

Influence of Spatial Exchange – The Columbian Exchange

TAKS:

Objective 2 (TAKS):

The student will demonstrate an understanding of geographic influences on historical issues and events.

- 9.6 Geography. The student understands the types and patterns of settlement, the factors that affect where people settle, and processes of settlement development over time. The student is expected to:
 - (A) [Locate settlements and] observe patterns in the size and distribution of cities using maps, graphics, and information.
- 9.11 Geography. The student uses geographic skills and tools to collect, analyze, and interpret data. The student is expected to:
 - (B) [Pose and] answer questions about geographic distributions and patterns in world history shown on maps, graphs, charts, models, and databases.
- 9.12 Geography. The student understands the impact of geographic factors on major historic events. The student is expected to:
 - (C) Analyze the effects of physical and human geographic factors on major events in world history.
- 9.23 Science, technology, and society. The student understands how major scientific and mathematical discoveries and technological innovations have affected societies throughout history. The student is expected to:
 - (A) Give examples of [major mathematical and scientific discoveries and technological innovations that occurred at different periods in history and describe the changes produced by these discoveries and innovations.

Objective 3 (TAKS):

The student will demonstrate an understanding of economic and social influences on historical issues and events.

- 9.18 Geography. The student understands the ways in which cultures change and maintain continuity. The student is expected to:
 - (A) Describe the impact of general processes such as migration, war, trade, independent inventions, and diffusion of ideas and motivations on cultural change.

Objective 5 (TAKS):

The student will use critical thinking skills to analyze social studies information.

- 9.25 Social Studies Skills. The student applies critical-thinking skills to organize and use information acquired from a variety of sources, including electronic technology. The student is expected to:
 - (B) Analyze information by sequencing, categorizing, identifying, cause-and effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations [and predictions], and drawing inferences and conclusions.

Common Concepts in WG/WH:

Effects of physical and human geographic factors on past and present events, such as:

- Change—how and why places, spatial organization, and processes change over time and affect events, conditions, and people.
- Perception—how and why people’s perceptions of places, issues, historic events geographic contexts, and resources change over time, affecting events, conditions, and behavior.
- Relationships—how and why geography influences and affects people, events, and conditions in the past and present.
- Analyzing relationships between geography and history through map interpretation.

Spatial Diffusion:

- spread of phenomena from point of origin to destinations
- rate of spread
- routes and paths of spread
- effects of spread

Materials and Resources:

- World map
- Western hemisphere map
- Article “Christopher Columbus, The Astute Observer” available at <http://www.maps101.com>

Procedures (allow 2 class periods):

Trace the spread of ideas, language, religion, customs, diseases, etc. from one culture to another by describing patterns of spread (pathways) and evaluating the influence of barriers and means of transmission.

1. Use a chart (Attachment 1) summarizing the Columbian Exchange (minerals, plants, animals, technology, ideas, diseases) to draw conclusions about how resources influenced the settlement of North and South America and how the exchange of these resources affected both the New and Old Worlds.
2. Use a map to trace the routes of exchange and diffusion (spread) of resources.
3. Describe the consequences of the initial contact and eventual exchange between the Americas and the rest of the world (Columbian Exchange) in terms of trade, migration, crops, livestock, diseases, and technologies.
4. Evaluate the benefits and negative consequences of the Columbian Exchange.
5. Examine a series of world and regional maps displaying cultural characteristics, such as religions, languages, livestock, and crops. List geographic questions suggested by the maps. How did the exchange of food shape the world?
 - What are the areas of origin, means of diffusion, and current distribution of religions such as Catholicism and Protestantism?
 - What are the areas of origin, means of diffusion, and current distribution of European languages such as English, Spanish, French, Portuguese, and Dutch?
 - What are the areas of origin, means of diffusion, and current distribution of different agricultural products?

Student Tasks:

- Describe the impact of the three environmental imports from the Americas that had the greatest impact on European, Africa, and Asian societies.
- Describe the three environmental imports from Europe, Africa, and Asia that had the greatest impact on societies in the Americas.
- Examine your answers to the above questions and compare your answers with those of other students. Evaluate the impact of the Columbian Exchange from the point of view of someone living in Europe and someone living in the Americas at that time.

Attachment 1: The Columbian Exchange

From the Americas to Europe, Africa, and Asia

Maize
Potato
Sweet potato
Beans
Peanut
Squash
Pumpkin
Peppers
Pineapple
Tomato
Cocoa
Chicken
Smallpox
Typhus

From Europe, Africa, and Asia to the Americas

Wheat
Sugar
Banana
Rice
Grape (wine)
Olive oil
Dandelion
Horse
Pig
Cow
Goat
Chicken
Smallpox
Typhus

The Battle Over Dolphin Bay

TEKS:

- 9.3 Geography. Such as student understands how physical processes shape patterns in the physical environment (lithosphere, atmosphere, hydrosphere, and biosphere), including how Earth-Sun relationships affect physical processes and patterns on Earth's surface. The student is expected to:
 - (B) Describe physical environment of regions and the physical processes that affect these regions such as weather, tectonic forces, wave action, freezing and thawing, gravity, and soil-building processes.
- 9.2 History. Such as student understands how physical processes shape patterns in the physical environment (lithosphere, atmosphere, hydrosphere, and biosphere), including how Earth-Sun relationships affect physical processes and patterns on Earth's surface. The student is expected to:
 - (A) Describe the human and physical characteristics of the same place at different periods of history.
- 9.6 Geography. The student understands the types and patterns of settlement, the factors that affect where people settle, and processes of settlement development over time. The student is expected to:
 - (B) Explain the processes that have caused cities to grow, such as location along transportation routes, availability of resources that have attracted settlers and economic activities, and continued access to other cities and resources.

Objectives:

- Explain the ways in which people and wildlife depend on and use coastal areas.
- Locate barrier islands and list the reasons why they should be protected.
- Evaluate advantages and disadvantages for a community to develop a barrier island.
- Develop workable compromises.

Materials and Resources:

- Background reading (Attachment 1)
- Map of Texas showing barrier islands (Attachment 2)
- Newspaper article (Attachment 3)
- Discussion questions with answers (Attachment 4)
- Poster boards
- Markers
- 3-by-5-inch index cards
- Hard hat for the developers (optional)
- Bell for the panel to call the room to order (optional)

Additional Resources:

- Mitchell, John G. 1992. *Our Disappearing Wetlands*. National Geographic Magazine (October): 3-45.
- Lee, Douglas Bennett. 1992. *America's Third Coast*. National Geographic Magazine (July): 3-37.
- Conserving America: *The Challenge on the Coast*. PBS television special (1994).

- Benhart, John E. and Alex Margin. 1994, *Wetlands: Science, Politics, and Geographical Relationships*, Pathways in Geography Publication, No. 9. Indiana Pa.: National Council for Geographic Education.

Procedures (allow 3 50-minute periods):

Students will describe and evaluate competing uses for barrier islands. Through role-playing, they will develop some steps that could be taken to help make a decision about whether or not to develop a barrier island.

Background:

Scientists estimated that by the mid-1990s, three out of four people in the United States would live within 50 miles of a coast. With so many people wanting to live in coastal areas, tremendous pressure is building to construct more houses, resorts, and other facilities to accommodate the projected human influx.

Unfortunately, coasts and development usually do not make a good match. The main problem stems from the natural instability of coasts. All coasts are constantly changing because of the action of wind, waves, and tides, and that makes building on coasts (whether on a barrier island, sea cliff, or dune) extremely precarious. Development projects often mean added problems for coastal habitats, among which include increasing pollution, increasing erosion, disrupting plant and animal life, and over-harvesting coastal resources.

1. Ask the students to think about some ways that people and wildlife depend on and use coastal areas. Remind them that coastal areas include sandy beaches, coastal wetlands, rocky shores, barrier islands, and other types of habitats. (People use coasts for a variety of recreational activities, including swimming, birding, sport fishing, and so on. People also depend on coastal areas for many resources, including fish, shellfish, seaweed, minerals, and oil. Many species of wildlife live in coastal waters, on sandy and rocky beaches, in dune areas, and in low-lying wetlands. Coastal wetlands also help trap pollutants and prevent flooding. Many species also nest in and migrate to coastal areas.
2. Next, ask the students to think of some ways that people's use of coastal areas may cause problems. (People create pollution, over-fish, destroy wildlife habitats, increase erosion, and so on.)
3. Have students read and discuss Attachment 1. Then, give students the following scenario:
 - Communities in many coastal areas are faced with the dilemma of deciding whether to develop nearby barrier islands and coastal areas. In trying to decide what to do, citizens and government officials must weigh a variety of factors, including environmental impacts, economic realities, and wildlife needs. You will be discussing a proposed development plan in Texas. Although the example is fictional, it is based on real-life issues. You will be focusing on several coastal towns in Texas that are trying to decide whether to allow developers to build a resort community on a nearby barrier island.
4. Display a map of the Texas coast and have the students point out the barrier islands. Pass out the newspaper article (Attachment 2) and have each student read about the proposed development plan.
5. The next day, divide the class into groups of four or five, with one group composed of three individuals. Assign this group of three the roles of congressperson, county commissioner, and university professor. Using the list of discussion questions provided (Attachment 3) (write the

questions on the board or project them on an overhead transparency), have students discuss their thoughts and answers to the questions. Then, using cards with either the word “Developer” or “Environmentalist” written on them, have one member from each group draw a card at random. The groups are now to investigate materials for and develop their arguments from the viewpoint of whichever card they drew. The teacher will need to walk around and work with each group to encourage good points of discussion or debate. Next, give each group a poster board.

6. If the group is representing the developer viewpoint, have them draw a master plan of the island, showing how it will be developed. Have them also design a logo for their company. They must take into account traffic, habitat destruction, home site, waste removal, and other pertinent factors. They will use this master plan for presenting their case.
7. If the group is representing the environmentalist viewpoint, have them develop a plan for protecting the coastal environment. They may also make signs with slogans and pictures that support their plan for display at the meeting when presenting their case. Advise students that making signs or slogans for display at a meeting should not stereotype environmentalists as slogan-making or poster-carrying individuals, but as individuals who have carefully investigated data and prepared reasoned arguments to support their positions.
8. The group with the congressperson, professor, and county commissioner will be developing questions to ask each side. This panel will decide whether the island should be developed. The teacher may want to help them get started by giving them examples of the type of questions they need to ask.
9. On the third day, give the groups about ten minutes to organize their discussion. Place the group of three at the front of the room in panel fashion. Have the other groups in clusters. Each group will present its proposals (both pros and cons). Encourage each person to lead at least one discussion question or answer. Remind the groups that they must come up with a workable compromise. The panel will ask questions to each of the groups about the proposed development. When everyone has finished their presentations, have the panel make its decision. Write down the strong points of the discussion on an overhead transparency or chalkboard. Evaluate with the class the viable options for each group.
10. Have students support, orally or in written form, the opinions and arguments they present. Use a checklist to make a written evaluation of students’ work. Presentation, group work, graphics or artwork, and content can each be worth 25 points, for a total of 100 points.
11. Extensions:
 - Have each group investigate a current coastal problem. Has the problem been resolved? If so, how? If not, why not?
 - Make a coastal issues bulletin board. The students need to bring to class articles relating to coastal development, pollution habitat destruction, and other topics.
 - Each group could investigate a threatened or endangered species that lives on or near barrier islands.
 - Have students read the quote by Rachel Carson at the beginning of “The Edge of the Sea”: “The edge of the sea is a strange and beautiful place.” Have the students write in their journals what Rachel Carson’s quote means, and then have a class discussion about the different perspectives.

Attachment 1: Background Reading “The edge of the sea is a strange and beautiful place”

- Rachel Carson, *The Edge of the Sea*, 1955.

The United States boasts thousands of miles of coast — enough shoreline to wrap around the earth more than three-and-a-half times. Along these coastal stretches, waves, wind, and land interact to create a dazzling variety of environments. In parts of Washington State, for example, mighty cliffs shoulder the Pacific. In Southern California, a sandy beach gently slopes into the sea. Near the tip of Florida, a mangrove swamp reaches into the warm waters of the Gulf of Mexico. Jagged rocks border the Atlantic on the coast of Maine.

Coastal Dynamics

On the Move: Whether they are rocky, sandy, or marshy, coasts have one thing in common, they are always changing. Every day, tides alternately cover and uncover the shore. Waves constantly crash against the coast, gradually reshaping it as they wear away rocks and pick up or deposit sand and other sediment. The effect of tides and waves on the shore is intensified during storms. When storm waves hit a sandy beach, for example, they cut into the beach, carrying away much of the sand and depositing some of it offshore. After the storm, gentler waves may gradually pick up sand from offshore and dump it on the beach, and the beach slowly builds up again.

Dig Those Dunes: Dunes form an integral part of the sandy beach environment. (Dunes form as wind blows dry sand off the beach, creating piles of sand behind the beach.) During a heavy storm, these piles of sand help break the force of waves that might otherwise sweep further inland. And after the storm, they provide a reservoir of sand for the beach. Wind and waves move sand from the dunes onto the beach, helping to replace some of the sand that was removed in the storm.

Rivers of Sand: Waves do more than move sand back and forth from the shore. They also create “longshore currents” that flow essentially parallel to the shoreline and move sand along the coast. Along some beaches, the amount of sand moved by longshore current in one day would fill more than 250 dump trucks. What happens to all this moving sand? In certain areas along the coast, such as near rocky outcroppings, inlets, and the ends of islands, longshore currents are interrupted and drop some of their sand load. Much of the sand settles in sand bars close to land, where waves can carry it onto the shore.

A Coastal System: “Erosion” (the loosening and carrying away of sand, rocks, and other material) and “accretion” (the buildup of these materials) are both part of the natural process of coastal change. As one coastal area is depleted, another is built up. In some areas, for example, longshore currents may carry bits of rock from an eroding rocky cliff to a sandy beach miles away. Currents also pick up and carry sediment that has been deposited in the ocean by rivers and streams. This continual transfer of material from one coastal area to another is what keeps a sandy beach built up.

Ups and Downs: Coasts are also affected by changes in sea level. Over geologic time, the sea level has risen and fallen by hundreds of feet. During the past century, the sea level has risen by about one foot. Today, it is rising faster. This rising sea level is increasing the rate of coastal erosion in many areas, especially on barrier islands, which lie just off the coast.

Trouble on the Shores

Fighting Changes: For many people, living on or near the coast is a lifelong dream. But construction on the shore inevitably puts people at odds with the natural processes of coastal change. For example, if a house is built on dunes, it can block the movement of sand from dunes to beach. Without sand from the dunes to help replenish it after storms, the beach will become narrower and more vulnerable to storm damage.

To keep coastal areas intact and protect development, engineers have tried a variety of strategies. Unfortunately, most of these stabilizing techniques are expensive, short-term solutions that create more problems than they solve. For example, engineers have tried to replenish certain beaches by dredging sand from other areas and dumping it on the eroding beach. But dredging sand from offshore areas disturbs or destroys the animals that live in these areas. And the “new” sand often doesn’t last more than a few years before it is washed away by storm waves. Despite these problems, some people consider beach replenishment to be one of the less harmful ways to protect coastal development.

Say Good-bye to Habitats: Besides interfering with natural coastal processes, development often destroys wetlands and other important habitats. Already, more than half of the coastal wetlands in the United States have been destroyed. Because these saltwater marshes and mangrove swamps serve as nurseries for over 80 percent of the commercial fish and shellfish species in the United States, as well as important stopovers for migratory birds, the destruction of coastal wetlands has hurt many species, not to mention the fishing industry.

Development can also disturb coastal areas where seals and sea lions breed, shorebirds nest, and sea turtles lay their eggs.

Toxic Tides: Too many people on or near the coast have created another serious problem: coastal pollution. In the last fifty years, the amount of pollution and the toxicity of pollutants in the ocean have increased dramatically. Here is a closer look at the reasons for coastal pollution.

Debris in the Sea: Each year, more than 14 billion pounds of garbage are dumped into the world’s oceans. This trash comes from many sources, including manufacturing plants, commercial, military, and recreational vessels, overflowing landfills along coastal areas, and people who illegally dispose of medical waste at sea. Besides creating an ugly mess as it washes up on beaches, some types of garbage can harm or kill wildlife. For example, more than two million seabirds and 100,000 mammals, along with countless other animals, die each year after eating or becoming entangled in plastic.

An Oily Problem: Oil pollution also affects the quality of coastal waters and the life in these waters. Although a damaged oil tanker or offshore rig can spill millions of gallons of oil, much of the oil in coastal waters comes from city streets and other land-based sources.

Deadly Discharges: Some coastal areas can be dangerous to your health, not to mention the health of fish and other animals. Many factories and sewage-treatment plants often discharge wastes directly into coastal waters. These wastes often contain hazardous chemicals that can build up in the bodies of fish, shellfish, and other creatures. Sewage also acts as a super fertilizer, promoting the growth of algae. The algae use a lot of the water’s oxygen, causing fish and other animals to suffocate.

We All Live Downstream: Even the actions of people who live hundreds of miles from the coast can have a significant effect on coastal water quality. That is because water that runs off driveways, roads, lawns and gardens ends up in rivers and streams that eventually empty into the ocean. This polluted water

(collectively called runoff) contains traces of pesticides, fertilizers, oil, antifreeze, gasoline, paints, and other chemicals. And each of these ingredients has an effect on water quality.

Hope for the Coast

Making a Change: Despite the many problems facing our coasts, there is hope for the future. Some states, for example, have passed laws to restrict unwise development on their coasts. In North Carolina, setback laws now require that all large buildings must be set back from the shore at a distance that is equal to sixty times the annual erosion rate. On the national level, Congress re-authorized the Clean Water Act, which in part requires that the discharge from factories and sewage-treatment plants meet certain standards before being released in coastal waters. There is also hope that international cooperation will help clean up coasts all around the world. In 1988, thirty-nine countries, including the United States, ratified an international treaty to restrict the dumping of plastic in the ocean.

A Group Effort: Of course, none of these laws will do much good without strong enforcement. In the past, many coastal protection laws have been ineffective because of a lack of funding and support. Conservation groups (such as the National Wildlife Federation, the Center for Marine Conservation, and the Oceanic Society) are working to strengthen and enforce existing laws and create new legislation. They are also helping to build support for coastal protection by teaching the public why our coasts are in trouble.

Taking the Plunge: All around the country, determined individuals are taking the initiative to clean up and protect their coastal areas. Through their efforts, they are drawing other people into the battle to save the coasts.

Source: Information gathered from a 1994 PBS television program titled *Conserving America, the Challenge on the Coast*.

Attachment 2: Barrier Islands along the Texas Coast

Houston Port Arthur

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Galveston Bay Galveston

Matagorda Bay Galveston, Island

San Antonio Bay

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Port O'Connor

Matagorda Island

Corpus Christi Bay

Corpus Christi •

Kingsville Mustang Island

Baffin Bay

Gulf of Mexico

Laguna Madre

Padre Island

Port Mansfield

Port Isabel

Instructions: Draw a sketchmap of the Texas coastline and barrier islands.

Attachment 3: The Coastal News

Developers Battle Environmentalists in Coastal Debate

The battle is on. Developers of the proposed 15,000-acre Dolphin Bay resort on San Juan Island, Texas, said yesterday that despite opposition from citizens' groups, they intend to go ahead with their plans to build. The developers, the Cliffside Development Group, released a report last week, which claims the new resort would provide thousands of jobs for the economically depressed towns of Rosa, Ellis, and Fort Ward.

"This resort would do more for the people of Texas than anything we have done in the last 50 years," said Congressman John Williams. "People would have jobs, they would have a place to vacation, and they would be able to enjoy the wildlife on the island."

Others agree, saying that in addition to providing much-needed jobs, the resort would increase tourism and bring more money into local economies. And it would provide greater access to the island, allowing more of the population to experience the barrier-island habitat. As one long-time resident of Ellis said, "I'll finally be able to build the vacation home I've always dreamed about."

The entire project will take almost 18 years to complete. The three-part development plan will include the construction of a marina, a hotel, shops, a beach club, two nine-hole golf courses, a sewage treatment plant, and several condominium and townhouse communities. A terminal, which will house two ferries to carry visitors and residents back and forth from the island to the mainland, is scheduled to be completed in the coming year. And a bridge linking the mainland to the island is expected to be completed within five years.

Despite the optimistic predictions from supporters of the development plan, many citizens, including environmentalists, scientists, and fishermen, feel the resort would eventually destroy the land and wreak havoc with the island's natural resources. As plans to go ahead with the project draw closer, several groups are launching anti-development campaigns.

"There are so many environmental flaws in the plan, it is hard to believe the state might actually go ahead with it," County Commissioner Diana Jones said in a public hearing last week. "I'm concerned about erosion from construction sites. I'm concerned about the destruction of prime wetland habitats. I'm concerned about pollution and over-fishing. But I'm most concerned about the long-term effects from over-development on a small, pristine barrier island ... especially given that the sea level is expected to rise dramatically along the Texas coast by the year 2100. San Juan Island is currently the best thing Texas has got going, and it seems that we are willing to gamble it away on an iffy development scheme."

Anna Hernandez, a university professor, agreed. "We would definitely be wasting taxpayers' money by building a resort. Given our hurricane history and the nature of barrier islands, this resort just won't last. The island is continually eroding and moving, and the proposed development will only accelerate change."

In a recent fact sheet distributed by the Save San Juan Coalition, opponents point to several additional problems associated with the proposed resort, such as the loss of critical wildlife habitat and the probability that increased tourism will destroy dune vegetation, contribute to over-fishing, and create a litter problem. The fact sheet also points out specific areas that would be negatively affected by the development. For example, the construction of the marina and golf courses would destroy major wetland drainage patterns in the 5,000-acre wildlife preserve that is located just east of the proposed resort. Runoff from the project could also have an impact on near-shore water quality, causing a decline in the productivity of the fisheries.

Environmentalists have been lobbying Congress to make San Juan Island part of the Coastal Barrier Resources System. If that happens, the developers would be unable to obtain federal financial assistance for building roads and power or sewer lines, and it would also prohibit them from receiving federally subsidized flood insurance.

“If a hurricane hit the island, Cliffside would lose everything if they don’t get federal flood insurance,” Jones explained. “But if they have tax-supported insurance, they don’t care about the risks. They would build for the short term gain and rebuild without losing a cent. Look at other communities that have tried to build on barrier islands. Disasters have been the norm. And you know who always ends up paying for the mistakes? The taxpayers and the wildlife!”

As the debate rages on, both sides will be lobbying federal, state, and local government to try to win support. For now, though, this battle is still too close to call.

Attachment 4: Handout the Battle Over Dolphin Bay

Discussion Questions:

List the reasons people are in favor of and against the proposed resort. (Divide your paper into pros and cons.)

List any additional pros or cons you can think of that were not presented in the article.

Discuss some of the steps your group would take to help the community reach a decision about whether to develop the island. (Would you talk to more people, hire consultants, or take any other steps?)

Try to devise some workable compromises. List your ideas and discuss the feasibility of each one. Can you think of an example of a coastal dilemma where compromise would not be in the best interest of the community?

What conclusion can your group make about the problems associated with developing coastal areas?