every fieldwork activity is completed)
- 10 12 mins (includes movement to/from the classroom): encouraging students to work in their groups and **conduct the fieldwork activities** around the school grounds; assisting students and moving between groups as necessary;
- 4 6 minutes: encouraging students to work in their groups to pool and summarise their findings on a graphic organiser such as a lotus chart (1 per group)
- 3 5 mins: inviting a representative from each group to share their findings as part of whole class discussion to determine a possible response to the co-constructed inquiry question and proof/disproof of the hypothesis
- 2 3 mins: asking students to consider whether the findings provide a reasonable response to the coconstructed question and what next steps in learning might be?
- 1 2 mins: encouraging students to complete an exit slip to determine their key take-aways from the process

#### Preparing for Fieldwork in 50 (Caldis, 2019b)

*Fieldwork in 50* begins with distilling from the syllabus a researchable question or hypothesis that students can investigate within a limited time.

To prepare effectively, teachers need to:

- make meaning of the syllabus to articulate what students should understand and demonstrate by the end of a topic;
- understand the intent of key questions in the syllabus and modify them appropriately;
- know the types of fieldwork activities that would be most appropriate or achievable for the topic in focus and have the necessary equipment available ahead of the lesson (e.g. scaffolded worksheets or apps downloaded etc.)
- understand that inquiry incorporates both primary and secondary research – some topics lend themselves better to fieldwork than others – choose your moments and your topics for the enactment of Fieldwork in 50; and
- explore taking calculated risks and adjusting practices.

Fieldwork in 50 is intended to be quick and resource efficient; to spark curiosity and/or consolidate information at key moments within a scheme of work. Fieldwork in 50 activities can be completed individually, in pairs, or in small groups. Upon returning to the classroom, students' findings are pooled to determine if there is a possible answer to the inquiry question. A graphic organiser such as a lotus chart/diagram can be helpful for students to summarise their findings as a group. On the lotus chart (EdGalaxy.com), each colour represented a different fieldwork activity e.g. blue = observation notes; red = data from weather tracker app; green = tallies/counts; yellow = interview questions. The co-constructed inquiry question and student generated responses from Fieldwork in 50 can provide a springboard for further discussion and a point to keep returning to as the unit of work is completed.

#### Lotus chart 1: Basic organisation



#### Lotus chart: Extended scaffold

Feel	See	Hear				Temp.	Humidity	Wind Speed
Smell	Observation Notes		-		-	Noise	Weather Trackers/ Apps	
			Observation Notes	Quadrant	Weather Trackers/ Apps	-		
			Annotated Sketches	Inquiry Question	Experiments			
			Interview Questions	Surveys	Counts			
	Which is the most important question?	What would you ask?				People	Flats	Cars
	Questions	Who would you ask?				Other	Counts	Trees/ Vegetation
		Why is this question important?						5.C

#### In closing

A pitch and personal geographical identity provides a bridge between curriculum and pedagogy, therefore, it can be used to shape pedagogical practice in the classroom. A pitch and personal geographical identity also demonstrates how a teacher has made meaning of Geography as a complex, dynamic subject to capture the interest of students and colleagues.

A Geography lesson out of every window is my pitch and geographical identity which leans on inquiry and fieldwork. The window sparks curiosity and can be used to prompt or respond to questions arising from the inquiry process. The pitch became enacted as Fieldwork in 50 which can be used to quickly gather data and information for further investigation. It is also a point from which students can reflect on whether all views from the window (e.g. perspectives from the community) would be the same compared to what is currently seen. A real window could be one found in a classroom, which provides an opportunity to conduct primary research in a Fieldwork in 50 format and it can be adapted to suit a range of units across time and place. A metaphorical window could be the provision of a visual representation, which can be used to prompt secondary research. Therefore, my pitch of *a Geography* lesson out of every window directs my teaching and learning approaches towards a distinctive area of Geography and contributes to making my Geography lessons geographical. A geographical Geography lesson becomes evident through pedagogical practice as well as content.

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## **PL ONLINE**



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OCT The Geography Teachers' Association of NSW & ACT 020 **GEOGRAPHY 142: TEACHING** 

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- using effective teaching strategies to integrate ICT into learning and teaching programs to make selected content relevant and meaningful (NESA Standard 2.6.2 and, contributing to collegial discussions to improve professional knowledge and practice (NESA Standard 6.3.2).
- The course is designed for flexible delivery, where participants can start, progress and finish at The come is designed to include energy, where participants can start, progress and internal at times convenient to them. The collaboration is in a 'pay it forward' style, where participants engage with previous contributions and contribute themselves – learning in the process, but also adding to the galleries of exemplars and case studies for future participants to review.

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## **DISCUSSION PIECE**

## That's not an excursion. THIS is an excursion! Fieldwork in Denmark

#### John Collins, Agricultural Tours Riverina

Having been lucky enough to teach in various education sectors in several countries I've encountered lots of interesting examples of teaching beyond the classroom.

Some of these examples have been interesting mainly because they have been very expensive -- luxurious trips to foreign places to study landforms or exotic industries or to immerse students in a foreign language.

Other extra-classroom projects have involved students living for periods as though they were in an historical era, such as 1860s goldrush Australia.

Yet others have proved unintentionally interesting due to incompetent planning or *forces majeures*, such as when unanticipated instances of civil strife, weather conditions or disease in a region leads to a panicked retreat or costly rescue effort. A number of recent rescues of students who've become lost on wilderness excursions in Australian national parks might come into this category. COVID-19 provides a wealth of new case studies.

In the late 1960s I took part in a UNE geography excursion mapping vertical landuses in the Sydney CBD. Equipped with maps of city blocks and clipboards we were to travel up and down lifts, sketching floor plans and recording the nature of activities on each floor. Unfortunately several of us ended up at local police stations. Ground floor tenants of many high rise buildings were retail banks, and excursion organisers failed to take into account high levels of anxiety caused by armed bank robberies plaguing Sydney at the time.

But I'm more intrigued by intentional excursions that perhaps are not considered especially interesting or unusual by those who organise or participate in them. I've known of adventure runs, and of self directed bicycle tours where students cycle their way to a number of mapped historical/geographical points of interest in their communities or regions, completing pro formas along the way. Many years ago the University of Newcastle conducted a "drive your own 4 wheel drive" excursion for adult learners which took them from Newcastle around the Birdsville Track and home again over 14 days. The group of 40 travelled in 22 vehicles in the company of a group of teachers including a botanist, an arid zone geomorphologist, an herpetologist and an accomplished author whose books focused on remote and arid Australia. It was great educational fun.

The most extreme excursions I've known of occurred in Denmark in the 1970s/80s. The Danish have been blessed for 170+ years with a post-compulsory school institution known as the Folkehøjskole (literally, the University of the People). The schools are residential, are forbidden to teach vocational skills or to formally examine their students, and occupy an important place in Danish society. The concept of the Folk High School has been exported with varying degrees of success to many other Scandinavian, European, North American and African countries. For fuller descriptions and a useful list of references see https://www. danishfolkhighschools.com/about-folk-high-schools/.

Driving through Denmark in 1979 I picked up two young Danish hitchhikers (I know, I know – but times were different then!) returning to their Folk High School after a weekend home visit. When we arrived at the harbourside town on Funen which was their destination I was invited to join them on their school. I use the preposition correctly – their school was an old wooden Greek inter-island ferry. The school's students were in the process of making the boat seaworthy and capable of housing 20 crew. They had decided to sail the boat to Venezuela to work on a community project for three months. On their return two things would happen – they would sell the boat to help pay for their venture and they would subject themselves to a "public examination". That is, each student would hire a public hall in their hometown and advertise they had participated in this excursion, had learned some things

### **DISCUSSION PIECE**

they considered could be helpful to Danish society and were inviting members of the general public to listen and to question them on their conclusions.

I later heard of another folk high school which purchased secondhand double decker London buses and fitted them out for overland journeys to India to work on developmental projects.

In preparing their vessels or vehicles for extended excursions the students learned skills such as shipwrighting, carpentry, motor mechanics, navigation and planning diets and laundry. During their travels they learned how to live together in close quarters, how to overcome unexpected difficulties and the importance of a Plan B, as well as a great deal about the foreign cultures in which they operated. But of much greater educational importance in my mind is that their adventures taught them an awful lot about themselves and their places in the world. That I'm sure was the most valuable outcome of all.

I fully appreciate that the Danish FHS is a unique institution. Most NSW schools and certainly the Department would pall at any suggestion they mimic the excursions described above. There remain however lessons in what I've described for our schools. Excursions offer opportunities for personal and educational development far beyond their immediate curriculum objectives. Despite several years of organising excursions on a commercial basis I know of no NSW schools that encourage or even allow students to research and design their class study tours - within given educational and financial parameters of course. Only a few schools known to me place equal emphasis on group dynamics, personal growth and curriculum objectives when designing class tours. Most excursions take place within the maximum time negotiated with fellow teachers and school administrations and few are jointly sponsored by multiple subject departments to fulfil multiple objectives, although one exception I've been associated with is where geography, business studies, agriculture and food technology students spent most of a week together in the NSW Riverina Region following the supply chain of a particular breakfast cereal.

Excursions are exceptional opportunities to achieve curriculum learning objectives along with a whole lot of other educationally worthwhile outcomes. What's to stop your school recognising their promise by having a staff member or committee focused on maximising potential learning outcomes of study tours, and also working towards financial and time economies – getting maximum educational bang for their budgeted buck. Most teachers know that the promise of and afterglow from excursions can improve classroom dynamics and thus decrease time spent on class behaviour management. Yet those same teachers shy away from excursions because of the extra work involved, unaware that the bulk of the effort can be farmed out.

Teachers, be brave when contemplating your next class excursion. Be prepared to think beyond the square in order to maximise its potential for good learning. Re-energise your colleagues as well as your students – goodness knows we all need a whammy of fresh air.

#### Epilogue

By way of epilogue two points should be made. The first relates to the folkehojskolen. Most do not offer travel as part of their educational offering although Brenderup Folk High School is one exception – see https://www.hojskolerne.dk/hojskoler?skole=brenderuphojskole. It's also worth noting the organisation behind the particular folk high schools I visited in 1979 seems to have gone rogue and has fallen foul of various government agencies (and InterPol!) for financial crimes and misdemeanours – see https://www.tvindalert. com/tvinds-social-education-facilities-danish-mediaspotlight/. But the vast bulk of the 60+ Danish folk high schools operating in 2020 continue to fulfil their charter diligently – within the law and with refreshing educational flair.

Finally, as this short article was being tidied for publication the NSW Department of Education put a complete stop to all excursions for an indefinite period. Bad timing! But the good times will return.

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## **INTERCONNECTIONS**



#### Image source: Shutterstock

### Connecting through time: A Stage 4 Case Study 'Dating and Technology' Betty Steele-Smith, HSIE Teacher,

Oran Park Anglican College

#### A fun lesson exploring how information technologies have changed the way we date over the years.

#### **The Inspiration**

While working from home during the Covid-19 quarantine, like many others, I did an autumn clean and found all manner of old phones and electronics that I dutifully sent to Officeworks for recycling like a true responsible citizen (and geography teacher). However, they were not recycled before they were duly extracted for an interactive geography lesson.

These old phones ranged from old antennae phones, to the ubiquitous classic Nokia 3315 (which probably still works) and to more recent models of the iPhone which are forced (or planned) obsolete due to software updates. It got me thinking about my teen years and how quickly communications technologies have changed in the past 20 years (or so). These old phones got me had me nostalgic and thinking about the times when phones were just about calling and texting people. When Snake 2 was the most exciting feature of a phone and when phone screens were green, black and pixelated, cybergossip was spread via

MySpace and flirting with your crush over MSN messenger. Those were the beginning years of Web 2.0, where user generated content as in its infancy and we were all trying to figure out the 'rules' of engagement. I remember clearly agonising over the 160 character text limit in an SMS to an early crush- wanting both to flirt, but also to flirt economically as my phone was prepaid and I wanted to stretch my phone credit for as long as possible. I also remember the first time someone in my close friendship group announced that they were 'in a relationship' on Facebook, it was quite the news! I have memories of conversations with peers about appropriate ways of being dumped or dumping someone in the face of all these 'new' technologies (can I just text him? Do it online- I know of someone who got dumped on MySpace! Send an email? Nah, probably should suck it up and do it face to face). These conversations the result of the advent and quick uptake of social media.

This got me thinking about how flirting/dating and coupling has changed over the years as a result of these changes in technology. Thus began my series of lessons using dating as a case study to illustrate how technology has changed the way people have connected over time using real life experiences and drawing data from people who have palpably seen the change. I hope you find these ideas fun and useful in your classroom!

> Figure 1: Some of the phones I found (and friends donated for the cause!)



#### The lessons

The program that came to mind which best suited what I wanted to illustrate with these old phones was the Stage 4 Interconnections program where students are required to make an:

- Examination of how information and communication technologies increases people's connections to services, information and people in other places
- Assessment of the impact of increasing global connectivity on people and places.

Below is what I did with these phones and how they made for a fun few lessons where we examined communications technologies and connections to people through exploring how dating has changed over the years.

#### Preparation

#### **Old Phones**

• Student homework: to bring an old phone from home that is out of commission for 'show and tell' next lesson- it could be a mobile phone, a landline phone etc. They need to know the make and model of the phone.

#### **Dating Interviews**

- Teacher Preparation:
  - Interview at least 3 people who have dated in 3 different decades (e.g. 80s, 90s, 00s and 10's) (A good idea is to interview teachers at the school who don't mind being filmed and then showing the film in class in later lessons- see below for lesson plan).
  - In my lessons, I interviewed 5 teachers one who dated in the 80s, 90s, 00s, early 10s and late 10's and filmed their responses and show them in class.
- Alternative to Teacher preparation:
  - An alternative task is to get the students to interview teachers or parents/ grandparents as their homework to expand this activity and bring their reponses in 2 lessons time (see lesson outline below).
- Interview questions about what it was like to date in their 'time':
  - What was the main form of non face to face communication with your beloved? (You might be in luck and have an older member of staff willing to talk about letter writing and love letters as a form of communication. Was it a

landline phone? MSN? Text messaging? This is a great starting question that 'places' the interviewee in a timeline).

- How did you organise dates? (Via phone, face to face, text messaging, you might have someone who met through online dating application which would be an interesting case in point of how communications technologies provide a service to connect peoples).
- What would happen if you were late? Or if there was an emergency situation? (Did you have to find a landline phone? Phone box).
- What was acceptable time to wait for someone before you were 'stood up' on a date. (This question is pertinent for those who dated before mobile phones were commonplace and perhaps gives the students an idea of the instantaneous nature of their life today due to the current nature of communication technologies).
- Cost to make a phone call (if you remember) (This question helps students see how communications technologies have become cheaper to access, gone are the days of counting text message characters in order to minimise cost).
- Ways people broke up. (A fun ending question. This is a good question to see how communications technologies facilitated different ways such as the 'text message breakup' or 'being ghosted' – a term that I was unfamiliar with until this exercise).

#### Lesson 1

#### The lesson

- Homework the previous lesson Students are required to bring ONE old phone they have retired that is sitting in a drawer at home somewhere. (they can work in pairs as well)
- Students come into class and spend 20 minutes with an A3 sheet of paper OR with their device to create a basic advertisement for their phone. In their advertisement, they noted the key 'defining' features on the phone when it came out to highlight the changes in technology.
- Students share their advertisement (30 seconds) in chronological order (From oldest phone to newest phone) and note the changes.

### **CLASSROOM ACTIVITY: INTERCONNECTIONS**

#### Reflection

- Reflection Activity: Students reflect on the impact of these changes on communications technology on:
  - People's connection with other people.
  - People's connection to services.
- Students may post their reflections on an online forum or discussion board (or any other format).

What they learn from this activity:

- Students can trace how technology has evolved over the last 10 to 20 years (depending on how old their phones get) and see how different technologies have developed and have changed the way we communicate.
- Students are also made aware of how people's connection to other people and services have increased over time with the advent, and fast development of communications technologies.

#### Lesson 2

These lessons provide a fun and engaging way to introduce and the changes in communication technologies and assess its impacts on people's connection other people as well as services that these new technologies provide.

#### The Lesson

- Case Study: Dating though the ages.
- Students are given the worksheet: *Case Study:Dating through the ages.*
- Students watch the interviews completed in the preparation and fill out the worksheet as they go to trace how technology has changed the dating landscape.
- Alternative Task: Students may have done their own interviews for homework, students can work in small groups to watch or share the interviews they have conducted. It is important in this instance to ensure that the groups are made so that there is a mix of 'eras' so that there is variety in sharing.



Image source: Shutterstock

- Reflection activity:
  - Students can complete this in groups or individually. Students reflect on these two questions:
    - a. How has technology impacted how people date and connect with each other?
    - b. Has technology made dating easier or harder?
  - Students can create a 200-word response on those questions and post their discussion online in an online forum or discussion board.

What students learn from this activity:

- Students can see tangibly how changes in communications technology have changed dating and increased people's connectivity to other people (for better or worse).
- Assessment of the impact of increasing global connectivity on people.

These lessons provide a fun and engaging way to introduce and the changes in communication technologies and assess its impacts on people's connection other people as well as services that these new technologies provide.

#### Changes in Technology Case Study: Dating though the eras

ERA	Describe the main form of communication? How did you organise dates?	What would happen if you were late? Emergency situation?	Acceptable time to wait for someone before you were 'stood up' on a date?	Cost to make a phone call?	(Acceptable) Ways to break up?
1900s–1950s (example)	Letter writing. Determining time and place of meetup and keeping to that. Visiting people face to face Later in the 1950s there were telephones and you could call from phone booths. You knew the number of your local phone booth sometimes.	You were not late! If you didn't show up something REALLY bad had to have happened to you! Someone could run and take a message. You explained later in a letter or face to face.	Up to 1 hour or sometimes more.	Didn't exist until later.	You could write a long letter Go to their house and meet them face to face. Later in the 1950s there were telephones in houses.
1980s					
1990s					
2000s					
2010s					

## **URBAN PLACES**

## HALF A CROSSWORD

#### Katerina Stojanovski, Stella Maris College

'This is a fun activity to get students speaking. They have to complete a crossword by working with a partner. They take it in turn to explain their words which their partner must guess. Obviously, they are not allowed to say the actual word.'

Half A Crossword

Editor: The example provided by Katerina is for Stage 5, however the tool would be a very useful revising any topic, as a pre-test of conceptual knowledge or to revisit a previous lesson before moving forward.

Create your own 'Half a crossword' using key syllabus concepts from a topic and the reference link below.

### Urban Places - Key terms (Partner 1)

#### Instructions

- Work with partner to complete the crossword.
- Explain the meaning of your keyword without telling your partner what the word is.



### **CLASSROOM ACTIVITY: URBAN PLACES**

### Urban Places – Key terms (Partner 2)

#### Instructions

- Work with partner to complete the crossword.
- Explain the meaning of your keyword without telling your partner what the word is.



#### Answers



#### Reference

Halfacrossword.com. 2020. *Home – Half A Crossword.* [online] Available at: https:// halfacrossword.com/ [Accessed 30 July 2020].

## **ENVIRONMENTAL CHANGE**

# **Biospheric Processes**

Katerina Stojanovski, GTA NSW & ACT Councillor

The biosphere is all the living things on Earth. Processes related to the biosphere are central in the creation of environments.

Some of the processes related to the biosphere include:

- evolution
- carbon cycle
- oxygen cycle
- photosynthesis
- food chains and food webs
- population fluctuations and movements

In today's lesson we will be covering the carbon cycle, oxygen cycle and photosynthesis.



#### **Carbon Cycle, Oxygen Cycle and Photosynthesis**

#### **Inquiry Questions**

- Where are the major stores of carbon found on the earth?
- How does carbon move through the short term carbon cycle?
- How does carbon move through the long term carbon cycle?
- What are the processes that use and produce oxygen?

Watch *Stores of Carbon on Planet Earth* – https://timeforgeography.co.uk/videos\_list/carbon-cycle/carbon-cycle-stores/

- 1. What % of biomass is made up of carbon? \_\_\_\_\_
- 2. What % of carbon makes up our bodies?
- 3. How is carbon distributed around the earth? Complete the table on the following page:

### **CLASSROOM ACTIVITY: ENVIRONMENTAL CHANGE**

MAJOR STORES OF CARBON ON THE EARTH	DESCRIPTION	%
Biosphere	Trees, plants	

Watch *The Long-Term Carbon Cycle* – https://timeforgeography.co.uk/videos\_list/carbon-cycle/long-term-carbon-cycle/

.....

.....

- 4. Define sequestration .....
- 5. Explain how carbon moves through the long-term carbon cycle?

Watch *The Short-Term Carbon Cycle* – https://timeforgeography.co.uk/videos\_list/carbon-cycle/short-term-carbon-cycle/

.....

.....

.....

### **CLASSROOM ACTIVITY: ENVIRONMENTAL CHANGE**

.....

6. Explain how carbon moves through the short-term carbon cycle?

#### Oxygen Cycle

.....

Read: https://www.ducksters.com/science/ecosystems/oxygen\_cycle.php

7. How is oxygen used and cycled by plants and animals? Support your answer with a labelled diagram.

.....

### **CLASSROOM ACTIVITY: ENVIRONMENTAL CHANGE**

8. Outline the processes that use oxygen (breathing, decomposing, rusting and combustion).



## **HUMAN WELLBEING**



### Newcastle Grammar School

## Assessment Task

**Drew Collins** 

#### **Notification of In-Class Task**

YEAR GROUP	Year 10	NOTIFICATION DATE	
TEACHER	Mr Collins	22/8/19	
RESPONSIBLE		Class w	ork – Weeks 6 and 7
SUBJECT Geography		DUE DATE	
TOPIC	Human Wellbeing	Week 8	
TYPE OF TASK	In-Class Presentation (pairs)	WEEKO	
DURATION	DURATION 4-5mins (class research time wks 6 and 7)		Year 10
WEIGHTING 30%		PERIOD	Various from week 8

SYLLABUS OUTCOMES		
GE5-2	explains processes and influences that form and transform places and environments	
GE5-6	analyses differences in human wellbeing and ways to improve human wellbeing	
GE5-7	acquires and processes geographical information by selecting and using appropriate and relevant geographical tools for inquiry	
GE5-8	communicates geographical information to a range of audiences using a variety of strategies	

#### **Content Being Assessed**

- 1. Using a series of both quantitative AND qualitative indicators, describe the spatial variation in human wellbeing and development around the world (~1 minute)
- 2. Examine the reasons for and consequences of these spatial variations in human wellbeing (~1min)
- 3. Discuss the issues affecting development & their impact on human wellbeing in ONE country (~2mins)
  - \* In your class no two countries may be the same
  - \* It may well be easier to choose an LEDC and you cannot choose Australia as your country study
  - \* All presentations will need to be submitted by the first lesson of the week due (random selection)
  - \* Each member will need to document their own work to achieve equity and even mark distribution

### **ASSESSMENT: HUMAN WELLBEING**

#### **Mode and Equipment Needed**

- Presentation medium (PowerPoint, Prezi, Google . Slides, iMovie, other but check before you start).
- BOYD and relevant ICT skills, alongside teamwork, . communication, trust, resilience.
- Vivi or another connecting mode e.g. cloud-based server (Office 365, Google Doc's, Schoolbox, Dropbox, Email as attachment). Check with your teacher and/or ICT well in advance.

#### **Suggested Qualitative**

- OECD Better Life Index •
- Happy Planet Index
- **Ecological Footprint**
- World Happiness

#### **Suggested Quantitative**

- HDI .
- **CIA Factbook**
- World Bank
- Gapminder

#### **Suggested Visuals**

- Images
- Graphs and stat's
- Maps (choropleth)
- Animation

HAPPY PLANET INDEX



Happy Planet Index

Better life Index http://www.oecdbetterlifeindex.org/#/1111111111



# GAPMINDER

Gapminder https://www.gapminder.org

### Year 10 Human Wellbeing Marking Criteria

#### Group Names: \_\_\_\_\_

Country: \_\_\_\_\_

4–5min presentation

TASK – PAIRED RESEARCH AND PRESENTATION	MARK
<ul> <li>Presents an engaging, coherent, succinct, logical and well–structured presentation of findings</li> <li>Provides extensive and detailed information showcasing human wellbeing around the world</li> <li>Uses a variety of geographical indicators and showcases highly relevant aspects</li> <li>Demonstrates broad and effective research skills AND terminology via your country study</li> <li>Incorporates a wide variety of diagrams, graphs and pictures to good effect</li> <li>Correctly referenced and formatted bibliography</li> <li>Presents information within the time period (+/- 15secs)</li> </ul>	17–20
<ul> <li>Presents a coherent, succinct, logical &amp; well-structured presentation of findings</li> <li>Provides detailed information surrounding human wellbeing around the world</li> <li>Uses a variety of both qualitative AND quantitative geographical indicators</li> <li>Demonstrates effective research skills AND terminology via your country study</li> <li>Incorporates a variety of diagrams, graphs and pictures to effect</li> <li>References information, however incorrect format</li> <li>Presents information close to the time period (+/- 15–30secs)</li> </ul>	13–16
<ul> <li>Presents a reasonably coherent and structured presentation of findings</li> <li>Provides information about human wellbeing around the world</li> <li>Uses only qualitative OR quantitative geographical indicators</li> <li>Demonstrates some research skills correct terminology via your country study</li> <li>Incorporates some diagrams, graphs and pictures</li> <li>Attempts to reference information</li> <li>Presents information outside the time period (+/- 30–45secs)</li> </ul>	9–12
<ul> <li>Poor presentation of findings failing to cover many aspects set in the assessment outline</li> <li>Poor or no use of geographical skills / terminology</li> <li>Lacks diagrams, graphs and pictures</li> <li>Poor research skills</li> <li>No referencing</li> <li>Does not meet time period (&gt;/&lt; 60secs)</li> </ul>	0-8

.....

#### Comment:

## **RESOURCE REVEW**



#### **Book: Fire Country by Victor Steffensen**

Victor Steffensen has had a passion for traditional cultural and ecological knowledge since a young age. His knowledge developed over many generations and this knowledge shows that Australia needs fire. Fire is part of a wholistic approach to the environment ensures proper land care and healing.

In his book Victor tells a personal story about learning about country and the use of fire using traditional ecological knowledge and cultural practices. Of particular interest for Geographers are Chapters 2–9 in which Victor explains how the use of fires depends on different ecosystems and the environmental clues that tell when the country is ready to be burnt.

I thought I knew a lot about cultural burning until I read this book. Editor

The following video clips illustrate some of the story that Victor tells in his book: Fire Country by Victor Steffensen | Book Trailer https://www.youtube.com/watch?v=fbZkkn1n4WM

Australian story (after 2020 Bushfires) https://www.youtube.com/watch?v=d-9hmEiH828&t=946s

#### **Teaching Resource: Tweed Sand Bypassing / Coastal Management**



Note: This resource is examined in a presentation in the GTA NSW & ACT Professional Learning Package for Term 4: Plan for 2021.

This visually exciting and inquiry-based teaching resource covers the entire Stage 5 topic Environmental Change and Management. After the contents and introduction, Sections 2 and 3 examine in detail coastal features, change and management. The focus is on the biophysical and human processes that change coasts at local, national and global scales. There are small case studies / illustrative examples from places in Australia and overseas – an opportunity for students to work in groups.

An in-depth case study on Tweed Sand Bypassing makes up Section 4 – three parts that in order focus



Source: https://www.tweedsandbypass.nsw.gov.au

on natural processes; change and management; impacts and governance. Contemporary resources and detailed information in these sections will build teacher knowledge and understanding, whether or not they are used in such detail with students. Chapter 5 is a comparative study of Waikiki Beach in Hawaii and the remaining sections provide support materials for classroom use – Assessment Task, Fieldwork, Stimulus Booklet, Student Activities and answers plus Blackline Master activity sheets.

The package uses an inquiry approach and a focus on applied knowledge and critical thinking with hyperlinked resources throughout. There is flexibility for teachers to use parts or all of the package to teach about coastal change and management.

## REPORT

## 2020 Australian Geography Competition

The 2020 Australian Geography Competition was significantly affected by the COVID-19 pandemic. Schools were starting to close just as the Competition was scheduled to be held. To give schools the maximum opportunity to participate, the deadline to submit answer sheets was pushed forward from April to August. Answers received from September onwards are still being marked and certificates issued, but those students are ineligible for prizes.

Australia-wide, entries were received for 65,837 students from 699 schools. In NSW, it was 26,762 students from 252 schools and in the ACT 1,995 students from 15 schools.

#### **Prizes**

YEAR	PRIZE	NAME	SCHOOL
7	Equal first in NSW	Andrew Pye	Sydney Boys High School
/		Leo Zhuang	Sydney Boys High School
		Lachlan Ballard	Sydney Grammar School
		Daniel Lloyd Hurwitz	Sydney Grammar School
8	Equal first in NSW	Daniel Nguyen	Sydney Boys High School
		Eric Scholten	Sydney Boys High School
		Warren Song	James Ruse Agricultural High School
	Equal first in Australia	Alex Koopejcharoen	Baulkham Hills High School
0		Sophie Lim	Abbotsleigh
9		Jimmy Nicholas	Shore School
		Liam Sewell	Shore School
	Equal first in Australia	Eric Huang	Baulkham Hills High School
10		Louis McKay	Northern Beaches Secondary College – Manly Campus
		Alex Murray	Shore School
11	First in Australia	Kevin Yuan	Sydney Grammar School
12	First in Australia	Zoe Ransevycz	Burwood Girls High School
School	First in Australia		Sydney Grammar School

Prizes were awarded in NSW as follows:

### REPORT

ACT is part of the Combined Territories group is the calculation of prizes. This also includes students from: Christmas Island, Cocos Keeling Islands, Norfolk Island and Northern Territory. Prizes were awarded in the ACT as follows:

YEAR	PRIZE	NAME	SCHOOL
7	First in Combined Territories	Ben Watson	Campbell High School
		Zara Mason	Canberra Girls Grammar Senior School
8	Equal first in Combined Territories	Rosemary Norton	Canberra Girls Grammar Senior School
		Dev Shah	Alfred Deakin High School
9	First in Combined Territories	Victoria Spark	Canberra Grammar School
10	First in Combined Territories	Alex Ricks	Canberra Grammar School
11	First in Combined Territories	Angus Whitford	Canberra Grammar School
12	First in Combined Territories	India Kazakoff	Canberra Grammar School
School	First in Combined Territories		Canberra Grammar School

#### High-performing schools

These NSW and ACT schools achieved outstanding results, coming within the top 10 in Australia. To be eligible for this category schools must enter students in each of Years 8, 9, 10, 11 and 12.

POSITION IN AUSTRALIA	SCHOOL
1st	Sydney Grammar School
2nd	Sydney Boys High School
3rd	Knox Grammar School
4th	Canberra Grammar School
7th	Northern Beaches Secondary College – Balgowlah Boys
8th	St Joseph's College – Hunter's Hill
9th	Kinross Wolaroi School
10th	Rosebank College

#### Selection process for 2021 iGeo



The fieldwork-based Geography's Big Week Out is the usual method to select students to represent Australia at the International Geography Olympiad (iGeo). In 2020 this was to have been hosted by the Geographical Association of WA. However, it has had to be cancelled due to COVID-19. Instead, the students will be selected via an assessment task. The first part of this assessment will be a 2-hour written test, administered at the students' schools. For students who score highly on this test, the second part of the assessment will be conducted individually via Zoom.

Circumstances allowing, the plan is that the four students selected for the 2021 team will attend a four-day training exercise in Brisbane during the April school holidays in preparation for the iGeo. It may be that the 2021 iGeo will be cancelled, as has the 2020 iGeo. However, if the health situation and travel restrictions allow, the Competition Committee would like to be ready to send a team. The advice of the Australian governments on gatherings and travel will be strictly adhered to.

### REPORT

These Year 11 students in NSW will be taking part in the selection process for the team to represent Australia at the 2021 iGeo in Istanbul, Turkey.

STUDENT	SCHOOL
Name withheld	
William Martin	St Joseph's College – Hunter's Hill
Gemma Snyman	Roseville College
Name withheld	

#### And in the ACT:

STUDENT	SCHOOL
Name withheld	
Angus Whitford	Canberra Grammar School



#### 2021 Competition

Next year's Competition will be held in schools between **18 and 31 March 2021**.

Here's hoping 2021 will be a more normal year for schools and not just "COVID-normal". We look forward to the participation of many schools that had to opt out this year.

For more information, please contact:

- Rachel Honey, Competition Coordinator
- W. www.geographycompetition.org.au
- E. AGCcoordinator@rgsq.org.au
- T. 07 3330 6907

Learn more about The Australian Geography Competition on the website



## **ADVICE TO CONTRIBUTORS**

#### **Geography Bulletin guidelines**

- 1. *Objective:* The Geography Bulletin is the quarterly journal of The Geography Teachers' Association of NSW & ACT Inc. The role of the Geography Bulletin is to disseminate upto-date geographical information and to widen access to new geographic teaching ideas, methods and content. 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, should be submitted to the GTA NSW & ACT Office by email gta.admin@ptc.nsw.edu.au

Submissions can also be sent directly to the editors: 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 coloured background, 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.

### Note: Please try to limit the number of images per page to facilitate ease of reproduction by teachers.

Diagrams created using templates should be saved as an image for ease of incorporation into the bulletin.

#### All assessment or skills tasks should have an introduction explaining links to syllabus content and outcomes. A Marking Guideline for this type of article is encouraged.

- 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 passporttype 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.)* 

#### 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 NSW & ACT Inc accepts responsibility for statements or opinions expressed herein.

#### Books for review should be sent to:

The GTA NSW & ACT Council PO Box 699 Lidcombe NSW 1825

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