Basic sampling strategies for A level Geography Fieldwork

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Introduction

- If you are doing an A level Geography course you will, at some point, enjoy the experience of fieldwork.
- Fieldwork can be used to bring a case study to life OR it can be used to conduct a geographical investigation. For a geographical investigation you will need to collect data so that you can test a hypothesis or answer research questions.
- In order to collect data you need to know two things:
  - How to design a sampling strategy
  - How to collect the data
- This presentation is designed to get you started on your sampling strategy.
- It is suitable for any of the A level Geography specifications. It uses examples of fieldwork from various contexts including urban fieldwork, carbon cycles, and sand dune ecosystems. (If you study **OCR A level Geography** please remember that you should not design your NEA around the investigation of a sand dune ecosystem.)

Why do you need a sampling strategy?

- To check whether you needed to add any seasoning to a pan of soup you might taste one small spoonful. The soup in the pan is all the same – so one taste-test will be enough to tell you what all of the soup tastes like.
- By tasting a spoonful of soup you are **sampling** it. By checking one spoonful you know what the rest of the soup should taste like.
- The same is true when we take measurements during fieldwork. We don't need to measure everything. By measuring a sample, we can estimate what other things, things that we haven't measured, should be like.

Figure 1 Sampling soup

The concept of population

Sampling is used because it is not necessary to collect all of the data to understand what the whole **population** is like. For example:

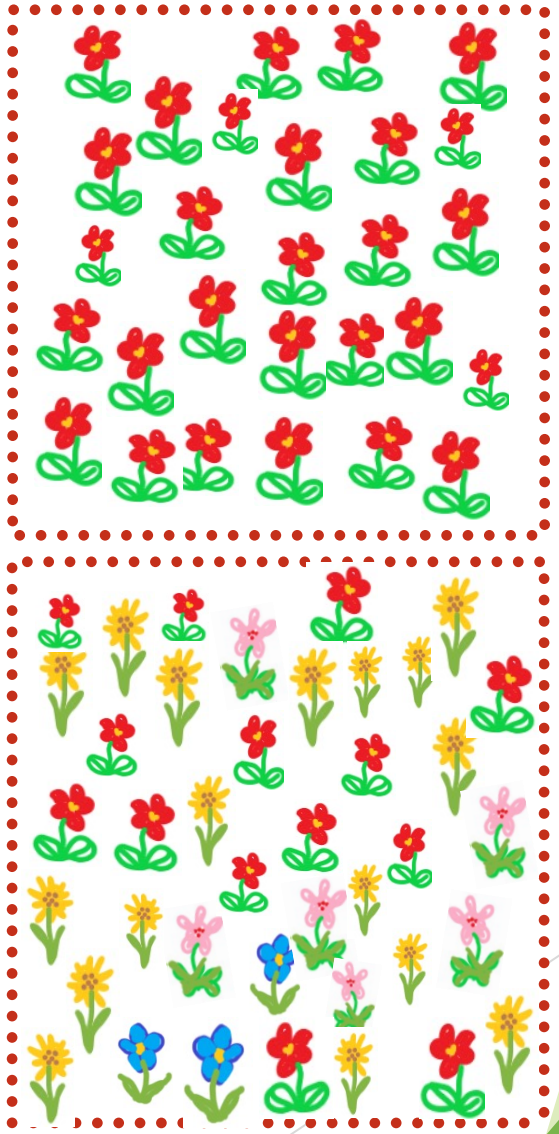
- In a sand dune ecosystem we might be interested in the types of plants growing in each zone of the sand dune ecosystem. The population in this example is all of the plants in the ecosystem. To understand the whole population we sample some plants in each zone.
- In a city we might be interested in how the flow of traffic in two particular streets varies at different times of day. The population in this example is all of the traffic that travels down each street in a day. To understand the whole population we sample traffic at key times of the day.

Population is the term we use to describe all of the data from which you select your sample

Population types

- Sometimes the individual data within a population is all very similar. For example, if you were to collect data about the age of students in your class the ages would be very similar. This is an example of a **homogeneous** population and it is illustrated in the top diagram.
- However, most sets of data contain a population that is varied. For example, if you were to survey the age of everyone living in your street you would probably find a great range of ages. This is an example of a **heterogeneous** population and it is illustrated in the lower diagram.
- The tin of soup is an example of a homogeneous population, so a taste-test of one spoonful is enough. In reality, of course, most populations in geography research are heterogeneous – it is just that some populations are more mixed than others.

Figure 2 Population samples



Homogeneous population

Heterogeneous population

The concept of representative sample

Figure 3 Representative sample

A **representative sample** is one that accurately reflects variations in the whole population.

An effective sampling strategy needs to be designed carefully to collect a **representative sample**.

Imagine that you were collecting data about plants growing in a sand dune ecosystem. The population is represented by the green box of plants in this diagram. If you only sampled plants inside the blue box you would conclude that the whole population is the plant with the blue flower. This would not be a representative sample.

In order to collect a representative sample you need to consider:

- **How many** samples you need
- **How to choose** the sample
- **Frequency** - how far apart the samples should be
- **Timing** – how often you need to collect the samples and whether they need to be from different times of the day or week

How many do I need in the sample?

Figure 4 Cut logs in a log store

- The logs in this log store are similar in size but they are not exactly the same. This means that we cannot know what they are all like by measuring just one.
- The population of logs in the store is rather heterogeneous.
- We need to choose a few logs that represent the variety of logs in the store – some smaller ones and some bigger ones. If we weigh each of these we can come up with a mean weight for the mass of the average-sized log in the store.

How should I collect the sample?

Figure 5 Cut logs in a log store

- **Probability sampling** is used to ensure a representative sample is selected. The main types of probability sampling are:
  - Systematic
  - Random
  - Stratified

- The easiest way to choose which logs to weigh is by using a **systematic sample** – choosing, for example, every tenth log in the pile.

Systematic sampling

Systematic sampling means using a regular system to choose a sample of data, for example:

- In a woodland or urban park:
  - Using a tape to measure the girth of each tree every 25 metres along a line through the urban park
  - Measuring light intensity every 5 metres along a transect through the edge of the woodland
- In a city:
  - Recording land use every 100 metres from a city centre.
  - Using a Cleanliness Index every 10 metres from a bus stop, metro station or fast food take-away

TIP: Systematic sampling is methodical and so is often the quickest way to collect a sample. It is also particularly useful when you are investigating an environmental gradient.

Random sampling

Random sampling means using a random method to select a sample of data. This means using a set of random numbers, a dice, random instruction cards, or an app on your phone. For example:

- In a woodland:
  - Pegging out a 10 metre by 10 metre area of the woodland and placing your quadrat according to co-ordinates generated by random numbers within that square.
- In a city:
  - Using a dice to decide whether to turn left, right, or go straight ahead, as you walk through the city. Then flipping a coin to decide whether or not to collect data.

TIP: Random sampling is the best way to select a representative sample as every bit of data has an equal chance of being selected. However, you must use something like a random number table to select the sample.

Stratified sampling

Stratified sampling means choosing a data set that is in proportion to segments of the whole **population**. For example:

- In a sand dune ecosystem:
  - Using secondary data to estimate the percentage of the ecosystem covered by embryo dunes, mobile dunes, fixed dunes, and dune slacks and then selecting a frequency of sample sites that match that proportion.
- In a city:
  - Using secondary data to estimate the percentage of the population who are in specific age groups and then selecting sample sizes for a questionnaire that are in these proportions.

TIP: You will still need to select your sample from within each segment of the population so you will still need to use random or systematic sampling.

Environmental gradients

Geography fieldwork sometimes involves the investigation of an **environmental gradient**. For example, in an urban environment it should be possible to investigate the following environmental gradients:

- House prices with distance from a green open space
- Urban land use with distance from the city centre
- Street cleanliness with distance from a fast food restaurant

In a urban park you could investigate:

- How noise declines across a park with distance from a major road
- How light intensity decreases with shading from trees

Sampling along a line (or using a **transect**) is the most effective strategy to investigate environmental gradients.

Environmental gradient is a term that is used to describe how data changes over distance.

A **transect** is a line along which you sample when collecting data.

How long should a transect be?

- A transect can be used to investigate distance decay – how data declines from a significant place. For example, how noise decays away from a busy road or how congestion decreases with distance from a stadium.
- The transect should continue until change in the variables is no longer significant. This means that the length of the transect will vary depending on what is being investigated: parking/congestion nuisance from a large event such as a concert or sporting event will likely require a longer transect than one used to investigate the distance decay of litter from a takeaway outlet.

Figure 6 The Principality Stadium, Cardiff

What direction should the transect go in?

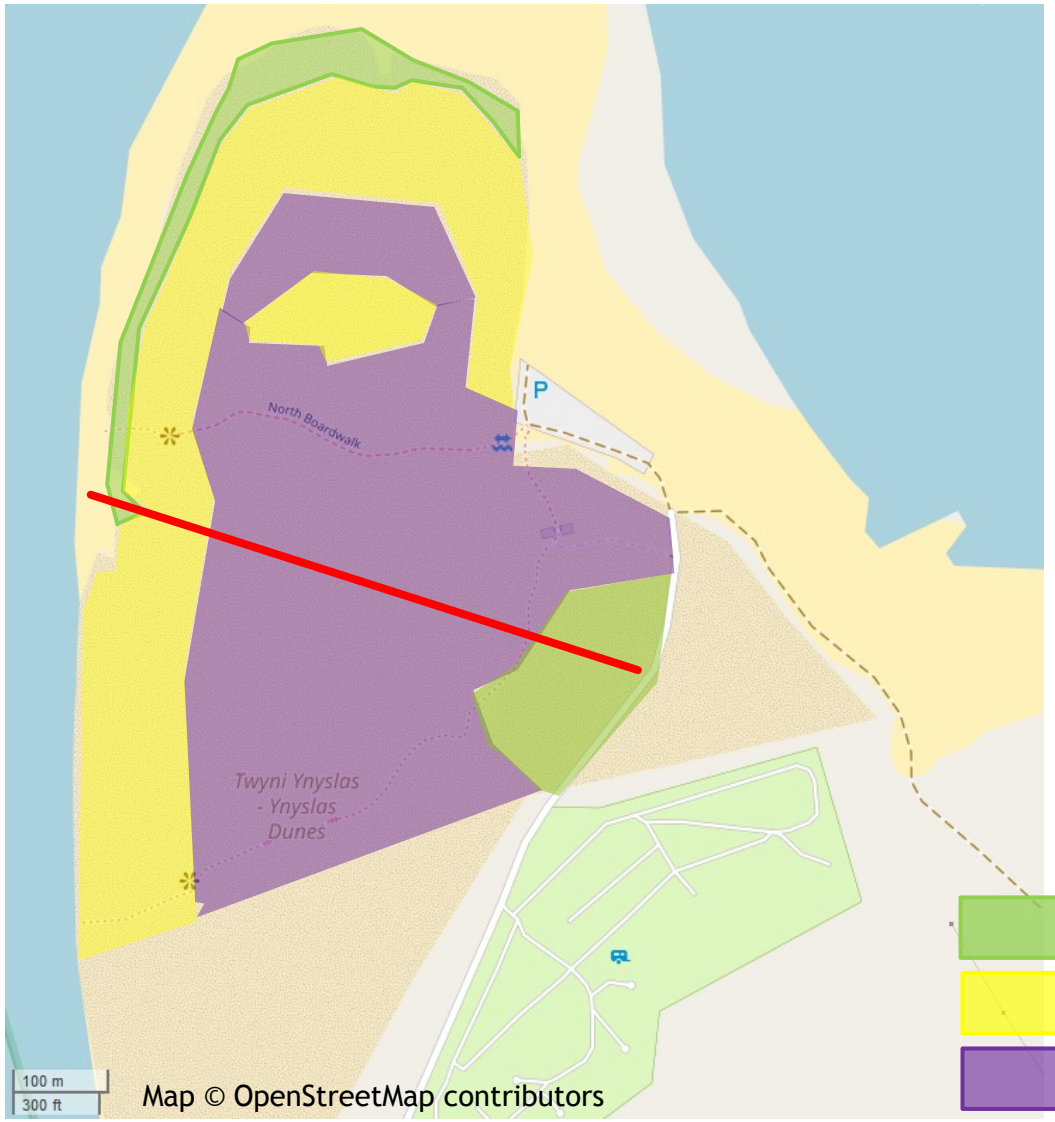


Figure 7 Map of the dunes at Ynyslas, Wales

A transect should be designed so that it is at right angles to the environmental gradient.
In this case, sampling along the red line would mean that changes along the environmental gradient from the embryo dunes to the dune slacks could be investigated as the zones get further and further from the top of the beach.

- Embryo dunes
- Mobile dunes
- Fixed dunes
- Dune slacks

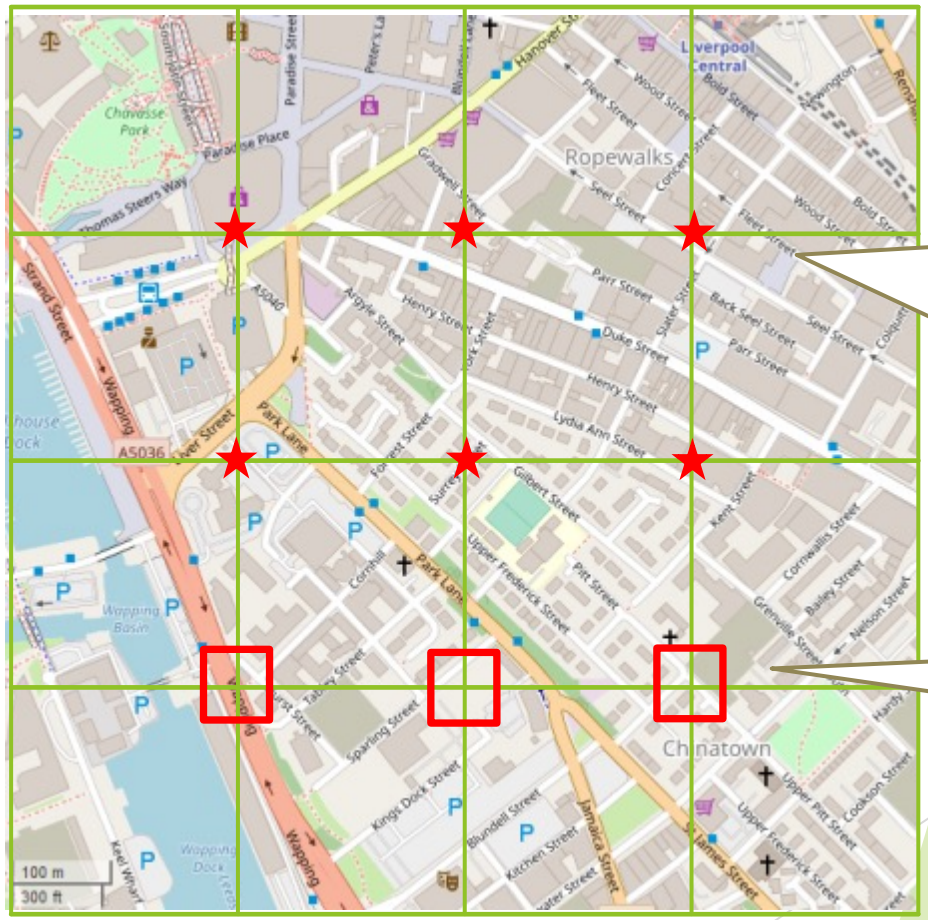
Sampling across an area

A transect will generate data along two dimensions.

- This should allow you to see how data changes over distance.
- This will allow you to test correlations between two sets of data using scatter graphs or by applying Spearman's Rank Correlation Coefficient.

However, what if you want to be able to draw a map using the data you have sampled? In that case, you will need to:

- Divide your study area up using a grid and collect data systematically or randomly from points or small areas (see the diagram opposite).
- Use more than one transect (see the next slide).



By drawing a grid on a map it is possible to collect data from points in space…

… or from small areas

Figure 8 Map of central Liverpool

Using more than one transect

- In this example the student wanted to investigate how the quality of the environment changed with increasing distance from the park.
- By collecting data from four transects (each shown with a different colour on this map) the student was able to see how the environment changed to the north, west, and south of the park, allowing them to map their data.
- Notice how sampling is sometimes limited by factors beyond your control.
- In this example it was not possible to sample to the east of the park or have transects that are perfectly aligned north, west, and south because of the road layout. This is when sampling is described as **pragmatic** or **convenience** rather than probability sampling.

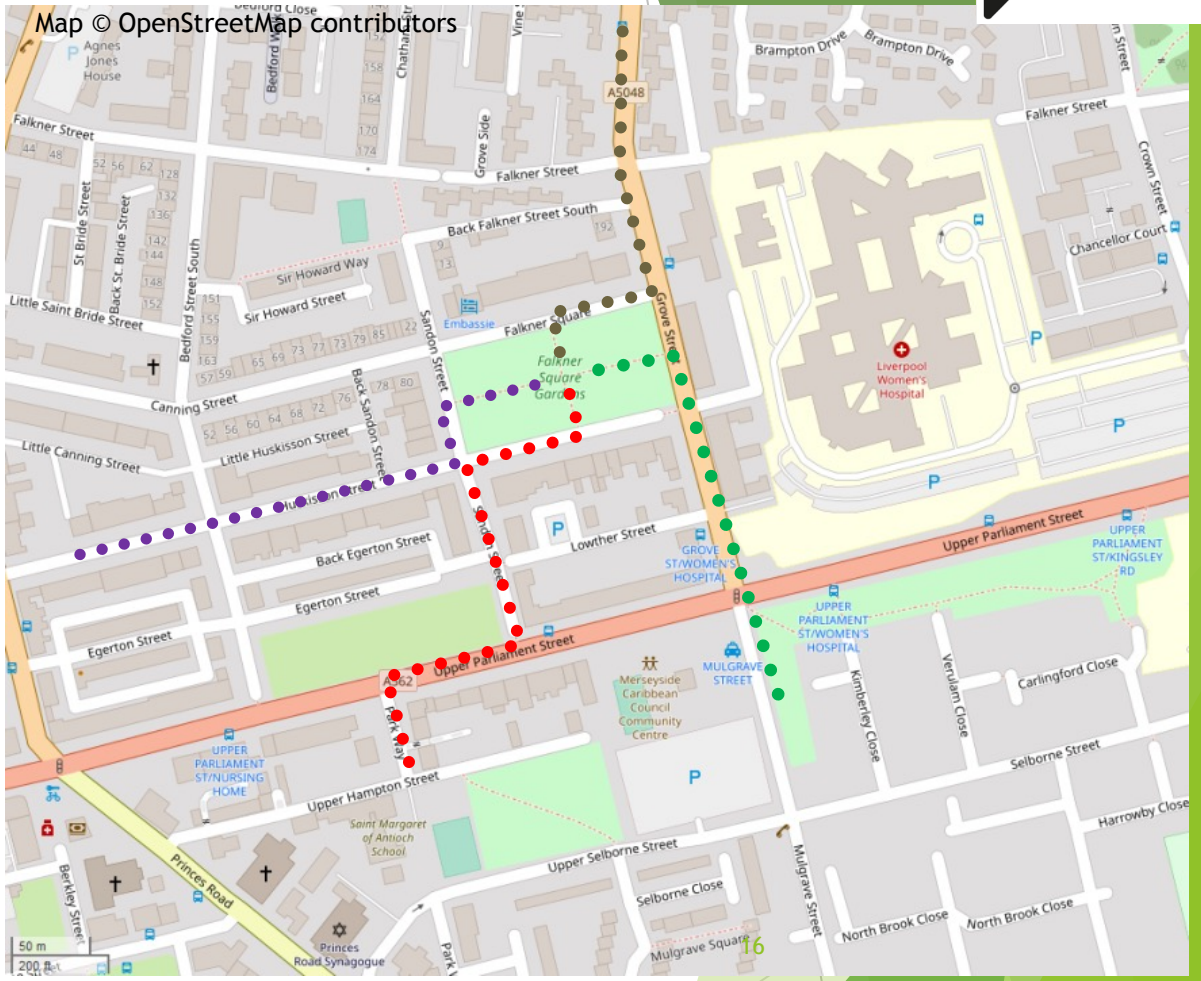
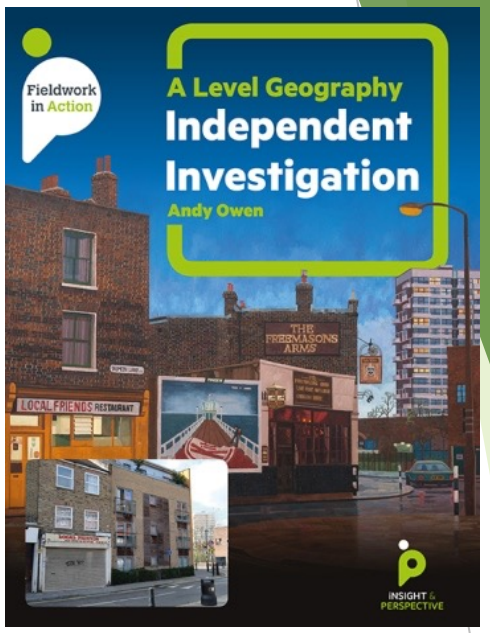


Figure 9 Map of Georgian Quarter, Liverpool

Pragmatic or **convenience** sampling means that the sampling strategy has been compromised by practical considerations.

TIP: Make sure you know the difference between convenience sampling and random sampling. Some students confuse them.

About Andy Owen



Andy Owen is an author who has written several books about fieldwork. Andy is an assessment expert including experience as a senior moderator. His book, *A Level Geography Independent Investigation*, has won a prestigious Geographical Association award. The book is published by Insight and Perspective.

https://insightandperspective.co.uk/publications/a-level-geography-independent-investigation-a-practical-guide

Amazon Customer reviewed A level Geography Independent Investigation: A Practical Guide (Fieldwork in Action)
1 of 1 people found the following helpful

★★★★★ **Brilliant - a real find** 22 May 2020

This is the BEST book for staff and students alike. The content is user friendly, and refreshing. New ideas and clear instructions combined with the necessary fundamentals that geographers need to know.

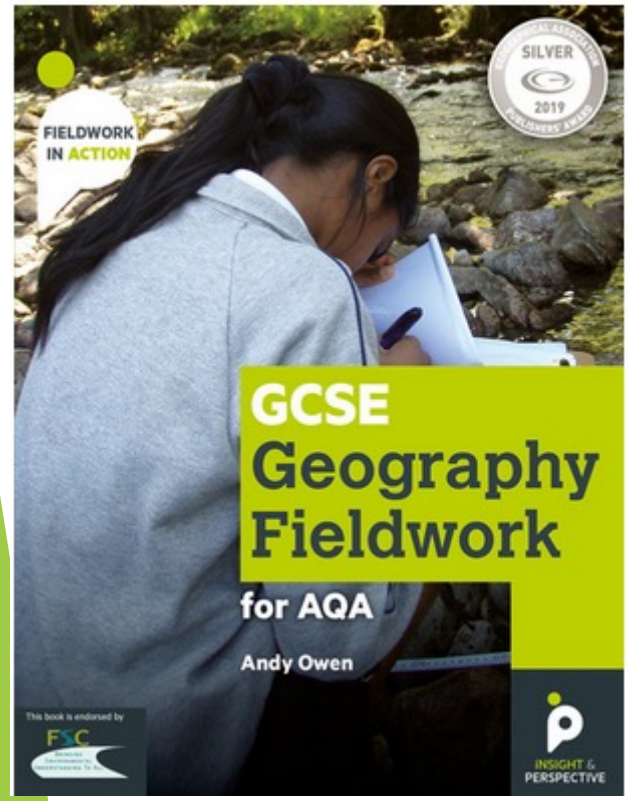
Insight and Perspective - A level Geography Independent Investigation (Highly Commended)

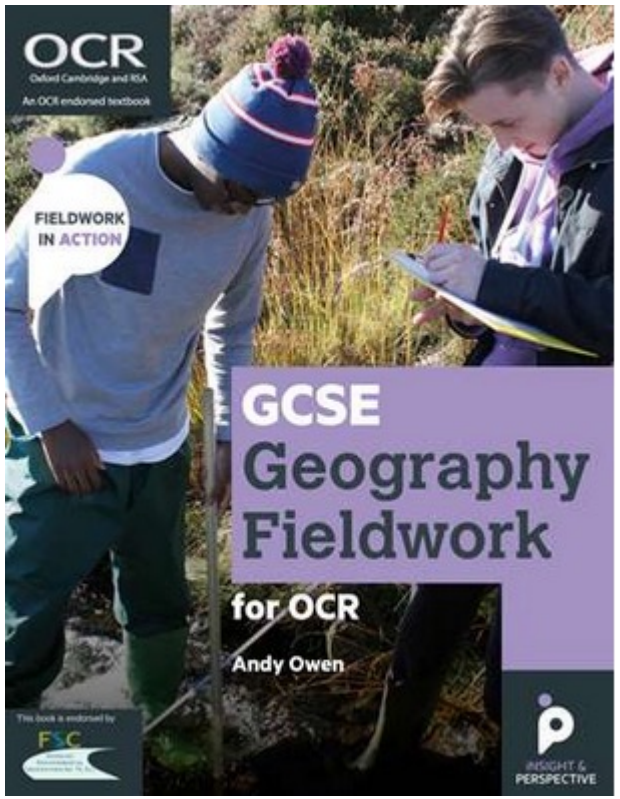
This book, aimed at A level students, supports them through the necessary steps to completing their independent investigation. The judges felt that this was a comprehensive and high quality resource which was student focused and accessible. They commented that it was useful to have everything for the NEA in one place and the features - including moderator tips, evaluation prompts, weblinks and fieldwork definitions – were well-placed and clearly written.

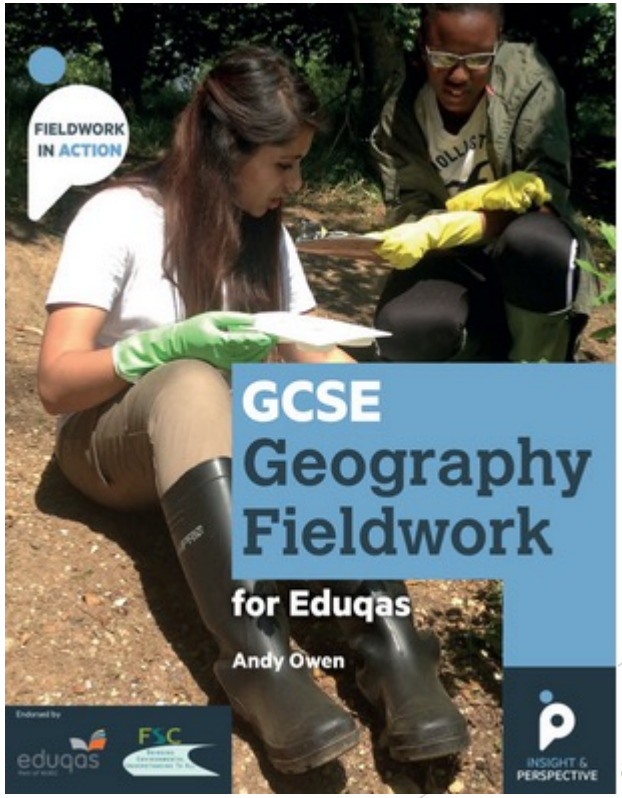
Fieldwork at GCSE

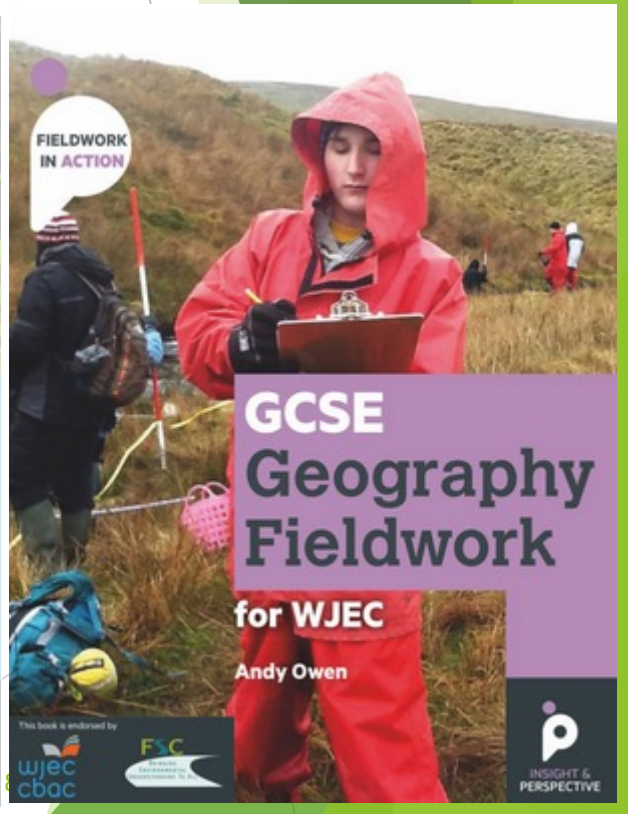
Andy Owen has written books to support GCSE fieldwork. Each book has been endorsed by the Field Studies Council (FSC).They are available at https://insightandperspective.co.uk/geography-1

GCSE Geography Fieldwork for AQA won the prestigious Geographical Association Silver Medal award. The book is published by Insight and Perspective.









Acknowledgements

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