

Resource & Environmental Economics Field Examination

May 23, 2019

Instructions:

- You have 4 hours to complete the exam. This time commences at the end of the 15-Minute reading period during which no writing is allowed.
- Please use your assigned "alpha letter" on every page to identify your exam. Do not use your name or social security number. Write on only one side of the page leaving at least One inch margins. Number each page, and make sure the pages are in order.
- You have four questions to answer.

Resources Preliminary Examination, Spring 2019

Answer any four of the following five questions.

1. The 2014 IPCC report called the time period between now and 2040 or so the era of committed climate change.
 - a) What do they mean by that?
 - b) What economic factors underlie why a given amount of climate change is committed?
 - c) Suppose we have a marginal cost curve for funds that can be used in a climate change related adaptation and/or mitigation effort. Suppose we also have ideas about the marginal net benefits of adaptation and mitigation. Using a conceptual framework, explain how you would advise policy makers on how much to allocate to mitigation versus adaptation.
2. An endangered species, the Monarch butterfly is a migratory species summering in most of North America and wintering in Mexico and southern California. The species is beloved by many naturalists and contributes to the health of our planet by pollinating many types of wildflowers. Monarchs rely on the milkweed plant to lay its eggs and for food for the caterpillar that emerges. However, farmers consider milkweed a weed and herbicides have reduced the butterflies' habitat. Much of this habitat loss is along migration routes, which lowers the survival rate of migrating butterflies.

The Monarch Butterfly Biosphere Reserve in Mexico is a World Heritage Site containing most of the over-wintering sites of the eastern population of the monarch butterfly. However, the site experiences illegal logging and harmful impacts of tourism. Conservation efforts sometimes conflict with the interests of local farmers, community-based landowners, private landowners, and indigenous people.



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- a. Discuss how you would go about estimating the value of monarch butterflies to society. What valuation methodology is most appropriate and how would you go about carrying out your value estimation?
- b. Name three examples of externalities that impede the conservation of monarch habitat. For each of your examples, suggest a government policy that would internalize the externality.
- c. Because the monarchs migrate between the U.S. and Mexico, the challenge of their conservation is international. Does this make conservation efforts more complicated? Why or why not? Devise/suggest an international approach (e.g., government policy, program, agreement) to help facilitate the success of an international monarch conservation program.

3. Water economists have recommended the establishment of water markets since at least the 1980's. In several western U.S. states, as well as in some other countries (e.g. Australia, Chile), water trades are legal, sometimes facilitated by the existence of a public or private water bank. However, there remain many barriers to trade and thus, economists continue to research better ways to arrange water exchange institutions.
 - a. Explain water rentals (spot markets), sales, and options markets and why all three might be desirable as parts of an "efficient" allocation of water via water markets. What does efficiency mean, and what would you expect to be the relationship between the rental price and the purchase price? How are options market contracts different from the other two?
 - b. What are at least three barriers to exchanges?
 - c. How does allowance for instream flow rights in the presence of water markets affect the goal of reaching efficiency? I.e. does it make it impossible? Explain the issues.

4. Two companies are currently disrupting the meat and seafood industries. Finless Foods produces seafood in a lab from carefully sourced fish cells. The resulting fish steaks and fillets are "fish-friendly" and free of mercury, hormones, and antibiotics. Impossible Foods produces a burger from plant-based ingredients but with the same flavor and nutrient content of a beef burger. The result is a burger that is healthier, cruelty-free, and low-emission. You are asked to evaluate the social costs and benefits of these new food options.
 - a. Choose **one** of these companies and identify the following:
 - stakeholders (industries and groups) affected by the food option
 - the main categories of benefits the food option brings to the stakeholders
 - the main categories of costs the food option imposes on the stakeholders
 - b. Discuss the global distributional welfare consequences of the new food options considered in part a. That is, are there geographic regions that are likely to benefit most from finless fish or meatless burgers, and those that are likely to be hurt most by them? Be sure to explain why.
 - c. Consider the global distributional welfare consequences you just discussed in the context of transboundary externalities. Are policy solutions that are typically used to reduce the negative impacts of transboundary externalities appropriate for the seafood or burger markets addressed by this question? If yes, what policies can be used to reduce negative distributional welfare impacts of meatless burgers or lab-grown seafood? If no, why not?

5. Numerous studies have found that farmers who adopt soil conservation practices benefit directly through a gradual improvement in the quality of their soil, leading to improved profitability. The rest of society also benefits since these practices reduce erosion, leading to improved water quality. However, farmers often do not adopt such practices because (1) they perceive them to be more risky and (2) because they are reluctant to “invest” in soil on farms that they may sell for residential development before they are able to enjoy the benefits of improved soil.
 - a. Assume that on average, the expected present value of net benefits of soil conservation to a farmer is positive, i.e., it appears to make economic sense to adopt such practices. Provide an economic justification for why government should or should not spend money encouraging the adoption of soil conservation practices.
 - b. Suppose that the government has decided to encourage soil conservation. They are considering three approaches: (i) direct payment for measured improvements in water quality, (ii) subsidized insurance for farmers who adopt soil conservation, and (iii) land-use restrictions that will eliminate market pressure to convert to residential development. Will these practices work? Which would you recommend, and why?