

YOUR NAME: KEY your TA's name: KEY**Environmental Biology 206 EXAM III 19 April 2006 (exam worth 100 points)****True or False (1 point each; 5 points total)**

- _____ In the western U.S., the majority of freshwater used is for irrigating agricultural fields
- ___ F ___ Vertebrates are ^{not} the only animals that migrate.
- _____ It takes more than 1,500 gallons of water to produce one kilogram of beef in the U.S.
- ___ T ___ The poles are heating at a faster rate than the rest of the planet.
- _____ Nitrous oxides ^{CO₂} comprise the largest human-contributed driver of global warming.

Multiple Choice (questions have only one correct answer; 15 points total; 1.5 points each)

- How many liters are there in a gallon? About...
a) 1 b) 2 c) 3 **d) 4** e) 5
- According to your textbook, what would it cost per child per year to basically end world hunger and many diseases.
a. \$ 0.15
b. \$ 2.50
c. \$ 7.50
d. \$ 15
e. \$ 57
- According to Guy McPherson's lecture, what would it cost to protect about 70% of the world's species?
f. \$ 20 billion
g. \$ 30 billion
h. \$ 50 billion
i. \$ 95 billion
j. \$ 1.3 trillion
- According to Guy McPherson's lecture, what does the U.S. spend annually on military-related projects?
k. > \$ 30 billion
l. > \$ 50 billion
m. > \$ 100 billion
n. > \$ 500 billion
o. > \$ 1.3 trillion
- What proportion of the water on earth is accessible freshwater?
p. < 1%
q. 3 %
r. 5 %
s. 10%
t. 21%

Key
12.5

Key

6. What causes the 'Dead Zone' in the Gulf of Mexico?
- natural eutrophication as the result of cyclical turnover of coral reef populations.
 - increased input of nutrients from agricultural runoff into the Mississippi River.
 - invasive fishes and nudibranchs whose populations have grown exponentially since the 1950's.
 - all of the above.
 - none of the above.
7. Endocrine disrupting chemicals (e.g., pseudoestrogens) seem to have the greatest impact on
- developing fetuses.
 - the elderly.
 - adult women in their mid 20s.
 - teenagers.
 - none of the above.
8. The leading cause of death in the world is:
- jumbo jet crashes
 - poverty and malnutrition
 - tobacco use
 - automobile accidents
 - malaria and AIDS
9. About 50% of the calories consumed by humans comes from:
- Wheat
 - Rice
 - Corn
 - All of the above
 - None of the above
10. The ratio of fossil fuel energy inputs to food energy outputs for industrialized agriculture in the U.S. is closest to:
- 1:1
 - 2:1
 - 5:1
 - 10:1
 - 20:1

Fill in the Blank (2 points per blank; 22 points total)

1. According to Guy McPherson, the four spikes threatening our planet as we know it are:

A. greenhouse gases B. extinction C. consumption D. human population growth

2. Rob Robichaux has spent many years attempting to move the Hawaiian Silverworts away from the brink of extinction.

3. The two main determinants of climate are temperature and precipitation.

4. The largest component of landfills that is currently recyclable is paper.

5. List three sources of data that scientists use to reconstruct prehistoric climate (e.g., before we had thermometers and fancy CO₂ detectors).

1. tree rings 2. ice cores 3. park rat middens

Fossils sediment cores ice, ice caps
stalactites - glaciers -

Key
25.5

Key

- 6. Los Reales landfill, like other landfills, produces methane gas that is captured and either burned immediately or used to produce electricity.
- 7. The incidental marine organisms caught and killed in pursuit of one marketable species is known as bycatch (by-kill).

Really Short Answer (not more than a sentence; 21 points total; 3 points each)

1. Approximately when did native Americans leave Tumamoc Hill? Why did they leave?

~1450 a.d.
(600 yrs ago)
will accept 500-800 for 2 pts

interaction with ← climatic Δ that made the area drier; not enough water to sustain them @ Tumamoc
wars too.

2. Define the Green Revolution as discussed in this class.

capital intensive changes in agricultural practices in 2nd half of 20th century that increased food yields, but @ the expense of increased water use, pesticide use, fertilizer use, and monocultural planting.

3. Why might it be advantageous for a moth to "answer back" when it hears bat echolocation?

If a moth can either disrupt/distort or mimic the sonar echoes that a bat uses to navigate and find prey then perhaps the moth can confuse the bat and escape.

4. Define adaptive radiation.

When a species arrives in an area that has lots of available niches that species might evolve into many, many species lots of them quite different from each other in terms of ecology, over a fairly short amount of time
(ex: Hawaiian silverswords from North American tarweeds)

5. In the article you read about Bt maize, what is the goal of a "high dose with refuge" strategy?

Both strategies are an attempt to slow (not stop) the evolution of resistance to the Bt toxin.

6. What is probably the leading cause of mercury pollution in the world?

Burning of coal as a way to produce electricity.

"runoff from power plants" - 2
Power plants (w/ coal) - 2

runoff + bioaccumulation - 1 pt
in oceans

7. Does a switch to dolphin-safe fishing practices for tuna impact other marine organisms? Why or why not?

Yes
↳ leads to very high shark mortality (and increased sea turtle and billfish mortality)

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Key

Short Answer (25 points total; 5 points each; a few sentences required)

1. What is a pseudoestrogen and why are they important in environmental biology (and important to both humans and other animals)?

↳ mimics hormones like estrogen; found in all sorts of human-made products including plastics, pesticides, + herbicides.
important b/c they disrupt normal development of animals (humans are animals too) when very young and most susceptible to hormone changes
leads to abnormal sexuality, feminized males, reduced fecundity, etc.

2. You are modeling the dynamics of a population of sea urchins using a matrix model. If your asymptotic growth rate (λ) is one, what does that mean for the population? Describe two ways that you could increase λ .

if $\lambda = 1$, pop size not changing
increase λ by \uparrow birth rate, \downarrow death rate, (earlier age of first reproduction, delayed senescence, larger clutch size, etc.)

3. How and why are fires in the pine forests of Arizona different now than they were in 1850? How do we know?

≤ 1850 , fires were very frequent (at least 1/decade), lasted a long time, covered lots of area, but burned rather gently and helped clean out the understory. In the late 1900s, early 2000s, following a century of fire suppression, the amount of fuel and density of trees leads to huge fires (very infrequent) that kill off lots + lots of trees.

One primary way we know is from studying fire scar records in tree rings.

4. Describe three ways that dams and reservoirs impact natural lotic (flowing water) ecosystems and the organisms that rely on them.

1. \downarrow Flooding - Δ deposition of sediment and may favor invasives
2. \downarrow water temperature will influence species composition
3. makes it difficult for individuals to move up and down stream
4. floods terrestrial habitat and leads to lots of fossil fuel use in boats, jet skis, etc.

other:

5. Decreased deposition of silt + sediment @ mouth of river, which can decrease ability of delta for many organisms and decrease resistance to damaging storms

5. Distinguish between the greenhouse effect and the ozone hole.

by \uparrow concentration of gases like CO_2 , CH_4 , NO_x
we are trapping more of the heat that used to escape into space and \therefore earth temp \uparrow .

(not directly related)

\uparrow UV radiation hitting planet, may reduce photosynthesis in damaged organisms, or cause cancer

Key
25

Essay: Use paragraphs and complete sentences. (12 points)

What are the causes, evidence, implications, and solutions for global climate change?

2 2 2 2

2 for spelling + grammar

2 for ~~for~~ overall thoroughness + evidence of understanding