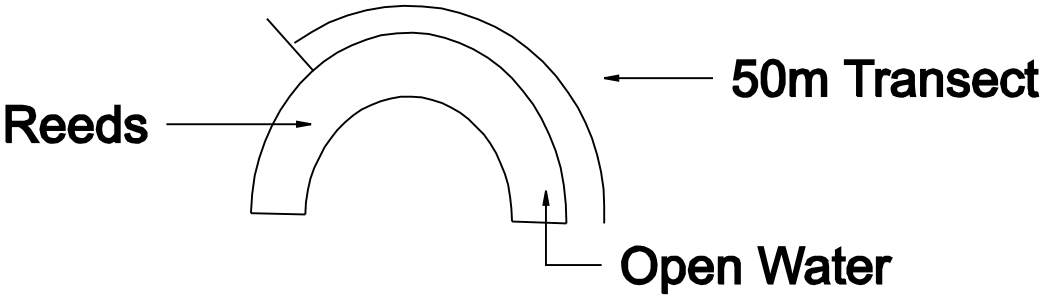
A Study of Succession in the Dragonfly Pond

Succession - The combination of processes, which produce a gradual change in the structure and species composition at a particular site.

Dragonfly Pond: The pond was created in 1986 by Anglian Water to provide a habitat for dragonflies. It is in a horseshoe shape and is situated next to Grafham water in Bedfordshire.

Dragonfly Pond:



Can Signs of Succession be Seen Around the Pond?

Hypotheses:

1) The further one goes around the pond away from the open water, the depth will gradually reduce.

   This is because as you go along the transect more succession will have taken place, therefore the pond will be more developed containing more plants and a higher soil level due to it containing more decayed matter from each community decaying as it is succeeded until the climax community is reached and more sediment will be able to build up in the roots of the new plants.

2) There will be more vegetation as one goes further along the transect.

   There will be a bigger hydrosere because more succession will have taken place and therefore the conditions will favour a greater range of plants to be supported.

3) The number of submergents will decrease slowly around the pond.

   The amount of submerged plants will decrease as the water level falls because these are usually found as deep-water colonisers and pioneer species who's decay year after year, gradually reduces the water depth allowing more plants to succeed them.

4) The number of emergent plants will increase slowly around the pond until marshland takes over.

   This is because as the water shallows the emergent vegetation can now break the surface and take over from the submergents. However as more and more silt is trapped in the rooted emergents and as they decay the water level decreases still further and marshland plants should be able to establish themselves.

Planning

To collect data from the pond we decided to have 15 data collection points along a 50m transect at 3.5m intervals. I chose a grided quadrat held at arms length facing away from the bank to collect values for percentage cover of emergent, submergent and marsh plant cover at each point. The quadrat had 100 squares and thus I was able to count how many full squares there were to record percentage readings. The depth I measured at arms length with a depth pole to the nearest cm. By taking points on a transect I was using a systematic sampling technique. I spent 1hour collecting the data.

Risk Assessment

When collecting data I was careful to step on firm ground and tried to keep off the edge of the bank and a dry sunny day was chosen to reduce the risk of falling into the pond.

Accuracy and Reliability of the Data

The depth was taken to the nearest cm of the depth pole and I held it at arms length from the bank for each measurement.

The quadrat was held at waist height and at arms length for each measurement, however it was sometimes difficult to accurately count the number of full squares covered by a plant type.

Proving Hypotheses:

To prove hypothesis 3 I used spearman's rank correlation coefficient to show that there was a direct link between the depth of water decreasing and the number of emergent plants. The correlation coefficient can then be put in to a graph to give a significance level of similarity between the two factors. (see working) The significance level came out to 1% so there is definitely a strong correlation.

The similarity can also be seen clearly on graph 3 where the submergents decrease rapidly after an anomalous bare ground reading at the first transect. This anomaly may have been caused by the submergent plants at this point being covered by soil falling in from the bank leaving very few plants to be seen here.

A further anomaly can be seen on the percentage of total plant cover (graph 5). There appears to be very few plants at point 8, this in fact was a mud strip used as a walkway to the centre of the pond and thus plants had not taken root here.

I also used spearman's rank to prove hypothesis 1 to show a direct link between depth of water decreasing with distance around the pond. The significance level came out at 1% so there is also a strong correlation. The general trend can also be seen on graph 1 where the trend line clearly shows a gradual decrease in depth with distance along the transect.

This indeed should be the case because the further around the transect one goes more succession will have taken place. The pioneer species will have been succeeded by more advanced plant through autogenic succession. The submergent plants, grow up and decay year after year, gradually decreasing the depth and changing the substrate until rooted emergent vegetation takes over. The rooted vegetation traps sediment, which decreases the depth even more.

Hypothesis 4 can be proved by looking at graph 4. From the trend line the number of emergent plants increases slowly with distance around the pond. This is because the emergent vegetation of the common club rush and pampus grass have established themselves more as the depth decreases. The marshland sere however has not yet fully developed and therefore didn't impact much on the graph. This should be the case as the water depth

decreases further still by the decay of emergent plants but the minimum depth of 20 cm is still probably too high for marshland scrubs.

Hypothesis 2 predicted more vegetation as one goes around the pond, this can't be seen from the graph of total percentage plant cover (graph 5). The graph shows very high levels of percentage plant cover along the transect and no distinct increase or change. This doesn't support my hypothesis but it's not to say the hypothesis is necessarily wrong. The hydrosere has developed from the single type of submergent plant ……. To a number of emergent plants and even a few marsh plants. To try to prove this I should have counted the number of different species at each point on the transect.

So in summary: Depth and submergent plants decreases along the transect.
Emergent plants increase along the transect.
Total percentage cover of plants is high throughout.

Evaluation:

I thought the investigation was very successful as I was able to prove all but one of my hypotheses and thus I was able to build up a clear picture of the changing seres. The main aim of the investigation was achieved in that of showing a presents of succession at the pond. The only sere not yet developed was that of marshland but in years to come no doubt it will be clearly visible as the climax community is reached in the po nd.

The only extension to my project could be that of collecting more data, such as that of the total number of different plant species at each point and this would have enabled me to prove Hypothesis 2

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