

# **Geography Fieldwork equipment**

Make your own – saves  
money and is fun

*Includes: a field work guide and apps that can be used with your geography students in field work.*

# Make your own fieldwork equipment

One of the factors contributing to the expense of fieldwork is the amount of equipment required. The range and number of items needed coupled with the frequency with which it is used (often not a lot) means that departments may be unlikely to purchase fieldwork equipment.

However, many studies require a certain amount of equipment, and that is where the ability to make your own for little if any cost to the department comes in handy.

We have provided instructions for equipment to help you investigate different geographical phenomena.

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# Infiltration

## What you need

- Section of drainpipe
- Ruler
- Water container
- Stop watch

## What you do

Place the drainpipe on the surface of the soil or land. Insert the ruler into the drainpipe so that it is standing on the soil surface. Pour a predetermined amount of water into the drainpipe. Time how long it takes for the water to infiltrate, or measure how much water remains in the drainpipe after a given length of time.

## When you use it

Compare infiltration rates between different land uses: soils, grassland, woodland, agricultural land, footpaths, tarmac. Use in a study of footpath erosion or trampling (the water will not infiltrate into saturated ground) or in an investigation into the role of man made surfaces in increasing the risk of flooding in urban areas.

## **Soil compaction**

### **What you need**

- Knitting needle
- Ruler

### **What you do**

Create your own soil pins using knitting needles. Push the needle into the ground as far as it will go before you feel resistance. Measure the depth. Take care when carrying and using knitting needles, they should be carried to the site in students' bags, not in their hands.

### **When you use it**

Compare levels of compaction at different sites and in different soil types, for example during a study of footpath erosion or trampling. Can be used in conjunction with infiltration equipment to determine why rates of infiltration vary between sites, and that impact that compacted and saturated soil can have on agriculture or on flood risk. The equipment can also be used to compare vegetated and cleared land as a small scale representation of the consequences of rainforest clearance.

## **Canopy cover**

### **What you need**

- Section of drainpipe or a pill box with the end cut off
- Acetate
- Graph paper
- Petri dish
- Tape or glue

### **What you do**

Photocopy your graph paper onto the sheet of acetate and cut out a circle that fits the drain pipe aperture. Place the acetate circle into a plastic Petri dish and stick this on one end of the drain pipe. For accurate canopy cover measurements, there will need to be around 100 squares of graph paper visible through the drain pipe aperture, but in reality this may not be possible so students will have to estimate the percentage coverage.

### **When you use it**

These pieces of equipment can be used to estimate percentage canopy cover at different sites, and are useful alternatives to expensive light meters. Use them during ecosystem studies to investigate the amount of light that reaches the forest floor in dense woodland and clearances. Alternatively, use them in rivers or on rock surfaces to record sediment particles size in situ.

## Suspended sediment

### What you need

- White plastic disc approximately 10 cm diameter
- Length of thick wire approximately 50 cm long
- Permanent waterproof coloured markers

### What you do

Colour sections of the plastic disc in the pattern shown in the diagram below. Insert a length of wire through the centre of the disc and secure. Bend over and tape cut ends of wire to ensure their safety. This home made Secchi disc is used to measure the levels of suspended sediment in a river. Drop the disc into the water and lower until the colours are no longer visible. Pinch the wire on the surface of the water and remove. Measure the depth at which the colours vanished and compare with other sites.

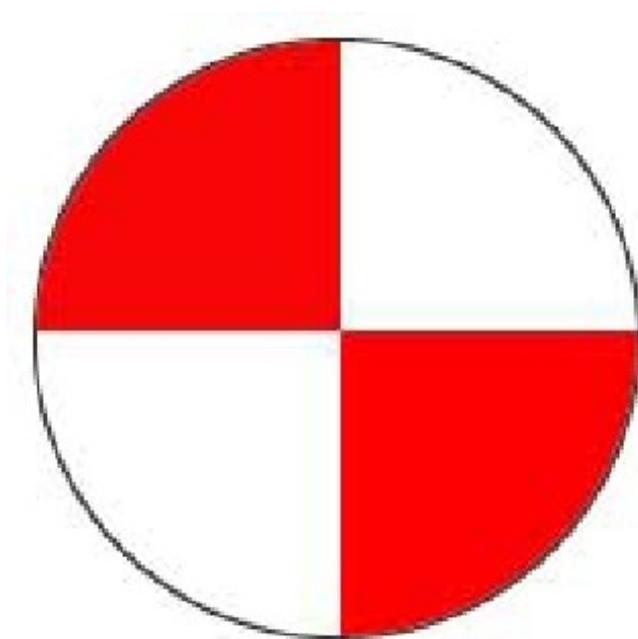


Figure one: plastic disc

### When you use it

This technique can be used to investigate changes in the river channel along its length, particularly with variations in the land use of the surrounding area, for example agriculture. It can also be used to compare rivers in different settings.

# Gradient

## What you need

- A water level/decorators level, available from DIY stores
- Two metre rules
- Tape

## What you do

Attach the two cylinders to each end of the pipe and tape each cylinder to a meter rule so that the zero point of the ruler is at exactly the same place on the two cylinders. Fill the level with water so that it the pipe is full and water is visible in both cylinders. The water will naturally find its own level, so if the two meter sticks are on even ground the water in the cylinders will reach the same point on the meter stick. This equipment can be used to measure very slight differences in height between surfaces. For example, if the water level in one cylinder is 880mm and in the other cylinder it is 890mm, there is a 10mm difference in height between the two sites.

## When you use it

Anywhere gradient measurements are required, for example sand dune or beach transects, river channel gradients, site levels. You can even use it to draw up contour maps of the school grounds. Gradient can be calculated using the following equation:

**Horizontal gradient = Difference in height between sites ÷ Distance between sites**

## **Species coverage**

### **What you need**

- A 10 square x 10 square section of plastic coated wire fencing
- Wire cutters
- Tape

### **What you do**

Cut your sections of fencing to ensure that each piece contains 100 squares. You can get a wide variety of types of fencing, and you may need to cut out some of the central wires in order to create a suitable sized square. Five to seven centimetre squares are an ideal size. Cover the ends of the wire that you have cut with tape to ensure safety.

### **When you use it**

This home made quadrat can be used to calculate percentage vegetation or species coverage in an ecosystem study. It can also be used to calculate the percentages of different land uses, canopy cover or even cloud cover if it is held up and looked through.

## **Vegetation sward height**

### **What you need**

- Perspex disc approximately 30cm diameter with a ruler shaped slot cut in the middle
- Half metre or metre rule

### **What you do**

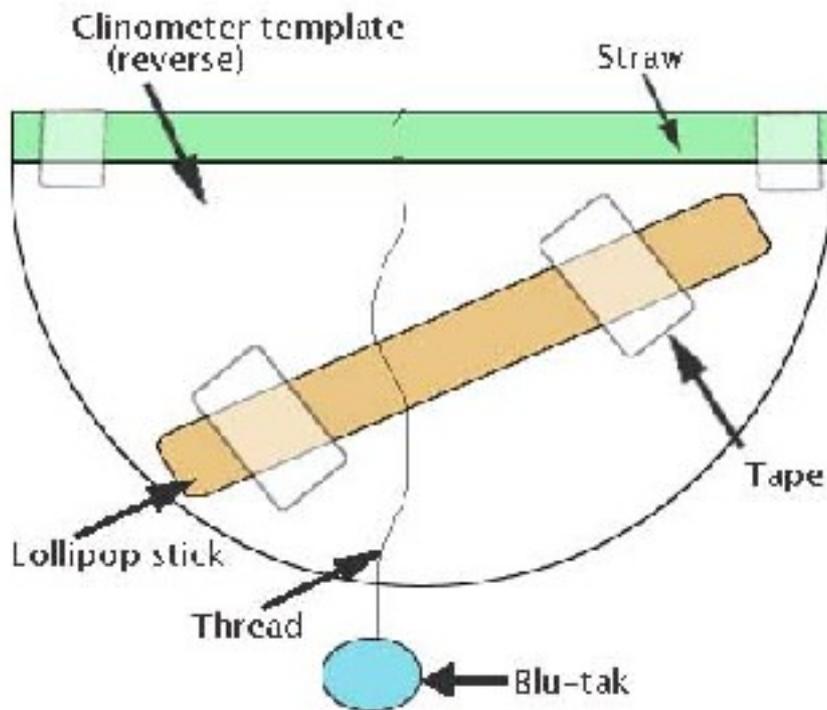
Ask your technology department or local DIY store to cut out your Perspex discs to your specifications and drill out the rectangular hole in the centre. Ensure that the hole is large enough to slot a half meter or a meter rule through. Place the zero end of the rule on the ground and drop the Perspex disc down over it. The disc will find the average level of the vegetation sward. Record the measurement from the rule.

### **When you use it**

This home made drop disc is used to measure variations in vegetation sward height across a site or between sites. Adding a grid to a clear Perspex disc will enable percentage coverage of vegetation or particular species to be calculated at the same time.

## Make your own clinometer

Below is a step by step guide to making your own clinometer.



**Figure three:** Finished clinometer

### What you need

- [Clinometer template document \(JPG\)](#)
- Sheet of thin cardboard
- Straw
- Lollipop stick
- Thread
- Blu-tak
- Tape

### What you do

Download your clinometer template and print it out onto thin cardboard.

Cut out your template, leaving approximately half a centimetre above the horizontal line on

the straight edge.

Tape a length of straw to the top of your cardboard clinometer template.

Tape a lollipop stick to the reverse of the clinometer template - this will give it added strength.

Make a small hole in the centre of the horizontal line on the straight edge of the template (just below the straw) and tie a length of thread through, leaving about 15cm dangling. Alternatively you can tie the thread around the centre of the straw.

Tie the loose end of thread around a small ball of blu-tak.

Adjust the thread so that it hangs down the front of the clinometer template.

## **How to use it**

Just like any other clinometer.

Pair up with somebody around the same height as you.

Find a gradient you want to measure the angle of.

You stand at one point with the clinometer, they stand at the other point.

Look through the straw and fix your sight on their eye level (or the top of their head if you're a bit taller than them).

Read the angle of the gradient from your clinometer using the thread as an indicator. You might need a third person around to help you to read the angle while the clinometer is still fixed to your eye.

# Quadrat

Is a square frame used for sampling an area

## **What you need:**

- 4 straws
- Sellotape
- Ruler for measurement

## **What you do:**

Sellotape the ends of 4 straws together to make a frame. Use the ruler to make sure each straw is the same length (needed to make a square) and is also a round number e.g. 10cm.

## **When you use it:**

When estimating vegetation cover e.g. vegetation on dunes. Place quadrat over area and estimate percentage of vegetation in the quadrat. When estimating cloud cover, hold up to the sky and estimate percentage of clouds in quadrat.

## **Sand deposition/erosion**

### **What you will need:**

- Stick or pole with cm intervals drawn on it. Make it brightly coloured for safety
- Ice-cream container

### **What you do:**

Cut plastic disc from ice-cream container. Cut a slot into it so that it fits over the stick/pole. Place stick on beach with disc on top and measure the cm where the disc sits (e.g. put stick 5cm into sand so disc will be sitting at 5cm mark). Measure time and height of disc. If higher (or is disc buried then indicates sand deposition) if lower then it indicates sand erosion.

### **When you use it:**

On beaches to determine sand erosion or deposition. Be careful to collect all of your equipment afterwards.

## Sand trap

### What you need:

- Stick or pole. Make this brightly coloured
- Some sort of container e.g. yoghurt container
- Tape to bind container to stick
- Plastic bag

### What you do:

Stick the base of the container to a pole and put into the ground. Tie a piece of plastic from a plastic bag to the top of the stick (to measure wind direction). Rotate the stick so the container is facing into the wind. Measure time and amount of sand trapped.

### Alternatives:

Have containers at different heights on the pole. Which containers have more/less sand? Put poles in different places. Do some places on the beach have more sand movement than others? Why?

### Extension:

Put sand in a container and gently move container backwards and forwards. This will cause a rough separation of sand grains by size.

### When you use it:

To measure sand transportation in wind. Students could then estimate if it is sand creep (loose sand rolling along surface), saltation (wind speed approx. 5m/sec. sand is briefly picked up then falls due to gravity), suspension (strong winds or if sand is small in dimension). Be careful to collect all of your equipment afterwards.

## Soil compaction

Is the measurement of how compact (or 'hard') the soil is.

### What you need:

- Implement to stick into the ground e.g. pencil, firm stick
- Ruler

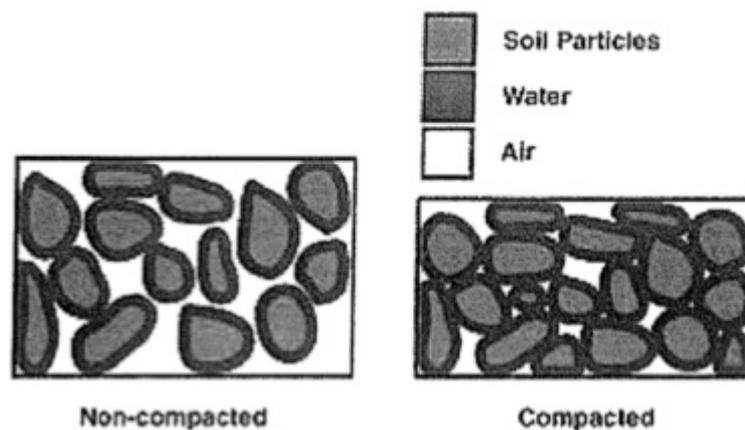
### What you do:

Push the implement into the ground as far as it will go before you feel resistance. Measure the depth. Check beforehand the suitability of the surface e.g. school staff may not be pleased to have several holes in the school field.

### When you use it:

When comparing the levels of compaction at different places and in different soil types e.g. drainage basins, coastal environments, and agricultural soils. Can also be used for manmade surfaces e.g. footpath, school fields.

Can be useful to combine with infiltration.



## Suspended sediment

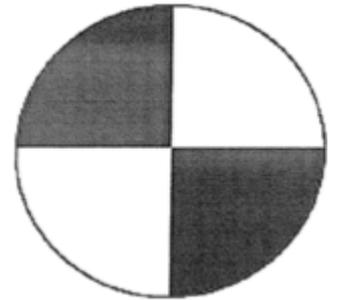
Is a measurement of the sediment suspended in water e.g. in a stream.

### What you need:

- White plastic disc approximately 10cm diameter e.g. cut top of ice-cream container
- Length of thick wire approximately 50cm long. Could also use a stick or some fixed thin item
- Permanent waterproof coloured markers

### How you do it:

Colour sections of the plastic disc in the pattern shown in the diagram below. Insert a length of wire through the centre of the disc and secure. Bend over and tape cut ends of wire to ensure their safety. This homemade Secchi disc is used to measure the levels of suspended sediment in a river. Drop the disc into the water and lower until the colours are no longer visible. Pinch the wire on the surface of the water and remove. Measure the depth at which the colours vanished and compare with other sites.



### When you use it:

This technique can be used to investigate changes in the river channel along its length, particularly with variations in the land use of the surrounding area, for example agriculture. It can also be used to compare rivers in different settings.

## Vegetation height

### What you need:

- Plastic disc approximately 30cm diameter with a ruler shaped slot cut in the middle e.g. top of ice-cream container
- Ruler

### What you do:

Cut your plastic discs so they are big enough to fit a ruler through them. Place the zero end of the ruler on the ground and drop the plastic disc down over it. The disc will find the average level of the vegetation. Record the measurement from the ruler.

### When you use it:

This homemade drop disc is used to measure variations in vegetation height across a site or between sites e.g. at Tongariro National Park, coastal environments, drainage basins. Adding a grid to a clear plastic disc will enable percentage coverage of vegetation or particular species to be calculated at the same time.

## Field guide

### Common coastal grasses

#### **Spinifex** (native species)

Runners carrying tufts of floppy grey-green leaves and ball-like seed heads. When the wind blows, the seed heads roll along the beach until they become lodged against some obstacle, and release their seeds.



#### **Marram grass** (exotic species)

Forms stiff, hardy clumps of upright stems up to 1.2 metres high.

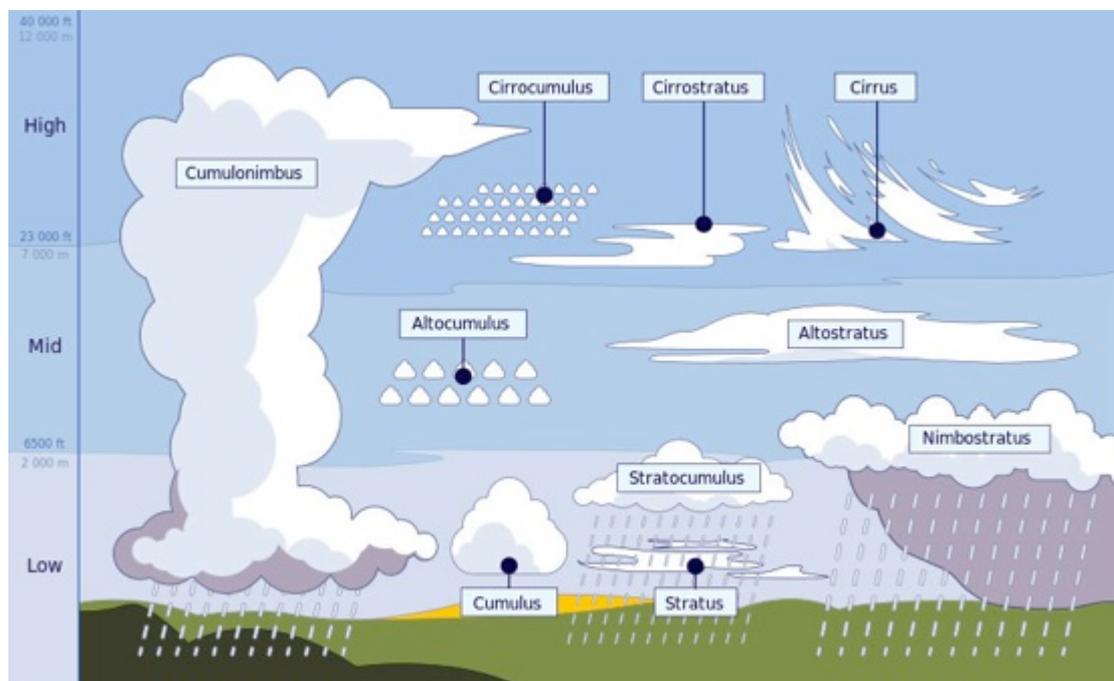
#### **Pingao** (native species)

Grows on the seaward face of sand dunes. Its long stems bear tufts of bright orange leaves, which were dried and used by Maori for weaving.



## Clouds – cloud cover and cloud type

Cloud Cover	
Symbol	Scale in oktas (eighths)
	0 Sky completely clear
	1
	2
	3
	4 Sky half cloudy
	5
	6
	7
	8 Sky completely cloudy
	(9) Sky obstructed from view



## Phone apps

Smart Measure – Measures distance, height, width and area

Advanced Tally Counter

Distance App

My measures & dimensions

Bubble Level – Spirit Level – Measures angles

Speed View – GPS speedometer

Skitch - This free app allows to take and annotate photos and then share them with others.

PollDaddy is a useful free app from the owners of WordPress. It enables you to make surveys and polls for free (up to 10 questions, more if you pay). You need to create the survey on a desktop and then you can then sync survey to an iPad in a Wifi zone and the survey will work offline whilst out in the field. It's very easy to use which is a bonus.

Decibel10 is a great app that makes use of your phone or iPad microphone to measure noise levels.

Google Earth

Calculator

NZ metservice

Smart Recorder – for interviewing and transcriptions

iTranslate – translator – useful for when interviewing foreign tourists

### References:

<http://www.rgs.org/OurWork/Schools/Fieldwork+and+local+learning/Local+learning/Fieldwork+in+the+local+area/Make+your+own+fieldwork+equipment.htm>