

Image source: Shutterstock

FIELDWORK EQUIPMENT and ITS USE

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'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).

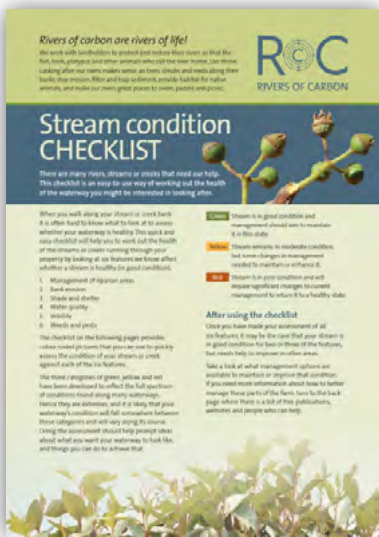
EQUIPMENT	PURPOSE / USE
Thermometer	Used to measure air temperature.
Anemometer	Measures wind intensity / strength.
Compass	Used to determine the direction eg wind.
Wet and Dry bulb thermometer	A hygrometer measures the relative humidity – the amount of moisture in the air compared with what the air 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 metre	A refractometer can be used for measuring high salt concentrations eg in estuaries, ICOLLS. An electrical conductivity meter is used to measure low salt concentrations in 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 phone app 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).

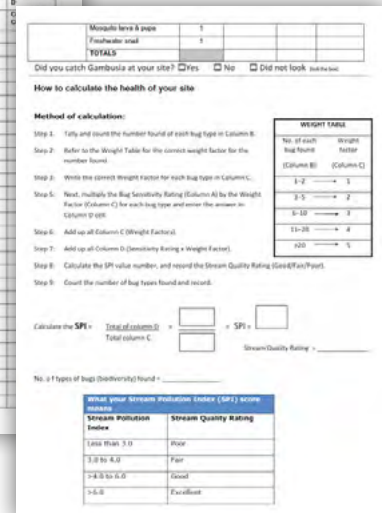
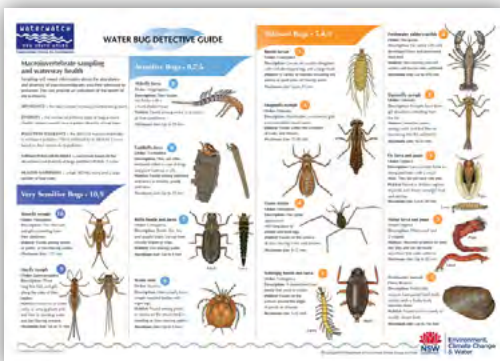
EQUIPMENT	PURPOSE / USE
Transect line	A transect is a line along which environmental features are observed, measured and recorded. A transect line can be created using a tape measure or a length of rope.
Quadrat	A quadrat is a 1 metre x 1 metre square made from pipe, rope or coloured string. It is used 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 bugs, 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. See Water Quality and Stream Condition Checklists

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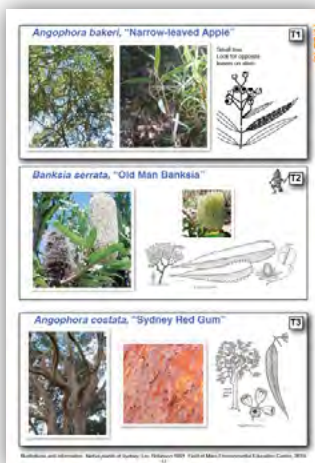
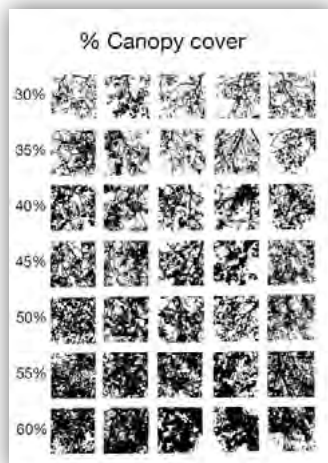
Figure 3: Examples of charts and checklists



Stream Condition Checklist available from <https://arc.com.au/product/river-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_rTMDeoqNW_Q



Cloud identification wheel <https://www.adventure-in-a-box.com/cloud-wheel-with-cloud-identification-guide-for-kids/>

FIELDWORK INVESTIGATIONS

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.

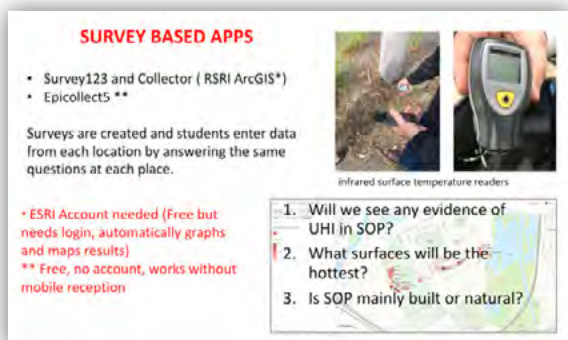
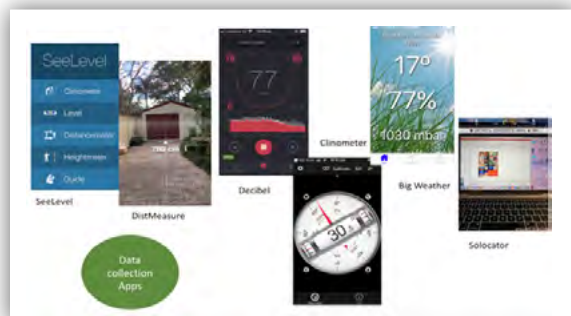
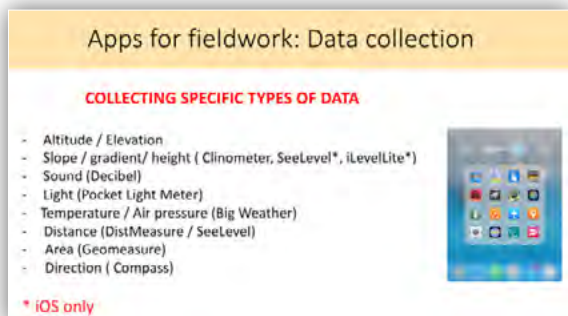
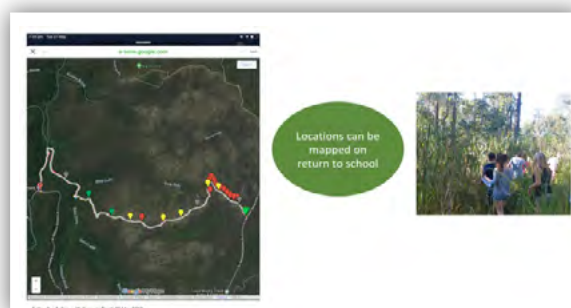
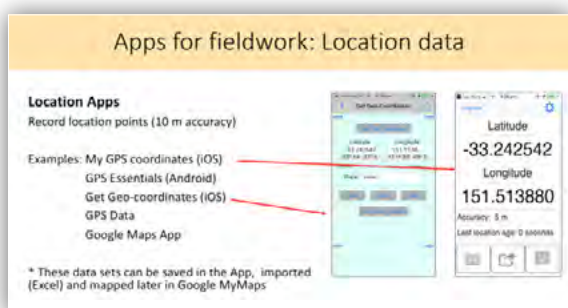
These include:

- Apps for location data e.g. My GPS Coordinates, GPS Data, GPS Essentials

- Apps for collecting specific types of data e.g. sound (Decibel meter), direction (compass), temperature (Big Weather), slope (clinometer)
- Apps that collect multiple data sets e.g. 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>

FIELDWORK INVESTIGATIONS

Learning to use fieldwork equipment: Support materials

NSW Waterwatch YouTube videos – <https://www.youtube.com/user/NSWWaterwatch>

 9. How to do a Water Bug Survey - Aquatic... 878 views • 3 years ago	 EC Calibrating - EC Dual Range meter 4.7K views • 6 years ago	 8. Measuring Dissolved Oxygen 3.8K views • 6 years ago	 7. Measuring Available Phosphate 2.4K views • 6 years ago	 6. Measuring Turbidity 386 views • 6 years ago
 5. Measuring Electrical Conductivity (salinity) 1.7K views • 6 years ago	 4. Measuring pH 280 views • 6 years ago	 3. Measuring Water Temperature 4.4K views • 6 years ago	 2. Collecting a water sample 255 views • 6 years ago	 1. Getting started - Site selection and risk... 217 views • 6 years ago

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_rbTMDDeoqNW_Q
An excellent resource on fieldwork equipment plus instrument use videos

1. Fieldwork equipment



1. Leaf litter coverage can be estimated with a quadrat (20)



2. Soil temperature can be measured with a soil thermometer probe (°C)

2. Fieldwork instrument use videos

Fieldwork instruments part 1

- Measuring air temperature using the thermometer function of the Keiss 3000 weather meter
- Measuring relative humidity using the hygrometer function of the Keiss 3000 weather meter
- Measuring wind speed using the anemometer function of the Keiss 3000 weather meter
- Measuring light intensity using a light meter.
- Note about reliability, potential error and biases.


Record the maximum windspeed each

Fieldwork instruments part 2


- Determination of soil
- Determining soil texture using a manual Casagrande method
- Measuring soil pH using the universal color method
- Measuring soil temperature using a soil temperature probe
- Handling and disposal of chemical waste
- Note about reliability, potential error and biases.

Rumbalara EEC – <https://sites.google.com/education.nsw.gov.au/stage-5-environmental-change-m/field-work-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) [Transcript](#)



Stage 5 Sand Sieving at 'The Ruins' / Wamberal Beach YouTube | Rumbalara EEC (1.52 sec) [Transcript](#)

FIELDWORK INVESTIGATIONS

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/1d8zTBYjg5j6tTsWqdjYBjEobommsFoo3/view>

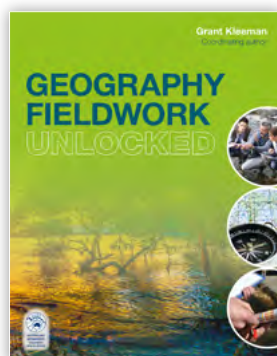
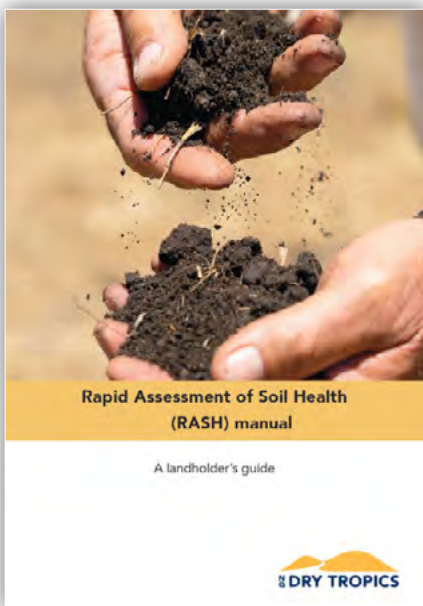
NQ Dry Tropics NRM produced a series of seven short videos to support the RASH Approach. The videos focus on different elements of soil health, and how to test them.

- 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/1d8zTBYjg5j6tTsWqdjYBjEobommsFoo3/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.