A PALEOLIMNOLICAL STUDY OF MAPLE AVENUE NATURE PARK’S POND, INDIANA

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Introduction

Maple Avenue Nature Park, a rehabilitated brownfield in Terre Haute, IN mantles an 8-m deep pond with nearly uniform depth. Through the 20th century, the park area was the site for illegal trash burning and waste dumping. Environmental testing over the past decade revealed toxic levels of petroleum, lead, cobalt, benzopyrene, arsenic, and cinder sediment from boilers around the margins of the lake. Part of the pond’s retaining wall consists mostly of trash, leading to a 7-m deep trash pit. The pond was dredged in ~1963-64 to provide building material for an adjacent bypass, effectively resetting the lake’s sediment history.

In the late spring of 2013, we began a study to examine two sediment cores from the park, taken from the deepest parts of the pond. In this study we used diatoms to explore potential eutrophication and resilience of a system to harmful anthropological disturbances.

Methods

- Two short surface cores (~25 cms of sediment) were extracted from the north end and south end of the pond.
- Core 1 from the north end of the pond was extruded into 5 mm increments.
- The organics were dissolved out of the samples with H₂O₂.
- Slides were made.
- A diatom count was obtained from the slides on a light microscope at 100x magnification.
- At least 300 diatoms were identified per sample.

Results

The core 1 diatom count of Maple Avenue Nature Park’s pond shows that the pond is, and has been, dominated by the planktonic species Cyclotella ocellata. There is a high abundance of Fragilaria and Asterionella and the Cyclotella ocellata is contrasted by the benthic species Navicula. Aulacoseira ambiguа is close to nonexistent at the bottom of the core and appears in greater numbers at 16 cm in depth through the top of the core, whereas the species Cyclotella michiganiana is in low abundance at the top of the core and is in higher abundance at the bottom. The microspheres added to the samples indicate that the entire core sample has a uniform diatom to sediment ratio.

Conclusion

The planktonic species Cyclotella ocellata is offset by the benthic species Navicula. There is an indication that there was a rise in water level at ~12 cm portion of the core, as well as a drop in water level at ~4 cm and ~22 cm. The pond’s circulation appears normal until a depth of ~16 cm where a decrease in the number of the species Aulacoseira ambiguа indicates enhanced stratification. Cyclotella michiganiana along with some factors, such as granules in the center of Cyclotella distinguenda, indicate higher salinity levels at the bottom of the core. This study shows the resiliency of a system to rebound from serious anthropological disturbances and the potential to successfully reclaim brownfields into recreational resources for a community.

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