The report forms a component of Practical Countryside Skills as a practical exercise undertaken by Volunteer Project Assistant Joanne Green. The report analyses the findings of the exercise.
Contents
Introduction ........................................................................................................................................... 3
Aims .......................................................................................................................................................... 3
Objectives ............................................................................................................................................... 3
Method .................................................................................................................................................... 3
Results .................................................................................................................................................... 4
Discussion ............................................................................................................................................... 7
Conclusion ............................................................................................................................................... 9
Recommendations .................................................................................................................................... 10
Appendix ............................................................................................................................................... 11
References ............................................................................................................................................. 12

Tables
Table 1: Location Points, Water behaviour and Habitat Types ............................................................. 4
Table 2: Water Chemistry Analysis ........................................................................................................ 4

Charts
Chart 1: Temperature ............................................................................................................................. 5
Chart 2: Conductivity .............................................................................................................................. 5
Chart 3: Total Dissolved Solids ............................................................................................................. 6
Chart 4: pH ........................................................................................................................................... 6
Chart 5: Water Chemistry Analysis ....................................................................................................... 7
Introduction
This report is for a component of Practical Countryside Skills. The component requires evidence of project management for a site named by Groundwork Oldham & Rochdale. The site chosen is Boarshaw Clough.

The Volunteer Project Assistant chose to lead a Water Chemistry Analysis at the chosen site.

Aims
To introduce volunteers to scientific assessment;
To assess environmental damage to water habitat; and
Average 3 findings.

Objectives
Project management experience for volunteer;
Risk Assessment experience for the volunteer; and
Benefit to site for Community Volunteering Qualification.

Method
Using non intrusive water sampling apparatus tests conducted for are:

pH;
Total Dissolved Solids;
Temperature; and
Conductivity.

Water from Location Points A, B, C, and D illustrated in Table 1 and in Appendix on the map, were tested in different beakers for one minute for each test. Each beaker
contained water for each test. Temperature was the first to be taken so ambient air temperature and volunteer hands did not affect the temperature of beaker water and give false readings.

The Volunteer Project Assistants undertook the analysis using a stop-watch to ensure time lapse for tests was identical, one minute. The Volunteer Project Assistants chose the testing Points and using teamwork relayed the results to each other out loud.

**Results**

**Table 1: Location Points, Water behaviour and Habitat Types**

<table>
<thead>
<tr>
<th>Location</th>
<th>Water</th>
<th>Habitat Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Standing</td>
<td>Lodge</td>
</tr>
<tr>
<td>B</td>
<td>Running from lodge to river</td>
<td>Lodge overflow</td>
</tr>
<tr>
<td>C</td>
<td>River</td>
<td>River</td>
</tr>
<tr>
<td>D</td>
<td>Standing</td>
<td>Woodland</td>
</tr>
</tbody>
</table>

**Table 2: Water Chemistry Analysis**

<table>
<thead>
<tr>
<th>Site:</th>
<th>Boarshaw Clough, Middleton, Rochdale, M24 2NG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>20/07/2012</td>
</tr>
<tr>
<td>Location</td>
<td>Conductivity (µ)</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------</td>
</tr>
<tr>
<td>A</td>
<td>548</td>
</tr>
<tr>
<td>B</td>
<td>553</td>
</tr>
<tr>
<td>C</td>
<td>298</td>
</tr>
<tr>
<td>D</td>
<td>559</td>
</tr>
</tbody>
</table>
Chart 1: Temperature

![Bar chart showing temperature comparison at different location points A, B, C, D.]

Chart 2: Conductivity

![Line graph showing conductivity comparison at different location points A, B, C, D.]

Water Chemistry Comparison at Boarshaw Clough
And Water Chemistry Analysis
Joanne Green
Chart 3: Total Dissolved Solids

<table>
<thead>
<tr>
<th>Location Point</th>
<th>Total Dissolved Solids (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>450</td>
</tr>
<tr>
<td>B</td>
<td>400</td>
</tr>
<tr>
<td>C</td>
<td>250</td>
</tr>
<tr>
<td>D</td>
<td>500</td>
</tr>
</tbody>
</table>

Chart 4: pH

<table>
<thead>
<tr>
<th>Location Point</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7.8</td>
</tr>
<tr>
<td>B</td>
<td>7.6</td>
</tr>
<tr>
<td>C</td>
<td>7.4</td>
</tr>
<tr>
<td>D</td>
<td>7.2</td>
</tr>
</tbody>
</table>
**Discussion**

The aims changed twice, once when the volunteer spilt the third sample on the second visit to the site. On the due date the volunteer was unable to attend the site because of a telephone interview. Therefore an average of three samples could not occur in the timeframe without potentially adding further financial cost to the Volunteer Programme Assistant Scheme.

Chart 1 illustrates the temperature range within the Lodge fluctuates by at least 5°C. According to the Field Studies Council freshwater retains more heat than its surrounding landmass. This difference results in the Lodge temperature not fluctuating as much as the temperature of its surrounding landmass. However the amount of fluctuation depends upon its water’s depth. The shallower the water the more the temperature will fluctuate and vice versa.

The volunteer chose to test the water at the surface, the epilimnion, so as to limit habitat damage of marine life. Please note the water at the epilimnion is likely to be warmer.
because it undergoes thermal stratification, than the deeper water and changes are more likely to occur in the season the analysis occurred, summer. Therefore to establish more accurate trends of the temperature at the lodge, analysis would need to occur at regular intervals throughout the year at using the same locations and depths. Also the wind strength needs to be noted because of the wind chill factor that has the responsive ability to cool or heat the water and so altering the temperature in those locations.

The Field Studies Council explains that higher and lower temperatures affect the metabolic rate of marine life. And those high temperatures, and high fluctuating temperature ranges, kill microorganisms within the water. The result of this to the Lodge is that those microorganisms sink to the bottom of the Lodge thus causing the bottom of the Lodge to become anaerobic and contain no oxygen, to sustain life at that depth. This affects abiotic factors. Abiotic factors are the important factors in a pond that enable pond life to be sustained and is light, nutrients, oxygen, pH, temperature and turbulence. The abilities of the abiotic factor will become compromised during night; diurnal, time in shallow areas because temperature range in those areas will be far greater than in deeper aquatic locations. Therefore these locations could become dead zones or contain extreme life forms, such as bacteria.

With regards to the fish in the Lodge, at the temperatures found on 20/07/2012 it is likely that fish who are reproducing in the Lodge are Trout between 3-14°C and Carp at 20°C. Also that shallow areas above 20°C will be void of fish roe regardless of whether the habitat contains optimal strata.

Chart 2 shows conductivity is less where the water flows into the river. According to the United States Environment Protection Agency low conductivity is due to dissolved inorganics in the water. They go on to explain dissolved inorganics as being chloride, nitrate, sulphate, phosphate and could also be the organics oil, phenol, alcohol and even sugar. The Agency points out that temperature affects conductivity and that at 25°C conductivity is optimal. Given the temperature in the Location Points is between 11.8°C and 16.8°C, it is more likely the Lodge has a low conductivity because of its temperature rather than containing higher volumes of inorganics or organics or both.

The Agency mentions sampling considerations the volunteer and the Volunteer Project Assistants did not do, such as using electrodes. Therefore further tests could be required to establish conductivity. Conductivity is important to water ecology as it enables transfer to take place that retain a healthy and nutritional base for its life forms, such as carbon dioxide and oxygen in the water that helps plants to grow.
Chart 3 concurs with Chart 2 as it shows there are less Dissolved Total Solids in the water; therefore conductivity is reduced when compared with Location Points A, B and D. United States Environment Protection Agency explains Total Dissolved Solids to be the inorganics already mentioned and include iron and other ores, salts and soil, clay, algae and particulates. Ores are metal fragments that are dissolved into the water; they can be naturally occurring or placed into the water either by man or by rainfall as can particulates.

High Total Dissolved Solids are an indication of seepage into a water body. Either seepage of organics or inorganics, and that carry a consequence of reducing the light permeating through the water. Reduced light compromises plants within the water from being able to photosynthesis. With the measurement methodology in the United States being different to how the samples were measured it is difficult to establish actual Total Dissolved Solids within the Lodge from the sampling that took place on 20/07/2012.

pH levels are given in Chart 4 and show the water is of excellent quality for a Lodge Pond. The pH must remain at optimal pH so that outflows to the river do not impact upon the quality of the river.

The findings above find in favour of Lodge management to use conservation techniques for the aquatic life in the water ecosystem. Species richness in English freshwater courses has been found to be varied in macroinvertebrates particularly in ponds containing high volumes of aquatic vegetation and where pH is most favourable (Biggs et al, 2005). Macroinvertebrates include larvae of dragon flies (Odonata), mosquitoes (Diptera), caddisflies (Trichoptera) and various water beetles (Coleoptera) and includes crustaceans too. Therefore if optimal conditions occur in each of the different habitat areas it is likely that aquatic life could become more diverse.

**Conclusion**

The Lodge depth needs to be calculated to establish if there are any dead zones as these zones reduce the available m³ to pond life. The impact of reduced m³ is that the Lodge will be far smaller than its size to human eyes.

The Flood Water and Management Act 2010 and its regulations require erosion must be managed to avoid risk of flooding. It is well known the river erodes its banks and those influxes of sediment flow into the river during wet adverse weather phenomena. Therefore adherence to the National Flood and Coastal Risk Management Strategy for England needs to be investigated and guidance for flood prevention taken from it.
Recommendations


2) To undergo all tests again, including Lodge depth and at regular intervals.

3) Physical and drainage changes made in accordance with National Planning Policy Framework and with Partnership approval.

4) Contact the Centre for Ecology & Hydrology for their guidance on how to create richness and diversity within the Lodge.
Appendix
Boarshaw Clough Map.
References


