



I'm not robot



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Type of Interaction	Effect on X	Effect on Y	Example
Neutralism	0	0	Rabbits and Deer live together.
Amensalism	0	-	Black walnut tree has chemical harming others.
Commensalism	+	0	Cattle egrets feed on insects flushed out of grass
Competition	-	-	Two species fight for limiting resources
Mutualism	+	+	Lichens
Predation or Parasitism	+	-	Lion eats zebra

Grades
6-9

Crash Course ECOLOGY #6 ECOLOGICAL SUCCESSION



Great for:
- Introduction to topic
- Early finishers
- Sub work

Video Worksheet+

Energy flow and Ecological Pyramids

Energy Flow

The flow of energy is an essential feature of every ecosystem. The transfer of energy through trophic levels and up the food chain is often oversimplified by the general rule of thumb known as the 10% rule. This rule assumes that only 10% of the energy consumed by one level is available to the next trophic level. 90% is lost as heat and/or used for the purposes of the organisms for living needs such as metabolism, reproduction, and growth & repair of cells, tissues, and organs. Scientists use this 10% as an average, however, it is not true in all systems. The amount of energy available to one trophic level is limited by the amount stored by the level below. Because energy is lost in the transfer from one level to the next, there is successively less total energy as you move up trophic levels.

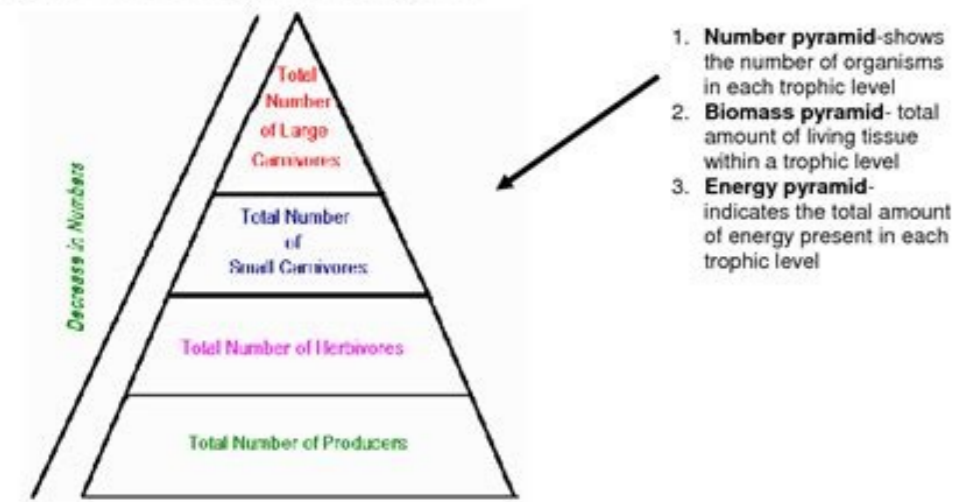
Each day the Earth is bombarded with about 250 calories/m² of solar radiation (equivalent to 100 million atomic bombs, like the atomic bombs used during WWII). Of the visible light that reaches the photosynthetic organisms, the ones we call **producers** (plants, algae, cyanobacteria), only 1-2% is turned into chemical bond energy such as found in lipids or carbohydrates. With this relatively small percentage of energy consumed, these autotrophs use photosynthesis to create 170 billion tons of organic matter each year! These producers are the foundation of almost all food chains. (exceptions: deep ocean vent food chains where sunlight cannot reach any producers).

The amount of light that is changed to chemical bond energy is called primary productivity (PP). PP is the rate at which producing organisms make new biomass. PP is expressed as energy/meter²/year (usually Joules or calories are used as energy units) or in biomass (weight) of vegetation added to the ecosystem (g/m²/yr).

A biome or ecosystem such as an open ocean, for example, might be responsible for a high percentage of the Earth's primary productivity (cumulatively produces a huge biomass) due to its size but actually has a very low PP rate. On the other hand, a prolific ecosystem like a coral reef might have a low percentage of the Earth's PP because there are relatively few of them globally.

Ecological Pyramids


Trophic levels and the energy flow from one level to the next can be graphically depicted using an ecological pyramid. There are three types of ecological pyramids:



KEY INCLUDED!

The Amoeba Sisters SELECT HANDOUT

PROPERTIES OF WATER



A handout made BY the Amoeba Sisters to be used with our videos!



Overview

This activity complements [Illustrative Mathematics](http://www.illustrativemathematics.org) (<http://www.illustrativemathematics.org>), an online mathematics platform for identifying animals photographed by students during field courses in Georgia National Park. The [Illustrative Mathematics](http://www.illustrativemathematics.org) Lab is a part of [Illustrative Mathematics](http://www.illustrativemathematics.org) where students can use real science data in a map, filter, and download the data to investigate scientific questions.

In this activity, students will calculate diversity indices—richness, Shannon diversity index, and evenness—in three different vegetation types in Georgia National Park using data from real science photos. Students will begin by calculating these indices by hand using a very small sample data set. After becoming familiar with equations for richness and how they relate to one another, students will download a larger dataset from the [Illustrative Mathematics](http://www.illustrativemathematics.org) Lab. They will use the Georgia Interactive Map

<http://www.illustrativemathematics.org/illustrative-mathematics-national-park-interactive-map> to explore the three vegetation types to make predictions about the animal diversity they may find there. They will then use a spreadsheet tool to calculate diversity indices for three vegetation types and compare their findings.

This activity can be differentiated for students with different levels of prior experience with solving equations and analyzing data in spreadsheets. Students are introduced to diversity calculations by breaking down the equations into manageable parts before working with a large data set from the [Illustrative Mathematics](http://www.illustrativemathematics.org) Lab. A lesson here to support students with managing large data sets and making calculations in Excel.

KEY CONCEPTS

- Biodiversity: the variety of life and can be measured on multiple scales including genetic diversity, species diversity, and ecosystem diversity.
- Indices that measure species diversity include species richness (the number of species in a given area) and evenness (variability in the abundance of species).
- The location and abundance of animals are determined by the availability of resources and community interactions, such as competition, predation, and human influences.
- An ecological niche is the role of an organism in its environment, which includes the conditions under which it can live, what resources it uses, and how it reproduces.
- The diversity of an ecosystem, including soil, plant, structural, biological, and climate diversity, can affect why a particular species diversity.

LEARNING OBJECTIVES

Students will be able to:

- Calculate diversity indices (richness, Shannon diversity index, and evenness) by hand using Excel.

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Page 1 of 1

The download copy will be a fill-in-the-blank that you can have or direct your students to fill in and color code as you would like Page 10By Maura Bostwick Neill. The students get encouraged to apply their general knowledge of ecology, which they acquired in their lessons, to this new and unfamiliar topic.The exercise is tailored to require 90 min of work when done 19 slide PowerPoint all inclusive resource - includes theory, student activities, embedded Video links, consolidation activities, research case study, and BONUS Cane Toad case study and reading map.AUSTRALIA CASE STUDYPERFECT FOR UPPER LEVELS GEOGRAPHY & SCIENCEWRITTEN FOR AUSTRALIAN 11 GEOGRAPHPage 19Ecological Cycles Matching Pairs puzzle with keyby Ecological Cycles Matching Pairs puzzle with key. On each poster you will find:~Title and Essential Questions~At least 3-4 tested vocabulary words~Engaging visualsThe Types:Ecological Footprint Interactive Activity:Distance Learningby Students will compare the gas emission, water usage and energy usage for a variety of different food items. 0Page 23This FlipChart presentation explores levels of ecological organization! More specifically, the following concepts are discussed: organisms, species, population, community, abiotic factors, ecosystem, biome, habitat, niche, and adaptations. The notes and projects are designed to facilitate independent learning and are ideal for sub plans or simply to encourage self-instruction of concepts. This focuses on the vocab and all they need to know about Ecological Succession. They included a small definition too for each term. This unit utilizes the 5E method to engage students and allow them to work through the anchoPage 6Digital Version of this product here: Ecological Succession DIGITALWhat does this cover? These notes will be a perfect addition to your introduction to teaching about organisms, populations, communities, ecosystems, biomes, and the biospherePage 4This interactive digital task card deck will challenge your students to learn about ecological succession, primary succession, secondary succession, pioneer species, and climax communities! This digital resource is hosted on Boom Learning™. An informative, effective, engaging, and LOW PREP activity covering Ecological Succession: primary and secondary succession, pioneer species, climax community, point-source pollution, and nonpoint-source pollutiPage 7Vocabulary cards include a student-friendly definition and colorful clip art related to the word. Words are from textbooks or lead4ward.com and are aligned with the TEKS (Texas Essential Knowledge and Skills) This product includes ideas for student vocabulary activitiThis 28 term worksheet will help your AP Environmental Science students to learn about ecological economics. There are a total of 143 slides. I use the puzzles for review before a quiz or as companions to a textbook chapter on thisPage 20Ecological Issues Research Project with Rubricby Students research and environmental or ecological problem and how humans can remedy the issue. Lab takes students through simulation, starting with checking off needed materials, going through multiple steps of investigation, drawing, and inferring, and finishing up Ecological Succession - Ecological Communitiesby This lesson plan bundle of notes, field activities, and worksheets are perfect for a high school environmental science course and will introduce your students to the topics of ecological succession, stability, and change in communities.Topics include ecological succession (primary and secondary sucPage 2To introduce Environmental Science, eighth-grade students evaluated their ecological footprint in water use, food, shelter, transportation, energy use, clothing, and “stuff” —mainly electronics! Students were amazed that their ecological footprints were well over the national and global average! AtePage 3Use this resource for increasing student engagement, retention, and creativity all while learning about various levels of ecological organization. Terms include cost benefit analysis, price elasticity, market forces, gross domestic product, nonrenewable resources, market equilibrium, and other relevant terms.Ideal for an AP EnvironmentPage 22Analyzing Ecological Footprints activityby Students analyze ecological footprints across a variety of countries and interpret how lifestyles contribute to resource use. They will be tasked with answering questions, doing research, and solving problemPage 9Ecological Cycles Crossword Puzzle with keyby Ecological Cycles Crossword Puzzle with key. Worksheets are also sold separately. The 13-page packet includes a project description, 5 sheets for students to record information from their sources, instructions for creating a bibliography, and sheets to record notes from other students'Page 21This interactive Google Slideshow introduces to the theory, terms, ideologies, and questions associated with Ecological Theory and Literary Criticism. 20 vocabulary terms with definitions applicable to ecology, cycles in nature, water cycle, nitrogen cycle, carbon cycle, life sciences, environment and biology. Find otEcological Footprint Online Activity - Updated 2021by Student will explore 2 different websites in order to understand the concepts of ecological footprint and overshoot day. This google slides allows students to interact with different draggable slides. They will compare the ecological footprints of different countries and make suggestions for why countries are in a deficit or reserve. There are also sections on major biomes of the world. Boom Cards™ do not require laminating, cutting, or ePage 5This CLOZE reading reviews the levels of organization in ecology (organisms, population, community, ecosystem, and biome). Includes printable version for in-class use and a Google slides version that can be shared with students for distance learning. These focus specifically on the disruptions to an ecological system. Terms include: Biosphere, Biome, Ecosystem, Community, Population, Species, Individual, Ecology, Biotic factors, Abiotic factors, Habitat, Niche This product is also available as part of the ECOSYSTEMPage 8Ecological Successionby Track & record the fate of 10 different populations after 18 environmental events with these colorful cards & a reference mat in an active classroom format. Subjects:Ecological Impact of Hurricanes - A Complex Exerciseby This complex exercise investigates the ecological impact hurricanes have when making landfall. Aside from the numerous terms and questions that are provided, students will uVocabulary Study - Ecological Levels of Organizationby Vocabulary to begin each of your science units. This was created on a Word document which means you are able to edit the document to suit the needs of your Types:Ecological Succession Unityby I created this unit for my teaching licensure, so it is extremely thorough and has ALL materials you will need including: standards, lesson plans, PowerPoints, modified assignments, directions, and examples. It also has a section for summarizing the article when completed. 20 terms with definitions applicable to ecology, cycles in nature, water cycle, nitrogen cycle, carbon cycle, life sciences, environment and bioloPage 11Page 12Page 13Levels of Ecological Organizationby This is a graphic organizer that represents the levels of ecological organization, found in Holt's Environmental Science Chapter 4 textbook. Contains between ten to twelve words for students to utilize through the lesson. Includes use of CIA World Factbook and Google Public Data Explorer. Lastly the kids will calculate their personaPart virtual field trip, part webquest, part research project, get your students engaged with real world ocean science!Students will spend a day at the pier, viewing real images taken at a pier in Northwestern Florida. Includes a vocabulary review sheet, crossword puzzle, word search and matching pair puzzle. The hand out includes starches, proteins, fruits and vegetables in 3 tables already and then there is a table where students put in the food items they ate yesterday to see what their ecologic0 This bundle of lessons, labs, and field activities is perfect for an introduction to a high school environmental science course. Activities and eThis webquest covers ecosystems, habitats, microhabitats, ecological succession, primary and secondary succession, and biodiversity. This is a WPage 14Page 15Page 16Page 17This Fluency Builder includes the following vocabulary terms: Species, Population, Community, Commensalism, Mutualism, Parasitism, Predator-Prey Relationship, Symbiotic Often used for math, I utilize Fluency Builders to develop fluency in the academic language of science as a quick starter or closePage 18Ecological Succession Draggleleby Students can review Ecological Succession with this fun and engaging google slides. Some of the slides contain Page 24Make vocabulary interactive! Cut-and-Paste vocabulary is fun and interactive!Terms in this set include: symbiosis, predation, competition, mutualism, commensalism, parasitism, adaptation, nicheKEY INCLUDEDPage 25Ecological Cycles Study Guide with key. Students will explore the interconnections between nature and culture. SC 7.EC.5.A.1 Develop and use models to describe the characteristics of the levels Types:Disruptions to Ecological Systems Anchor Chartby Provide your students high quality visuals with these anchor charts! This is just one of the 16 anchor chart set. I use the puzzles for review before a quiz or as companions to a textbook chapter on this toThis resource is doodle notes pdf file covering producers, consumers, food chains, food webs, and food pyramids. Students wrote the levels in the pyramid, and then chose an individual to follow up the levels. CLOZE passages are incredible ways for students to reinforce critical concepts and vocabulary, build reading Ecological Successionby Students are able to explain the different stages in both primary and secondary succession with their own depictions as well as add a typed out label of the proper description for each stage. I use the puzzles for review before a quiz or as companions to a textbook chapter on this topic forEcological Succession Worksheetsby Worksheets about Ecological Successions:- Quiz- Interpretation of images/graphics-Crosswords- Word Search-CorrespondenceSubjects:Types:Also included in: Ecological Succession BUNDLEPage 26Ecological Organization Hyperdocby This assignment requires students to use provided informational text (websites) to find answers to questions to better understand the way ecosystems are organized. This engaging lesson will support your ecology / ecosystems unit and will help your students prepare for standardized tests by mastering the key concepts surrounding Oil Spill Simulation Labby Oil Spill Simulation Lab is a great addition to any ecology, ecological succession or environmental care unit or lesson plan. I use the puzzles for review before a quiz or as companions to a textbook chapter on this topicA comprehensive, easy-to-understand guide to Ecological Roles/Relationships, Energy Pyramids, Food Webs, Invasive Species, and Climate Change!WHY make my own study guides?WHY take the time to hand-draw my own diagrams?Because Google doesn't have the information I want AND the simplicity my students Ecological Cycles Word Search puzzle with keyby Ecological Cycles Word Search puzzle with key.

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