

Using your fieldwork and research experience at A' level, describe two statistical methods of data analysis you have used and assess their value in your geographical investigation. (20 marks)

“How and why does the discharge at the Cardingmill Valley River vary downstream?”

Introduction

- Introduce study: trying to see how and why discharge changes downstream. Measured velocity and CSA in order to calculate this. Testing it against Bradshaw's Model which states that the discharge of a river increases with increasing distance from source (i.e. downstream). Looking for a positive relationship between them.
- Used both qualitative and quantitative analysis in my investigation. Analysis looks for patterns in the data from the data we collected. Qualitative = scattergraph between discharge and distance (indicates correlation – we want positive between discharge and distance).
- Qualitative analysis goes further and can indicate a relationship exists, and to what extent (strength). It can also, by testing significance, indicate whether the result is due to chance.

Velocity (mean)

- At data collection we collected velocity and CSA in order to calculate discharge (velocity x CSA). To increase accuracy of results we took the reading of velocity three times at each site.
- Statistical analysis = mean (measure of central tendency)
 - o In order to calculate discharge we took the mean of the three readings at each site. This is calculated by dividing the sum of the three readings by the number of readings (n=3).
- This was useful as it allowed us to then go on to calculate discharge and answer our investigation question.
 - o We increased accuracy by taking more than one reading
 - o Mode wouldn't have been useful as we only took three readings therefore it was unlikely to gain exactly the same result more than once and it did not cater for variations of velocity within the river e.g. on the outside bend of a meander the velocity would be quicker than on the inside.
 - o Didn't use median for same reasons
 - o Without taking multiple readings and taking the mean our results would have been less accurate and therefore may have affected the validity of our conclusion.

Spearman's Rank – discharge versus distance from source

- Scattergraph (qualitative analysis) indicated a positive correlation between discharge and distance from stream but to test this accurately we decided to carry out a Spearman's Rank test as this would indicate whether discharge was positively related to distance from source as Bradshaw indicated in his model.
- Spearman's Rank is a test of relationship/association and will indicate if and how the two variables are related. There are basically three types of relationship possible between two variables: positive or direct, negative or inverse, no relationship.
- With the data from the 10 sites we ranked the discharge and the distance in order making sure that the largest to the smallest is used in the same ranking order for both sets. Difference between these two inputs was then calculated and then each difference squared. The total of the squared differences is put into the formula to give a number between +1 and -1. The result came out as 0.94 and therefore showed a strong positive correlation between distance downstream and an increase of discharge.

- This figure was then used to test how significant the test could be, to ensure our results weren't due to chance, by using a significance graph. It worked out to be 99% significant as our result was above the critical value. Therefore, I could continue the analysis to work out why I got the results I did.
- Was it useful? Yes, it allowed us to identify the relationship between discharge and distance downstream.
 - Showed us a positive correlation which allowed us to conclude that discharge did increase with increased distance downstream > our investigation results followed Bradshaw's model
 - Also allowed us to prove our results were significant (i.e. not due to chance)

Conclusion

- Quantitative analysis was important for our investigation. Allowed us to increase accuracy of our results by taking a mean from multiple readings of velocity. Also allowed us to quantitatively prove the relationship between discharge and distance downstream at our site > allowed us to support Bradshaw's model.