



The Difference Between Artificial and Man-Made Wetlands on Biodiversity



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Introduction

Wetlands are areas of land where water covers the soil either at or near the surface or perennial (lasting year long) and can be either man-made or natural. The importance of wetlands can include flood control, breeding grounds for aquatic animals, a source of water for land animals, and home to all sorts of species.

Research Question: “How does the biodiversity compare between natural and manmade wetlands?”

Experiment

- The independent variable is the type of wetland, whether it is artificial or natural. Other factors, such as geolocation, climate, wetland age, and indigenous wildlife, could affect the wetlands' ability to be biodiverse.
- The dependent variable is the level of biodiversity within the wetland/ecosystem. The level will be quantified by the amount of animal, insect, and plant types (mammal, reptile, amphibian, etc.) and species.
- The control variable will be a natural wetland. Since you cannot make a natural wetland, there are other options. The control will be chosen based on wildlife abundance and overall health.
- The results should consist of graphs and/or spreadsheets with explanations explaining all the different bits of data.

Evidence Summary

This group took 10 papers, two Review Article Analysis, six Research Article Analysis, two Science Communication Article Analysis as our research for this projects. We took one from each category and created a summary.

Review Article Analysis

- One article focused on the ability of anthropogenic water bodies to act as a refuge for native species. They say that what makes a refuge is somewhere native species can go to get away from disturbances and be able to recolonize from the refuge after the disturbance is gone.

Research Article Analysis

- This evidence stated, over the world, man made wetlands are growing while natural wetlands are decreasing. While manufactured wetlands are deep and freshwater, natural wetlands are shallow and saline. Waterbird populations, on the other hand, reflect the physical and chemical characteristics of wetlands.

Science Communication

- This study evaluates the possible nutrient and gas release responses of artificial wetlands and natural wetlands (peatlands) to climate change.

Graph Data

Effects of Biodiversity in Natural Wetlands Versus Man-Made Wetlands

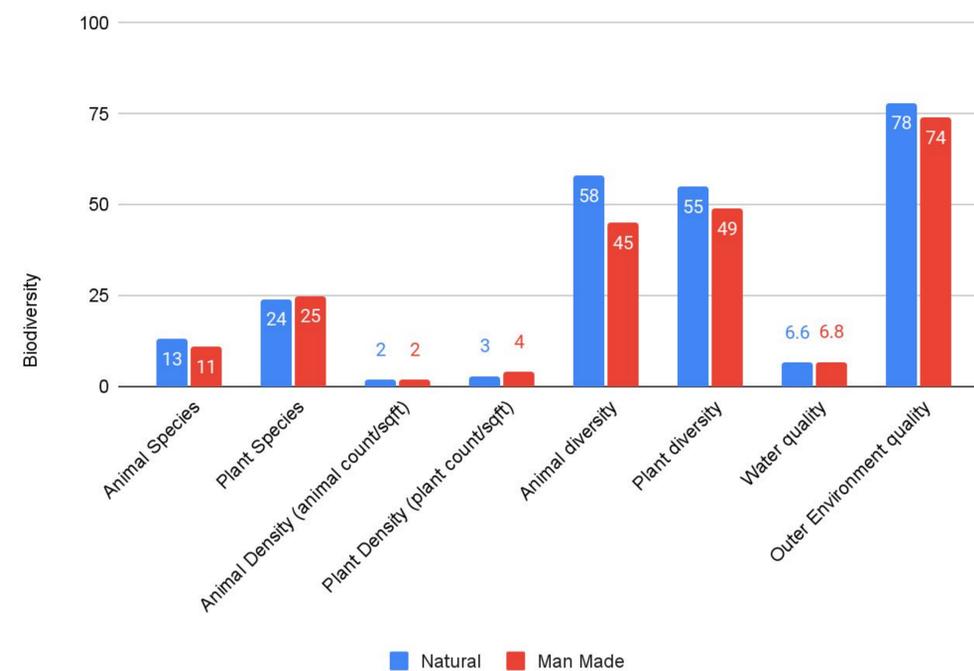


Figure above- The bar graph represents various biodiversity that is necessary for a wetland to thrive. Scientist compared the similar biodiversity within a natural wetland and a man-made wetland. The data shown implies that natural wetlands are higher in biodiversity but not significantly higher than man-made wetlands.

Major Findings from our Summarized Evidence

Review Article Analysis

- “In all cases, the largest limitation to anthropogenic water bodies providing refuges for freshwater biodiversity is the lack of recognition of their actual, or potential, biodiversity value”
- “Generally, habitat in urban, agricultural and industrial landscapes will have simplified structure compared with that in less disturbed landscapes...”

Research Article Analysis

- “Waterbirds are declining around the world because of their dependency on wetlands for survival, reproduction and recruitment”
- “we showed that artificial wetlands, favouring some waterbird species over others, may perform some but not all the functions of natural wetlands”

Science Communication

- “Wetlands exist globally in every country (except Antarctica) and also in all different types of climates. Depending on different definitions and estimates, they cover only about 5–8% of the world's land surface, but comprise 20–30% of the world's carbon pool
- “Found that the production of methane in constructed wetlands would increase under a high water table due to the anaerobic condition of the substrate”

What Does a Wetland Look Like?

Constructed or Man-made Wetland



Natural Wetland



Conclusion

- Artificial wetlands serve as vital habitats for certain species, particularly waterbirds, but cannot fully compensate for the loss of natural wetlands.
- The global decline of natural wetlands necessitates urgent conservation efforts to mitigate the loss of these crucial ecosystems.
- Artificial wetlands, although effective in certain areas of conservation and under the right conditions can match the effectiveness of natural wetlands, ultimately fail to match or exceed natural wetlands.

Citations

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- Shokoufeh Salimi, Suhad A.A.A.N. Almuktar, Miklas Scholz, Impact of climate change on wetland ecosystems: A critical review of experimental wetlands, Journal of Environmental Management, Volume 286, 2021,