

Investigation of ecology on four sites on the river nar essay sample



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“ The environmental conditions change along the river. These conditions affect the diversity of species found at the different sites.”

Site 1- Kings Lynn

The first site we visited was situated on the river Nar just 400 meters from the Great Ouse and 1km from the sea. There are varying flow rates on this stretch of the river due to a sluice gate, which is controlled automatically. When the tide comes in the gates are closed, which prevents water from coming in therefore the flow rate slows down and the water becomes shallower. When the gates are open the flow rate increases and the site gets deeper. Due to the inflow of seawater the section gets brackish, this will cause osmotic problems for fresh water animals.

There is a pumping station situated near the site, which may pump industrial waste like heavy metals, oil, into the river also, road surface pollution and fertilisers from upstream are present in the river.

Site 2- Kings Lynn

This site is situated further down stream. There is no flow rate and no tidal influence. There is a huge population of surface algae, which prevents the penetration of light and the absorption of oxygen. Therefore there is less oxygen in the river and this will affect the fresh water species and plant life found here.

Site 3- High Bridge

Fields of sugar beet, potatoes and cereal crops surround this section of the river. These fields receive fertiliser, some of which may be washed in to the river. The water is above land level therefore every year the land gets waterlogged and the water is removed by being passed back into the river, therefore there is a greater agricultural influence in the river. The river has been straightened so the water flows more efficiently. It is also periodically cleaned i. e. vegetation and silt is removed. This is going to have an effect of the species found because there will be less vegetation therefore lower amount of oxygen available therefore less food therefore less shelter therefore fewer species. Algae present due to the presence of nitrates and phosphates present in the fertilisers passed into the river from the surrounding fields. The algae will also deplete the amount of oxygen present therefore there will be less available for the invertebrates.

Site 4- Castle Acre

This site is situated near the source of the river. It is a hilly part and contains a large amount of calcium carbonate that may be used by invertebrates in the synthesis of exoskeletons. The water is filtered through chalk therefore the conditions are alkaline and very cold. The water is shallow and fast flowing. The water will contain low amounts of phosphates and nitrates because the surrounding fields undergo low intensity farming.

The variables that will be taken into account include the flow rate, depth of water, amount of nitrates, phosphates, ammonia present in the water, the temperature, the amount of pollution from the surrounding areas, biological oxygen demand and the pH.

Plan / method

When carrying out this investigation, I will proceed to do the following:

Take water samples from each different site and determine the relevant amounts of different species present and their frequency. Give a description of each site and measure the following environmental factors

- 1) the flow rate
- 2) the oxygen levels at each different site in mg/l
- 3) test a sample of water for the pH and temperature
- 4) record all the species present
- 5) the temperature
- 6) test for nitrates, phosphates and other minerals

The results for this investigation were obtained by following the method below.

A sample of water was collected in a sample tray. The sampling net was placed in the water against the current and moved in a joggled motion, ensuring to dislodge as many samples of as many species as possible. The kick search method may also be used in shallow water with a fast current (castle acre). After the sample was collected, it was carried up to the tray and the contents emptied into the tray. The thermometer was then placed into the tray and the temperature recorded. The species in the tray were

then identified and their frequency recorded. The flow rate was then measured by selecting a 5 meter measuring how long it takes for a stick or debris it cover that area. The flow rate was then measured using the equation:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Time

This method of measuring the flow rate is not very accurate so considerations must be taken into account when looking at the results.

Chemical tests were also carried out at each site to measure the pH and all other organic compounds found in the river. To measure the pH you need to take a sample of water and add a universal indicator. Measure the colour the water turns against the chart on the box this will give you the pH of the water.

Discussion

The Trent biotic index is preferred over using a chemical test because a chemical test is too time consuming and more expensive. The Trent biotic index takes on a long-term view of what the water is like and a chemical test show only a snapshot of what the water is like at that moment of time.

Because the river is situated near and industrial site there is a possibility of chemical pollution but due to the movement of water by the time the sample for the chemical test is taken the chemicals my have already been washes away. Therefore the results obtained may not show a true reflection of the

amounts of chemicals contained in the river. Also different times of the day
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will result in different flow rates and therefore different amounts of chemicals at one moment of time.

At the first Kings Lynn site the water was acidic due to the pollution of heavy metals and road surface pollution injected into the river by the industrial sites. The acid reacts with the calcium carbonate, which results in the neutralisation of water. The reaction reduces the amount of calcium carbonate in the water, which results in the fewer species found that are dependent on calcium carbonate to build exoskeletons. Therefore this leads to a decrease in species diversity. As shown by the species results table. The pH results show that the water is slightly below neutral at 6.5.

At the second Kings Lynn site there is a lower oxygen level due to the presence of surface algae which use up the oxygen during respiration but a higher demand for oxygen by any species that are trying to survive in those conditions. The supply of oxygen does not meet the demand therefore the invertebrates that rely on high oxygen content to survive they will die off for example stonefly nymph. Invertebrates who can tolerate a low oxygen content will be found in this section of the river. Due to an increase in the amount of algae there will be competition for the already depleted amount of oxygen. This will lead to a decrease in the amount of species present.

The third site on the river Nar, High Bridge, has a high concentration of organic material from the fertilisers and the pesticides applied to the surrounding fields. Not all organic material is harmful in the right amounts. However this site has very high amounts of organic compounds when compared to the others. This could lead to an increase in populations of

detritivors, which would lead to an increase in the populations of carnivore. An increase in the numbers of species present will lead to an decrease in the amount of oxygen therefore the species will gradually disappear starting from stonefly nymph. Large amounts of nitrates and phosphates will lead to an increase in the growth rate of plants especially algae which do not allow light to penetrate and eventually lead to a decrease in the amount of oxygen in the water.

The final site visit on the river Nar was castle acre. Of all the sites this one has the fastest flow rate. Only species with sufficient anchorage mechanisms will be able too survive in this section of the river for example shrimp. Also due to the movement of water there will be a higher concentration of oxygen. There will therefore be an increase in the number of species, which require a higher concentration of oxygen for example stone fly nymph and a decrease in the amount of smaller species that have a lower demand for oxygen for example Tubifex worm.