

METHOD OF ANALYSIS
DESCRIBE, JUSTIFY, EVALUATE

An excellent way to analyse data collected in an investigation into the DOWNSTREAM CHANGES IN A RIVER, (Waithe Beck in Lincolnshire) its channel, flow and bedload where two sets of data may be related to each other is the Spearman's Rank Correlation Coefficient.

Usually at least 8 sets of data are needed, in this case from 8 sites along the course of Waithe Beck. We would expect that the hydraulic radius would increase in a downstream direction; this is a measure of the efficiency of the channel and is calculated by dividing the area of the channel by the wetted perimeter. A larger deeper channel is more efficient and has a relatively small wetted perimeter and therefore less friction

The NULL HYPOTHESIS is that there is No Relationship between the two variables and the aim of the test is to reject the null hypothesis and therefore accept the ALTERNATIVE HYPOTHESIS and prove that there is a relationship between the distance downstream and the hydraulic radius. This must be done at the 95% confidence level at least.

For this test the two sets of data must be ranked independently from highest value to the lowest value. The difference between the two ranks is then calculated. The smaller the difference in the two ranks the more likely a positive correlation will exist. The difference between the ranks is then squared and this is totalled and entered into the formula which includes the sample size.

$$r_s = 1 - \frac{6 \sum d^2}{(n^3 - n)}$$

d = difference in ranks
n = sample size

The result is always between +1 for a perfect positive correlation and -1 for a perfect negative correlation. The nearer the result is to 0, the less likely a correlation exists.

