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

Methods
- Physical-Chemical Testing
  - pH
  - Temperature
  - Alkalinity
- Nutrient Analysis
  - Ammonium Analysis
  - Nitrate/Nitrite Analysis
  - Phosphorus Analysis
- Oxygen Analysis
- Metal Analysis
  - Potentiometry
  - Polarography

Methodology & Expected Results
- Organic acids
- Insoluble Carboxylate Acids - humic matter
- Sulfates from pollution and acid rain
- Expected: Low pH
- To confirm pH test
- Expected: Low pH
- Dissolved Oxygen
  - Chemical Oxygen Demand
  - Biochemical Oxygen Demand
- 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
- 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 +
- Nitrites can cause toxicity to plants in low doses
- Nitrates are essential nutrient for plant growth
- Expected: Positive +

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 to parameters such as pH, alkalinity, conductivity, dissolved solids, suspended solids, colour and the Langler Index. Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), Nitrogen, Phosphorous, Ammonium and trace metal analyses will be carried out also.

All tests will be validated protocol, performed in triplicate and 2 independent tests of the same water sample.

Works Cited

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

For more information, visit https://www.npws.ie/protected-sites/sac/000672