6th/Science

Title of the Lesson

Land (Use and Development) that I Love

Timeframe: 4 days

Standard/Indicator(s)

6.8*, All ecosystems, including watershed ecosystems, are affected by complex biotic and abiotic interactions involving exchange in matter and energy. Key ideas include:*

a) *a watershed is the land that water flows across or through on its way to a stream, lake, wetland, or other body of water*

Abiotic factors determine ecosystem type and its distribution of plants and animals as well as the usage of land by people. Abiotic factors include water supply, topography, landforms, geology, soils, sunlight, and air quality/O_2 availability.

b) *Wetlands form the transition zone between dry land and bodies of water such as rivers, lakes, or bays. They provide food and shelter for wildlife and fish and nesting and resting areas for migratory birds.*

c) *human activities can alter the abiotic components and thus accelerate or decelerate natural processes*

d) *analyze and explain the functioning of wetlands and appraise the value or wetlands by humans*

Enduring Understanding	Essential Knowledge & Practices
Watershed systems are dynamic and complex; interactions within the system may influence the overall health of the watershed.	**Identify** abiotic and biotic features in a watershed. Use maps to **determine** the location and size of Virginia's regional watershed. **Locate** their own local watershed and the rivers and streams associated with it. **Analyze** and **explain** the functioning of wetlands and **appraise** the value of wetlands to humans. **Propose** ways to maintain water quality within a watershed. **Argue** for and against commercially developing a parcel of land containing a large wetland area. **Design** and defend a land-use model that minimizes negative impact.

Note. Adapted from the "VDOE Science Instructional Plan Template," *VDOE*, 2020.

Essential Question
How do we improve our land-use choices so that we can feed a growing world and still maintain a high quality of life and healthy environment?

Support about the Standard (optional)

Communities make land-use decisions every day; in fact, look around you and you will see the result of these decisions. A major challenge facing most communities, both rural and urban, is how to plan for continued growth given the impact that humans have already had and continue to have on the land.

Engineers of many types play big roles in figuring out the best ways to develop a growing area or community without harming the existing community and natural environment. Architectural, civil and transportation engineers all focus on the safety, cost and design of new buildings, bridges, dams, roads and other structures. To work on new community projects, engineers must understand the land use that already exists in an area. With this information, they can recommend the best place to build a structure that will have the least negative effect on the environment. Essentially, this means choosing the area and/or design that will affect the least number of animals, plants and people already living in the area and protect them from pollution and loss of food or habitat.

The terms land use and land cover (also known as the acronym LULC) are often used simultaneously to describe those maps that provide information about the types of features found on the Earth's surface (land cover) and the human activity that is associated with them (land use).

When it comes to maps, city planners think in terms of land use categories and create color-coded land use maps. All planners use the same color codes when designing maps and plans. Each zone is assigned a certain color that is only used for that zone. Services such as transportation have no color, but link one usage area to another. These services may be housed in one of the zones, such as a bus station in a downtown commercial area, but the service itself cuts across the entire range of zoning districts.

Commercial Zone (**RED**): Businesses that sell goods and services to local citizens (retail) or other businesses (wholesale)

Industrial Zone (**PURPLE**): Highly developed factories, warehouses, or plants that produce mass quantities of a product

Residential Zone (**YELLOW**): Places for people to live (homes, apartments)

Parks/Recreation Zone (**BROWN**): A piece of land reserved for public use and recreation

Agricultural Zone (**GREEN**): Land used for livestock, growing crops, and required farm buildings (barns and farmsteads)

Note. Adapted from the "VDOE Science Instructional Plan Template," *VDOE*, 2020.

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Materials and Safety (Always refer to the VDOE Safety in Science Teaching)

Slicing up Earth's Land Resources – show prior to starting activity

Land Use Video – show prior to starting activity


Neighborhood Map.pdf


Land that I Love Activity Sheet.pdf


Graph Paper Template.pdf

White board with grid lines

Dry erase markers (land use colors listed above)

Lesson Preparation

To prepare for this lesson, have students paired with a partner and start with the videos to review concepts. Introduce the activity and then provide each pair with a copy of the documents, white board, and set of dry erase markers (in the land use colors).

Students now work for an engineering firm which deals with community planning. The citizens have voted to add a new vehicle manufacturing facility within walking distance of the school. This center will bring in revenue to the county so the students (the engineering firm) need to figure out where to build this structure that will have the least effect on the environment.

Suggested Prior Instruction

This lesson is designed to be a performance-based assessment for the land use component of the watershed unit. Prior to this being assigned, students should have knowledge of what our watershed is, how humans impact watersheds, and ways to reduce negative impacts.

Note. Adapted from the "VDOE Science Instructional Plan Template," *VDOE*, 2020.

Engage: Living in a world of scarcity, we are continually faced with choices about how to use our limited resources, and we must recognize that our decisions impose opportunity costs.

Teacher Directions	Additional Notes
Group students into pairs (either pre-assign or have them choose a partner, whichever works best for your group) Choosing among uses of resources necessitates evaluating the costs and benefits of the alternatives. Because people's values and preferences guide their choices by shaping their perceptions of costs and benefits, and because individual values differ, community-based decisions about resource use may be especially difficult. Students will complete the Neighborhood Map document and answer the questions below.  Neighborhood Map.pdf How has your community's land changed over time? What are the five main types of **land use**? Land that is used for a **manufacturing** area is considered what type of land use? How does this change impact the environment or other communities in the area? How does your local community compare to **urban sprawl** issues in the rest of the country or world?	*Students requiring additional support can be given a map of the local area instead of having to create one.*

Note. Adapted from the "VDOE Science Instructional Plan Template," *VDOE*, 2020.

Explore: Land can be used for many things, such as housing, stores, parks, manufacturing, etc. Building a city is like putting together the pieces of a jigsaw puzzle. Certain land uses, like puzzle pieces, will not fit together well. This is called incompatibility. Only when each piece is in the right place, will you have an orderly, attractive, and economically strong community.	
Teacher Directions	**Additional Notes**
With their same partner: Students will now create a map of their school neighborhood on the dry erase board. The map will be 100 squares and must be accurate. For this map, you are not drawing items to represent the structures; instead, each square on the dry erase board must be filled in using the color that corresponds to the specific **land use** type (**commercial, industrial, recreational, residential, agricultural**) While creating the map, think about the following questions and be prepared to answer them in your presentation. What would happen if there weren't enough homes for the people who work in your community? Where would they live? How would they get to work? Is there enough open space, such as parks, where people can play sports and have picnics?	*When completing this part, it's helpful to have examples of land use model drawings available for students to reference.* *5C connections include collaboration, creativity, citizenship, and critical thinking*

Explain: The essential knowledge and practices with which students engaged and explored, are now made clear and comprehensible. This is also an opportunity for students to explain their understanding of the concept or practices.	
Teacher Directions	**Additional Notes**
With their same partner and using their map from the previous section: Students now work for an engineering firm which deals with community planning. The	*5C connections include collaboration, creativity, citizenship, and critical thinking*

Note. Adapted from the "VDOE Science Instructional Plan Template," *VDOE*, 2020.

citizens have voted to add a new vehicle **manufacturing facility** within walking distance of the school. This center will bring in **revenue** to the county so the students (the engineering firm) need to figure out where to build this structure that will have the least effect on the **environment**. Students will analyze their map to determine if they have the required **infrastructure** in place to support their new community addition. Students will also evaluate their land zone rations to determine if they are within acceptable ranges for the types of zones in the area. At this time, students can make changes to their map and plant locations if it is not acceptable.	

Elaborate: The intention is to facilitate the transfer of concepts and abilities to related, but new situations.	
Teacher Directions	**Additional Notes**
AEC stands for Assertion, Evidence, Commentary. When students write AEC paragraphs, they are developing an organized thinking process to show what they know. Students will create their own AEC response to the question that they discussed with their table partner. The response will be a minimum of three paragraphs. What effects do think the development has had on the environment? Do you think the land was used wisely? Why or why not?	*The AEC paragraph can be scaffolded to meet the needs of all students.*

Note. Adapted from the "VDOE Science Instructional Plan Template," *VDOE*, 2020.

Evaluate: The intention is for students to reflect on their new learning.	
Teacher Directions	**Additional Notes**
Students will design a PowerPoint presentation on the research they conducted and the potential environmental impacts of the development of the new manufacturing plant. The PowerPoint will be created from the perspective of students addressing the planning commission during the public hearing meeting to approve the project. Students will present their presentations with part of the class acting as members of the board and others as concerned citizens. The class will vote on each presentation to determine whether or not to allow the building as proposed.	*5C connections include collaboration, creativity, citizenship, communication, and critical thinking.* *Those needing extra support can be provided a template to use for the presentation and additional resources to be able to present to the class.*

References

Suggested Post Instruction

Student Page(s)


Neighborhood Map.pdf


Land that I Love Activity Sheet.pdf


Graph Paper Template.pdf

Note. Adapted from the "VDOE Science Instructional Plan Template," *VDOE*, 2020.