

Investigating Plant Diversity and Anthropogenic Effects in NYC Wetlands

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Abstract:

Using arcGIS we studied anthropogenic effects present in New York City urban wetlands and examined their impacts on plant diversity. Focus was on parameters such as: topography, population density, fragmentation and the percent land cover of impermeable surfaces. Plants were surveyed in Flushing Meadows, Ramble, and Inwood Hill. Results led us to the conclusion that anthropogenic effects have a weak yet present relationship to the diversity of plants in the urban wetlands of New York City. As opposed to the percent of impermeable cover, fragmentation and population density had a more evident relationship (in these sites) with plant diversity. Future research should focus on invasive plant species, the curvature and width of roads within a one mile radius; as well as the purpose the wetland was created for and its current usages.

Introduction:

- Wetlands are defined as areas where the water table is at equal level with the land.
- They are important because they act as a buffer zone, preventing flooding and filtering harmful pollutants.
- Anthropogenic effects on wetlands include air pollution, water pollution and fragmentation that alter the functions and diversity and abundance of species of the plant community.
- It is important to take into consideration that urban wetlands differ from rural wetlands as they are more affected by human presence (Ehrenfeld, 2000).
- It was hypothesized that when human presence increases, plant community composition decreases.

Methods:

- Plant Survey taken at randomly generated plots
- Identified plants utilizing a wetland field guide
- Used ArcGIS to create visual representations of data
- i-Tree Canopy to generate land coverage surveys

Results:

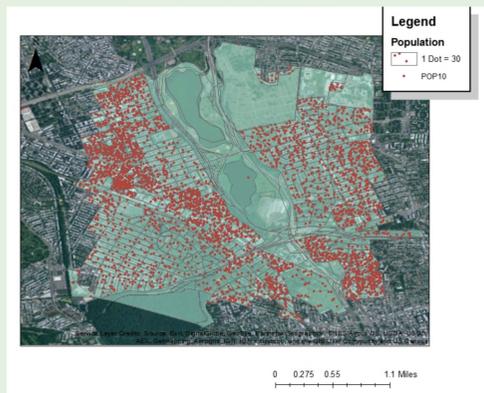


Figure 1: Population Density Map of Flushing Meadows

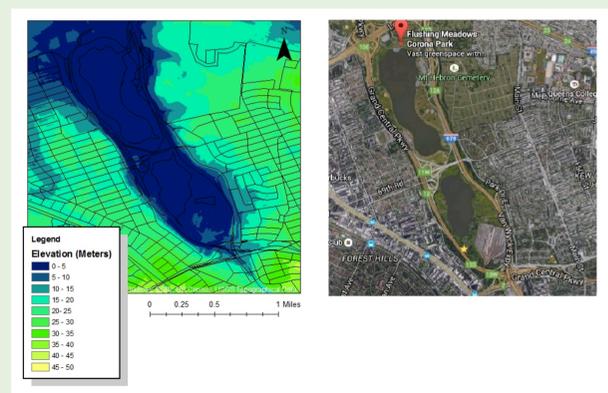


Figure 2: Topographic Map of Flushing Meadows



Figure 3: Population Density Map of the Ramble

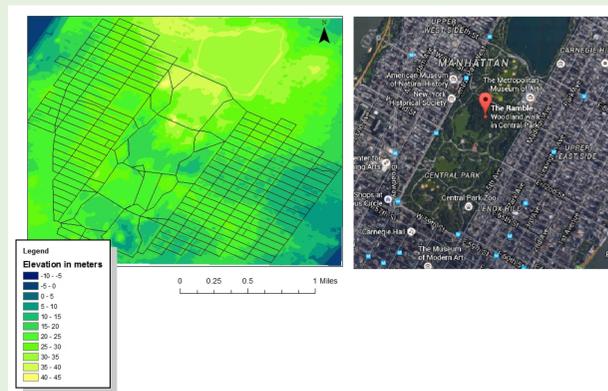


Figure 4: Topographic Map of the Ramble



Figure 5: Population Density Map of Inwood Hill

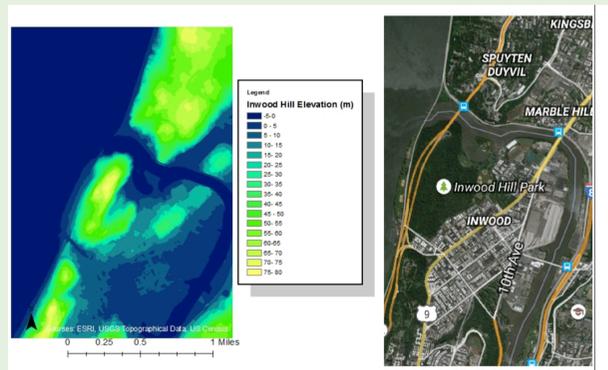


Figure 6: Topographic Map of Inwood Hill

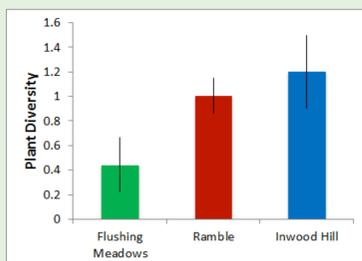


Figure 7: Plant Diversity (Shannon-Wiener Index) in our sites.

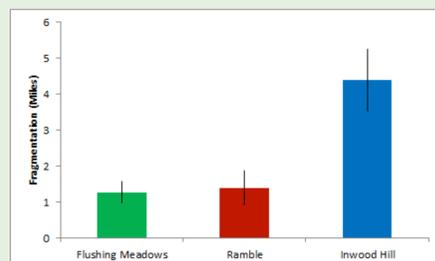


Figure 8: Fragmentation at our sites

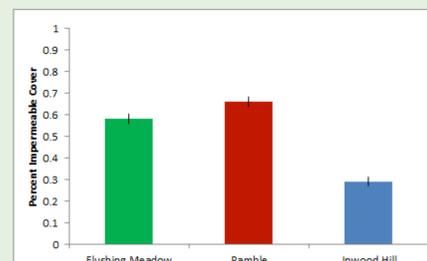


Figure 9: Percent Impermeable Cover

Discussion:

- Population seems to be most dense in Inwood Hill, yet it has the greatest plant diversity.
- There seems to be more fragmentation for places with higher plant diversity, however this is a weak relationship.
- Fragmentation may actually lend itself to helping plant diversity in urban wetlands since there is less chance for invasives to travel between sites.
- Between Inwood Hill and Flushing Meadows, there seems to be a relationship between land coverage and plant diversity.
- Topography can be taken into consideration, since all the sites have different elevation, slope, and shape.

Implications:

- For future studies there should be consistency with sample size, the time each site is studied.
- One recommendation would be to collect information on Invasive Plant Species; it can provide more information on the composition of the plant community.
- Refocus the study to analyze socioeconomic status as a factor.
- A more specific study on the type of wetland (eg: freshwater, brackish or saltmarsh) studied in the particular geographic area.
- Studying the usage of wetlands would be beneficial as well.

Works Cited:

Ehrenfeld, J. G. (2000). Evaluating wetlands within an urban context. *Ecological Engineering*, 15(3), 253-265.
Ellis, E. C., & Ramankutty, N. (2008). Putting people in the map: anthropogenic biomes of the world. *Frontiers in Ecology and the Environment*, 6(8), 439-447.

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