A Special Thanks To My Committee

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Problem Statement

The Monk Botanical Gardens is a nonprofit located in Central Wisconsin. This facility lacks educational resources that detail ecological relationships on the grounds. The majority of the educational programs would benefit from having an in-depth interactive tool that explains the biodiversity of flora and fauna and the symbiotic relationships presently active on the grounds.
Visitors are unaware of the biodiverse ecosystem found at the Monk Botanical Gardens, limiting their full understanding of conservation. As a result, these individuals would greatly benefit from an illustrated interactive narrative, linked to the garden’s website, that explores the five ecological relationships: mutualism, commensalism, parasitism, predation, and competition.
The Project

- 2D interactive illustration
- Examines the ecological relationships:
  - Commensalism
  - Mutualism
  - Parasitism
  - Predation
  - Competition
- A varied audience
- Final website, link on the garden’s website, and a sign for the garden
The Website

To use the interactive during this presentation, scan the QR code or visit the URL below

tinyurl.com/ecologicalmonk

Side note: It may take a few minutes to load :)}
Great Blue Heron
*Ardea herodias*

North America, Central America, the Caribbean, and the Galapagos

Height: 3.2 - 4.5 feet
Weight: 4.6 - 5.5 pounds

Predation and competition

Saltwater and freshwater habitats, open fields and grasslands

Least concern, with some of their populations rising due to numerous conservation efforts

**Ecological Relationship Focus**

Cormorants typically inhabit the same wetlands and grasslands as Great Blue Herons. Herons and cormorants will compete for resources such as nesting sites and food. In addition, cormorants have acidic feces that can destroy the vegetation herons use as nesting sites.

**Ecological Relationship Focus**

The great blue heron is considered a predator in the animal kingdom. When hunting, the heron will wade slowly, stalking its prey. Once found, the heron will stab the prey with its bill.
Common Buckthorn
*Rhamnus cathartica*

Native to Europe and western Asia
Invasive species in North America

Height: 20 - 25 ft tall
Diameter: 10 inches

Competition

Forested habitats and grasslands

Least concern, highly invasive species that can destroy and outgrow native vegetation

**Ecological Relationship Focus**

Many plants release chemicals that block the germination or growth of other plants. This process is called allelopathy. Invasive plants have been found to produce more of these chemicals than other plants, which helps them compete and wipe out native plants.
Turkey Vulture
Cathartes aura

Southern Canada, United States, and South America

Height: 2.1 - 2.7 feet tall
Weight: 1.8 - 5.3 pounds

Commensalism and mutualism

Countryside, subtropical forests, shrublands, grasslands, and wetlands

Least concern, with some of their populations rising due to numerous conservation efforts

Ecological Relationship Focus

The turkey vulture shoves their entire head into easily accessible body cavities of decaying carrion. The turkey vultures have a mutualistic relationship with the bacteria in their gut. The bacteria get nutrients from what is being ingested and the turkey vulture gets protection from harmful diseases.

Ecological Relationship Focus

Turkey vultures use their complex sense of smell to locate roadkill. Turkey vultures will locate roadkill or carcasses that have been left behind by other animals. This is a commensalistic relationship.
Barred Owl
Strix varia

Eastern and Midwest United States

Height: 16.9 - 20.0 inches tall
Weight: 1.0 and 2.5 pounds.

Predation, commensalism and competition

Dense, mature forests that have a thick overhead canopy

Least concern, with some of their populations rising

Ecological Relationship Focus
Spotted owls share nesting sites and have the same prey as barred owls. But, barred owls can be aggressive and will compete out spotted owl populations. This relationship is an example of interspecific competition.

Prey of the Barred Owl
- Eastern Grey Squirrel
- Sciurus carolinensis
- Mice musculus

Barred owls are considered a bird of prey, or a predator. They seek prey from a perch and are often seen flying low through the forest. Their diet consists of mainly small mammals like mice, squirrels, rabbits, oppossums, and some frogs, snakes, and insects.
Common Greenshield Lichen
*Flavoparmelia caperata*

- **North and South America, Europe, Asia, and Australia**
- **0.1 in to 0.3 in**
- **Mutualism and commensalism**
- **Forests and temperate woodlands on trees and rocks**
- **Threatened by pollution, habitat loss, and climate change**

**Ecological Relationship Focus**

Lichens are made up of a fungus and a photosynthetic organism, like algae or a cyanobacterium. The fungus grows around the algal cell, receiving a constant supply of food produced by the algae. The algae receives water and nutrients absorbed by the fungus. Both organisms benefit from this mutualistic relationship.
Ghost Pipe  
*Monotropa uniflora*

**Ecological Relationship Focus**
Ghost pipes are considered a parasitic plant. Since they do not undergo photosynthesis, they take their water and nutrients from connections to fungi, like *Lactarius fumosus*. The fungi is a host for the ghost pipe. The fungi that ghost pipes associate with are *ectomycorrhizal*, meaning they do not penetrate their host’s cell wall.

**North America except for the Rocky Mountains**

**4.0 - 8.0 inches tall**

**Parasite**

**Shaded woods with moist soil**

**Least concern with stable populations**
Groundhog
Marmota monax

North America

Length: 16.0 - 20.0 inches
Weight: 6.0 and 14.0 pounds

Commensalism

Terrestrial habitats, primarily in forests and grasslands

Least concern, with a stable population.

Habitat Focus
Groundhogs use their sturdy claws to dig through the earth, building complex underground burrows. These burrows can be identified by a large mound of dirt at the entrance of the hole. There are several rooms, including a bathroom and a den. They use these burrows for sleeping, raising young, and hibernating.

Ecological Relationship Focus
Groundhogs have a commensalistic relationship with multiple organisms. They build complex burrows that other organisms, like snakes, frogs, opossums, skunks, and foxes, use as shelter in times of need or the presence of a predator. One organism benefits while the other is not affected.

Burrow Borrowers
Common Garter Snake
Thamnophis sirtalis
Giant Water Bug
Lethocerus americanus

- Southern Canada and North America
- 2.0 - 2.4 inches in length
- Predation
- Ponds, marshes, the edge of lakes, and slow-moving creeks
- Least concern with steady populations

Anatomy Focus

Ecological Relationship Focus
Giant water bugs are predators. When hunting, giant water bugs lie low to the bottom, motionless, waiting for their prey to swim by. Once they strike their prey, the giant water bug injects venomous digestive saliva with their rostrum.
Painted Turtle
Chrysemys picta

North America, Southern Canada, and Northern Mexico

Length: 3.5 - 10.0 inches
Weight: 11.0 - 18.0 ounces

Predation and mutualism

Ponds, lakes, marshes, and slow-moving rivers with muddy bottoms

Least concern, with some populations rising due to conservation efforts

Ecological Relationship Focus
Painted turtles have a mutualistic relationship with the common snapping turtle. Common snapping turtles frequently are covered in algae and leeches. As omni-vores, painted turtles frequently eat the algae and leeches off the common snapping turtle. The painted turtle gets a meal and the snapping turtle gets a cleaned shell or body. Both species benefit from this relationship.

Ecological Relationship Focus
Painted turtles are considered predators in the animal kingdom. They are omni-vores, so their prey includes both plants and other animals, like tadpoles, insects, small fish, crustacean, and algae.

Prey of the Painted Turtle
Canada Darner Dragonfly
Aeshna canadensis
Monarch Butterflies
Danaus plexippus

North and South America

Wingspan of 3.0 to 4.0 inches

Mutualism, and parasitism

Open fields and meadows with a dense flower presence

Endangered, with numerous conservation efforts in place to try and increase their populations

Ecological Relationship Focus

There are multiple parasitic species that use monarch caterpillars as their host, like tachinid flies. The fly injects its eggs into the monarch caterpillar, growing inside the caterpillar. The tachinid larva will eat the caterpillar from the inside out. Eventually, when the caterpillar goes to make its chrysalis, it dies and the fly larva emerge.

Ecological Relationship Focus

Monarchs obtain nectar from many types of flowers, including swamp milkweed. Pollen rubs off onto its body and then the monarch travels to another milkweed, where the pollen from the first flower fertilizes the second flower. This is an example of mutualism; both organisms benefit from the interaction.
Smooth Turtle Leech
Placobdella parasitica

North America

Length: 0.3 to 3 inches

Parasite

Freshwater sources, mainly staying low to the murky bottom of ponds

Least concern, reproducing rapidly and in high numbers

Anatomy Focus
When the leech goes to feed, it anchors itself to the host by pressing its mouth against the surface of the host’s body. It then releases an anesthetic that desensitizes the surface so it can go unnoticed for a longer period of time.

Ecological Relationship Focus
The smooth turtle leech is a segmented parasite that spends most of its time on the bottom of murky ponds. The common snapping turtle glides along the bottom of ponds, making it the perfect host for leeches.
**American Bullfrog**
*Lithobates catesbeianus*

North America, parts of Canada, parts of Mexico, and Cuba.

Length: 3.5 - 8.0 inches
Weight: 1.5 lbs

Predation and competition

Freshwater habitats, like lakes, ponds, and marshes

Least concern, invasive in certain parts of the world

**Ecological Relationship Focus**

When two organisms from different species compete for resources, they exhibit interspecific competition. American bullfrogs compete with other organisms, like painted turtles, for resources in their ecosystem.

American bullfrogs may also compete with other amphibians, birds, and fish.

Press play to hear their mating call.
Want to learn more about the wildlife at the garden?

Scan this QR Code

or type in this URL: tinyurl.com/ecologicalmonk

There are a variety of organisms at the garden. This activity will give you a little more insight into the life of these organisms and what you can do to help them.

This project was created by Chyna LaPorte for her senior thesis project.
Thank you!
Chyna LaPorte  
IME402 - Biomedical Art  
Artist Statement 

“Ecological Relationships at Monk Botanical Gardens” Artist Statement

Up to this point, my professional career as a Scientific Illustrator has been marked by a fascination with life science, environmental education, and science communication. I have spent the last two summers interning at the Monk Botanical Gardens where I was first their horticulture intern and then their education intern. I spent the entire summer digging in dirt, finding bugs, watching snakes slither by, and at the same time, showing children from the ages of 3-12 all of these fascinating critters. I got to explain to them what makes a plant an invasive species and show them how buoyancy works with leaf boats. During all of this, I was creating interactive booklets and signage for the garden. I had the opportunity to educate a wider audience verbally and through my illustrations, while sharing my passion for nature and the environment.

For my senior thesis project, I combined my passion for nature, the environment, and my experiences with my scientific illustration techniques to create a unique interactive experience for visitors of the Monk Botanical Gardens. I explain the five main ecological relationships (mutualism, commensalism, parasitism, predation, and competition) through twelve interactive asset pages, alongside an opening mural of the garden. This establishes a setting for the project that is familiar to the users and is visually stunning. In addition, a sign was created that features an image from the project, a qr code, and a link to the interactive, that can be installed alongside the pond at the garden.

Each asset page has an explanation of the ecological relationship, in addition to information on the geographic range, size, habitat, and conservation status of the species. The twelve asset pages featured are: great blue heron, common buckthorn, turkey vulture, barred owl, groundhog, monarch butterfly, bullfrog, ghost pipe, lichen, giant water beetle, painted turtle, and common turtle leech. Along the side, there are 8 buttons that take the user home, to a glossary, to the garden’s website, to a map of the garden, to the credits page, a help page, the sources, and a trophic level illustration. The trophic level illustration features all organisms in this project and where they fall in a food web.

Throughout the project, I used my skills as a scientific illustrator to research, illustrate, and code a complex topic, making it approachable for a wider audience. The illustrations have a whimsical feel while being scientifically accurate and educational all while representing the garden.