



Relationships within Ecosystems

Rachelle Everswick, B.A. AYA Integrated Science Comprehensive Education

Cedarville University



ABSTRACT

This lesson is geared towards high school students in a Biology or Environmental Science class. While learning about ecosystems, the NASA Earth Observatory will be utilized to provide students the opportunity to explore real data from NASA's Terra satellite. Students will learn about both biotic and abiotic factors within ecosystems. Using the Earth Observatory, students will use the data depicted on global maps to examine net productivity of vegetation and then compare it with other factors such as rainfall, fire, and surface temperature. They will draw on this data to speculate the relationships between factors and their influence on the net productivity of a given area.

LESSON OBJECTIVES

- Students will analyze real technical data from NASA's Earth Observatory about various factors influencing Earth's physical environment.
- Students will identify and explain the impact of abiotic factors on vegetation productivity.

OHIO STATE STANDARDS

B.DI.2: Ecosystems

ENV.ES.1: Biosphere

- Ecosystems

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

WHST.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

21ST CENTURY SKILLS

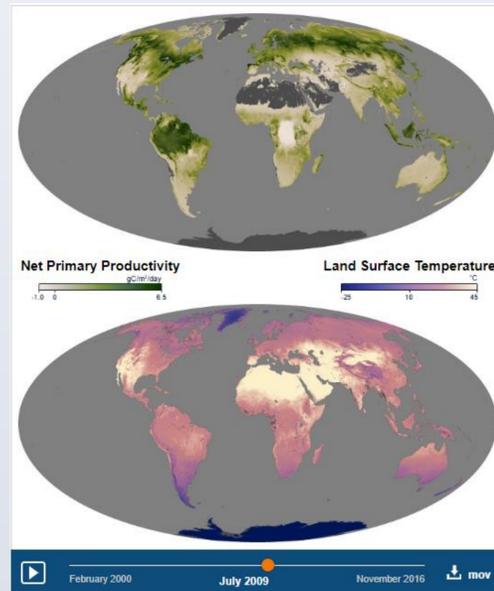
This lesson activity contributes to the development of the following 21st Century Skills:

- Environmental Literacy
- Communication and Collaboration
- Information Literacy
- Global Literacy

LESSON ACTIVITY PLAN

Initially introduce the concept of connections between biotic and abiotic factors, and then the students will start the activity outlined below:

- Students will survey NASA's Earth Observatory and will first look at the global vegetation map. They will next familiarize themselves with the global map of net productivity of vegetation, watching the animation move through the years and reading the supplemental information provided. The net primary productivity will represent our biotic feature that we are using to draw relationships to with multiple non-living factors. Students will complete a worksheet with the trends that they notice during this activity.

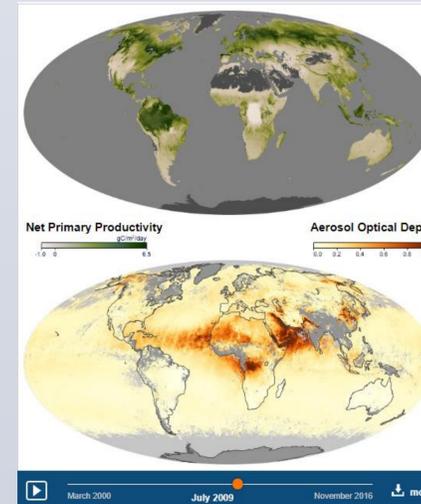
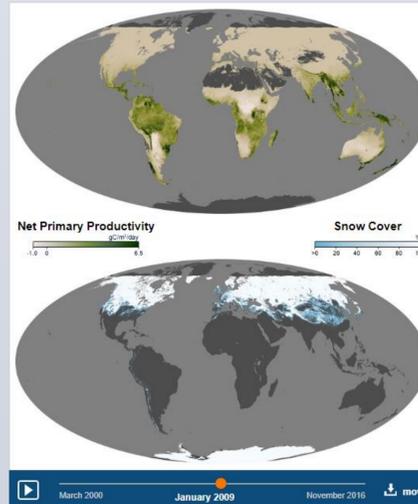
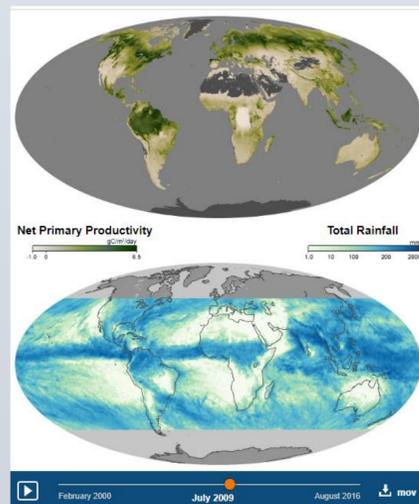


- Using the compare feature, students will compare net primary productivity to land surface temperature. They will identify the relationship between temperature and productivity, filling out their worksheet with a brief explanation of how they reached this conclusion.

- Next, this comparison process will be repeated with net productivity and total rainfall, again recording the trend they noticed.

- Students will then choose from natural abiotic factors which include snow cover, cloud fraction, and water vapor. With the chosen feature, students will continue to compare and describe the relationship between it and the primary productivity.

- Finally, students will explore the relationship of an anthropogenic factor, such as aerosol density, to the net productivity, to determine how they correlate.



ASSESSMENT

Formative

Throughout the class period, the teacher will carry out an informal formative assessment by having conversations with the students and checking on how their work is going. The students will also be able to ask questions as needed.

Summative

During the activity, students will complete a worksheet that explains the relationship trends they identified and how they came to those conclusions. These worksheets will be graded.

Results

Students' graded worksheets will be used to check for understanding of relationships within ecosystems. If students correctly identify relationships between the productivity and abiotic factors, the teacher will move on with the ecosystem unit. If not, the topic can be presented and taught in a different format.

PEDAGOGICAL APPROACH

This lesson activity takes more of a student-centered constructivist approach:

Role of the Teacher: Acts as a facilitator, providing only the framework for the activity and help as necessary.

Role of the Students: Takes active role in learning process as they make connections between the various factors through the analysis of the maps.

CONCLUSIONS

This lesson activity allows students to use actual data from earth to draw conclusions from. This activity will help reinforce the correlation between abiotic and biotic factors. Using this activity will lead to further ecosystem studies, such as identifying biomes and latitudinal impacts on vegetation. Population studies would be an interesting extension of this lesson.