

Environmental Studies 30
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Name: _____

FINAL EXAM

This exam is worth 135 points.

I. Short answers: Answer any five for 15 points each.

1. Sketch the basic elements of Darwin's theory of evolution by natural selection.

2. Draw climographs for the "Canadian" coniferous forest mountain orobiome in California (e.g. Yellow Pine Belt at 5,000 feet elevation) and a proper Boreal Forest site in Canada. Describe in words the most important differences between climates in the two sites.

3. In which biomes are horticulture, agriculture proper, and pastoralism most commonly practiced (one or two biomes per subsistence strategy)?

4. What are secondary plant compounds and what is thought to be their function?

5. Why is density stratification such a basic element of hydroclimate in pelagic systems?

6. How does the importance of the coriolis effect vary with latitude? Can you explain why?

7. Why do you suppose the species diversity of fish usually quite low in lakes compared to rivers?

II. Biome Problems: 5 points for each part.

1. First Terrestrial Biome:

a. Name this biome:

b. Draw a typical climograph for this biome. Indicate cold seasons (if any) with bars for freezing and frosty weather.

c. Describe the soil forming processes that are active in this biome. Are the resulting soils good or poor for agriculture?

2. Second Biome:

a. Name this biome:

b. Draw a typical climograph for this biome. Indicate cold seasons (if any) with bars for freezing and frosty weather.

c. What are the main human uses of this biome?

3. First Aquatic Biome: Consider an estuary with the classic two-layer flow type of circulation.

a. Diagram in longitudinal section how the two layer flow system works. Why does the surface current speed up near the mouth of the estuary?

b. Diagram vertical profiles of salinity and net velocity near the midpoint of the estuary.

c. Suppose you are in charge of designing the sewage treatment outfall for a city near the mouth of this estuary. To keep the estuary as clean as possible, at what depth should you put the outfall? Explain.

4. Second aquatic biome: You have been hired as an extension agent to help California Coastal fishermen find fish. You know that fish are attracted to upwelling zones, and decide your job is to help fishermen find upwelled parcels of water to fish in.

a. Each fisherman will require some measuring devices to detect upwelling water. If you had to choose instruments to measure only two things about the water, what would you choose to measure and why?

b. One of your fishermen is quite puzzled because upwelling comes and goes in a difficult to predict fashion. How would you explain to him why upwelling is episodic?

c. One of your more adventurous fishermen proposes to make an expedition far out sea to hunt for upwelling zones toward the middle of the North Pacific. He is enthusiastic about finding a mid-ocean "mother lode of fish." Draw him a couple of profiles, perhaps of those same two parameters you chose instruments for above, comparing what he is likely to see there with close to shore, and explain why he is unlikely to be successful in his quest.