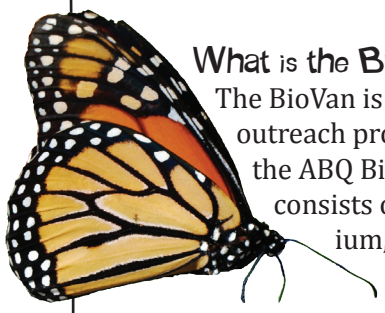
The Rio Grande and ME

El Río Grande y YO

ABQ BIOPARK

A Teachers Guide to the BioVan

GRADE LEVEL: 4-5



What is the BioVan?

The BioVan is an education outreach program for the ABQ BioPark, which consists of the Aquarium, Botanic Garden, Zoo and Tingley Beach. The mission of the BioVan is to give students an introduction to the diversity and interdependence of life and to encourage stewardship of the Rio Grande. The BioVan presentation follows the course of the Rio Grande as it starts in the San Juan Mountains of Colorado and empties into the Gulf of Mexico and open ocean of the Atlantic.

Why the BioVan?

The Rio Grande and ME. El Río Grande y YO. It's our responsibility to care for the river because it is important to us. It supports life here in Albuquerque all the way to the Gulf of Mexico. Community, plants and animals are nourished by its fresh water from its beginning in Colorado to the ocean. Water is a critical natural resource, and precious to us, especially in the southwest desert. The Rio Grande supports mountains, forest, river and desert ecosystems and all the plant and animal life associated with them in an interdependent web that extends further than we can imagine. In the end, what counts most is that we must be good stewards of the river, the Rio Grande. The ABQ BioPark and the BioVan help make this happen.

How doe the BioVan work?

The BioVan is staffed by a facilitator, environmental educator, a teaching artist and volunteer Rio Rangers. It includes live animals, plants, biofacts and a follow-up activity. Using a variety of teaching strategies, the BioVan combines science with the arts. Other components of the program include a teacher workshop, a Bio-Box which contains hands-on loan materials, grade-specific Teacher Guides and a free weekly hike in the Bosque for two classrooms!

How to Use the Teacher's Guides

Three BioVan Teachers Guides are available for grades K-1st, 2nd-3rd,4th-5th. The same *key concepts* are noted in each Teacher's Guide. These concepts are to help guide the *teacher* throughout the BioVan learning experience. The grade level concepts do vary and are designed to build upon the previous grade concepts. The grade level concepts are for the *students*.

Each Teacher's Guide has three lessons: Water as a Natural Resource, The Rio as an Ecosystem and Stewardship. Each lesson has two activities: one activity is hands-on and one activity is a written with the worksheet provided. Worksheets are at the back of each lesson. Each lesson is designed to interrelate with the other lessons within the guide and to build upon the same lesson in the other two grade-specific guides.

TEACHER CONCEPTS

Adaptation – a modification of an organism or its parts which enables it to survive and reproduce in its environment.

Aquifer – An underground layer of rock, gravel or sand that stores water.

Biodiversity – The variety of plant and animal species in an environment.

Conservation – The conscious use of natural resources in a way that assures their availability for future generations.

Ecosystem – A stable, naturally occurring system of interdependent living and non-living things.

Habitat – The dwelling place of a living thing, chosen for its availability of suitable shelter, space, food and water.

Interdependence – The relationships among living and non-living elements of the environment.

Natural Resource – A portion of the environment that can be drawn upon to care for a need.

Pollution – Any substance deposited in air, water or land leading to a condition of impurity, unhealthiness or hazard.

Riparian – Relating to the bank of a waterway such as a river.

Stewardship – The wisdom and respect we demonstrate to all living organisms and the habitats entrusted to our care.

STUDENT CONCEPTS

Freshwater – Water with insignificant amounts of salt or minerals. (.5ppt)

Saltwater – Water containing a large amount of salt. (sea water, 34.5 ppt)

Ecological Niche – The role held in a community by a living thing.

Food Web – Interconnected food chains in an ecosystem.

Wildlife Corridor – The connection of protected areas that enables animals to move safely from habitat to habitat as they search for food, shelter and mates.

Theme: Water as a Natural Resource

Teacher Background

Billions of years ago, Earth was enveloped in clouds so thick and hot that sunlight could not penetrate and moisture could not fall from the surface. As the Earth cooled, rain fell for eons, washing mineral salts from the land masses into the ocean basins – a process that continues today. When water evaporates from fresh or salt water, the heavier salt and mineral content remains behind. That's why rain – even rain falling over the ocean – contains no salt; it's one reason why the ocean always stays salty. The hydrological or water cycle is important in maintaining both salt and fresh water ecosystems. Organisms living in oceans survive partly because the water cycle keeps the saltiness of the water fairly constant. Species that have adapted to terrestrial life survive in part because the water cycle continuously replenishes their sources of fresh water.

Ocean Survey

Demonstrate our dependence on the salty ocean for food and other products used in daily life.

Standards

Science: Cite examples of interconnectedness between the U.S. and the world community.
Language Arts: Use vocal expressions to report.

Introduction

The oceans and seas contain 97% of the world's water. This large salt water environment is home to a variety of plants and animals that many people throughout the world use for food. Some products that we use everyday have ingredients derived from ocean plants and animals. For example, carrageenan (car a GEEN an) from seaweed is used as a thickener in some ice cream, pudding and toothpaste. Some fish components are used in medicine.

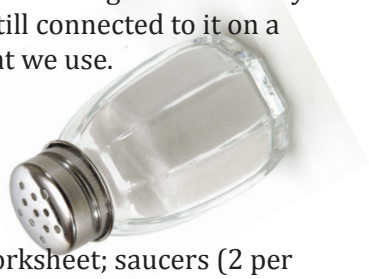
- Can you think of an ocean food you have eaten?
- Why would the ocean be a food source for many nations?

Materials: A can of tuna; toothpaste; box of pudding mix (ingredients must list carrageenan).

Procedure: Show the students the items. How are the items related? All of the products contain ocean ingredients. Tuna is obvious, but check the ingredients of the pudding and toothpaste to find the ocean connection. Ask students to locate some ocean related items in their homes. Be sure to check the ingredients! Other household products with ocean connections: hand lotion and shampoo may contain kelp extracts (seaweed); pearls are from oysters; the cuttlebone used for pet birds is from a relative of the octopus; lipsticks and cosmetics may contain squalene from sharks; cod liver oil from cod. Don't forget to check the toothpaste, ice cream, pudding and wet dog/cat food for carrageenan.

Wrap Up: Have the students report or bring their findings to class. Were they surprised to find ocean ingredients in so many products? Even though we live many miles from the ocean we are still connected to it on a daily basis by the products that we use.

Salt of the Earth



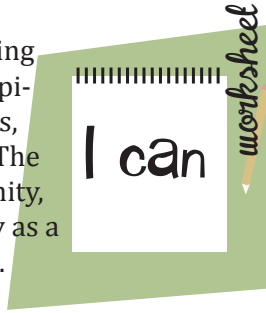
Differentiate between **freshwater** and **saltwater**.

Standards

Science: Describe changes of state in matter.
Language Arts: Spell correctly to demonstrate an understanding of spelling patterns.

Introduction

Explain to students that water is cleaned during the water cycle, resulting in freshwater. Precipitation, glaciers, the polar caps, ponds, streams, aquifers and most lakes contain fresh water. The cycle also keeps the oceans at a constant salinity, about 34.5 parts per thousand (about as salty as a cup of water mixed with ¾ teaspoons of salt).



- Do you think rainwater has any salt in it?
- Does tap water have any salt or minerals in it? (variable trace amounts)
- What's the difference between rainwater, salt water and tap water?

Materials: Salt of the Earth worksheet; saucers (2 per team); 1 cup warm water with ¾ teaspoon of salt mixed in; 1 cup distilled water.

Procedure: Divide students into teams. Give each team saucers labeled A and B. Pour 2 teaspoons of either distilled or salt water into each saucer without letting students know which saucer has which water (You keep track of the contents of each team's saucers.) Instruct students to observe and record the results on the worksheet each day. Evaporation may take three days, depending on humidity.

Wrap Up: Talk with students about the results of their experiment. Make sure they understand that when water evaporates, its mineral and salt content remains.

Theme: The Rio Grande as an Ecosystem

Teacher Background

The Rio Grande originates in the mountains and discharges at sea level, creating a gradual changing corridor of habitats along its course. Water and land habitats associated with the Rio support complex communities of organisms that help maintain the health of the river system as a whole. If every organism in a community lived in the same kind of habitat along the Rio and competed for the same resources, few might survive. A way to reduce competition and improve chances for survival is for each species of plant and animal to have a different niche in the ecosystem. Within the ecosystem, many of the plants and animals are connected, either directly or indirectly, through the intricacies of food webs. Like communities of plants and other animals, human communities along the Rio interact with and depend upon the river ecosystem in many ways.

One River, Many Voices

Identify examples of how we are interdependent with the Rio Grande ecosystem.

activity

Standards

Social Studies: Explain how the physical features and the natural resources of the United States influenced its settlement.

Science: investigate causes, effects and ways to prevent environmental pollution.

Introduction

The water of the Rio Grande enables plants and animals and people to survive in an otherwise dry area. Although we all share one river, we each have a different view of it and make different demands on it, depending on the niche we occupy.

- What kinds of ecological niches are formed along the river?
- Do the human niches affect the other niches? How?
- What positive things have people done to protect, improve and restore the river ecosystem?

Materials: One River, Many Voices worksheet.

Procedure: Give each student a worksheet and have them find the different human niches represented (fisherman, birdwatcher birder?, commuter, sailor, rancher, farmer, city person, shrimper, rafter) along the Rio.

Wrap Up: The Rio Grande is a heavily used river. Increasing human population along the river puts a variety of additional demands on the river. We need to remember that the river is a shared resource. We share it with many human communities and with plant and animal communities too.

Teamwork

Identify an example of interdependence between living organisms in the Rio Grande, Gulf Coast and Atlantic Ocean ecosystems.

Standards

Science: Investigate and describe the life cycles and adaptations of plants and animals.

Art: Develop teamwork skills through cooperative art experiences.

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Introduction

Ask the students to discuss ways that plants and animals depend on each other for food, shelter or reproduction.

- What examples can you think of from our area (Middle Rio Grande)?
- What examples can you think of in the ocean?

Materials: Drawing paper; pencils; crayons or colored markers; reference materials.

Procedure: Divide students into 3 groups, representing a habitat from the Rio Grande, Gulf Coast and Ocean. Each group can decide exactly what habitat they represent (i.e, mountain along the Rio Grande, sand dune along the coast). Ask each student to choose a living organism (non-human) in that habitat (plant, invertebrate, fish, amphibian, reptile, bird, mammal) and research what it looks like, how it behaves and what eats it. Have each student draw their living organism. Have each of the 3 groups compile the drawings, explaining their choices and the interdependent relationships they identify within their habitat.

Wrap Up: Ask each group to present their art work, explaining their choices and the interdependent relationships they identified.

Theme: Stewardship

Teacher Background

People have had a greater influence on the Rio Grande ecosystem than all its other plants and animals together. Larger cities and more bridges, highways, dams and agriculture along the Rio accommodate our growing numbers. In New Mexico alone, nearly 2 million people live in communities along the Rio and its tributaries. In the natural scheme of things, the availability of nutrients, water and shelter in a habitat limits populations. Humans have overcome some of the natural obstacles to population growth – scarcity of food, water, shelter – by inventing tools and techniques for pumping and storing water; building shelters; and producing and storing more food. But when one species uses up more of Earth's natural resources it usually means less is available for other forms of life. People need to remember that the Rio Grande is a shared resource – equally important to all the plants, animals and humans that depend on it.

Safe Spots

Debate the Pros and Cons of establishing a wildlife corridor from the headwaters of the Rio Grande to the Gulf of Mexico.

Standards

Language Arts: Write for a persuasive purpose. Use relevant statements and questions.
Social Studies: Identify ways of participating in government and influencing decisions.
Science: Participate in projects that protect the environment.

Introduction

The number of people living along the Rio Grande to the Gulf of Mexico is estimated over 6 million and increasing. Other organisms that depend on the Rio Grande are crowded out when more and more people move in.

- What happens if the space left for wildlife is too small?
- With the protected wild areas that we already have, how would the animals benefit if the spaces were connected?

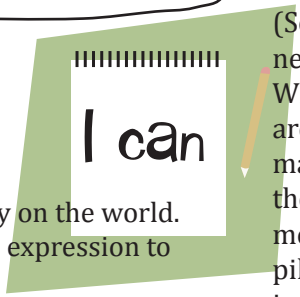
Some people suggest that a protected wildlife corridor should be established throughout the course of the Rio Grande to enable more plants and animals to flourish. The corridor would be from the headwaters of the San Juan Mountains all the way to the Gulf of Mexico. It would connect the protected areas we already have (national forests, wildlife refugees, private lands, etc.)

Materials: Safe Spots worksheet.

Procedure: Give each student a worksheet. Guide students with coming up with one or two important issues concerning the wildlife corridor idea as it would affect each character. Divide the class into three teams. Designate one team as the voting panel and assign each of the other teams one of the characters. Have the team discuss if their character supports or opposes the idea. Using their character's arguments, each group gets two minutes to defend their side with one minute allowed for rebuttal from a character that feels the opposite. The voting panel will decide if a wildlife corridor should be established based on the strengths of the arguments presented.

Wrap Up: As a class, discuss and evaluate the arguments. Express the class opinions in writing to elected officials.

Balancing Act



Summarize how the success of people affects other species in the Rio Grande ecosystem.

Standards

Social Studies: Analyze the impact of technology on the world.
Language Arts: Conduct an interview. Use vocal expression to report.

Introduction

When Albuquerque was founded in 1706, there were many Pueblos and 35 Spanish families living along the river near the Middle Rio Grande. Today, there are over half a million people living here representing thousands of families.

- What happened to the plants and animals that lived in this area before roads, homes and businesses were built?
- Compare the environmental impact of the first 252 residents with that of today's much larger population.

Materials: List of interview questions.

Procedure: Compile a list of interview questions. (Some examples: What plants and animals were found near your home when you first came to Albuquerque? What were the boundaries of the city? What did the area along the Rio Grande look like? What were the major events that changed life in the city or along the river?) Student will interview their oldest family member or neighbor and record their answers to compile an oral history about growth and development in Albuquerque and the effect on other species in the ecosystem. How has the human population growth in Albuquerque impacted other species?

Wrap Up: Have each student report their findings. On butcher paper, create a timeline using their information. In what decade did most of the people interviewed move to Albuquerque? How have the Rio Grande, the land surrounding it and wild species changed over time?

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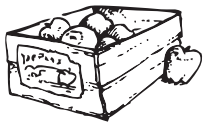
EXPLORER'S NAME _____

SAFE SPOTS: DO I WANT A WILDLIFE CORRIDOR?

DEVELOPER

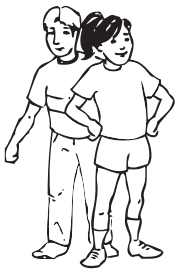


FARMER

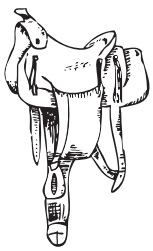
ENVIRONMENTALIST

BIRDER

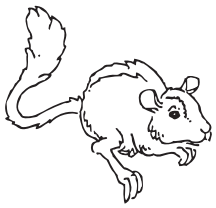
AN ADULT I KNOW



ME!



RANCHER



ANIMAL

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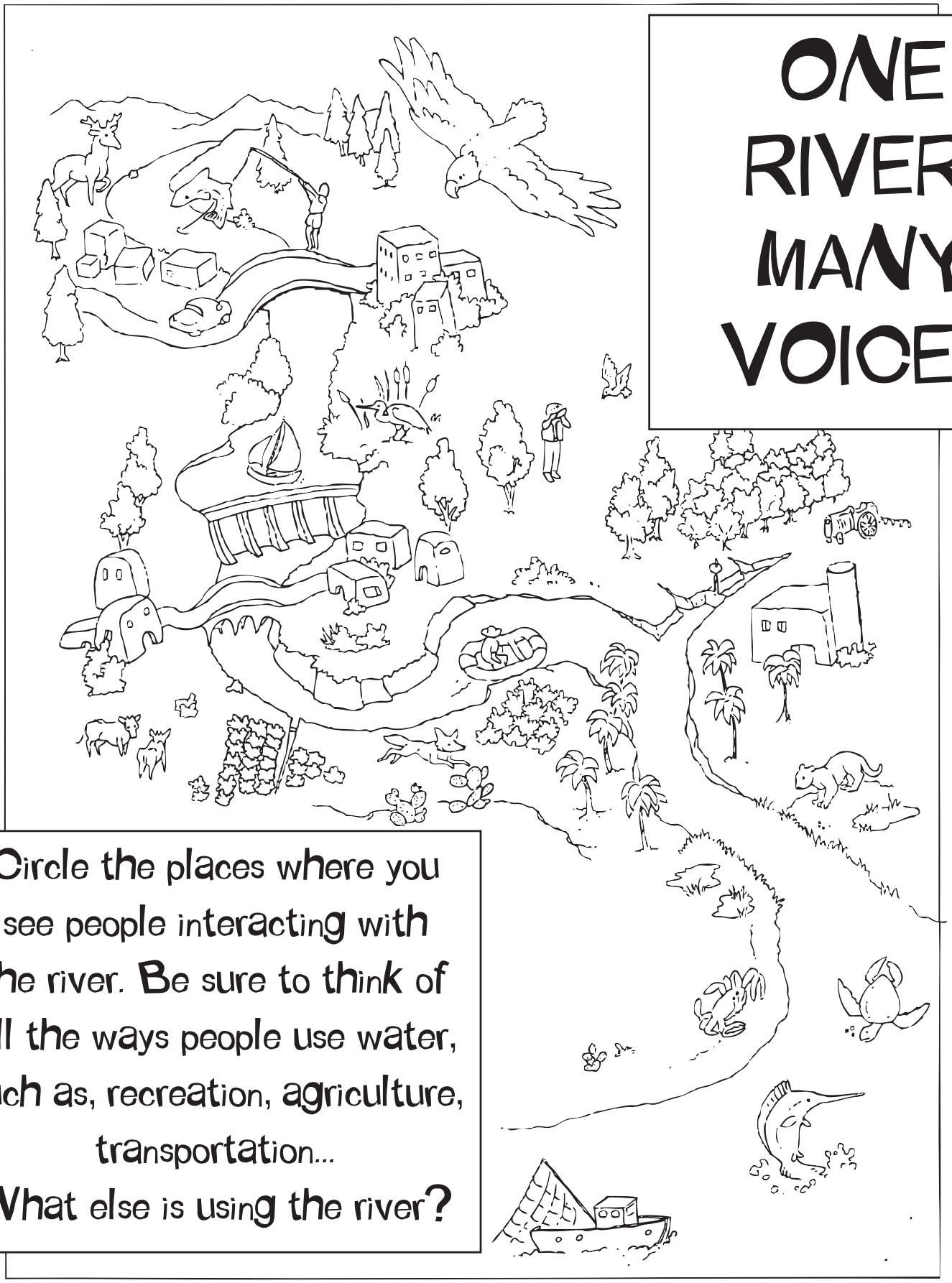
EXPLORER'S NAME _____

ONE RIVER, MANY VOICES



Circle the places where you see people interacting with the river. Be sure to think of all the ways people use water, such as, recreation, agriculture, transportation...
What else is using the river?

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EXPLORER'S NAME _____

Salt of the Earth

SALT WATER DISH

FRESH WATER DISH

Day 1
Observations

Day 2
Observations

Day 3
Observations

Which saucer has the freshwater?

Which saucer has the saltwater?

How can you tell the difference?