

Title: Investigation of the potential variation of toxins in bog- land water systems

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Problem / Question

- What minerals are found both normally and abnormally in bog- land water systems?
- If found, are any of these detrimental to the bog ecosystem?

Objectives

- To carry out water testing on bog land water systems in the Clara Bog to assess the presence of abnormal mineral content
- To assess abnormal vegetative growth in the locale of the water systems to correlate their supporting nutrients with those found in the water systems
- To merge ecology and hydrology to investigate the presence of abnormal mineralisation and the possible causes for their occurrence in the bog water ecosystem

Project Overview

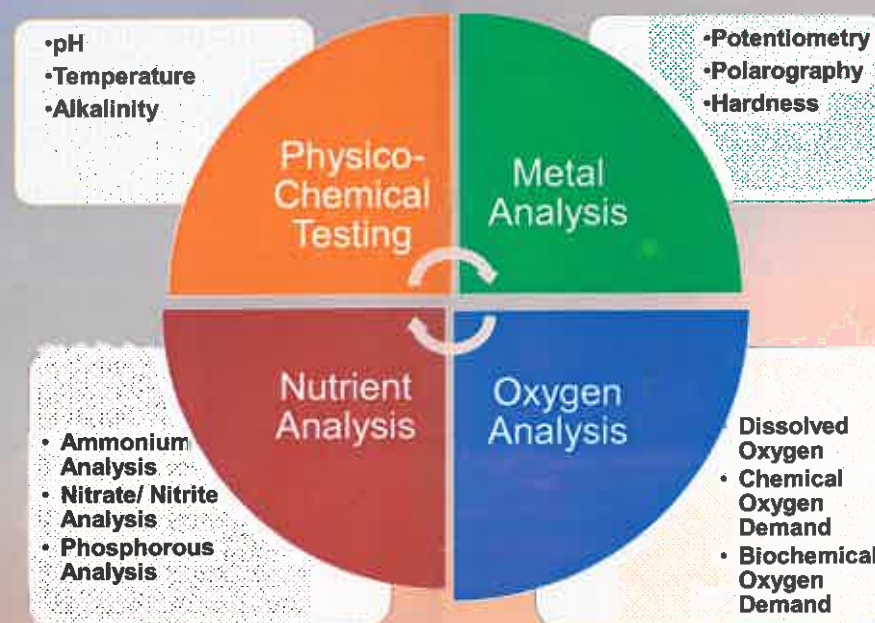
Irish bogs have suffered much damage from human activities such as peat extraction or agricultural works. Peat extraction is normally carried out with the use of drainage ditches to cause drying for ease of extraction. When areas have undergone such drying, shrinkage occurs, as does the absorption of water from outside sources, such as agricultural run-off, streams and rain.

The bog is known for its acidic and anaerobic nature. These conditions are unlikely to support most types of plant growth outside the realm of mosses, such as those of the *Sphagnum* genus. Despite this fact, abnormal plant growth has been identified in the bog of interest, Clara Bog, raising the question of the origin of the supporting factors, which is hypothesised to be from aforementioned external water sources contaminating the bog ecosystem.

A battery of physico- chemical testing will be carried out on water samples from different areas of the bog on parameters such as pH, alkalinity, conductivity, dissolved solids, suspended solids, colour and the Langelier Index. Biochemical Oxygen Demands (BOD) and Chemical Oxygen Demand (COD), Nitrogen, Phosphorous, Ammonium and trace metal analyses will be carried out also.

All tests will be of validated protocol, performed in triplicate and as two independent tests.

Methods



Unapproved Man-made water system feeding minerals to an SAC- Taken July 2016- Sarah Healion

Methodology & Expected Results

pH

- Organic acids
- Insoluble Carboxylic Acids- humic matter
- Sulfates from pollution and acid rain
- **Expected- Low pH**

Alkalinity

- To confirm pH test
- **Expected- Low pH**

Hardness/ Potentiometry/ Polarography

- To detect Calcium and Magnesium, Zinc and Copper that are native to the bog and essential for plant growth
- **Expected- Presence of Ca, Mg, S, K**

Ammonium Analysis

- Released from macromolecules from humic matter prone to oxidation
- Provides sufficient nitrogen for plant growth
- Can be readily converted to nitrates and nitrites
- **Expected- Positive +**

Nitrate/ Nitrite Analysis

- Nitrites can cause toxicity to plants in low doses
- Nitrates are essential nutrient for plant growth
- **Expected- Positive +**

Phosphorous Analysis

- Major nutrient essential for plant growth
- **Expected- Positive +**

Works Cited

- Crushell, P et al , 2009 The Origin and Development of a Minotrophic Soak on an Irish Raised Bog An Interpretation of Depth Profiles of Hydrochemistry. *The Holocene*, 19(6), pp 921- 935
- Schlesinger, W. H , 1997 *Biogeochemistry- An Analysis of Global Change*. 2 ed Boston Academic Press.
- Valverde, F. F et al , 2016. *Clara Bog SAC- Conservation objectives supporting document- raised bog habitats*, Dublin National Parks and Wildlife Service.

For more information, visit
<https://www.npws.ie/protected-sites/sac/000572>