Geography GCSE Revision Guide

Paper 3:
Geographical Investigations

Topic areas included in this paper:

- River Fieldwork
- Rural Settlements Fieldwork
- UK Challenges

NOTE — Question 2 and 3 are optional questions on coastal fieldwork and urban settlement fieldwork. **DO NOT ANSWER THESE QUESTIONS**

Name:………………………………………………………

Form: …………………….

Section A — Investigating Physical and Human Environments

7 Key Terminology

Key term	Definition	Advantages	Disadvantages
Primary data	Data that you collect first hand, by us.	Careful consideration is known to have been given to control a range of variables, and data is known to have been collected in a reliable and trustworthy manner	There are limits to places that are accessible to get the primary data, as well as money, equipment and resources available to get the data.
Secondary data	Data that has been collected and published by someone else.	Allows data to be gathered from areas that were inaccessible for us. It allowed a wider range of data to be collected that we didn't have the time or ability to collect. This saved us money and time from having to collect it ourselves.	There is no knowledge of how the data was collected, which means the reliability of the data may be questionable The secondary data will have been collected on a different day, at a different time of the year, affecting the accuracy of the results.
Qualitative data	Descriptive data and results collected without numbers, based on people's opinions or ideas e.g. an interview, a field sketch, annotated photographs or observations.	This allows data that is not numerical to be recorded. It allows for subjectivity in the collection and analysis of the results. Opinions can be expressed.	As the data is more descriptive it is difficult to make comparisons between results. It can also be difficult to condense and present the data.
Quantitative data	Data and results which contains numbers e.g. measuring velocity.	As the data is numerical it is easy to make comparisons between data sets. The quantitative data is often very objective and accurate, showing clear trends.	It prevents any descriptive or explanatory comments on data. Some topics do not lend themselves to numerical quantities (e.g. opinions).
Systematic sampling	Systematic sampling is when a sample is selected in a regular and consistent manner. (For example collecting a river sample every 50cm across the river's width.)	This reduces bias, as the results are collected at set intervals.	Itcan lead to a poor representation of the overall sample if large areas/groups are not hit by the structured order. There may be practical constraints in terms of time available and access to certain parts of the study area .
Stratified sampling	Stratified sampling is when the larger sample size is divided into smaller sub-categories. This helps to ensure that certain groups are included within our sample size (e.g. we used this to ensure that 2 sites were included from the upper course, 2 in the middle course and 2 from the lower course of the river)	Results are more accurate as you ensure that all subgroups needed in the sample size are included.	The proportions of the sub-sets must be known and accurate if it is to work properly (prior knowledge of the area is required).
Random sampling	Random Sampling – This is when a sample of a study area/group is selected at complete random, with no prior knowledge of the area needed	This reduces bias, as the results are collected randomly, so everyone/everything has an equal chance of being selected	It can lead to a poor representation of the overall sample if large areas/groups are not hit by the random numbers generated.

Section A — Investigating Physical Environments (River Landscapes)
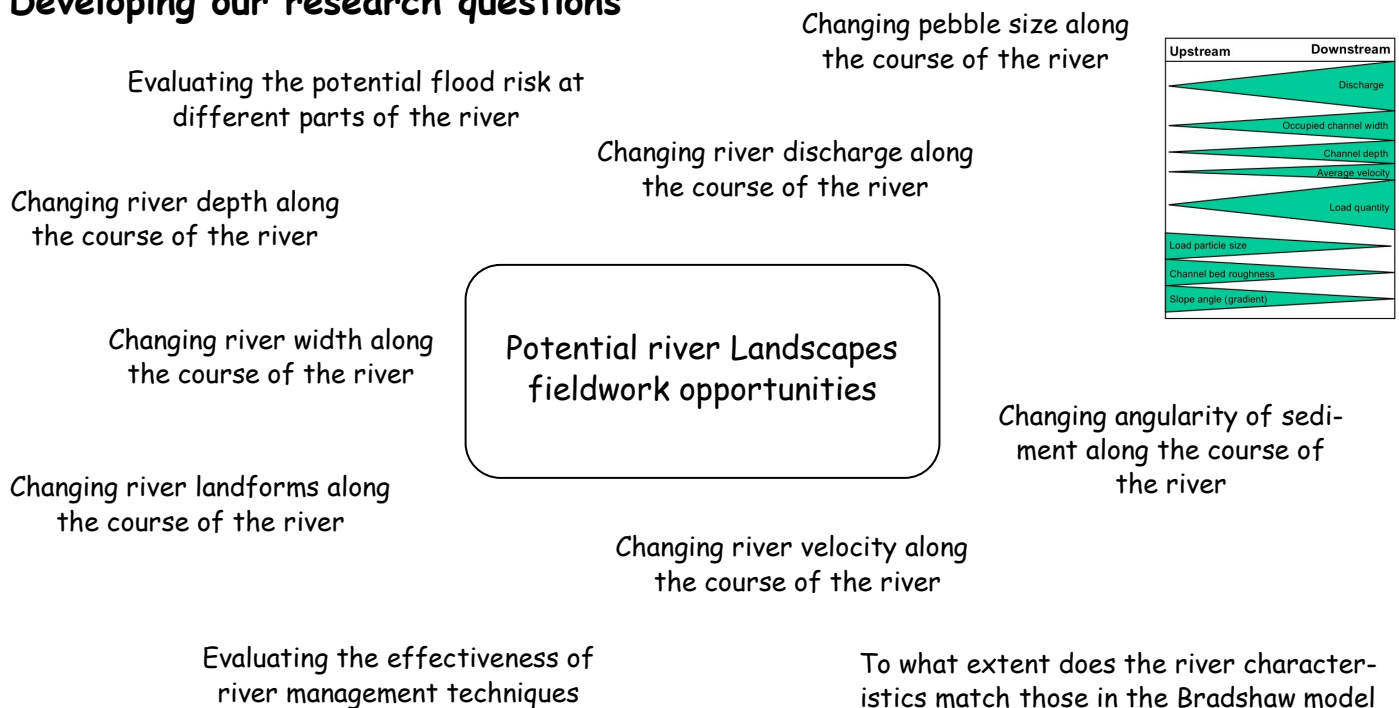
7.1 Formulating enquiry questions

Area of study

To complete our river fieldwork we visited the River Clywedog in North Wales. The source is in Snowdonia. It then flows eastwards, south of Wrexham, towards the River Dee, which it enters at the English/Welsh border.

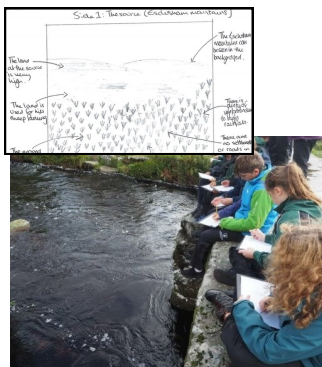| Why did we choose this site	Risk assessment
1) Close to our school. The river is easily accessible by coach. 2) It is a small tributary of the River Dee, meaning that it is not very deep or fast flowing. 3) The river is surrounded by forests, which intercepts heavy rainfall, so reducing the chance of flooding.	1) Drowning — To minimise this risk we used the flood risk map (GIS) to identify areas of low risk and used this to locate areas to complete our fieldwork. 2) Getting lost — To minimise this risk we all had access to a map, staying in small groups, and had a contact number of the teacher. 3) Slipping/falling — To minimise this risk we ensured that we had the appropriate clothing and footwear with us.

Developing our research questions

Changing pebble size along the course of the river

Evaluating the potential flood risk at different parts of the river

Changing river discharge along the course of the river

Changing river depth along the course of the river

Changing river width along the course of the river

Potential river Landscapes fieldwork opportunities

Changing river landforms along the course of the river

Changing angularity of sediment along the course of the river

Changing river velocity along the course of the river

Evaluating the effectiveness of river management techniques

To what extent does the river characteristics match those in the Bradshaw model

Enquiry question 1	How does river discharge change with distance from the source? (*note: discharge is calculated by = (width x mean depth) x velocity*)
Enquiry question 2	How does river width and depth change with distance from the source?
Enquiry question 3	How do river features change with distance from the source?

Section A — Investigating Physical Environments (River Landscapes)

7.2 Fieldwork methods — data collection

Measuring changing river landforms along a river course — Fieldsketch	
Description of data collection method	This is a qualitative data collection method. At the six different sites (2 from each river course — stratified sampling) a sketch (drawing) of the area took place. This was fully annotated to show the different features along the river at each site, and to annotate the causes of these landforms.
Benefits of collection method	+ allows additional information to be annotated around the sketch, to show river processes and how landforms were created. + allows for unimportant information to be omitted from the sketch; focusing on the key features.
Limitations of collection method	- subjective as students may choose to include or omit certain features that are important (human error) - field sketch is not an accurate representation of the real world (especially for those with poor artistic ability). There may be differences in scale or location (human error)

Measuring velocity of the river	
Description of data collection method	This is a quantitative data collection method. The flow meter was placed into the water, with the propeller facing up river towards the source. The instrument was lifted approximately 20% above the river bed to avoid an obstructions. The velocity reading was then taken. This was repeated in the middle and at either side of the river (stratified sampling) and an average measurement was recorded.
Benefits of collection method	+ the test was repeated three times, with an average measurement recorded. This ensured that a more accurate velocity was obtained. + the same person took the measurement each time to ensure for consistency.
Limitations of collection method	- the flow meter was temperamental and so results were affected by the use of the technology. - a tennis ball and a stopwatch were used to measure the velocity, which opened up to human error.

Measuring the width of the river	
Description of data collection method	This is a quantitative data collection method. The tape measure was used and stretched across the top of the river, from bank to bank, ensuring that it was just above (no touching) the river water. The width of the river was then taken 3 more times and an average measurement was recorded,
Benefits of collection method	+ the test was repeated three times, with an average measurement recorded. This ensured that a more accurate velocity was obtained. + the same person took the measurement each time to ensure for consistency,
Limitations of collection method	- when the tape measure was not held tight, inaccurate results were recorded. - vegetation at river bank made access to certain areas more difficult, therefore affecting results.

Section A — Investigating Physical Environments (River Landscapes)

7.2 Fieldwork methods — data collection

Measuring the depth of the river	
Description of data collection method	This is a <u>quantitative data</u> collection method. The tape measure was used and stretched across the top of the river, from bank to bank. At every 50cm across the river the depth was taken using a meter ruler (systematic sampling). This was placed into the river with the thinnest part of the ruler facing the flow of the river to minimise any splashing of the water. An average measurement for the mean depth was then recorded.
Benefits of collection method	+ the test was repeated three times, with an average measurement recorded. This ensured that a more accurate velocity was obtained. + the same person took the measurement each time to ensure for consistency.
Limitations of collection method	- small amounts of splashing against the ruler made getting an accurate reading difficult. - areas where large rocks were present in the water affected results, as the ruler could not be accurately placed onto the river bed.

Discharge = (width x average depth) x velocity

Secondary data for sites 1,2, 5 and 6 (inaccessible for us to complete)	
Description of data collection method	For sites 1 and 2 (near the source of the river), and sites 5 and 6 (near to the mouth of the river), secondary data was used. This was because these locations were not accessible for us on the day and all the necessary results had already been obtained from another source (A Level students). This provided us with a range of <u>qualitative</u> and <u>quantitative data</u> in the form of field sketches, velocity, width and depth data.
Benefits of collection method	+ allows data to be gathered from areas that were inaccessible for us. + collection of data from other sources saved us money and time from having to collect it ourselves.
Limitations of collection method	- There is no knowledge of how the data was collected, which means the reliability of the data may be questionable. - The secondary data was collected on a different day, at a different time of the year, making the results less accurate when comparing it with the primary data results. - Sampling strategies used are unknown.

# Section A — Investigating Physical Environments (River Landscapes)

7.3 Fieldwork methods — data presentation

Field sketch to show changing river features	
Description of presentation method	An annotated picture of the area showing the main features for each site.
Benefits of presentation method	+ allows additional information to be annotated around the fieldsketch. + allows for unimportant importation to be omitted from the sketch; focusing on the key features
Limitations of presentation method	- subjective as students may choose to include or omit certain features that are important (human error) - difficult to make comparisons with other areas as data is not quantitative. - field sketch is not an accurate representation of the real world. There may be differences in scale or location (human error).

Proportionate arrows to show changing velocity	
Description of presentation method	Arrows of different sizes drawn onto a map of the river. The size (width) of the arrow is proportionate to the speed of the river. The larger the arrow, the faster the river flow.
Benefits of presentation method	+ shows multiple data (location of site and speed of river in that location). + clear to see trends/correlations and anomalies.
Limitations of presentation method	- difficult to calculate actual value (if not shown). - a large range for the data means that presentation of the arrows may be too large or too small to be presented on the map.
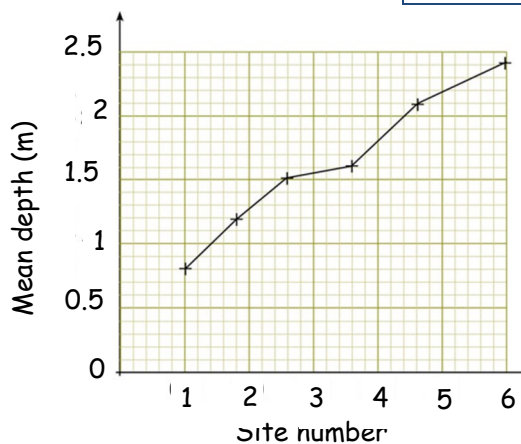
Line graph to show changing river mean depth and width	
Description of presentation method	The plots showing mean depth or width are plotted for each site. They are then joined with a straight line to show the changes in mean depth or width between each site.
Benefits of presentation method	+ exact figures can be read from the graph, making comparisons easy. + clear to see trends/correlations and anomalies.
Limitations of presentation method	- needs continuous, quantitative data to be able to produce this. - can only display two forms of data (x axis and y-axis).
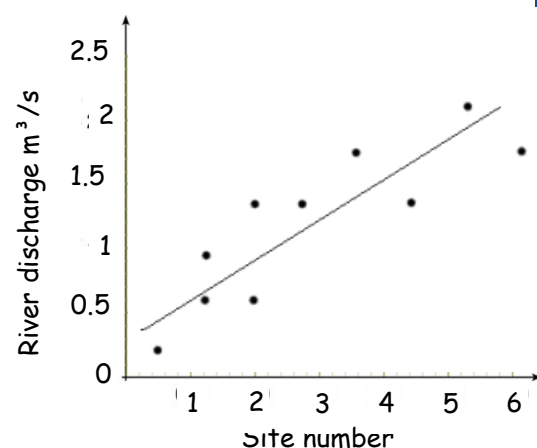
Scatter graph To show changing river discharge	
Description of presentation method	The plots showing river discharge for each site are plotted onto the graph. A line of best fit is then drawn onto the graph to show a correlation.
Benefits of presentation method	+ clear to see trends/correlations and anomalies. + exact figures can be read from the graph, making comparisons easy.
Limitations of presentation method	- needs continuous data to be able to produce this. - trend difficult to read with small data set.

Section A — Investigating Physical Environments (River Landscapes)

7.4 Fieldwork conclusions

Conclusion	Evidence for conclusion	Explanation of conclusion
The discharge increases with distance from the source Discharge = (width x average depth) x velocity	Velocity at site 1 (near source) = 1.40 m/s Velocity at site 3 = 1.68 m/s Velocity at site 6 (near mouth) = 2.87 m/s Discharge at site 1 (near source) = 0.02 m³/s Discharge at site 3 = 3.36 m³/s Discharge at site 6 (near mouth) = 85.1 m³/s	The velocity increases as more water is carried in the river. This means that less of the water is in contact with the bed of the river, so there is less energy used to overcome friction. Hence rivers flow progressively faster on their journey downstream. The width and depth of the river increases as more water is added to the river (from tributaries), giving the river more power to erode the sides and bed of the river, so it can carry more water. Therefore, **as river discharge is the volume of water flowing through a river channel at one point; the discharge will increase as width, depth and velocity increases.**
The width and depth of the river increases with distance from the source	Width at site 1 (near source) = 0.2 m Width at site 3 = 4 m Width at site 6 (near mouth) = 14 m Depth at site 1 (near source) = 0.05 m Depth at site 3 = 0.5 m Depth at site 6 (near mouth) = 2.12 m	The width and depth of the river increases as more water is added to the river (from tributaries), giving the river for power to erode the sides and bed of the river.
The river features seen along the river change with distance from the source	River features (upper course) = V-shaped valleys, interlocking spurs, waterfalls and gorges River features (lower course) = meanders, ox bow lakes, levees and floodplains	In the upper course features like V-shaped valleys, interlocking spurs, waterfalls and gorges are formed, as this is where vertical (↕) erosion is much greater than lateral erosion (↔). In the lower course features like meanders, ox bow lakes, levees and floodplains are formed due to lateral erosion (↔) being greater than vertical (↕) erosion. The increased lateral erosion will also lead to a loss of land at the sides of the river. This is affected by other features such as the gradient of the land, river velocity and discharge.

Section A — Investigating Physical Environments (River Landscapes)

7.5 Fieldwork evaluation

Success of fieldwork	Limitations of fieldwork
Data collection methods were repeated 3 times to ensure that accurate results were obtained.	Some of the data had to be collected from secondary data sources. This means that the reliability of the results can be questioned
Data collection methods were repeated by the same person each time to ensure that the methodology was consistent.	Some of the equipment was faulty and unreliable (e.g. flow metre), affecting the overall results.
A combination of stratified sampling and random sampling was used to determine where on the river the measurements were taken - this ensures that different courses of the river were included, and also reduces bias.	The secondary data was collected at a different time of the year and under different weather conditions affecting the overall conclusions that can be drawn.
Some of the data was collected by primary data collection methods, ensuring that the results were therefore reliable.	More than 6 sites for data collection methods would have ensured that the results were more accurate. Using only 6 sites limited the conclusions that could be drawn.
Data was collected from 6 separate sites along the river course making the results more reliable to see trends.	Some of the measurements may have involved some elements of human error in timing or measuring. (e.g. reading information from tape measures or using the stopwatch for timing.)
(also see the success of data collection and presentation techniques)	*(also see the criticisms of data collection and presentation techniques)*

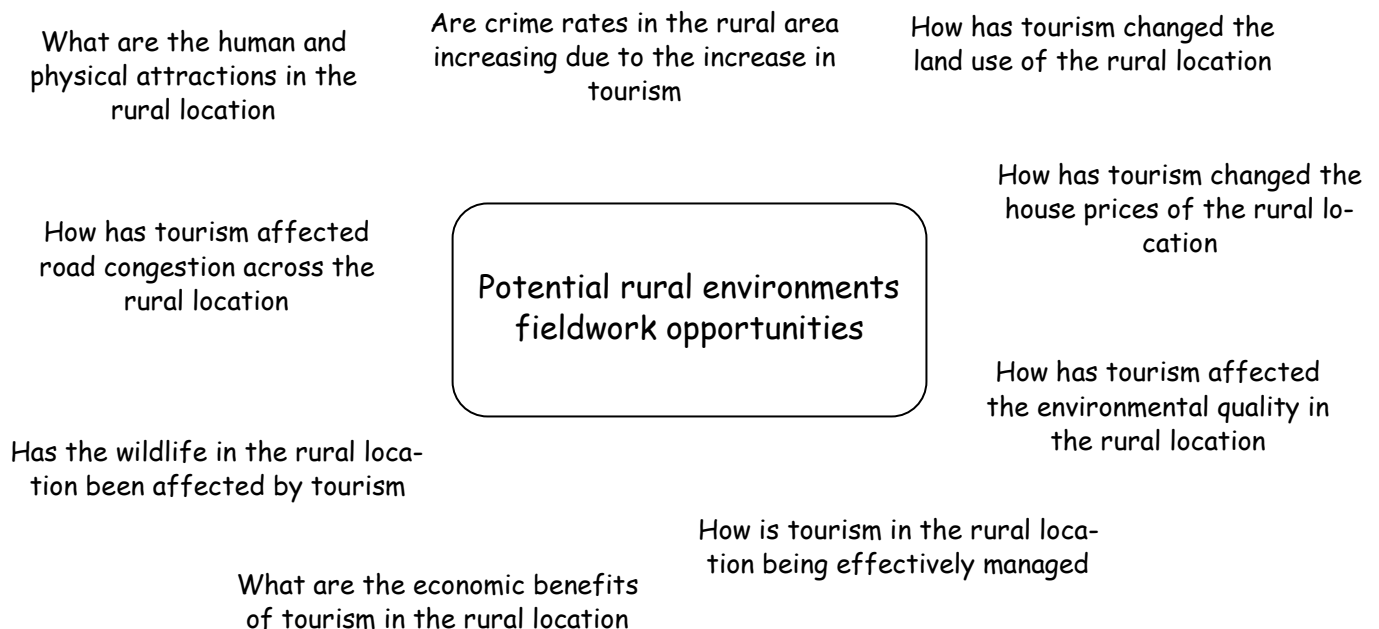# Section A — Investigating Human Environments (Rural Environment)

7.1 Formulating enquiry questions

Area of study

To complete our rural fieldwork we visited Bowness in the Lake District, North West England. This is a rural area that has experienced change as it is increasingly becoming a popular tourist site.

Why did we choose this site	Risk assessment
1) Close to our school. The river is easily accessible by coach, with available car parking for the coach. 2) Perfect example of tourist honey pot site in a rural location. 3) Low risk of getting lost, as the area of study is reasonably small.	1) Poor weather — to minimise this risk we used the flood risk map (GIS) to identify areas of risk to flooding if there was rainfall. We also checked the weather forecast and had appropriate clothing (e.g. coats). 2) Getting lost — to minimise this risk we all had access to a map, staying in small groups, and had a contact number of the teacher. 3) Slipping/falling — to minimise this risk we ensured that we had the appropriate clothing and footwear with us.

Developing our research questions

What are the human and physical attractions in the rural location

Are crime rates in the rural area increasing due to the increase in tourism

How has tourism changed the land use of the rural location

How has tourism affected road congestion across the rural location

Potential rural environments fieldwork opportunities

How has tourism changed the house prices of the rural location

How has tourism affected the environmental quality in the rural location

Has the wildlife in the rural location been affected by tourism

How is tourism in the rural location being effectively managed

What are the economic benefits of tourism in the rural location

Enquiry question 1	How has tourism affected congestion across the rural location (people/traffic)
Enquiry question 2	How has the environmental quality been affected by the change in the rural area?
Enquiry question 3	How has the age structure been affected by the change in the rural area?

Section A — Investigating Human Environments (Rural Environment)

7.2 Fieldwork methods — data collection

Bi-polar analysis of Cockshot Point

Measuring the environmental quality of the rural location (bi-polar analysis)	
Description of data collection method	This is a <u>quantitative data</u> collection method. We went to three different areas of Bowness and completed a bi-polar analysis at each location. For each location we graded an aspect of the environment between +5 (very good) and –5 (very bad)
Benefits of presentation method	+ quantitative data obtained makes it easy to make comparisons between areas and at different times of the year. + multiple environmental characteristics allows for a range of different characteristics to be considered.
limitations of presentation method	- very subjective and so may be biased opinions. - only considers a small range of environmental characteristics, and also only a small range of numbers to choose from, making selections difficult.

Measuring the environmental quality and land use of the rural location (field sketch)	
Description of presentation method	This is a <u>qualitative data</u> collection method. An annotated field sketch was taken of different areas around Bowness, showing the environmental quality of areas around Bowness and how the land is being used to cater for tourists and local people.
Benefits of presentation method	+ allows additional information to be annotated around the fieldsketch. + allows for unimportant information to be omitted from the sketch; focusing on the key features of the rural area.
Limitations of presentation method	- subjective as students may choose to include or omit certain features that are important (human error). - difficult to make comparisons with other areas as data is not quantitative. - field sketch is not an accurate representation of the real world (especially for those with poor artistic ability). There may be differences in scale or location (human error).

Collecting the traffic flow and people flow data within the rural location	
Description of data collection method	This is a <u>quantitative data</u> collection method. At numerous, predetermined sites across Bowness the number of vehicles passing at any one point was recorded. This took place for a 10 minute interval. This could then be compared with secondary data of the area from 20 years ago. Again, at numerous, predetermined sites across Bowness the number of people passing at any one point was recorded. This took place for a 10 minute interval. This could then be compared with secondary data of the area from 20 years ago.
Benefits of presentation method	- quantitative data obtained makes it easy to make comparisons between areas and at different times of the year. - multiple locations included in the sample, and data collected throughout the day. This ensured that the results were more representative of the whole area and therefore more reliable
limitations of presentation method	- when large numbers of people/cars were coming past at one point it made the counting process difficult and opened this up to human error - as we were at sites for 10 minutes, sometimes groups of people would pass us multiple times. These were then included in the data multiple times

Section A — Investigating Human Environments (Rural Environment)

7.2 Fieldwork methods — data collection

Collecting questionnaire data on the environmental quality, population structure and changing land use within the rural location.	
Description of data collection method	This is a <u>qualitative data</u> collection method. In Bowness we used random sampling to question members of the public about their views towards the environmental quality in Bowness, the population structure of Bowness and the land use within Bowness.
Benefits of presentation method	+ using random sampling techniques meant that there was no bias in selecting individuals to take part in the questionnaire. + opinions can be communicated in a way that isn't possible through quantitative data. + a large sample site gave us a large range of opinions, which made our results less subjective to our own opinions
limitations of presentation method	- The questionnaire data collected was only from a mid week day in October. This is not a popular time for tourists and many people will have been in work on this day. The majority of people were elderly, foreign or those with very young children; affecting the overall results. - People may not have been honest when completing the questionnaire. They may have simply answered with what they think we wanted to hear. - Completing questionnaires is very time consuming and difficult as many people did not want to answer our questions.

| Population age	Bowness	Cumbria	England
Age 0 to 4	4.3%	5.1%	6.3%
Age 5 to 9	4.5%	4.9%	5.6%
Age 10 to14	5.2%	5.5%	5.8%
Age 15 to 17	3.7%	3.7%	3.7%
Age 18 to 24	6%	7.4%	9.4%
Age 25 to 29	4.4%	5.3%	6.9%
Age 30 to 44	17.1%	18.3%	20.6%
Age 45 to 59	21.9%	21.7%	19.4%
Age 60 to 64	8.5%	7.6%	6%
Age 65 to 74	12.7%	11.1%	8.6%
Age 75 to 84	8.1%	6.8%	5.5%
Age 85 and over	3.4%	2.6%	2.3%
Mean Age	45.4	42.9	39.3
Median Age	48	44	39

Secondary data — Measuring the changing age structure of Bowness using census data from Bowness, the county of Cumbria, and England.	
Description of data collection method	This is a <u>quantitative data</u> collection method. We accessed secondary census data about Bowness, showing information on the % of people in each age category in Bowness. We were then able to make comparisons between Bowness and the county of Cumbria and England.
Benefits of presentation method	+ allows population data to be gathered that we would not be able to complete from our own study on the day. + collection of data from other sources saved us money and time from having to collect it ourselves.
limitations of presentation method	- There is no knowledge of how the data was collected, which means the reliability of the data may be questionable. - The census data is only collected every 10 years, so is out of date. This may affect how reliable our results are. - Sampling strategies used are unknown.

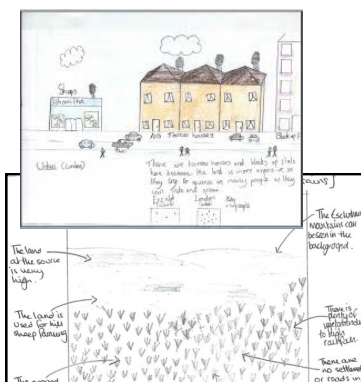# Section A — Investigating Human Environments (Rural Environment)

7.3 Fieldwork methods — data presentation

Located proportional symbols to present traffic flows /pedestrian flows	
Description of presentation method	Onto a map of Bowness, proportionate symbols were located around the area. The size of the symbols showed the amount of cars that were passing at any point. This allowed us to see the busiest and quietest areas of Bowness.
Benefits of presentation method	+ trends can be seen very easily, dependant upon which symbol is largest + it represents two forms of data: (1) amount of vehicles in Bowness and (2) the location of the vehicle counts
Limitations of presentation method	- it is very difficult to obtain exact figures from the map. - A large range for the data means that presentation of the arrows may be too large or too small to be presented on the map
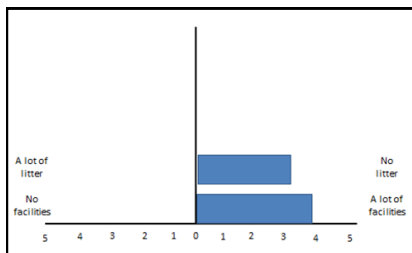
Bi-Polar analysis to show the environmental quality of Bowness	
Description of presentation method	A bi-polar, bar chart was used to show the results for the different environmental features. The scale between –5 to +5 is presented on the x axis.
Benefits of presentation method	+ makes comparisons between data sets very easy and clear. + shows exact numbers clearly.
Limitations of presentation method	- can only be used to show discrete data, but not for continuous data. - can only be used to show one variable on each axis.

Field sketch to show key environmental and land use features in Bowness	
Description of presentation method	An annotated picture of the area showing the main features for each site.
Benefits of presentation method	+ allows additional information to be annotated around the fieldsketch. + allows for unimportant importation to be omitted from the sketch; focusing on the key features.
Limitations of presentation method	- subjective as students may choose to include or omit certain features that are important (human error). - difficult to make comparisons with other areas as data is not quantitative. - field sketch is not an accurate representation of the real world (especially for those with poor artistic ability). There may be differences in scale or location (human error).

Section A — Investigating Human Environments (Rural Environment)

7.3 Fieldwork methods — data presentation

Wordle to analyse questionnaire data	
Description of presentation method	The qualitative information gathered from the interviews was input into the wordle online system. A word cloud was then created showing the key terms that were frequently used by interviewees
Benefits of presentation method	+ it reveals essential words and phrases from the qualitative clearly, showing key trends + it saves time, rather than analysing large qualitative data sets
Limitations of presentation method	- it is difficult to establish how many times certain words have been used, as they only increase in size, but there is no key - non essential words might be included in the work cloud, even though they are not needed for the investigation (e.g. the, however)

Secondary data — Population pyramid to show the changing population structure of Bowness	
Description of presentation method	The data for the population structure of Bowness was put into a population pyramid, which breaks down the data into male and female categories, as well as 5 year cohorts.
Benefits of presentation method	+ makes comparisons between data sets, and trends, very easy and clear to read + shows exact numbers clearly
Limitations of presentation method	- the population pyramid only shows the age and sex of the population, but can not show any other information - the figures are age cohorts (e.g. 0-5 or 10-15), so detail is lost about specific age groups

Section A — Investigating Human Environments (Rural Environment)

7.4 Fieldwork conclusions

Conclusion	Evidence for conclusion	Explanation of conclusion
The vehicle count and pedestrian count highlighted that the number of cars and people in Bowness has increasd over the past 20 years. It also shows that the largest number of cars and people are concentrated around the lake side, and this decreases as you move away from the lake.	On Lake Road (lakeside count): 2019 — 71 vehicles (in 10 minutes) 2000 — 44 vehicles (in 10 minutes) On Crag Brow (high street away from lake): 2019 — 65 vehicles (in 10 minutes) 2000 — 51 vehicles (in 10 minutes) On Rayrig Road (away from high street and lake): 2019 — 30 vehicles (in 10 minutes) 2000 — 9 vehicles (in 10 minutes)	As Bowness has become more and more popular as a tourist resort, the amount of cars and people in the area has increased from 20 years ago. This may be as a result of (1) advertising campaigns to attract people to the area, (2) people have a greater work-life balance, so are able to visit these locations more (3) people having greater affluence and disposable income to spend on these breaks. The highest concentration of people/cars is around the lake, indicating that this is the main natural attraction of the area.
The environmental quality has been affected in some of the areas across Bowness, although management techniques have minimised this in the most popular areas.	In the main tourist area (boat cruise terminal) there was high levels of noise pollution (score = -4), litter (score = -3) and air quality (score = -3). Slightly further away from this popular area (at Cockshot Point) the results were lower noise pollution (score = 3), litter (score = 1) and air quality (score = 2). The questionnaire results highlighted that people thought that litter and noise pollution was an issue in Bowness.	The environmental quality of Bowness has been affected significantly in the most popular areas. The number of cars and people has resulted in litter, noise and air pollution in these areas. It has also resulted in animals being forced away from the area, scared away by the tourists. Moving further away from the main tourist site, the environmental quality improves.
The population structure of Bowness has changed. The amount of people aged over 60 has increased in Bowness, whereas the amount of people aged 20-40 has decreased.	Median age in Bowness = 48 years old Median age in England = 39 years old Mean age in Bowness = 45 years old Mean age in England = 39 years old	Many of the younger people in Bowness have been forced to leave the area due to increased house costs. This has been as a result of the area becoming more and more popular and so greater demand for housing. Older people view the area as a quiet and peaceful area in which to retire, increasing the average age.

Section A — Investigating Human Environments (Rural Environment)

7.5 Fieldwork evaluation

Success of fieldwork	Limitations of fieldwork
The questionnaires were taken from 50 members of the public. This was a large sample group which meant that the results were reliable.	The primary data collected was only from a mid week day in October. This is not a popular time for tourists and this may have affected the results. (it was just a snapshot of that one day)
The environmental quality survey was taken numerous times across different parts of Bowness, and an average score was then taken. This meant that an accurate representation of the area was given.	The secondary data was collected by the police and crime agencies. This will have had an impact on the results, as we don't know how or why this data was collected.
Most of the data was collected by primary data collection methods, ensuring that the results were therefore reliable.	The questionnaire was taken using random sampling. This meant that we could not be sure that a fair representation of people were included in the sample group.
Random sampling techniques were used to collect data for the questionnaire . This ensured that there was no bias in the results.	The environmental quality survey was subjective and based on our own opinions. This affected the overall reliability of the results.
Stratified sampling techniques were used to select locations to complete the environmental quality survey. This ensured a range of locations (tourist and residential) were included as part of the study.	When completing the land use survey, it was difficult to determine whether the building was a local or tourist shop/service. This ultimately affected our results
	Time limitations on the day meant that some of the data collection activities had to be rushed.

Section B — UK Challenges

8.1 The UK's resource consumption and environmental sustainability challenge

### Changes in UK population in next 50 years

The UK population is expected to increase significantly over the next few decades, as it has done over the past 50 years.

In 1960 the population was approx. 52 million.

By 1980 the population was approx. 56 million.

By 2010 the population was approx. 62 million.

By 2030 the population is predicted to be 71 million.

Figure 1: UK population estimates and projections, 1960 to 2030
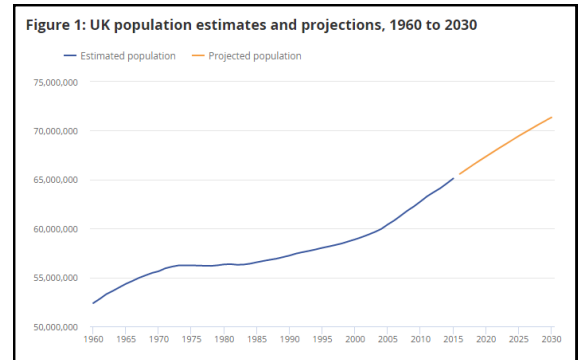
Population change — pressures on resources

As the population of the UK is increasing, there is great pressure put on a range of resources:

- As there is a growing demand for **energy**, fossil fuels will be exploited at a faster rate, and greater pressure will be placed upon finding fossil fuels (e.g. fracking). This could also lead to more land being taken up with renewable energy sources, such as wind farms or HEP.

- A growing demand for **food** will mean that certain resources, like fish, will be exploited and overfished from around the UK oceans/seas. Also woodland areas will have to be deforested to make way for more farmland, to grow more food.

- A growing demand for **water** (for domestic use, industry use, and agricultural use) will lead to greater pressure to provide water to the increasing population. This will lead to water shortages, in rivers, lakes and reservoirs

- The growing population will lead to growing demand for **wood** for building and for furniture. This will increase deforestation rates across the UK.

Population change — pressures on ecosystems

As the population of the UK is increasing, there is great pressure put on ecosystems around the UK:

- A greater demand for **space** will result in ecosystems being built upon. Deforestation of deciduous woodlands will occur to create space to built houses.

- Increased population means an increase in **car ownership**. This pollutes the local environment with noise and air pollution. On a global scale, it can lead to global warming and so will increase the risk to ecosystems across the UK.

- Ecosystems will have to be converted into agricultural land in order to meet the **food** demands of the growing population. For example, many wetland areas have been drained of water to grow crops.

- Marine ecosystems will be affected by overfishing and offshore wind farms to meet the energy and food demands of the growing population.

Section B — UK Challenges

8.2 The UK settlement, population and economic challenges

UK migration statistics
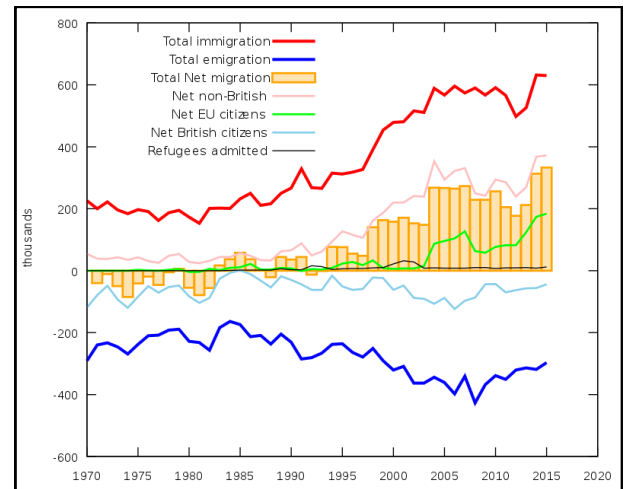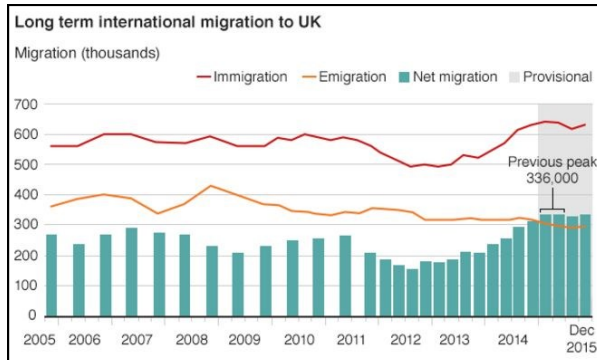
Reliability of UK migration statistics

UK migration statistics are not always reliable and difficult to measure due to:

1) People enter the UK illegally and so are not included in statistics.

2) There is not formal method of measuring who is coming into the UK and out of the UK apart from those who apply for a VISA (note — a VISA is not needed for EU citizens).

3) People may have entered the UK to work temporarily and may, or may not, be included in migration statistics.

Attitudes towards migration

Positive attitudes towards migration	Negative attitudes towards migration
Local shop owners will be able to sell more products to a growing number of customers. (migrant workers on average earn £20,000 per year and so have approx. £6000 disposable income).	House prices are increasing across the UK due to a greater demand from a growing population. This makes it very difficult for first time buyers to purchase a home.
New people coming into an area provides local residents with the opportunities to experience a range of different cultures and traditions (e.g. Chinese New Year celebrations in Liverpool).	Some local residents feel that the increase in migrants is creating higher unemployment rates for the British born citizens.
Migrants coming into the UK can bring a diverse range of skills and provide the government with additional taxes. This helps as the UK has an ageing population who do not pay any tax.	The education systems struggles to cope with the number of students that do not speak English as their first language, making educating the students more difficult.
Many migrants who come into the UK are prepared to do the jobs that British people are not prepared to do (e.g. manual labour), which is beneficial for business owners and the national government.	Police forces in Cambridgeshire have to deal with over 100 different languages and have to pay additional costs for translators.
	NHS workers and bosses claim that the increase in migration is putting greater pressure on the NHS and it is unable to cope with the increased demand.

Section B — UK Challenges

8.2 The UK settlement, population and economic challenges

The UK two speed economy

The **two speed economy** in the UK refers to the way that London is economically developing and growing at a much faster rate than the rest of the UK.

Causes of the two speed economy	Bridging the gap between London and the rest of the UK
Companies prefer to have headquarters in London due to skilled workforce available from the range of universities in the city.	The government have invested in regeneration projects in other areas of the country, to encourage people and businesses to locate here (Liverpool Docklands Regeneration).
There are excellent transport links to Europe and the rest of the world from London attracting people and businesses (e.g. London has 4 large airports).	The High Speed Rail 2 (HSR2) between London and the North is under construction to attract businesses away from London (whilst still having access to the capital).
Firms located in London have a positive image. It makes the company appear more prestigious.	Government spending and regeneration projects across cities in the north of the country have helped to improve transport links, therefore attracting businesses and people to the area.
London is often the focus of government regeneration (East London Olympics regeneration) and receives much more money than other cities across the country, attracting people and businesses.	The government have moved some key Gov. departments out of the capital, to encourage urbanisation and the location of businesses in other locations (e.g. Passport office in Cardiff) .
There are excellent transport links within the capital city (e.g. London underground).	

Greenfield and brownfield sites

When building new homes/buildings in the UK, they can either be built upon brownfield or greenfield sites:

	Advantages	Disadvantages
Greenfield sites (A greenfield site is an area that has never been built upon before)	Greenfield sites are away from the traffic and pollution in the city. It is a cleaner environment. The layout of new buildings is not determined by the previous development on the land. (they can be as large or as small as desired). The land is away from the city, so is much cheaper. Buildings can be larger and with a much lower density as there is less demand for the land.	Building on greenfield sites means that natural land is permanently lost. It will encourage commuting from the countryside into urban areas and so could increase traffic congestion. Wildlife would be disturbed by the increased noise and air pollution. Farm land may be lost, reducing local food supplies.
Brownfield sites (A brownfield site is an area that was once built on, and this has been cleared for new buildings)	Brownfield sites usually have good services already in place, such as water, gas, sewage and electricity. Brownfield sites are often near areas of employment, reducing commuting and air pollution from cars. Building on land that was previously build on reduces the loss of any of our countryside. Building on brownfield sites help to rejuvenate old or worn down areas.	Some sites are contaminated with pollutants, such as old factories, so it costs a lot to redevelop these. The land is expensive to buy as it is usually located within an urban area, where demand for land is high. Old buildings may have to be demolished, which can be very costly.

<u>Section B — UK Challenges</u>

8.3 The UK's landscape challenges

Approaches to development of National Parks

Benefits of developing National Parks	Problems with development of National Parks
Increased house prices within the national parks — which is beneficial for the home owner looking to sell their property.	The houses will increase in price, making them too expensive for first time buyers in the area (leading to outward migration).
Increased tourism, creating jobs for locals and supporting the local economy.	The jobs created in the area through increased tourism are only seasonal jobs (usually only during spring and summer) and low paid.
Increased protection and conservation of natural habitats, as tourists come to national parks to see the scenery and wildlife.	When certain areas of the national park are blocked off to tourists, the impact of tourism is then concentrated in other areas of the national park.
Rural shops and services are maintained, due to increased use by tourists.	Most tourists will arrive at national parks by car. This leads to congestion on the roads, air pollution and noise pollution.
Increased number of shops and services introduced which benefit locals and tourists.	Tourists cause noise pollution, footpath erosion, litter, vandalism, fires and often disturb livestock.

Approaches to conservation of National Parks — New Forest

Conservation method	Evaluation of method
When any trees are cut down for timber they are replanted with native species of deciduous trees.	+ this ensures that the size of the forest remains the same, even if some deforestation takes place. - the trees take a long time to grow, and the natural habitats will take a long time to recover.
Very little maintenance work in the New Forest takes place during the summer months. (e.g. cutting down timber, planting new trees and culling deer).	+ this ensures that plants/trees are not cut back during their growing season, and animals aren't disturbed during their mating seasons. - the winter climate makes maintenance work difficult for the rangers.
The national park employs a number of rangers who work in the area.	+ this ensures that the area is maintained well, that tourists have minimal impacts, and they ensure that the rules around the forest are upheld. - there is a large financial cost to employ the rangers.
In the New forest there are restrictions as to where people can go (walking and in their cars).	+ this ensures that the impacts of tourists are minimised and animals are not disturbed, by only allowing the tourists to go to certain areas. - this concentrates the problems of tourism in one area, and may put off tourists from coming to the area.
At the New Forest Visitor centre, they provide a visitor leaflet called '5 ways to love the forest.	+ this ensures that visitors know how, and why, they can help to care for and protect the forest. - the leaflet adds to the litter caused by the tourists and it is not a guarantee that they will read it, or follow the instructions.

Section B — UK Challenges

8.3 The UK's landscape challenges

Approaches to managing river and coastal UK flood risk

Coastal Management	Description	Benefits	Negatives
Sea wall (hard engineering)	This is a large wall built at the bottom of cliffs (sometimes curved) to absorb/reflect the waves energy.	Very effective Lasts for many years	Expensive to build Unattractive
Rip rap (hard engineering)	Large rocks placed in front of the cliff to absorb wave energy.	Effective for a number of years More natural than sea wall	Unattractive/unnatural Can be expensive for large rocks being imported
Groyne (hard engineering)	Wooden walls stretching out to sea to prevent longshore drift, so the beach stays. (the beach is a natural defence).	Helps to encourage a build up of a beach (a natural defence)	Not effective in storm conditions Unattractive
Beach replenishment (soft engineering)	The placing of sand and pebbles onto the beach (the beach is a natural defence).	Looks natural Reasonably cheap option in short term	Only a short term option — requires constant maintenance so expensive in long term.
Managed retreat (soft engineering)	Large rocks placed in front of the cliff to absorb wave energy.	Reasonably cheap option (although compensation has to be paid)	Land is permanently lost As land falls into the sea, it pollutes sea water
Cliff regrading (soft engineering)	The angle of the coastline is changed to create a gentle slope — reducing the wave power slowly.	Looks natural Provides a natural habitat for animals	Not very effective in storm conditions Requires maintenance

River management	Description	Benefits	Negatives
Dams and reservoirs (hard engineering)	These are barriers (walls) constructed to hold back and control the flow of water. They store the water in a large man-made lake called a reservoir, behind the dam.	Also produces HEP Long lasting and effective	Large areas of land are flooded Unsightly
Channelisation (hard engineering)	This is the process of deepening or straightening rivers, so that more water can flow through the river at a faster velocity.	Long lasting Effective as river can hold more water	Disrupts the natural processes of the river Expensive
Flood plain zoning (soft engineering)	This is when the government or local council will refuse planning permission for building houses near to the river and on its flood plain.	Very cheap as no defences built Provides natural habitats for animals	Large areas of land cannot be built upon Encourages urbanisation in other areas
Washlands (soft engineering)	This is when areas around the river are used to let the river flood onto. It floods onto less valuable land and prevents river flooding in other, more valuable, areas.	Gives a safe place for floodwater to go to, avoiding flooding in valuable areas	The land can no longer be used for urban developments or farmland

Section B — UK Challenges

8.4 The UK's climate change challenges

Potential impacts of climate change on people and the environment

Impacts of climate change on people	Impacts of climate change on environment
Heat related diseases - there may be an increase in diseases such as skin cancer and heat stroke as temperatures increase.	**Increased storms -** across the UK the increased temperature has led to an increase in the number of storms and floods.
Decrease in winter related diseases - as the winters will be milder, less people will die from the winter related illnesses, such as pneumonia.	**Increased drought** - due to a lack of rainfall in areas, particularly affecting areas along the east coast of England.
Crop yields affected - crops may not thrive as well in the warmer climates. Farmers may have to change the crops that they can grow.	**Sea level rises** - leading to coastal flooding and increased coastal erosion rates.
Drought - in some areas drought may affect food/water supplies and food/water security for those in the area.	**Ice melting in highland areas** - affecting natural landscapes and habitats.
Coastal flooding - due to sea level rises, coastal city areas are more vulnerable to flooding.	**Warmer river temperatures** - may lead to the migration or extinction of marine animals.
Death of marine life - as a result of warmer temperatures, marine life may not survive affecting the fishing industry and affecting food security.	**Increase forest growth** - due to more favourable conditions.
	Pests/insects - Warmer conditions may attract mosquitos to the UK.

Responses to climate change on local and national scale

Local responses to climate change	National responses to climate change
• The city of London council give out free energy saving light bulbs to households to reduce energy waste.	• UK Government have introduced 'feed-in tariff' incentives to home owners and businesses, to be more energy efficient. Businesses and home owners which have solar panels or wind turbines receive a 'feed in tariff' which means they are paid for any electricity they haven't used.
• Local schools have invested in renewable energy sources to reduce energy wastage (e.g. MCHS has solar panels on the roof of the sports hall).	• The Climate Change Act 2008, has created legally binding targets to reduce greenhouse gas emissions.
• The Mersey Forest Group, is a local group based in Liverpool. Their intention is to plant more trees across the city to make Liverpool and the UK more resilient to climate change.	• The UK government has invested heavily into the development and improvement of offshore wind farms and these facilities across the country.
• Liverpool Council works with Liverpool Mutual Homes and is investing in improving council homes around the city, to improve energy efficiency (reduce energy waste).	• The government has increased road tax for cars that are not energy efficient. Electric cars are exempt from road tax (i.e. they don't pay road tax).
• Liverpool have invested heavily in improving public transport across the city (regeneration of city centre stations, more frequent trains and buses, park and ride systems across the city), in order to reduce cars and greenhouse gas emissions	• There are government grants for renewable energy sources (e.g. solar panels on homes), making this energy source more accessible.