

River Study - Investigating A Drainage Basin - Barbon Beck, Yorkshire Dales

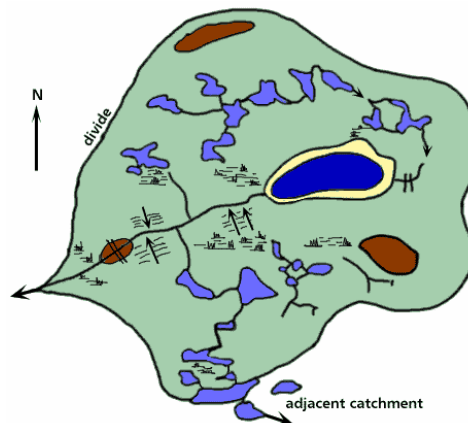
Introduction

We went to Barbon Beck in the Yorkshire Dales to investigate an upland catchment. We also went to understand what happens to a rivers discharge and water quality downstream. My skill objectives were measuring discharge and sampling water quality in doing this. I have now developed these techniques. Our hypotheses are that 'there will be an increase in discharge downstream' and in this happening will 'there be a decrease in water quality.'

What is a drainage basin?

A drainage basin is the land area where precipitation runs off into streams, rivers, lakes, and reservoirs. It contains a river and its tributaries and is an area from which the river collects its water. This is sometimes known as a catchment area. Precipitation which falls on the drainage basin will reach one of the main rivers and follow into the sea.

Diagram of a typical drainage basin



Describe the drainage basin characteristics.

Some of the drainage basin characteristics are that the relief land was very hilly with large hills in place instead of small mountains. These large hills were elongated with large steep slopes. The southern part of the drainage basin was the largest part. The main part of the geology here is limestone. Grass is the main vegetation and we found it common that the farmers were

using this land for the grazing of sheep in a lot of places. After the Second World War there was little peat on the land to retain the water. A solution was supposed to have been found and this was to cut out grips into the peat on the hills to improve produce. This meant much more water was going into the river which therefore gave potential flooding downstream at high rainfall or a lot of snowmelt.

In the response to a storm even, assuming the drainage basin was not saturated. Describe and explain the response of this catchment.

If there was a storm and the drainage basin was not saturated you would expect a flashy response on the hydrograph. A cause of this can be because of the gripping which has taken place.

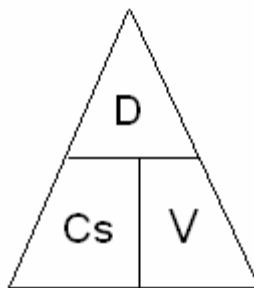
There are little trees which would soak up a lot of water so this means more water will go in the river and increase its potential flooding.

How do you measure discharge?

Discharge is measured in cumecs. The equation is:-

Discharge (D) = Cross Sectional Area (Cs) x Velocity (V)

This can be put in a multiplication table to find out the other values if you don't have either Cs or V.



Give reasons for the predicted hypothesis. Based on the secondary reading, what theory underpins your hypothesis.

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Hypothesis 2

What is water quality?

Water quality is how clean the water is and what is actually in the water. This could mean the dissolved load which can affect the water in a number of ways.

How do you measure water quality?

We measure water quality through the biotic and abiotic indicators. This is done to find how clean the water actually is. When we have rainfall we are assuming that all the water coming into the catchment is relatively clean. This is because it is part of the hydrological cycle. 3% of the world's water is freshwater but only 1% is useable because the other 2% is locked in ice. Water can be coming dirty and unusable whilst moving in the drainage basin by becoming contaminated. The causes for this are mainly down to agriculture and industry. Sewage has to be controlled and treated because if not we will definitely find high phosphate concentrations. When transportation is taking place on our roads and water or a river is nearby to the road some of the materials and liquids used here have to be washed somewhere. This is most of the time into the nearby water. This can include small fragments of rubber and most likely oil, salt and other chlorides.

The techniques of Biotic and Abiotic Indicators

The techniques of this hypothesis were to use the biotic and abiotic indicators to measure the water quality. Something which we always find certain is that water quality will always be better in the upland catchment. Biotic are what animals, insects, fish etc living in the water and this is able to tell us how clean the water is. This can be done because you will find healthy trout and salmon in clean water because fish need high oxygen levels to survive. Whereas bloodworms are found in dirty water because they can survive in poor water quality areas. Biotic tests are on a long-term basis so you can see the view of it over a long period of time by taking this test.

Abiotic are the conductivity tests, nitrate test kits, phosphate test kits and the total dissolved load.

The abiotic indicators are actually looking inside the water to see what is dissolved in it as you cannot see it. These show what the water is like. If the water is found to have high nitrate content it is most likely caused by something like slurry or fertilizer which has been put on nearby fields. If it found to have high phosphate content then it is most likely have sewage in it. This is only a 'snapshot' test though because it is only on that day what the water is like.

Results

A Table to show the readings which can tell us about the abiotic indicators that we found whilst we were in the Yorkshire Dales at six different sites.

Type	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Conductivity	16	23	0	45	48	54
Phosphates	4	5	0	14	12	10
Nitrates	0	0	0	5	5	5