Educators Guide

to the

Reptiles Alive Assembly Program:

"Wetland Reptiles Alive!"

Young slider turtle basking on a log.

Click HERE to Book Your "Wetlands Reptiles Alive!" Show

Program Overview

"Wetland Reptiles Alive" is an educational live animal show exploring various wetland habitats. The audience will discover how wetland reptiles and amphibians adapt to the many challenges that come with living in aquatic environments.

This guide provides materials that will aid students in getting the most out of the "Wetland Reptiles Alive!" program and includes: wetland and animal facts; vocabulary; and suggested resources and activities which can be adapted for different grade levels.

Below is a list of possible animals your audience might meet during this program:

Depending on the duration of your program, students will meet 5-6 animals (30-minute show) or 7-8 animals (45 minute show). Keep in mind that listed animals are subject to change and animals not listed here may be substituted.

For more details on individual animals, visit our animals page, or, click on each species listed below:

Amphibians (2-3):

American Bullfrog

American Toad

African Bullfrog

Argentine Horned Frog

Spotted Salamander

Crocodilians (0-1)

American Alligator or Alligator Puppet

Lizards (1-2)

Plated lizard

Savannah Monitor

Iguana

Snakes (1-2)

Boa Constrictor

Burmese Python

Corn Snake

Eastern Rat Snake

Turtles (2-3)

Common Snapping Turtle

Diamondback Terrapin

False Map Turtle

Spotted Turtle

Types of Wetlands

A group of kayakers explore a tidal freshwater wetland.

A wetland is a habitat that is dominated by water. In a wetland, plants have to be designed to survive submersion without drowning. Some wetlands are dry for part of the year, but at some point, the soil is completely saturated. There are many types of wetland, defined by the type of water, the duration of saturation, and flow.

Wetlands can be freshwater, saltwater, or brackish water, which is a mixture of fresh and salty water. The biggest wetland habitats are coastal zones. These include beaches, river deltas, and marshes. Most of these are salt or brackish water. Freshwater wetlands include lakes, ponds, rivers, and swamps.

Green sea turtles bask on volcanic rocks in Hilo Bay HI.

Life in wetlands has many challenges to overcome, so each environment will have a different composition of plants. Plants in constantly flowing water require deep, strong root systems. Wetland plants' roots are submerged in water-logged soil, with little exposure to oxygen, so most have oxygen reserves in their stems. Roots that sit in salty water face even more challenges. Plants absorb water through their roots, but salt water pulls fresh water out of their roots. Marsh plants combat this by having a type of suction system for pulling in water and expelling salt.

Animals also have to be adapted for wetland environments. Most lizards and snakes that live in aquatic habitats are both excellent swimmers and climbers. Water monitors have long, streamline bodies for hunting fish and sharp claws for racing up trees. Aquatic turtles are designed very differently than land turtles. Their shells are typically flatter and smoother for better hydrodynamics. They also have webbed feet to swim quickly.

Crocodilians, including caimans, alligators, gharials, and crocodiles, are perfectly adapted wetland reptiles. Their webbed feet and long, powerful tails allow them to swim over 20 mph. With their eyes and nostrils on top of their heads, they can spend an extended amount of time submerged while hunting and resting. They even have a flap in the back of their mouth that blocks water from going into their lungs when they catch prey. One of the most impressive thing about crocodilians is their immune system. Because of their rough, dangerous lifestyle and high microbe level habitat, they are immune many types of bacterial infection.

Amphibians inhabit almost every freshwater wetland habitat in the world. Frogs and salamanders require healthy, clean aquatic communities for a majority of their life cycle. Amphibian eggs are jelly like and do not have shells and therefore can't survive out of water. For most species, the entire reproductive process takes place in the water. The name amphibian comes from the two life stages that they experience, one half in water and the other half on land. Most juvenile frogs, toads, and salamanders are designed to survive in the water, with gills for oxygen exchange. However, this adaptation is not permanent and is lost during the animals metamorphosis stage, when the animals slowly change to a terrestrial lifestyle. Many adult amphibians still stay close to water. Their skin is thin, highly porous, and covered in mucus so it must stay moist to allow for oxygen exchange.

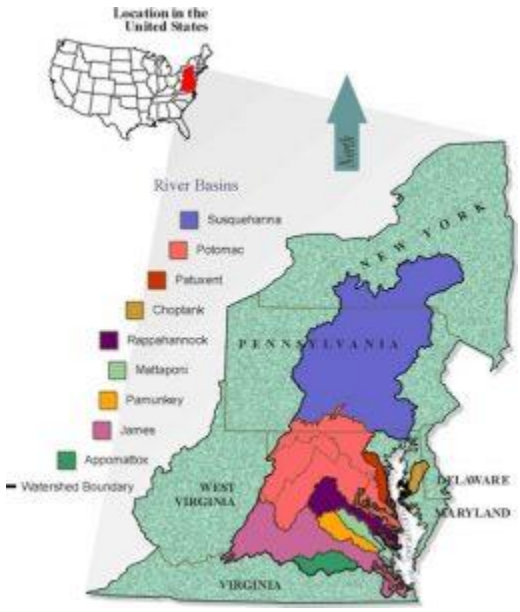
These wood frogs eggs have been laid in a vernal pool type of wetland.

Critical Habitat

Wetland systems are not only important to the plants and animals that live in them, but to all life on Earth. The water cycle ties all living things together by providing the necessary precipitation to different climates. Through this cycle, all wetlands are tied together, because water that evaporates from a mountain stream may eventually fall as rain in a parched desert.

Many wetlands are connected physically as well. The rivers, streams, ponds, lakes, marshes, swamps, and estuaries make up large, mappable areas called watersheds. A watershed is a zone of land where a drop of water can fall anywhere and will eventually end at the same point of entry into the ocean. For example, here in the Northern Virginia, Maryland, and DC area, all the rain and snow that falls will eventually flow into the Chesapeake Bay through connecting rivers and streams. However, this is only true of the precipitation that falls on the eastern side of the

Appalachian Mountains. Anything that falls on the western slopes of the mountains will instead flow west, eventually into the Mississippi River.



Map of the Chesapeake Bay watershed.

Because of the interconnectedness of water systems, events in one location can have dramatic impacts on a very large area and a broad community of life. This is why wetlands are so vulnerable to a variety of threats that can damage and destroy the life in them. Damage to even a single wetland has an impact on the rest of the system, including areas that may be thousands of miles away.

Threats

Wetlands cover between 4-6% of all land on the planet, and because of the water cycle, most of our land masses are affected by the health of the wetlands. There are many threats to our water systems.

The most commonly known threat is **pollution.** There are two kinds of water pollution, physical and chemical. Physical pollution is, quite simply, garbage. Aquatic life can get tangled up or choked by the trash that ends up in wetlands. Chemical pollution can come from many different sources. Chemicals from cars and road maintenance runoff into wetlands when it rains. Fertilizer, pesticides, and herbicides don't stay in farm fields either. Precipitation pushes these chemicals into surrounding streams and other wetlands. Other sources of chemical pollution include oil spills, industrial waste, and improper disposal of household chemicals. Natural disasters like storms and floods can exacerbate both physical and chemical pollution.

Erosion is also a major threat to aquatic systems. When soil gets pushed into the water, it can cause all kinds of problems. The obvious problem is how the soil can fill in waterways and disrupt waterflow. Wetlands are very balanced systems and can be very delicate. Waterflow, sunlight, and nutrient content need to stay in certain parameters for the plant and animal life to stay healthy. When a high amount of soil ends up in the water, it brings nutrients from the surrounding land. While high nutrient content might sound like a good thing, it can change the concentration of necessary nutrients and cause algae to bloom, reducing the oxygen content in the water. Erosion can also reduce the amount of sunlight that can filter through the water to submerged plants. Less healthy submerged vegetation leads to fewer healthy animals that feed on them. Erosion is most frequently caused by human development and expansion.

Another threat to wetland ecosystems is **invasive exotic species.** In the modern age of growing international commerce and travel, it is very easy for plants and animals to accidentally travel. When a non-native species ends up in any wetland habitat that it doesn't belong in, it can potentially thrive if the conditions are right. These non-native plants and animals are in a foreign environment away from their native pest and predator species. As long as they can get a foothold, their populations can increase rapidly and they can outcompete native species for important resources.

Conservation Efforts

Because wetlands are so vulnerable, many of them are at risk of being damaged or destroyed. The good news is that because most of the threats to wetlands are caused by humans, they can be fixed by humans too. The first step to repairing a wetland is to determine how much damage has been done. After an initial visual scan, biologists will do an assessment of the species that are present and absent. This is because some species are more sensitive to change than others. The most sensitive species are called indicator species, because they indicate the health of the habitat. Amphibians are very reliable indicator species because of their sensitive skin. Amphibians breathe and drink through their skin, so any small chemical change in their environment can make them ill, causing them to either die out or migrate away. Therefore, their absence indicates that the habitat is in need of repair.

Wood frogs and other amphibians can "breathe" through their skin and are sensitive to toxins in the environment.

Conservationists realize how valuable wetlands are and and how their health impacts us all. Clean up efforts are a regular measure made toward removing physical pollution from aquatic environments. Some wetlands are easier to clean than others based on size and accessibility. Chemical pollution is harder to clean up. Measures often include some kind of filtration and neutralization using other chemicals.

Most wetlands come with their own natural method of filtration. These natural barriers are known as riparian areas and are often filled with strong, hardy vegetation. These plants catch physical debris before it enters the water system. They also filter the water with their roots. The roots also serve an important role in keeping the soil stable and preventing erosion. Sometimes, in areas with high density of human development, riparian areas are damaged or eliminated all together. Conservation efforts to restore or rebuild riparian areas are critical in maintaining clean and healthy wetland systems.

Prevention, while expensive and labor intensive, is more effective in the long run than repeated clean up efforts. Legislation has been passed in the form of the Clean Water Act in 1972 to manage the discharge of pollutants into waterways. Since then, corporations and development companies are required to filter and minimize their discharge. Awareness campaigns are also a critical part of public efforts. They encourage the general public to care about their wetlands and make conscious decisions to make a difference. People can help by choosing environmentally conscious companies for food, materials, and even housing. Also recycling garbage and reducing the amount of non-recyclable material has a huge impact on physical pollution. People can reduce water waste in their own homes by using less water while washing dishes, clothes, and even themselves. Water is a precious resource on our planet. It is our responsibility to protect it and the organisms that call it home.

Activities

Study Wetland Plants

Wetland plants come in all shapes and sizes. They serve many different functions in their wetland habitats.

1. Acquire cases of flowers of your choosing from your local nursery. Help your students gently remove the plant and roots from their containers. Have them make observations about the roots, especially how they hold the soil.
2. Use large construction paper to make different shaped leaves. Help your students study the different benefits and challenges to each leaf shape. Look at the way they would blow

in the wind, how much light they would absorb, and the kind of shelter they might provide other life.
3. Provide white carnations and celery stems for your students. Fill vases or tall cups with water and the student's choice of dark (red or blue) food coloring (green and yellow do not work well). Use the food coloring to dye the water until it is relatively translucent (20-30 drops) and place one carnation and one celery stem in each cup or vase. Over the next couple of days, help your students observe the change. The celery stem will show colored veins transporting the water to the leaves. The carnation will display the color in the petals.

Amphibian Skin

Amphibians make great indicator species because their skin is so sensitive. The permeability of their skin can be challenging to visualize.

1. Cut up thin pantyhose/tights into roughly 4" x 4" squares, making enough for your students to work in pairs.
2. Have the students take turns holding the material vertical while the other blows air through the fabric into their hand.
3. Have the students take turns holding the material horizontal while the other pours water onto and through it. This part is best done outside or over an empty bucket.

Recycling

A child is never too young to learn about how to recycle and the benefits recycling provides to our planet.

1. Make fun-looking flashcards with images of typical household items that get thrown away. These can include newspaper, bottles, food, and cans. Help your students figure out which items can be recycled and which must be thrown away. Make sure they notice how little actually ends up being thrown in the trash.
2. Collect the scrap paper, including construction paper and newspaper, that your class would ordinarily recycle. Have your students cut them up into small (roughly 1" x 1") pieces, they don't need to be perfect. Soak these in water for at least 10 minutes and then have your students use their hands to mix, blend, and break down the paper. The teacher/adult can then take the mixture and blend it further in a blender or food processor. Place a window screen on top of a towel and then dump the paper pulp onto the screen. Using a smooth (not fuzzy) towel, have the students take turns pressing the water out of the pulp. Once the patties are thoroughly rung out, flip them onto a solid surface such as a counter or a cutting board. Let them dry for a few days and then allow your students to use the paper for future projects.

Resources

How can students learn more about reptiles & amphibians?

There are many ways students can pursue their interest in animals and learn more about reptiles and amphibians.

1. Visit your local library for great books about herps.
2. Take a trip to a nature center, museum, zoo, or aquarium. Be sure to read the information about the animals on display. There are usually staff members available to answer your questions.
3. Check out nature and animal programs that are offered at nature centers, libraries, and other venues across the area. Visit the website of your local nature center or library for a list of upcoming programs.
4. You can email animal questions to Reptiles Alive LLC: reptilesalive@gmail.com

How can students help reptiles and other wild animals?

The best way students can help reptiles and other animals is to educate themselves about wildlife and then teach others what they have learned. People are more likely to care for and respect animals they understand - education leads to conservation.

How can students become Zoologists or Herpetologists?

A great link to learn about how one develops a career in herpetology is at https://ssarherps.org/all-about-herps/how-to-be-a-herpetologist/

Glossary

A

Abiotic - Any non-living thing.

Adaptation - Any change that improves a living thing's chances of survival.

Amphibian - A category of vertebrate animal that is characterized by thin skin covered in mucous, and part of life spent in water.

Aquatic - Having to do with water, usually referring to something that lives in the water.

B

Biotic - Any living thing.

Brackish - Water that occurs at the junction of fresh and saltwater.

E

Estuary - The ecosystem where a river meets the ocean.

Ecosystem - A habitat in which biotic and abiotic factors interact.

H

Hydrodynamic - The way an object moves in water.

I

Immune System - The way a living organism's body fights sickness or disease.

Indicator Species - A plant or animal that gives biologists an understanding of the health of an ecosystem.

M

Marsh - A salty wetland habitat that is affected by the tides.

Metamorphosis - The process of change experienced by many animals, including amphibians.

Migrate - To move from one habitat location to another.

N

Nutrient - An element or compound that is needed for plants and animals to function.

P

Pollution - Garbage or chemicals that can be damaging to an environment.

Precipitation - A part of the water cycle in which water condenses in the air and falls to the ground.

R

Riparian - Habitat that borders a wetland.

S

Swamp - A forested freshwater wetland.

T

Terrestrial - Having to do with land, typically referring to something that lives on land.

W

Watershed - An area of land in which all water will eventually flow toward the same point.

Wetland - A habitat in which the soil is completely saturated with water for an extended period of time.

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