

Understanding and Conserving Wetlands

Francisca Eunice G. Rebullida
Codwell Elementary School

INTRODUCTION

The suburbs are one of the best places in which to live. However, in the past few years the development of housing projects around Houston has been so rapid that natural habitats are vanishing almost overnight. Nature is trying to survive. The trees have been cut down, and animals are found dead on the road because their habitat has been destroyed. The animals continue to look for a new habitat for their survival. When I drive in the suburbs, I sometimes see a group of turtles or ducks or geese crossing the road. Gone are the frogs that used to come around the yard after heavy rains. Are human beings nature's enemy? The natural wetlands that used to be found in the suburbs are gone, replaced by houses and convenience stores.

One common but threatened wetland type in Texas is the playa, sometimes described as a magical habitat. According to Nickens:

The playa lakes seem to come out of nowhere, suddenly emerging with a passing shower. Shrouded in mystery, they are almost North America's most important and imperiled wetlands, providing critical resting and foraging habitat for more than a million migrating shorebirds, ducks, geese and strong birds. Gone tomorrow... Dry most of the year, playas are vital catch basins for the rains that rejuvenate the arid Southwest and southern plains of Texas. Largely taken for granted, and increasingly defenseless against destruction, these wetlands provide vital habitats for thousands of sand hill cranes and other birds.
(42)

This description of the playas resonates with me but will not with my students. Most of my students have not noticed the plants and animals in local ponds and bayous, and in general are unfamiliar with natural habitats. This unit will introduce students to wetland habitats in the Houston area and will develop their interests in protecting nature.

This lesson is written for ESL students from grades 3-5. It could be modified for students in mainstream classes. The curriculum unit will take about two to three weeks, during which I will be teaching them science/ESL for 45 minutes each day.

OBJECTIVES

In compliance with HISD's Science CLEAR Curriculum, the learning focus of the second semester (third nine weeks) of fifth grade is Ecosystems. The students will investigate habitats, biomes, and ecosystems. According to the Horizontal Alignment Planning Guide for the third nine weeks, there are eight key concepts: first, survival in organisms; second, symbiosis; third, energy flow in food chains; fourth, food webs; fifth, **habitats**; sixth, predator-prey relationships; seventh, ecosystems; and eighth, nitrogen, carbon, and water cycles. This curriculum unit focuses on the fifth topic (habitats).

The goal of the unit is for the students to first understand the wetlands habitats and then learn how to conserve them. Thus, this curriculum unit both covers the ecosystem learning focus and introduces one of the concepts for the third nine weeks (habitats). The first part of the unit will

focus on understanding the wetland habitat, and the second part will focus on how to conserve the habitats. Science and language arts will be integrated throughout my unit. This lesson will meet a number of TEKS and English as Second Language (ESL) Objectives. These will be my objectives. The students will be able to:

- TEKS Science 5.2.01 Describe some structures and processes that are found in a simple system including structures of a plant and processes in plant growth.
- TEKS Science 2.04 Describe cycles (including the water cycle) structures and processes found in a simple system such as an ecosystem.
- TEKS Science 5.2.06 Describe and compare life cycles of plants and animals.
- TEKS Science 5.2.07 Identify any actions that require time for changes to be measurable including growth.
- TEKS Science 5.2.11 Compare the adaptive characteristics that result in an organism's unique niche in an ecosystem.
- ESL.A5.2.11 Use strategies before reading (skim, scan, preview text; question purpose and expected outcome, activate prior reading knowledge) and during reading (text coding/margin notes, use of pictures, graphics, cognates, and other contextual clues, visualization, prediction cycle, self-questioning) to enhance the comprehension of appropriate language proficiency level texts with teacher support when needed.
- ESL.A5.2.21 Develop and revise relevant questions pertaining to a specific topic before, during, and after reading multiple print resources independently with teacher support when needed to research a variety of topics (of personal and academic importance).
- ESL.A5.2.15 Identify cause-effect relationships concerning character traits, motivation, plot line, conflict and relationships in fictional texts that are at appropriate language proficiency level with teacher support when needed.
- ESL A5.2.16 Use single or multiple appropriate level sources/paired texts to draw inferences (predictions, conclusions, generalizations) from explicit textual visual information including the underlying themes, and support them with textual evidence, with teacher support when needed.

RATIONALE

I have observed many new housing developments being built around Houston. Developers are cutting trees and bushes down. The animals that lived in these areas have to find new places to live. The natural wetlands are slowly getting polluted with car fluids, lawn pesticides, and fertilizers. This curriculum unit will introduce students to wetland ecology and how they can take care of the environment. Teaching students about these topics will help them become interested in wetland preservation and restoration. I hope that the lessons will not only give the students knowledge of scientific concepts but also encourage them to become good stewards of nature. A good steward of nature has the ability to think and find ways to protect and preserve the natural world from pollution or destruction caused by human activities. Thus this lesson will emphasize both science and stewardship.

This unit will help the students in learning English as a Second Language and will help them gain cognitive academic language proficiency in the areas of listening, speaking, reading, and writing. Reading about wetland habitats, how they work, and how to conserve them will help the students increase their science and reading vocabulary, decoding skills, and comprehension skills, and will improve their sentence structure. Also, they will learn the scientific concepts relating to wetlands. This is important because wetlands are such a common part of the natural landscape in the Houston area. In addition, these wetlands are under increasing pressure from development. A

year ago there were hardly any houses near the bayous that surround the school. However, in the last few months one can see the new houses sprout like mushrooms.

This unit will help the students understand and identify different types of wetland habitats. The students will realize that wetlands (especially bayous and ponds) are common in their neighborhoods and will learn how to help conserve them.

One of the questions that I will ask the students is what kind of plants and animals live in their housing area. The next question that will be asked is what the students can do to help conserve/protect the plants and animals. The students will know that they have valuable treasures in their own neighborhood. The students will be aware of their surroundings and think of ways to conserve their surroundings. No matter how simple these solutions are, the students will be able to take small steps to conserve or protect nature. Our discussions about wetland science and conservation will raise the students' level of awareness. The students will then be motivated and able to show other people how to take care of wetlands in their housing area.

“Habitat” is defined as the local environment in which a particular organism lives (Morgan 84). The diversity of habitats within the ecosystem is enormous. The students will realize that their own neighborhood is actually a habitat. Ponds, bogs, and bayous are places where certain species of plants and animals interact. Wetland habitats are particularly important habitats for conservation because they support a group of species that live nowhere else.

Students will learn that in order for these fish, frogs, turtles, rabbits, squirrels, birds, and snakes to survive, they require water, food, shelter, and a place to raise their young. Certain animals have specific needs. For example, rabbits eat plants. They need plants for food. Perhaps there are coyotes in the bushes or forested area waiting to catch rabbits for food. The coyotes need the rabbit for food. And the coyotes need the plants because plants keep the rabbits fat and healthy. The students will understand that habitats can be changed by animals, humans, and other forces such as climate. When habitats change, the plants and animals change, too. Thus, if wetland habitats change too much, the species that used to live in them may be lost.

The most important lesson that the students will learn in this unit is to respect and take care of nature. They will acquire academic knowledge in science and integrate this in their English as a Second Language acquisition in the areas of listening, speaking, reading and writing.

UNIT BACKGROUND

Wetlands are defined in state law as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. The major wetland ecosystems of Texas include coastal marshes and estuaries, forested scrub/shrub, tidal flats, bottom land hardwoods, and the playa lakes concentrated in the Panhandle (“Wetlands” Texas Environmental Profiles 1).

Humans can have overwhelming destructive impacts on natural habitats. For example, many years ago rabbits were imported into Australia with serious consequences. In their new habitat, the rabbits were outside of their old food web. They had no enemies to eat them, and the rabbit population grew enormously, severely overgrazing huge areas. The Australian government now spends millions of Australian dollars each year to control the rabbit population. As we have become more aware of how we can inadvertently destroy natural habitats, this is now the time to teach students the importance of natural habitats and how people can help conserve nature. In this unit, I will integrate science with reading and language arts by having the students read science-related texts written by Joanna Cole: *The Magic School Bus Takes a Dive*, *The Magic School Bus Takes a Hop*, *The Magic School Bus Gets Eaten* and Megan McDonald's book *Judy Moody Saves the World!* In addition, the fifth grade science textbook will be used in the curriculum unit.

My lesson plans include five parts, which are often woven together in individual lessons.

Part I: Introducing Habitats

This unit will have five parts. *The Magic School Bus Hops Home* will be the first book that will be read to the students by the teacher. This book will be the springboard for the first topic, habitats. Vocabulary words such as habitat, insects, heron, and pond will be defined. Comprehension questions in reading and science will be answered. The students will make a diorama, a miniature replica of a bullfrog's habitat. Another extension activity will be for the students to create a controlled environment for a bullfrog in the science lab. Also, the students will create wetland aquariums. There are several choices: the bog, the pond edge, the drainage ditch, etc. In the case of the pond and drainage ditch aquariums, the students could stock them with plants and animals that they collected themselves. In the case of the bog aquarium, the students would have to pay for the predatory plants and these plants may require good care in order to survive. So this option should only be chosen if the resources are available.

The Magic School Bus Hops Home

Ms. Frizzle's students describe her as the strangest teacher in their school. She wears weird clothes and invents crazy projects. One day she is acting like a normal teacher but until one of the students, Wanda brings her best friend, Bella the frog, to school. Ms Frizzle begins teaching her students what a bullfrog needs in her home or habitat. The class and Ms. Frizzle start building a habitat for Bella in the science lab so that she has a safe place to sleep, water, food and fresh air. Suddenly Bella hops out of the window.

To find Bella the bullfrog, Ms. Frizzle gets an idea! She decides to go on a field trip with her class. They all climb aboard the magic school bus. Ms. Frizzle tells the class that the best way to find a frog is to be a frog! The old school bus starts spinning and hopping away like a frog. Ms. Frizzle and her class go to the woods toward a fast running creek, through the stream, onto dry land, and to a big pond where they find Bella.

Science Textbook

After the introduction, the students will read through the section on habitats in their *Fifth Grade Science* and answer the study questions. The students will find the vocabulary words, decide the main idea with supporting details, and then write a summary on each habitat.

The Magic School Bus Takes a Dive

The students will read this book with the teacher. This story is also about Ms. Frizzle and her class. She assigns her students a science project to do research on coral reefs, because the class is building a model of a coral reef in a fish tank. One of her students, Dorothy Ann, comes to class with a treasure chest that she made for the class. That reminds Ms. Frizzle of her treasure map, a map of a real place with a real coral reef. She has another fantastic idea! Ms. Frizzle is going to take her class on a field trip to the coral reef. The students discover that there are lots of different kinds of fish and invertebrates living in a coral reef, such as hermit crabs, sea anemones, pistol shrimps, goby fish, sharks, remoras, copepods, and the reef corals.

The class inspects different parts of the reef with their mega-magnifiers. They find out that a coral reef is really a limestone skeleton built by little animals. These little animals are called polyps. They build new coral all the time. The class builds their own coral reef on site. When it is completed, Ms. Frizzle's students return to the old school bus and travel safely back to the classroom.

The teacher will read to/for the students. The teacher will do before, during and after reading activities. Before reading the students will define words such as coral reef, sea anemones,

remoras, copepods, polyps, algae, and symbiosis. During reading, the teacher will ask comprehension questions. After reading, the students will summarize the text.

This reading will be followed with one or more science activities. A large number of activities are possible, and The Magic School Bus website is a good resource for activities that relate to the lessons. After reading *The Magic School Bus Takes a Dive*, the parents and students will go on a field trip. This trip will be an outdoor adventure for parents and students.

Part II: Field Trips

The students will go on several field trips during school hours. They will go to the small wetland habitat that is on our school grounds in the playground. The students will observe and investigate the different plants and animals that are found in our school's wetland habitat.

With the help of their parents, the students will also go to a nearby bayou in the neighborhood. Houston has four major bayous passing the city: Buffalo Bayou, White Oak Bayou, Braes Bayou, and Sims Bayou. Buffalo Bayou runs through downtown and the Ship Channel. White Oak Bayou runs through the Heights and toward downtown. Braes Bayou runs along the Texas Medical Center. Sims Bayou runs through the south of Houston and downtown Houston. Finally, the class will take a group field trip to Offatts Bayou in the City of Galveston.

The field trips will culminate the end of each lesson. The goal of the field trip will be to enhance students' understanding of science and conservation. For example, after the lesson on *The Magic School Bus takes a Dive*, one of the most interesting places in West Galveston is the Galveston Island State Park Habitat Restoration Project (GISP). It is one of the largest restoration projects in the Galveston Bay Complex. The GISP plan and restoration project focuses on restoring smooth cord grass (*Spartina alterniflora*) with some high marsh and some sheltered water and is expected to support sea grasses. The goal of this project is to enhance 750 acres of shallow water habitat and restore approximately 115 acres of estuarine wetland habitat. In addition to the Galveston Island State Park restoration project, the students will see the terraces constructed in the region where original marshes have been lost. The project is enhancing the terrestrial and aquatic wildlife in the area.

Field trips must be well planned. Here are suggestions on how to plan a field trip. Students and teachers together will set up the field trip's goals. For example, the students will be able to increase their knowledge of the concept of wetlands, observe the flora and fauna, and use technology to enhance their observations. Choose a destination. The teacher will have to research possible sites that are related to wetlands (Texas). Choose a day for the field trip and find a contact person in the area to get pertinent information. Find out how long the field will trip take and what costs are involved. Visit the place prior to the class field trip to troubleshoot and plan for parking area, parking fees, passes, and permits. Scout the place for a good meeting area, a lunch area, and hazardous areas to keep the students away from. Arrange the school bus transportation through the school district's transportation manager. Do the paperwork. A month before the field trip, send a packet to the students that contains the following information: pamphlet, handout, and other important information that will acquaint the students with what they will be seeing or doing on that field trip. Prepare activity sheets of things the students need to look for. Create a field trip schedule. Include in the schedule what the class will be doing, the designated meeting place for lunch and departure for the bus drivers, teachers, parents, and students. Make a list of students' groups and the (parent) chaperones that are assigned to each group. For identification purposes, make a name tag for each student listing student's name, school, and chaperone's/volunteer's name. Set rules for the class and the parent chaperone/volunteer. Go over the class rules or expectations before departure. Discuss the basic rules, such as stay with your group and obey your parent chaperone/ volunteer. Remind the students that there will be no shouting, running, or climbing. Assign groups. The teacher does not

assign herself to a group. Assign other parent chaperones and volunteers to troubleshoot and coordinate the students' groups. Announce the class groupings at the last minute to avoid students' begging and whining. Two days before the field trip call the parent chaperones to remind them of the trip and ask them to bring their cell phones along. Finally, make a packet for the chaperone/volunteer. The packet contains the following information: parents' names and telephone numbers to call when in need of assistance in planning the field trip as well as participating on field trip day. Give the time, place, and detail of the trip, and a complete list of students going to the field trip for headcounts throughout the day.

During the field trip the students will record their observations, draw or take pictures. After the trip the teacher will lead the class through a discussion using guided questions: What animal/plant did you find most interesting? Explain your answer. How do you think this animal/plant functions in the ecosystem? Why do you think that this animal/plant is important in the ecosystem? Explain your answer. Do you think that animal/plant is endangered? Why? How would you help protect that plant/animal?

Journal writing will provide the integration between family trips and class field trips. The students will write their thoughts, observations and feelings about their family field trips. Reading the students' first journals will allow the teacher to identify any misconceptions the students have. The teacher will create mini lessons to correct the misconceptions. Thus, the students will write another journal with the correct/right facts. The teacher will make the journal a reading assignment for the students. They will read the corrected journal to their parents.

Part III: Judy Moody

Judy Moody Saves the World! was written by Megan McDonald. The book has eleven chapters. Fifth graders will enjoy reading this book because Judy Moody is a third grade student who sets out to win a band-aid contest. She dreams of having her own designer adhesive designer bandage. But Judy loses the contest. She comes up with an even better idea. She is going to protect the environment, the endangered species. The story is humorous. One of the most interesting parts of the story is when Judy drives her family crazy. Judy Moody is in a Mr. Rubbish Mood. Mr. Rubbish is a character in her brother's comic book. He built his own house out of French-fry cartons and pop bottles. Mr. Rubbish believed in recycling everything and never used anything from the rain forest. Judy Moody collects products in the house that came from the rain forest. Judy conducts research on the *Cicindela dorsalis dorsalis*, a Tiger Beetle. She discovers that northeast beach tiger beetles are found in the Chesapeake Bay areas of Virginia. They are endangered by changes in habitat, human population, shoreline development and erosion (Mc Donald 61). Judy inspires her classmates to work on an award winning environment-saving project.

The students will understand how Judy Moody gets serious about protecting the environment. Although her family and friends think that she is overdoing it, Judy Moody inspires her classmates and schoolmates to carry out an award winning project to help save the world by recycling and collecting bottles to raise money for the rain forest. This money goes to plant trees in the Children's Rain Forest in Costa Rica. One hundred brand new trees are planted, like a Band-Aid for the rain forest.

Judy Moody will perk the interest of the students to be involved in wetland conservation. After reading the story and emphasizing that Judy inspired her classmates to work on an award winning environment-saving project, the students will be able to write a copy-changed version of *Judy Moody Saves the Wetlands!* The students will be given a hypothetical situation. If Judy Moody lived in a place called Environville and a group of housing developers wanted to get rid of the swamp by Environville's river and replace it with a fantastic new shopping mall, what would Judy Moody do if she discovered that the swamp is an important habitat and a natural water filter.

Part IV: Conservation

This part of the unit will help the students understand that oil spills have different causes, but the result is the same. Oil damages plants and wildlife that make the oceans and coastlines their homes. Oil causes water pollution. It is a dangerous chemical when it gets into the water. Usually, oil floats in a thin layer on the surface. Oil sticks and coats the feathers of ducks, geese and water birds. So when they try to clean their feathers with their beaks, the water birds swallow so much of the oil that they get poisoned. Scientists are learning the best ways to stop oil spills and the students will learn how they can help.

The literature that will serve as the spring board for learning about conservation is *Oil Spill!* (Berger). In 1989, the Exxon Valdez, an oil tanker, slammed into an Alaskan underwater reef and spilled out 11 million gallons of oil. Oil covered 11,000 square miles of the ocean, an area comparable to the state of Maryland. *Oil Spill!*, the Let's Read and Find Out science book, explains why oil spills occur and how they are cleaned up. It also gives suggestions on how to prevent oil spills in the future. The students will define the following key vocabulary words: crude oil, tankers, shore oil terminal, skimmer, chemicals, bacteria, and disasters. The students will answer comprehension questions to check their understanding, such as "what happened to birds and other animals in Alaska as a result of the oil spill?" The students will identify different ways to help prevent oil spills. After reading the story, students will write letters addressed to a U.S. senator expressing their concern about oil spills.

Pollution is less visible in the ocean than in other habitats (Morgan 86). Every year three million tons of oil pollutes the sea. Half of the oil comes from land-based sources such as refineries; a third of the oil is deliberately dumped when tankers are rinsed. Less than a sixth comes from accidents involving oil tankers. Oil does not dissolve in water, but floats on or near the surface. Birds' feathers become coated and lose their waterproofing qualities, as does the fur of marine animals such as seals. If a bird is covered in oil it is unable to fly and drowns; if it ingests any oil, its gut can be damaged. Detergents used as oil dispersants are just as damaging to natural habitats and wildlife as the oil itself.

Habitat degradation and destruction by humans are the leading causes of extinction in the world today. Mark Bush states that the draining of wetlands, the felling of tropical rainforest, and the pollution of the rivers and oceans are generating an unprecedented wave of extinction. These effects are compounded by the introduction of new predators and competitors that oust the local wildlife. The domestic cat is a major threat to the bird populations of the Galapagos, Hawaii and New Zealand. An accidentally introduced snake has eliminated virtually all the native bird species of the island of Guam, and the Nile perch (a predatory fish that can grow in excess of 100 kg) is making huge inroads on the native cichlid fish species of African lakes. It would be comfortable to blame this latest wave on extinctions on extraterrestrial bodies or climate change, but we cannot. Humans alone are to blame.

Wetlands are low marshy areas that are wet at least part of the year. They help to clean water by slowing it, allowing the sediments to settle out, and allowing plants and bacteria to purify the water. Oil spills harm wetlands. Usually oil spills causes oil to float on fresh water like rivers and lakes. Sometimes very heavy oil sinks in fresh water. Depending on the circumstance, oil spills can be harmful to birds, animals, and plants. Ducks, geese, beavers, and fur bearing animals are affected. Oil spills destroy their insulating or their water repelling abilities. Thus, these creatures are exposed to harsh elements. Also, oil spills contaminate the plants. When the animals eat, the contaminated plants oil is ingested. Oil contamination poisons these animals. Fresh water fish as well die.

Part V: Extension Activities

Extension activities are provided at the end of each lesson. There are interesting hands on activities for wetlands. One of the suggested activities is the answer to the question can a wetland soak up a flood of muddy water? This activity is called Dirt Drop. The students will make muddy water, stir, observe what happens to muddy water, and observe muddy water, again stir the water to get it moving and observe what happens to the dirt and water. To wrap up the activity ask the students to answer the question how wetlands might help clean dirty flood waters. Another extension activity is the Wetland Home Challenge. Suggest a visit to the Galveston marsh, swamp, bog, streamside or other wetlands with the family. Ask the students to make a list of the plants and animals that the students see and write a learning log about the wetland visit. The creation of a drainage ditch in an aquarium or a fish tank is a class activity. This mini wetland will need the following materials: wet soil, Venus fly trap and pitcher plants, and baby shrimp. The students will observe the habitat and record their findings. They can watch how the plants and animals interact with one another and write their observations in their learning log. A major class project with the help of a scientist or a professor, an approval from the principal that includes a school budget for this project is to build a mini wetland in a pond within the school playground.

In addition to the books that I have mentioned previously, another good reading resource for students is the *Houston Chronicle*. The students will make an album, "Understanding Wetlands," that contains ten pages of news articles and photos. The materials needed for this activity are the following: *Houston Chronicle* newspaper articles, photos, glue, scissors, pencils, Manila folders, and white copy or construction paper. The students will cut out and paste pictures or news articles about habitats and wetland conservation from the newspaper and will write a brief summary of each newspaper article.

LESSON PLANS

Lesson One: *The Magic School Bus Hops Home* (Science, Language Arts)

Time allotment: 2-3 days; 45-50 minutes per day

Objectives

- TEKS Science 5.2.04 Describe the cycles, structures and processes that are found in a simple system such as an ecosystem.
- ESL.A5.2.11 Use strategies before reading (skim, scan, preview text; question purpose and expected outcome, activate prior reading knowledge) and during reading (text coding/margin notes, use of pictures, graphics, cognates, and other contextual clues, visualization, prediction cycle, self-questioning) to enhance the comprehension of appropriate language proficiency level texts with teacher support when needed.

Materials Needed

The Magic School Bus Hops Home, a ball of yarn or string, hand lens, metric ruler, pencil, paper, construction paper, colored pencils/crayons, popsicle sticks, a plastic sandwich bag, a chart.

Data Collection Chart

Animal's Name	Draw a picture	What size?	How many animals?

Procedures and Activities

Before Reading

1. Brainstorm with the students using the **What I Know-What I Want to Know-What I Learned (K-W-L)** Chart. For the **K**, ask the following questions. What do you know about habitats? What are some of the basic things that animals require from their habitats? What is a pond? Can habitats change? Why? For the **W**, What would you like to know about habitats? The last question **L** will be asked after reading the story. What did you learn from it?
2. Define the following words: habitat, interact, needs. Students can also note and define words that they do not understand after skimming the book. Another option is to make a word search puzzle to find 20 vocabulary words from the story.
3. Have the students name the small and big animals, insects and plants that they see in the school's pond.
4. Explain to the students that they will write two lists. The first list is what they think they will find in the school pond before the field trip. The other list is what they have seen in the school's pond after their mini field trip to the school pond.
5. Take the students for a mini field trip to the school pond.

During Reading

Read and discuss pages 1-30.

Comprehension Check

1. What did Wanda bring to school?
2. What does a bullfrog need in her home or habitat?
3. What happened to Bella while the class was building a habitat for her?
4. Why did the class take the old school bus to look for Bella?
5. Describe the first habitat, a fast running creek.
6. What kind of water do frogs need to lay their eggs?
7. What kind of bird did the class see while searching for Bella?

8. Describe the next habitat, the beaver pond.
9. Describe the ideal habitat for Bella.
10. Why did Wanda leave Bella in the habitat that she was found?

After Reading

Take the students to the school playground and then to the school pond. Guide the students to make a list of plants and animals living around the school playground and another list of plants and animals that live in the school pond. Divide the students in groups of 4. Each group cuts a string which is 10 meters long and makes a circle. The first two groups will make a circle in an area around the school and the next two groups will make a circle around the school pond. They will record their observations in their area. After that they will trade places and again record their observations. Show the students an example of how to fill out the chart and then make them fill out their group chart. Discuss the differences between the two habitats. Ask the students why there are differences. Explain to the students how humans can create a difference in the environment to suit their needs.

To extend this lesson the students can write a friendly letter to the author, Joanna Cole.

Assessment

Student will write the answers to questions 1-10 above. Next, the students will submit their complete data collection chart. Finally, the students will create a diorama or a model of the first and the second habitat. Each group will do an oral presentation.

Lesson Two: *The Magic School Bus Takes a Dive*

Time allotment: 2-3 days; 45-50 minutes per day

Objectives

- TEKS Science 5.2.11 Compare the adaptive characteristics that result in an organism's unique niche in an ecosystem.
- ESL.A5.2.15 Identify cause-effect relationships concerning character traits, motivation, plot line, conflict, and relationships in fictional texts that are at appropriate language proficiency level with teacher support when needed.

Materials Needed

The Magic School Bus Takes a Dive, pencil and paper, dictionary, notebook, ribbons or scarf of a 4 feet cloth for the Coral Reef Game (Race)

Procedures/Activities

Before Reading

1. Students will read the title and will make their predictions about the story.
2. Create a Word Search Puzzle for the students to introduce the vocabulary words: coral reef, hermit crabs, sea anemones, pistol shrimp, goby fish, remoras, copepods, suction cups, polyps, algae, partners, and pollute.
3. Ask the students to define the vocabulary words and use them in sentences.

During Reading

Read the story to the students. Ask questions and discuss main ideas in the story.

After Reading Comprehension Check

1. What was Ms. Frizzle's class project?
2. What is a coral reef?
3. What were the students looking for?
4. Describe the students' treasure.
5. Why did the hermit crabs stay close to the sea anemones?
6. What do pistol shrimp use to dig holes? Why?
7. Why do goby fish depend on pistol shrimp?
8. Explain the idea of partners working together.
9. What are remoras? Copepods?
10. How do the remoras, the copepods and the shark depend on each other?
11. What are coral reefs made of?
12. Why are the polyps important to the coral reef?
13. What is a wetland habitat?
14. Why do some species live in coral reefs and some species live in wetland habitats?
15. Compare and contrast coral reefs from wetland habitats.

After Reading

Ask the students to work with a partner to talk about cooperation and its benefits. Guide the students to the part of the story that mentioned the partnership of the hermit crabs and the sea anemones. The hermit crabs are safe from the sharks and the octopus as long as they stuck stay close to the sea anemones. The hermit crabs carry the sea anemones on its back.

Extension Activity: Take the students to the playground and play the Coral Reef Game. They will pretend that they are racing to the safety of the coral reef. Let the students hop with one leg to the finish line. Then, let the students tie their ankles with a partner and race to the finish line without communicating. The last round let the pairs run with a three legged movement. Explain to the students the benefit of cooperation.

Under the supervision of an expert or a scientist, the students can also build in the science lab a mini coral reef in an aquarium or fish tank. The materials will be provided by the school. The scientist or the expert will provide the teacher with a list of materials needed to build the reef habitat for the class. Add aquarium plants and use a grow bulb for sunlight. A possible alternative would be to go to the pet store or visit the zoo and look at the coral reef aquarium and try to identify species that they learned about in the book. The students could watch the movie *Finding Nemo* at home and try to identify all the species.

Assessment

Write a science journal (1-2 paragraphs) about coral reefs.

Create a classroom mural of coral reef partnership in groups of four.

Lesson Three: *Judy Moody Saves the World!* (Language Arts, Science)

Time allotment: 2-3 days; 45-50 minutes per day

Judy Moody Saves the World! will not only increase students' interest on saving the rainforests and the endangered tiger beetle in the story but also lead to research and discussion about the threats to the wetland habitats. What will Judy Moody do to save the wetlands? Her research will include: the definition of wetlands and the value of wetlands for habitats, for water purification,

for flood control, for recreational activities, and for food webs. The threats for wetlands are the following: destroyed or degraded by filling for drainage of land development and by dredging for business and recreational water traffic; industrial and business operations, agricultural runoff, storm water, and other sources; and susceptibility to pollution, and exploitation by introducing foreign animal and plant species because they attach to soils that run to the water.

Judy Moody can help in wetland restoration. She can plant *Spartina alterniflora* (smooth cord grass) in the Galveston Bay to stabilize the island mound structures and to provide habitat for birds and aquatic species as well as for its intrinsic value. Relate this story to the real story of *Like Father Like Son*. Two brothers, Bob and Doc Pearson made a pact as children to restore their father's land to benefit wildlife. Today, the Pearsons are making good to that promise. Bob and Doc Pearson are following their father's footsteps, and in 2000 they were given the Lone Star Land Steward Award in the High Plains Ecological Region of Texas for conservation work on their land. Since 1998 the Pearsons have planted more than 1,700 native plants fenced in a 70 acre playa, constructed three buffered water ways and flash grazed a pasture to restore native short grass – all the harvesting 50 bushels of dry farm wheat and grazing about 250 hear of cattle each year (Slobe 4). The students will develop their creative writing skills in a new story of Judy Moody Saves Texas Wetlands!

Objectives

- TEKS Science 5.2.07 Identify any observe actions that require time for changes to be measurable including growth.
- ELA. 5.2.12 Combine and / or interpret salient details/fact from narrative and expository texts to determine and support essential information and main/major ideas.
- ESL.A5.2.15 Identify cause-effect relationships concerning character traits , motivation, plot line, conflict and relationships in fictional texts that are at appropriate language proficiency level with teacher support when needed.

Materials

Judy Moody Saves the World!, pencil and paper, highlighters, chalkboard, event map

Procedures/Activities

Before Reading

Show the cover page to motivate student's interest.

1. Read all about the author and illustrator.
2. Read about the character on the Who's Who Introduction.
3. Discuss the real life connection of the story to the author, Megan McDonald and the illustrator Peter H. Reynolds.
4. Bring up other books written by Megan McDonald.
5. Clarify vocabulary words: crazy strips, big-eared bats, old-fashioned, invisible, jitterbugs, compost, global warming, endangered, lunatic, ecosystem.
6. Ask students to use the vocabulary words in sentences.
7. Read aloud the most interesting part of the story.
8. Relate the story to the student's daily routine or current events.
9. Communicate to the student your personal view of the story.

During Reading

1. Assign a student in each group to read a chapter.
2. Discuss the elements of the story such as main characters, setting and the summary of each chapter.
3. Students read to answer their questions, who, what, where, when, why, and how (W questions).
4. Allow the students to read silently.
5. Walk around the classroom and clarify individual student’s questions.

After Reading

Students use the Event Map to summarize *Judy Moody Saves the World!*

EVENT MAP

Title	
Author	
Event 1 Crazy Strips Contest	
Event 2 Batty for Banana Peels	
Event 3A Mr. Rubbish Mood	
Event 4 Pigtoes, Pumas, and Pimplebacks	
Event 5 Beetle Emergency	
Event 6 Pond Scum	
Event 7 Luna Two	
Event 8 Batty for Band-Aids	
Event 9 Project P.E.N.C.I.L	
Event 10 Batty for Bottles	
Event 11 The Winking Disease	

Pair and Share Learning Activity

- Divide the students in pairs.
- Model the color coding activity to introduce the Questioning the Author Strategy:
 - Select Chapter 1 “Crazy Strips Contest” on pages 1-14 to read with the class.
 - Color code each highlighter to assign a particular level of understanding
 - Yellow: Student understood the text
 - Green: Student confused with the text
 - Blue: Student found an interesting part.
- Assign each pair to read a chapter and color-coded text.
- Remind the students that all text must be highlighted.
- Discuss the highlighted text with the students. Ask why they chose a particular highlighter.
- Lead the discussion to clarify misunderstood ideas/parts.
- Brainstorm with students.
- Make a class copy – changed version of the story *Judy Moody Saves Texas Wetlands!*

Assessment

- Have students write a book report.
- Have a teacher made comprehension check.
- Have students create a skit and then act out the key main points of the chapter.
- Have students create a poster “Save the World.
- Have students design T-shirts with environmental slogans for the character of their choice in *Judy Moody Saves the World!*.
- Divide the students in groups (three students in each group). Each group will create their own copy-changed version of Judy Moody Saves Texas Wetlands.

Lesson Four: Oil Spills (Science, Language Arts)

Time allotment: 2-3 days; 45-50 minutes per day

Brainstorm with students the definition of oil spills. Use the semantic map chart. Write down what students know about oil spills. Ask the students to make predictions on what *Oil Spills!* by Melvin Berger is all about. Discuss the uses of oil, how oil spills happen; oil spills into rivers, bays and oceans caused by accidents involving oil tankers, barges, pipelines, refineries, and storage facilities while it is transported to the users. Talk about oil and oil products in our environment that can cause harm. We, the people, need to avoid dumping oil or oil waste in the garbage, sewers, or drains. When we dump oil in the sewer, oil washes into the drains, bayous, rivers, and swamps. There are some ways that we can avoid using oil. Some of these ways are riding the bicycle, walking, or taking the bus to some places we need to go. Car drivers and owners must find ways to dispose oil from their vehicles properly. Emphasize to the students that when we use less oil, less oil needs to be transported and there is a lower risk of oil spills. People have to share the responsibility for creating the problem of oil spills and we should also be responsible for finding ways to prevent oil spills. Conserve our wetlands.

Objectives

- Sci. 5. 1.11 Evaluate the impact of research on scientific thought, society and the environment.
- ELA.5.07 Identify and use expository text structures (problem/solution, chronology, comparison//contrast, cause effect), print features, graphic aids, and organizational aids in non-fiction to discuss how they influence the scope and/or depth of a text and to locate, organize and recall information.
- ESL. A5.2.16 Use single or multiple appropriate level sources/paired text to draw inferences (predictions, conclusions, generalizations) from explicit textual, visual information, including the underlying themes, and support them with text evidence with teacher support when needed.

Materials

Oil Spill! by Melvin Berger; Semantic Map Poster, Pencil, and Paper

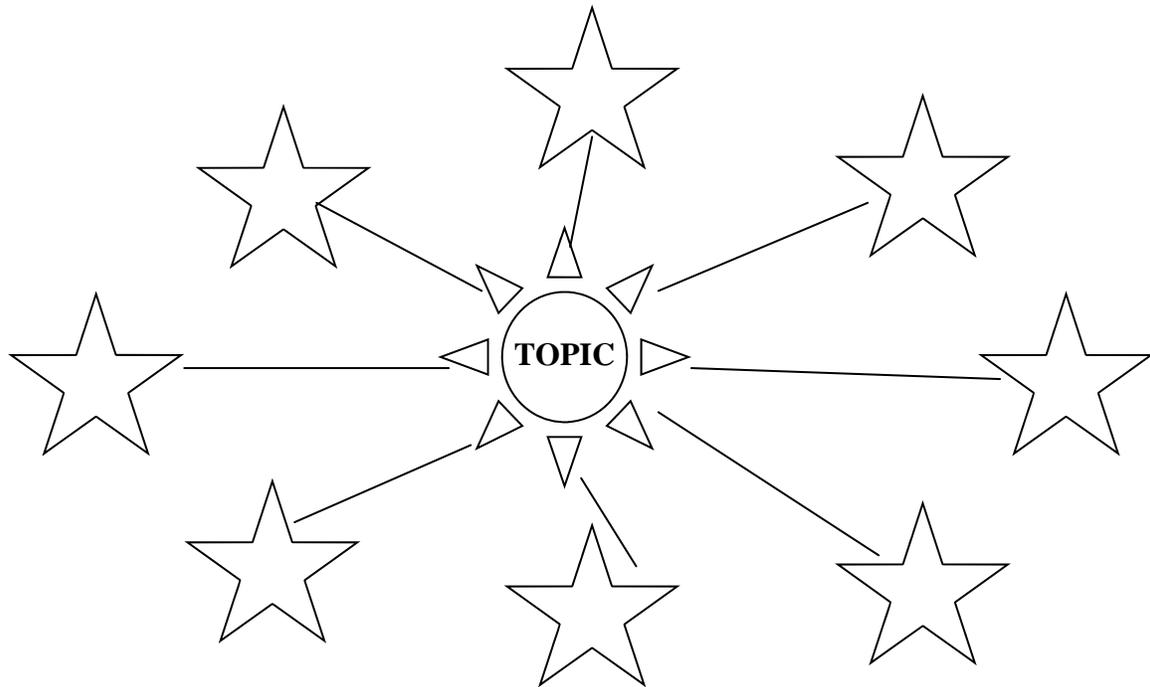
Procedures/Activities

Before Reading

1. Introduce the book.
2. Show the cover page to motivate student’s interest.
3. Read the title, author and illustrator aloud.
4. Discuss what the ship, sea otter and water show.

5. Use the semantic map to remind the students that this is a good way to organize information about a topic.

SEMANTIC MAP



6. Ask the students information about oil spills.
7. Write students' responses on the semantic map.
8. Define vocabulary words and tell the students to use them in sentences.

During Reading

1. Read silently.
2. Tell the students to write down difficult words and concepts.
3. Use the guide questions below:
 - What will happen when the oil tanker hits a reef?
 - What is the risk in setting oil on fire?
 - When oil comes to the shore, scientists spray it with hot water. Why?
 - Why might scientists add bacteria to the oil?
 - How can people prevent oil spills from spoiling into beaches like this one the Prince William Sound?

After reading the article, "Oil Spills in Galveston Bay 1998-2002," explain to the students that scientists working for the Galveston Bay Status and Trends Project had analyzed oil spill data collected for water bodies in four counties of the Lower Galveston Bay Watershed (Brazoria, Chamber, Galveston, and Harris). A total of 262,010 gallons of petroleum products were spilled into waters of Galveston Bay from 1998 – 2002. Bunker C and heavy fuels, diesel, crude oil, and spills categorized as "Other" had the highest number of volume spilled. The Houston Ship Channel was the location of the largest volume of spills. Galveston Bay had the second largest volume of petroleum product spilled. The Texas City Ship Channel, Greens Bayou, and the San Jacinto River also ranked high in terms of volume spill. However, when compared to the

amounts spilled in Houston Ship Channel and Galveston Bay (areas with the most shipping traffic), those amounts seem minor.

Accidental spills or deliberate dumping of oil and other toxic material affect the aesthetic and ecological functions of Galveston Bay. The coastal strips and shallow waters of bays and estuaries are ecological niches for multitude of species. Shorebirds, sea mammals, fish, mollusks, and crustaceans all find in these zones their main habitat and sustenance. But busy ports, with their urban sprawl, toxic, out flows and oil spills can pose huge threats (“Crisis Management in Bays and Estuaries” 1-2):

1. Help students add information to their semantic map.
2. Have students take turns summarizing.
3. Students discuss, complete and share these questions:
 - o What happened to ducks, geese, seabirds and other animals in Alaska as a result of the oil spill?
 - o Think and summarize the different ways people help to clean up the oil spills.
 - o Choose your favorite part and circle it. Then write about how one or more strategies have helped you read that part.
 - a. The Exxon *Valdez* Disaster
 - b. Causes and cleanup at Sea
 - c. Cleanup on shore
 - o Write a letter to your Congressman/Senator about the threat of oil spills to the environment/Galveston Bay.

Assessment

Create your own reading test using the questions given above.

Cut and paste newspaper articles related to oil spills or environmental concerns and solutions.

Design a poster to help prevent oil spills.

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Coastal wetlands make communities more resilient. The capacity of a system, community, or society potentially exposed to hazards to adapt, by resisting or changing, in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures. (SDR, 2005). by providing flood storage, storm surge buffers, erosion control, water quality improvements, and wildlife habitat. See [@inproceedings{Powell2014ConservingWF, title={Conserving wetlands for humans and amphibians: A multidisciplinary approach to understanding the social and ecological effectiveness of New England's wetland policies}, author={Veysey Powell and S Jessica}, year={2014} }](#). Veysey Powell, S Jessica. Freshwater wetland ecosystems are a valuable resource, but current policies fail to prevent their continuing destruction. Policy-makers increasingly use decentralized wetland-buffer programs to address such policy failings, but scant research has evaluated whether these programs are both ecologically