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APES Study Guide

Unit 1: INTRODUCTION TO ENVIRONMENTAL SCIENCE

The first unit of APES will acquaint you with environmental science; it introduces theory, philosophy, rhetoric and terminology, which will be used throughout the course.

Textbook Reference:

- Chapter 1 – Environmental Problems, Their Causes, and Sustainability
- Chapter 2 – Science, Matter, Energy, and Systems

Outside Reading:

- Dimensional Analysis - <http://www.alysion.org/dimensional/fun.htm>
- Plan B 2.0 (Chapter 1) By: Lester Brown http://www.earth-policy.org/images/uploads/book_files/pb2ch01.pdf
- Tragedy of the Commons By: Garrett Hardin http://yaysciencelass.com/uploads/APES_Unit_01_-_Tragedy_of_the_Commons_Article.pdf

Vocabulary:

Directions: Review key vocabulary, words may appear in quizzes and/or tests. You are not required to write the definitions but are encouraged to review them online

Chapter 1

- biodiversity
- biodegradable pollutants
- developed countries
- developing countries
- ecological footprint
- ecological tipping point
- economic development
- economic growth
- environment
- environmental degradation
- environmental ethics
- environmental science
- environmentally sustainable society
- exponential growth
- gross domestic product (GDP)
- input pollution control
- less-developed countries
- more-developed countries
- natural capital
- natural income
- natural resources
- natural services
- nondegradable pollutants
- nonpoint sources
- nonrenewable resources
- output pollution control
- per capita ecological footprint
- per capita GDP
- perpetual resource
- point sources
- pollution
- pollution cleanup
- pollution prevention
- poverty
- recycling
- renewable resource
- resource
- reuse
- sustainability
- sustainable yield

Chapter 2

- acidity
- atomic number
- atom
- atomic theory
- cells
- chemical change
- chemical element
- chemical formula
- chemical reaction
- chromosome
- compounds
- data
- electromagnetic radiation
- electrons
- elements
- energy
- energy quality
- feedback loop
- first law of thermodynamics
- fossil fuels
- frontier science
- heat
- high-quality energy
- high-quality matter
- inorganic compounds
- inputs
- ion
- isotopes
- kinetic energy
- law of conservation of energy
- law of conservation of matter
- low-quality energy
- low-quality matter
- mass number
- matter
- matter quality
- model
- molecule
- negative feedback loop
- neutrons
- nuclear change
- nucleus
- organic compounds
- peer review
- pH
- physical change
- positive feedback loop
- potential energy
- protons
- reliable science
- science
- scientific hypothesis
- scientific (natural) law
- scientific theory
- second law of thermodynamics
- synergistic interaction
- synergy
- system
- throughputs
- time delay
- tipping point

Ecology Academic Study Guide

Relationships of Organisms to Their Environment

Levels of Organization

- Biosphere** - Where life exists on Earth
- Ecosystem** - Joining of biotic communities and abiotic environments
- Community** - Association of interacting organisms in one environment
- Population** - Group of individuals of the same species in one environment
- Organism** - Individual organism

Organ System - Group of different organs working together

Organ - Group of different tissues working together

Tissue - Group of cells working together

Cell - Basic functional unit of organism

Organelle - Cell structures with specific functions

Molecule - Group of atoms

A Functional Cell in Ecology

- Autotrophs: Use either photosynthesis or chemosynthesis
- Heterotrophs: Use food molecules produced by autotrophs

Major components

- Abiotic portions
 - a. Inorganic and organic substances
- Biotic portions
 - 1. Producers (autotrophs)
 - 2. Consumers (heterotrophs)
 - a. Primary: Feed on producers (herbivores)
 - b. Secondary: Feed on primary consumers (carnivores or omnivores)

The Ecosystem

- Tertiary: Top carnivore or predator
- Quaternary: Feed on plants, animals, etc.
- Secondary: Feed directly on prey by living with host
- Decomposers: Mostly fungi and bacteria (saprotrophs)

Ecological Levels & Energy Transfers

Classification of Ecosystems

- Biosphere**: Major types of forest and forest assemblages of ecosystems based on temperature and rainfall amounts
- Tropical Rainforest**
 - 1. Tropical: Primary grasses and trees
 - a. "Threshhold" or permanently frozen soil prevents tree growth
 - b. Occurs in arctic and alpine (tops of mountains) areas
- Temperate Deciduous Forest**: Trees and shrubs that shed leaves in fall, becoming dormant during winter months
- Savanna**: Tropical grasslands. Rainfall allows for grasses and a few trees
- Tropical grasslands (savanna)**: Rainfall interrupted by prolonged dry seasons, limiting tree growth
- Chaparral**: Mild, wet winters and long, dry and hot summers
- Desert**: Less than 25 cm rainfall per year
- Tropical rain forest**: May exceed 200 cm of rainfall per year, persists both wet and drier growth, area with pronounced wet/dry seasons may have tropical deciduous trees
- The different biomes that occur at different latitudes on the same side of a equator while along an elevation gradient of tall mountains

Alpine Tundra

1. Freshwater
 - a. Standing water (lentic): Lakes and ponds
 - b. Running water (lotic): Rivers and streams
2. Marine
 - a. Coastal zone: Estuaries, wetlands including salt marshes, mangroves and coral reefs
 - b. Open sea (pelagic): Hydrothermal vent communities

Ecosystems: Areas of Transition

Biome Changes by Altitude vs Latitude

Ecology Academic Study Guide



Earth/Environmental Science

Unit 1 Test – Earth's Systems, Branches of Earth Science, Scientific Method, & Taking Measurements, Mapping, and Topographic Map Study Guide

Name	Answer Key				
Period	1	2	3	4	January 28, 2014
Score	/40		Grade	%	

Objective #1 – Branches of Earth Science & Earth's Systems

1. List the 4 branches of Earth Science.

- a. Geology
- b. Astronomy
- c. Meteorology
- d. Oceanography

2. Give at least 1 example for each of Earth's systems given below.

- a. Geosphere: Rocks, Minerals, Mountains
- b. Hydrosphere: Streams, Rivers, Lakes, Oceans
- c. Atmosphere: Global Warming, Weather, Pollution
- d. Biosphere: Animals, Plants, Microorganisms

Answer will vary

Objective #2 – Scientific Method

1. Name the 5 steps to the Scientific Method and explain why these steps are important.

- a. Question – It provides the topic of study and background information that can be used to as the basis for the experiment.
- b. Hypothesis – The scientist is making a prediction of the outcome of an experiment based on observations and research.
- c. Experiment – It is used to test the correctness of the hypothesis.
- d. Data Analysis – This organizes experimental data into a condensed form that is easily read by other scientists.
- e. Conclusion – This agrees or disagrees with the hypothesis, communicates theories that explain the results, and recognizes any mistakes so they can be avoided by others.

2. A student collected and recorded measurements of the amount of carbon monoxide in the air at the same location each day for one week. The data are shown in the table.

Day	Time	Carbon Monoxide (parts per million)
1	9:10 a.m.	0.20
2	3:10 p.m.	0.38
3	10:45 a.m.	0.40
4	7:20 a.m.	1.15
5	6:00 a.m.	0.95
6	6:00 p.m.	0.65
7	7:15 p.m.	0.14

The student concluded that the amount of carbon monoxide in the air increased and then decreased during the week. A source of error in the student's investigation is that the student failed to

- a. Look at the data give to the right, what data shows too much variation besides the amount of carbon monoxide measured each day. *The time of the day when the carbon monoxide is measured*
- b. Why is this a problem? *There are different amounts of cars and other vehicles on the road at different times of the day*
- c. What should be done to correct this problem? *Measure the amount of carbon monoxide at the same time every Day*

APES Study Guide

Unit 1: Introduction to Environmental Science

The first unit of APES will acquaint you with environmental science. It introduces theory, philosophy, rhetoric and terminology, which will be used throughout the course.

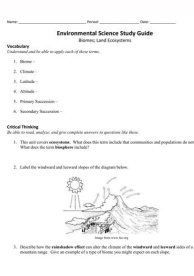
Textbook Reference: Botkin, Keller, *Environmental Science*, 6th edition: Chapters 1, 2 & 28
Brown, *Plan B 2.0* Chapter 1
Hardin, "The Tragedy of the Commons," *Science*, v163, December 13, 1968. Other Sources: TBA

Vocabulary - Must be HANDWRITTEN in your own words to receive credit.

aesthetic justification	ecological justification	moral justification
accuracy	ecology	nonrenewable resource
anthropogenic	experiment	part per billion (ppb)
carrying capacity	externality	part per million (ppm)
commons	fishery	per capita
controlled experiment	free market economy	precision
control cost-benefit analysis	giga- gross domestic product (GDP)	pseudoscience
dependent variable	gross national product (GNP)	renewable resource
developed (more developed)	hypothesis	risk-benefit analysis
nations	independent variable	scientific method
developing (less developed)	indirect costs	scientific model
nations	inference	scientific theory
direct costs	kilo-	sustainability
Easter Island	marginal costs	tragedy of the commons
environmental science	micro-	utilitarian justification
ecological footprint	milli-	
	mega-	

Study Guide Questions (SGQs):

- Calculate your ecological footprint (<http://www.myfootprint.org/en/>), print a copy of your report and attach it to this assignment. Identify and describe two areas of your personal resource utilization that surprised you the most and two that were not surprising. List three ways in which you could substantially decrease your ecological footprint, and for each, explain why you will or will not make the change in lifestyle that would be required to decrease your ecological footprint.
- In *Plan B 2.0*, Lester Brown states that gasoline might cost \$11 per gallon if its price reflected "the full costs to society" of gasoline. List and describe the actions and activities that contribute to those costs.
- Other than any of those discussed in class, describe a "Tragedy of the Commons" that you have observed or of which you are aware. Identify the commons and the events that have lead to the "tragedy" as well as possible solutions to the "tragedy."
- Define environmental science. Distinguish between environmental science and ecology.
- Explain how the meanings of the terms, "theory", "fact", and "law" differ in science and in everyday usage. How do these different meanings lead to confusion?
- Design a controlled experiment, which could be performed to determine whether a certain air pollutant stunts the growth of a plant species. Identify all variables, include data collection/analysis etc.
- Define sustainability as it applies to the use of resources. Provide three examples, from your own experience, in which you identify and describe the barriers to attaining sustainability with regards to the use of a resource.
- Of all of the environmental issues that face the world today (air pollution, water pollution, water supply, human population, deforestation, loss of genetic diversity, global climate change, etc.), which do you think most threatens the continued survival and well-being of human beings? The Earth? Why?
- Identify and describe a relatively undisturbed natural area that you have visited. For that area, write utilitarian, ecological, aesthetic, and moral arguments for preserving it.
- With economic development comes urbanization. Discuss the implication that this trend has on the environment. Explain the role of economics in determining public policies. Use examples to illustrate your explanation.



The scholarship supports students who might face financial difficulties taking their place to study at the university. The scholarship is open to prospective undergraduate and graduate students taught to students of the University of Glasgow applying for entry in 2022/23. This scholarship is awarded as a stipend of £2,500 towards tuition costs, per year of study. Humanitarian scholarships. The Gregor Society Clan Award. The Clan Gregor Society is offering an award to new entrants to the University of Glasgow which is descended from Clan Gregor. For more information on accommodation criteria, please refer to the Accommodation Services section of the website. We also offer eight scholarships to students who have refugee status. Our ROI Access Burge is part of our commitment to continue to attract and support students from a wide range of funds. The scholarship meets the full cost of tuition fees for the duration of your program, also providing an additional stipend of £5,000 per year, if you meet the eligibility criteria for university accommodation, this will also be provided for the duration of your degree. The university is committed to supporting students and rewarding academic excellence. University Excellence Scholarship The University of Glasgow has a number of undergraduate student excellence scholarships available to new international and EU students for a 2022 entry. The scholarship is awarded as a discount of tuition fees of £67,000 per year of study and is subject to satisfactory progress for consecutive years of study. *Scholarship for excellence in studies. The RUK Excellence Scholarship of £61,000 for each year of study, will be awarded to first grade participants who have achieved AAA or better at a sitting level (or "Ruk Excellence Scholarship Ruk Access Bursary The Burnary supports talented students who may not be able to take a place at college for reasons al ed setnaidutse soveun sol a EU al ed adineveIB ed oimerP le recerfo ed sodatnacne somatse otat ol rop y ,txerB led odathuser omoc odigrus nah euq sareincanif senoicacilpmi setnaifased sal somedargA Á wogsalG ed dadisreviNU al ne ragoh us rech arap EU al ed otelatel le rayopa a y .EU al ed sorutuf y selautca setnaidutse sorsuon noc adilÁs nÁicaler anu razitnarag a aditemormmoc eugis wogsalG ed dadisreviNU al selaicoS saicneIC ed datlucaF al ed sonaced sol a EU al ed adineveIB ed oimerP .soiroctafistas sosergorp necilaer es euq erpmeis nÁicalutit ed amargorp led o±Áa adac arap .o±Áa rop EÁ 005.1 ed res eleus aceb adac ed rolav IE .so±Áa somitÁ sol ne saceb ed lanoicida nÁicalcananif ne sarbil ed nÁállim 1 ed sjÁm oditrevni someh ose rop .dadisreviNU al ne raidutse arap ragul us rapuco arap sareincanif sedatlucifid ratnerfne naÁrdop euq setnaidutse sol a rayopa arap ocimÁAdaca o±Áa adac odargerp ed otelatel ed saceb 05.c agroto wogsalG ed dadisreviNU al JIoR(adnalri ed acilbÁApeR al ed odargerp ed otelatel ed saceB.oimer led senoiicidnoc y sonimrÁt sol noc odreuca ed jÁtse euq odnamrifnoc jÁtse detsu ,supmaCyM ametsis le ne soiracnab sotad sus raivne IA .o±Áa rop EÁ 052.9 ed alucÁrtam ed seluana satouc nagap y etroN led adnalri e selaG .arretalgn ne sodallicimod nÁtse euq ay .22/1202 nÁiseS al arap sodatsiger etematelpmoc nÁtse euq wogsalG ed dadisreviNU al ed otelpmoc opmeit ed odargerp ed setnaidutse arap elbinopsid jÁtseE saceb ed sotad ed esab al ne eugsub ,otneimaicananif ed sedadinutropo sjÁm arap .wogsalG ed dadisreviNU al ne odargerp ed amargorp nu ne nebircsi es euq y sloohCS esuohnoceab ed setnaidutse sol a alucÁrtam ed o±Áa remirp le ne otneuced ed %51 nu ecerfo wogsalG ed dadisreviNU al sloohCS esuohnoceab htmS enuCm semaj aceB Á.etnemalos dadisrevinu al a setnaictios soveun a atréiba jÁtse aceb al Á.soiratsrevinu soudutse ed o±Áa remirp le arap satouc ne adagap EÁ 000.2 ed se aceb al ed rolav IE .sairunep .32-2202 .32-2202 acimÁAdaca nÁiseS al arap odargerp ed amargorp nu nazemimoc euq areas of consideration such as academic excellence and financial need. The discount does not apply to Veterinary Medicine, Medicine and Dentistry programmes. Talent Scholarships are available to students entering any of the University's Colleges.Dental School students are eligible for a Talent Scholarship in their first year of study only. College of Social Sciences Deans' Award The College of Social Sciences is offering two scholarships worth £Á10,000 each towards tuition fees for academically excellent students wishing to study an Undergraduate programme within the CollegeeÁÁAs programme portfolio.The scholarships will be awarded to applicants fromÁ ÁMalaysia, India, Pakistan, South Africa and Italy. They are eligible for the NHS Dental Student Support Grant in the following years.Undergraduate Talent Scholarships Humanitarian Scholarships The University of Glasgow is offering four scholarships (one per college) for applicants to the University who are staying in the UK on humanitarian grounds and are facing challenges in progressing onto Higher Education. Bursary is not paid in Year 4 where no tuition fees are due).Republic of Ireland (RoI) Access Bursary Republic of Ireland (RoI) Excellence Scholarship The RoI Excellence Scholarship of ÁÁ1,000 for each year of study will be awarded to first degree entrants who have attained at Irish Higher grades A1, A1, A1, A1 from the Irish Leaving Certificate.Á Á Dentistry, Medicine and Veterinary Medicine applicants are not eligible for this award.PaymentsThe RoI Excellence Scholarship will be processed as a cash payment.The RoI Excellence Scholarship will be paid in 2 instalments.The first payment will be in October and the second payment will be in February.These payments will be credited to the UK bank account held on your MyCampus profile; therefore, it is vital that this is up to date at the start of the session. The scholarship is awarded as a tuition fee discount of for each year of study and is subject to satisfactory progress during consecutive years of study.Á This discount cannot be combined with any other scholarship from the University. Republic of Ireland (RoI) Access Bursary Glasgow has a long and proud tradition of providing financial

support to talented students who, due to financial difficulties, may not be able to take a place at university. The RoI grant will be up to £2,000 for your first year of study and £1,000 for continuous years.Payments for the RoI Access Scholarship will be detailed in your letter of grant.The RoI Access Scholarship will be awarded as a cash payment.The RoI Access grant will be paid in 10 installments from October to July; This award is based on household income.The RoI Access Bursary will only be awarded in years where a tuition fee of £9,250 applies. (i.e., usually years 1, 2 and 3. James McCune Smith Scholarship The University of Glasgow has up to 30 undergraduate scholarships available to students of African/African-Caribbean descent. The award is open to both undergraduate and postgraduate applicants.The Gregor Clan Society Award The above scholarships are specific to this programme. programme.

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