Rivers of the World

Objective:

1. Students will be able to identify various animals living in and around rivers.
2. Students will demonstrate an understanding of how rivers are formed.
3. Students will identify natural resources and discuss water conservation.
4. Students will formulate relevant questions about living organisms in the environment.
5. Students will predict results of specific environmental changes on river wildlife.

Grade 1-2

Key Vocabulary:

- **Habitat**
- **Formation**
- **Erosion**
- **Survival**
- **Resource**

Related Literature:

Where the River Begins
Thomas Locker

Pond and River
Steve Parker

Explore Rivers and Ponds
Carla Mooney

Performance Objectives:

Grade 1: Strand 4: Concept 3 – PO 1-3; Strand 6: Concept 1 – PO 4-5
NGSS: 1-LS1-2-B
Grade 2: Strand 1: Concept 1 – PO 1-2;
NGSS: 2-ESS2-3-C

Background Information:

The rivers of the world provide a source of life to humans, animals, plants, and insects. **Habitats** for many animals can be found along the side of rivers and in under the river itself. Among the longest rivers in the world are the Amazon, Mississippi, Yangtze, and Nile. These rivers, like all others in the world, are important to the natural environment, the place where animals and people live.

Rivers are naturally flowing streams of water that generally begin high in the mountains where rain fall, melting snow, and ice contribute to their **formation**. Rivers exist in every type of environment in the world. From glacier packed areas to dry deserts, rivers carry important resources to their surrounding areas. Rivers flow downhill from their source, which can be springs from underground, melting snow and water that falls back to earth as rain.

Rivers carry large amounts of water back to the ocean where sea water constantly evaporates. This helps make new rain clouds, which supplies rain to rivers again. Rivers also carry water to lakes creating special homes for plants and animals. For example, turtles, ducks, dragonflies, and otters are found along rivers in many parts of the world.

As rivers flow, the movement of water carves out the land in its path. Habitats are formed alongside the flowing river and under the water. Large fish can live in the deepest parts of the river while smaller fish may be found along the banks and among the plant life. Deer, bobcats, and coyote are among the wildlife that inhabits river banks in Arizona.

The journey taken by a river is part of the water cycle. The energy from flowing water carves out the land as it moves downward. A perfect example of the power of flowing water is the Grand Canyon in Arizona. Over millions of years, the water has carved out a very deep, wide, and beautiful canyon. From any direction you look, the shape, size, and color of the canyon walls have been shaped and changed by the flowing water.

The Grand Canyon

The **Colorado River** water rapidly flows through the land taking soil, clay, and sand along with it. This causes deep grooves in the river's path, which is called erosion. **Erosion** can create valleys and deep grooves in the earth's surface. Over long periods of time these grooves can become part of creating canyon walls.

The Colorado River is part of what created the Grand Canyon in Arizona. Wildlife along the Colorado River includes reptiles, insects, and mammals. Water is necessary to the survival of life in or near the river.

The **Mississippi River** is another major river in the United States. Many stories have been told about the "mighty" Mississippi and the unique freshwater wildlife that live there. The National Parks Service says that the Mississippi River is home to 260 species of fish and 40 percent of the nation's waterfowl. Many birds use the river as a pathway to follow when they migrate. A variety of insects, amphibians, and reptiles inhabit the environment along the river as do many other animals that use the river banks as a source for food and shelter.

The banks of the Mississippi display the plants of the region. Trees, shrubs, and floating water plants are common types of vegetation found there. Areas along the

river have formed marshes that house varieties of birds, insects, fish, and in some locations, river otters.

Alligator gar are the largest species in the gar family, and among the largest freshwater fishes found in North America. Mature alligator gar commonly measures 6 ft in length, and weigh over 100 lbs. However, anecdotal reports suggest they can grow up to 10 ft in length, and weigh as much as 350 lbs.

Diet studies have shown alligator gar to be opportunistic ***piscivores*** (fish eating), and even scavengers depending on the availability of their preferred food source. They occasionally ingest sport fish, but the majority of stomach content studies suggest they feed predominately on forage fishes as well as invertebrates, and water fowl. Diet studies have also revealed fishing tackle and boat engine parts in their stomachs.

Alligator gar inhabit a wide variety of aquatic habitats, but most are found in the Southern United States in reservoirs and lakes, in the backwaters of lowland rivers, and in the brackish waters of estuaries, bayous and bays. They have occasionally been seen in the Gulf of Mexico.

There are now efforts to reintroduce Alligator gar between Tennessee and Illinois as part of an effort to control invasive Asian carp.

These river otters have found a marshy area to rest and hunt for food.

North American river otters have returned to an area along the Mississippi where once they were in danger. The National Parks Service continues to watch over these playful animals in hopes that their habitat will be maintained as a safe place for them to survive.

Asian small-clawed otters are native to Southeast Asia from northern India to southeastern China, the Malay Peninsula, and parts of Indonesia. This species of otter weighs between 8-10lb on average and is only about 2 ½ feet long from nose to tail, a significant part of that length being composed of the tail. Asian small-clawed otters are the smallest of the 13 species of otters in the carnivore family **Mustelidae**. Other members of this family include weasels, skunks, and ferrets. They spend much time on land, unlike other otter species, which makes them semi-aquatic animals rather than marine mammals.

Their paws are a distinctive feature because their fingers and toes are only partially webbed, leaving the end of them free for movement. Because of this, they have a high degree of manual dexterity so they can use their paws rather than their mouths to catch their prey. They will also flip stones and dig in sand for clams, mussels, and crab. This partial webbing is a feature unique to this species of otter.

These otters eat a variety of crustaceans and mollusks, small fishes, amphibians, and insects. They supplement their diet with small rodents and snakes.

The **Amazon River** is another example of how flowing water winds its way through the land. Scientists have discovered that 40 percent of the world's fish live in freshwater. One of the longest rivers in the world, the Amazon River, is home to thousands of living creatures. A variety of wildlife exists along the length of the river, and it flows through the largest tropical rainforest in the world.

The start of the famous river is high in the Andes Mountains of Peru. The Amazon River contributes nearly one-fifth of all of the fresh water that flows on Earth. Some scientists believe that the Amazon Basin contains more species of fish than the Atlantic Ocean. Some interesting examples of these species include electric eels, stingrays, pink dolphins, and manatees.

Amazon River Dolphin

The banks of the Amazon River provide habitats for a wide variety of animal and plant life. During the rainy season, animals, plants, and humans can face changes in their lives as the river begins to flood.

In the dry season the river water flows very slowly. Water is a natural **resource** that changes how people and animals live. Water is what forms all of the rivers in

the world. Large or small, rivers provide important resources for the **survival** of animals and humans.

Sources: US Department of Natural Resources; World Wildlife Federation; National Parks Service, U.S. Department of Interior, National Geographic; UCMP Berkley; Arizona Game and Fish Department; Turtle Magazine. Photos: U.S. Department of Interior and public domain.

Procedures and Activities:

1. State the learning objectives. Review previous instruction as it relates to the topic and objectives.
2. Review vocabulary.
3. Read related literature. Follow-up with discussion and open-ended questioning about rivers, wildlife, and natural resources.
4. Discuss natural resources and how important they are to life on earth. In addition, discuss events such as flooding, dust storms, rain storms, etc.
5. Review the relationships of humans and wildlife. Discuss conservation of endangered species and give examples. Ask students to think about an animal that may be endangered and talk about ways to protect the animal in a natural environment.
6. Read and share the information about the Asian small-clawed otters, river turtles, and Apache and Gila trout. Ask open-ended questions about each species and their habitat.

 **Indicates 'take along' activity.**

Snack: Turtle Cookie (See attached for materials and directions.)

Activity: **Pre field trip activity**. The food chain activity allows students an opportunity to understand how animals live and gather food. Focus on the dependence of plants and animals and the concept of survival in their environment.

Activity: First, show the picture of a river and discuss the formation, change in direction and wildlife. Next, have students draw a river and fill it with wildlife. This activity reinforces the variety of life in and around a river, the

formation of a river and the interdependence of various species. Ask students to make predictions about how animals live along the river and how people can protect the animal habitats.

Activity: 'What do you know about rivers?' consists of 6 questions that students can answer individually. Each question offers an opportunity for discussion related to the formation, location, and inhabitants of rivers. As a group, discuss each question and answer.

 **Activity:** At OdySea Aquarium, students select their favorite river animal. Students draw a picture of their favorite river animal and list 3 important characteristics about it. After the field trip, students can share their selection with small groups or in a classroom forum.

Activity: Students write a short story about a 'super hero' river turtle. Remind student that the story has to have a plot that involves the 'super hero' turtle doing something very special. Funny stories are always great!

Activity: 'My pet turtle,' is a craft that students will enjoy making.

Reflections and Assessments: Students are assessed on various levels depending on the activity. Participation, grade standards, and percentages may be applied to each activity. Activities are designed for flexibility and can be used for pre- or post-field trip learning.

Most activities meet the **STEM** guidelines involving problem solving, investigation, using technology, integration of interdisciplinary instruction and inquiry.

The Asian Small-Clawed Otter

Guess who lives along some of the rivers in Asia? Right, the Asian small-clawed otter! The Asian small-clawed otter is the smallest species of otter in the world, but you wouldn't know it from their playful nature and sense of adventure. Named for their very small claws, these otters can use their 'thumbs' to hold the smallest objects and morsels of food.

Otters enjoy an aquatic lifestyle. They have long bodies and short legs, and their paws are partially webbed to help them propel through the water. Asian small-clawed otters have a double coat, which means the under fur is thick and helps keep them warm. The outer coat is coarse and acts as water-proofing. Generally brown in color, the Asian small-clawed otter has cream-colored fur on the neck, chin, and throat.

The Asian small-clawed otter is a social animal that lives in small family groups. When baby otters are born, both parents care for them and keep them safe from harm. When baby otters are about seven weeks old they take their first swim and begin to eat solid food. The diet of an otter consists largely of crabs and fish, but sometimes a bug or two is added!

Otters are often found along river banks playing in the grass, resting and grooming their fur. They prefer shallow water with lots of vegetation. The greatest threat to the otter is the loss of habitat. Deforestation, pollution, and loss of food contribute to the potential loss of the Asian small-clawed otter.

Ken Billington – Wikimedia public domain

River Turtles

Many different species of turtles can be found living in and around rivers. These are the types of turtles who like freshwater environments in ponds, lakes, and rivers banks. River turtles are found all around the world, and some can be found on the endangered species list.

Most turtles have a diet made up of plants, grasses, leafy vegetation; however, some species of turtles eat meat classifying them as omnivores. Turtles are reptiles that live on land and in the water. Generally, turtles have a light-weight shell and webbed feet with long claws.

Eastern painted turtles are one of the most commonly found turtles in North America. Their small size, about 5 to 7 inches, and colorful features make them an interesting creature to observe. The edges of the turtle's shell are smooth and have yellow or orange patterns along with darker spots on them. The stripes on the nose of the Eastern painted turtle are characteristic of the species. These turtles enjoy basking in the sun and like to climb onto a rock or branch to get out of the water and in the sun. The life-span for an Eastern painted turtle in captivity is over 20 years.

Eastern Painted Turtle

Another land and water turtle found in the United States is the yellow-bellied slider. Living in and near slow-moving rivers, ponds and marshes, the yellow-bellied slider's name describes the color of its plastron, which is a term for the bottom part of the shell. The carapace, or upper shell, is generally brown and black, sometimes having a few yellow stripes. The yellow-bellied slider can range in size from 8 to 13 inches. The turtle's skin is olive green with patches of yellow and black spots.

Yellow-bellied sliders, like other turtles, lay eggs in a nesting area not far from the water. It takes the eggs about 2 to 3 months to hatch, and the baby turtles stay in the nest until the weather is warm. Thick surface vegetation keeps the turtles protected during their 30-year life span.

Yellow-bellied Slider

All turtles living in the wild are susceptible to changes in the environment, pollution, and human interaction. Keeping turtles from becoming endangered means conserving their natural habitats and monitoring their surroundings.

The Apache and Gila Trout

Arizona has long been the home of the Apache and Gila trout, which are the only native trout species in the state. Since the 1800's, Apache and Gila trout swam in the White Mountain rivers and streams and were documented as unique to the region. The Apache trout has an olive-yellow body with black spots across the body, fins, and head. The golden-colored belly of the trout offers another identifying characteristic of the species. The Apache trout can grow between 9 and 20 inches in length and average about 5 pounds in weight. The Gila trout's body is an iridescent gold that blends into a darker shade of copper on the gill plates. Small spots on the fish's body extend from the head to the dorsal and caudal fins. The tiny spots and the red/pink lateral band are identifying characteristics as the Gila

and Apache are closely related in shape and size. Both types of trout prefer clear, clean water flowing over gravel riverbeds.

Apache Trout

The Arizona Game and Fish Department has reported that historic photos and stories have been told about the hundreds of trout caught in a single visit to the local rivers. Considered to be on the decline by the early 1900's, federal agencies began to stock non-native trout in an effort to replenish the lakes for trout fishing. Believing that stocking the lakes would resolve the concern of over-fishing, species of rainbow, brook, cutthroat, and brown trout were introduced to the local lakes to live alongside the Apache and Gila trout. As time passed, evidence became available that the non-native trout were competing with the Apache and Gila trout for food and shelter and making it hard for the native species of trout to survive. The White Mountain Apache Tribe worked diligently to ensure the survival of the trout species by closing fishing in reservation waters. In 1969, the Apache trout became the first species to be listed as endangered. Considered endangered under the Federal Endangered Species Preservation Act, actions were taken to label the Apache trout protected under the law. By 1975, the Apache trout had been down-listed from endangered to threatened, due to conservation efforts. It was clear that these native fish were a part of Arizona's history and the community's relationship with native species. Human intervention would impact the population of both species of trout. A joint effort was undertaken by the White Mountain Apache Tribe, the U.S. Fish and Wildlife Service, and USDA Forest Service to form the Apache Trout Recovery Team. This joint team made plans to bring the species of native trout back from the decline.

Gila Trout Release (Photo in public domain)

Along with diminished food and shelter, the native trout species faced another battle. The natural environment for these fish was deteriorating by livestock that grazed near streams and rivers, timber being harvested and other land uses near the trout's habitat. These activities introduced dirt and pollution to the clear water. This increase in the destruction of the trout's natural habitat required intervention. The Arizona Game and Fish Department teamed up with the U.S. Forest Services to develop a habitat improvement plan designed to protect areas of the lakes and streams and improve water quality and riverbeds. The recovery team launched a plan to protect the rivers and streams, restoring the environment by stabilizing banks, adding vegetation and fencing or closing areas to reduce erosion.

An Apache trout recovery stream

The Apache trout is now returning to its natural habitat due to the continuing efforts of the recovery team. Part of Arizona's natural history, the Apache trout continues to survive and is found nowhere else on earth.

Source: Arizona Game and Fish Department.

FOOD CHAIN

BEAR

BIG FISH

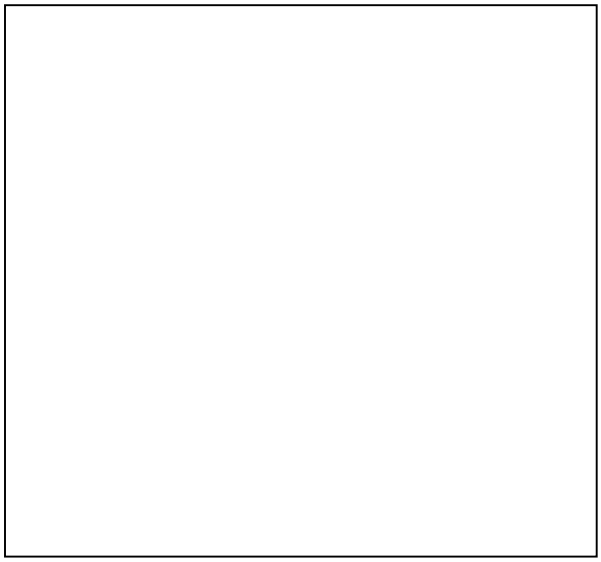
WATER PLANTS

TINY FISH

Who eats who in a food chain? Cut the pictures out and glue them in the order of who eats what first, second, third, and fourth.

The River Food Chain

1



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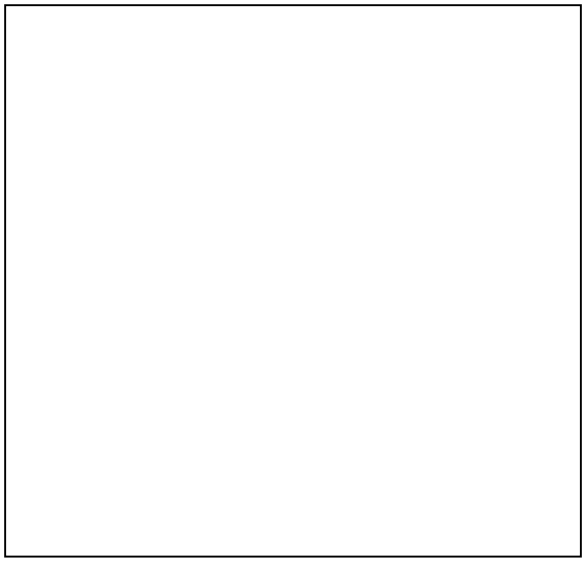

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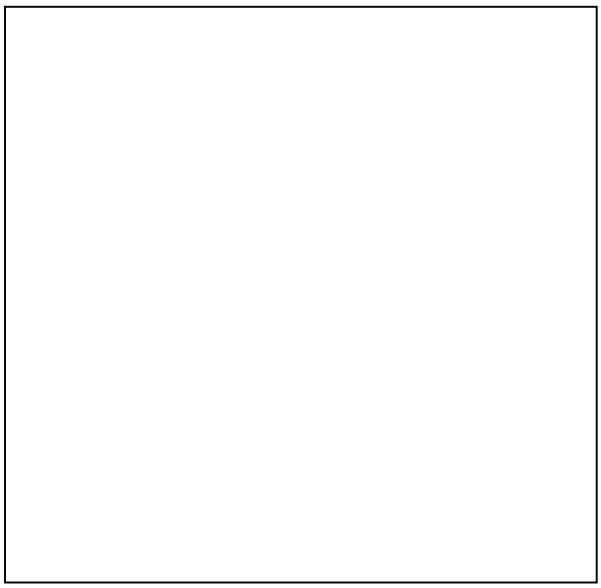

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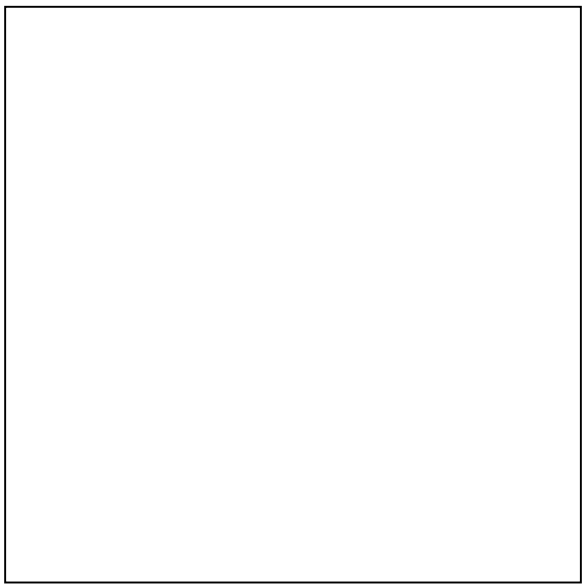

Draw a River

In the space below, draw a river and fill it with these plants and animals:

1 Frog 2 Fish 1 Dragonfly 1 Butterfly

Grass and water plants 1 Turtle

Picture of a River

Students can view the picture of a river and better understand the environment along the banks of the river. Discuss the changes in the river's direction, mountains in the far background, and vegetation.

Turtle Cookie

Snack Items:
Pretzel sticks
Vanilla wafers
Frosting
Blue food coloring
Mini candy for eyes
Oatmeal (any flavor) cookies

Directions: Each turtle cookie has 4 ½ pretzel sticks, 2 oatmeal cookies, 2 candy eyes, one vanilla wafer, white frosting to hold the cookies together, and blue frosting to attach the eyes. Spread white frosting on the bottom of both cookies. Place 4 pretzel legs and the half piece for the tail; place the vanilla wafer (head) in place and put the second cookie on top. Secure the cookies by pressing lightly. With a small amount of blue frosting, frost the candy eyes and put on the head. A tasty treat for sure!

What do you know about rivers?

Circle your answer.

1. Where do most rivers begin? Deserts Mountains

2. In what direction do most rivers flow? Up hill Down hill

3. What river is located in Arizona? Nile River Colorado River

4. Circle the animals that live by a river:
   Turtle Frog Whale Fish Seal

5. When river water cuts away the land, what it is called?
   Rainfall Erosion

6. A place where wildlife lives is called what?
   House Habitat

My Favorite River Animal

My favorite river animal is _____

Three interesting characteristics about my favorite river animal:

1. _____
2. _____
3. _____

My favorite river animal looks like this

My favorite river animal's name is _____

SUPER HERO TURTLE!

My story begins: _____

_____

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My Pet Turtle

Materials:
Paper bowl
Green and brown acrylic paint
Black marker
Green construction paper
Glue
Paintbrushes
Scissors

Directions:

Make a pattern for the head, legs and tail of the turtle. Copy the pattern so each student has a pattern. Using green construction paper cut out the head, legs and tail. Set aside.
Students paint the inverted paper bowl with the pattern of a turtle shell. Use green and brown acrylic paint.
When the paint is dry, turn the bowl over, and glue the head, legs, and tail on the edges of the paper bowl. (A stapler may be needed to reinforce the glue.)

Your pet turtle is ready for a name!