The world of environmental management

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Abstract

As the City of Red Deer continues to grow, it is necessary that the urban development do not disturb Hazlett Lake and the plant and animal species in the area. For the prevention of wildlife/ habitat disturbance, water pollution and weed evasion, a monitoring program was implemented. In any environmental management project, there are three stages of steps that must be completed. Firstly, before any of the field work begins, safety protocols, geographic information system (GIS), and environmental policies must be considered. The GIS is a very helpful tool in this project because it is a monitoring program and the changes to the wetland can be seen over time. Next, the field work begins. With Hazlett Lake, water sampling, sediment sampling, vegetation and wildlife assessments and noting the water level are all crucial tests that have to be completed each year the program is in place to maintain the wetland's overall health and track any observed changes. Once the results from the lab arrive, they are compared to government guidelines to determine if the wetland's health is being maintained and if any preventive measures need to be taken. The results are also compared to previous years to determine if any changes occurred. It was found that fluorene in the sediments and pH in the water were higher than guidelines. These areas will be especially monitored with care to ensure the wetland is conserved.

Key words:
environmental management, environment, environmental consulting

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Overview

What is environmental consulting and management?
Environmental management and consulting involves providing advisory services for clients on environmental issues and helping them mitigate their environmental damage while also making sure they comply with environmental policies. A varying degree of work is involved but often includes areas like air/land/water contamination and environmental impact assessments.

What is this project about?
With the growing development of Red Deer, preventing negative impacts to Hazlett Lake and surrounding parks are necessary. The city is determined to maintain the wetland's overall health and sustainability.[1]

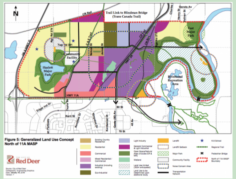

Figure 1: Structure plan for Hazlett Lake [2]

Prevention of:

- Water pollution
- Water level fluctuations
- Wildlife disturbance
- Habitat disturbance and/or destruction
- Altered water supply
- Weed evasion

Is required for the conservation of Hazlett Lake and will be achieved through a monitoring program.

Initial Stages

A number of things must be taken into consideration and implemented before actual field work begins. Such things include:

❖ Does the area have environmental significance?

Wetlands play a crucial role in sustaining Alberta's biodiversity by providing habitat for a variety of plant, fish and animal species. Additionally, they also protect the water quality and provide water infiltration and storage.[3]

Figure 2: Hazlett Lake

Figure 3: Hazlett Lake

❖ Government legislation concerning environmental policies/regulations

Alberta Environment and Parks (AEP): All field samples must meet the required guidelines

Alberta Wetland Policy: A framework for managing, sustaining and rehabilitating wetlands

Water Act: Water Act approval is required if an activity impacts a wetland

❖ Geographic Information System (GIS)
Software that provides the necessary tools for individuals to create, use, store, analyse, and share geographic information which aids in making important decision.[4] In environmental management specifically, GIS can be used to see trends and environmental changes through the years.

-Land and air quality

-Vegetation and land-use type

-Population density

-Jurisdiction boundaries

-Urban development

-Land features

-Hydrographic data

Figure 4: GIS data layers

GIS analysis is an especially valuable tool for this project as it is a monitoring program. Changes in land use, land cover and vegetation health can easily be tracked and compared through time.

❖ Which tests must be completed and why are they vital?

Water Sampling:
Maintaining a good water quality is crucial for the wellbeing of many aquatic plants and the overall health of the wetland as wildlife and fish rely on the waterbody as habitat and as a drinking source. The data collected can be easily compared year to year and produces a Trophic State Index.[5]

Figure 5: Water sample example

Figure 6: Sediment sample example

Sediment Sampling:
These samples will tell us the measure of contaminants at the bottom of the lake. An increase in contaminants from storm water runoff could be hazardous for the wildlife and plants present.

Figure 7: Solstice employee and I doing a vegetation assessment

Vegetation and Wildlife Assessments:
Plant communities play an important role within a wetland. With the uptake of nutrients and other contaminants, they refine the water. It is also important to do vegetation assessment to keep track of invasive weeds and other plant species. The health of a wetland can also be assessed by comparing wildlife observations from year to year.

Water Level:
The hydroperiod or the natural seasonal fluctuations of the water level determines the type of wetland and in turn will determine the diversity and distribution of plant and animals species.[5]

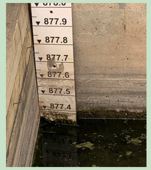

Figure 8: Water level at Hazlett Lake

Lab Analysis

Water samples are generally tested for:

- pH ~ a pH outside the range of 6.5-9.0 can be detrimental to aquatic organisms. A change in pH can also affect the solubility of metals and nutrients
- electrical conductivity (EC) ~ by measuring the EC, we get a sense of how many ions are dissolved in the water, a high EC is usually a result of runoff
- total and dissolved metals ~ the accumulation of certain metals in plants and animals can be damaging to their health
- major nutrients ~ an excess of nutrients like phosphorus and nitrogen can cause algal blooms, lowering the water quality
- chlorophyll a ~ determines the trophic state index which is used as an indication of the wetland's biological condition
- total dissolved solids (TDS) ~ represents the total concentration of dissolved organic and inorganic matter that can come from urban runoff

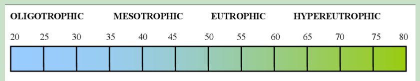

Figure 9: Trophic State Index

Sediment samples are tested for:

- total metals ~ can be toxic to the ecosystem if present in high concentrations
- total phosphorus ~ indicates the water quality and the trophic state of the wetland
- poly cyclic aromatic hydrocarbons (PAHs) ~ as they are rarely biodegradable, PAHs can accumulate and remain in the soil for a long time having serious ecological damage[6]
- total petroleum hydrocarbons (TPH) ~ chemical compounds that come from crude oil which can contaminate the environment

Results and Recommendations

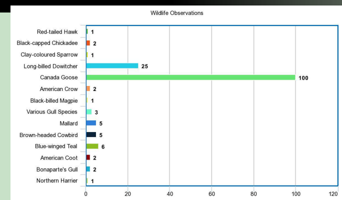

Figure 10: Wildlife observation at Hazlett Lake

Figure 11: Hazlett Lake site diagram delivered to the client [7]

Although fluorene was found to be higher than sediment quality guidelines, it is considered to be a statistical anomaly and further monitoring is recommended.[8] The pH level was also higher than water quality guidelines but the past trends suggest that Hazlett Lake is an alkaline wetland.

Comparative Analysis:
As it is a monitoring program, comparison of the data from previous years is necessary. Although, direct comparisons may result in faulty conclusions as data was collected at different times during the year.

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[8] *Hazlett Lake 2018 Monitoring Program*

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