

**Resource & Environmental Economics Field Examination**  
**Jan, 2009**

**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 and number each page. Do not use your name or social security number. Write on only one side of the page leaving at least one inch margins. When you submit the exam, make sure the pages are in order.

You have four questions to answer.

Answer four of following five questions.

**Question #1**

The doctrine of prior appropriation is a common form of water allocation, particularly in the western portion of the United States. It is typified by the statement "first in time, first in use". Therefore, agricultural users that provided much of the early settlement are the senior rights holders, whereas urban users typically have more junior water rights. This differs from the riparian rights system in which no seniority is granted, and all users along a river or stream have access to water.

- a) Discuss the economic rationale for why the appropriative water rights system was originally adopted. Why was this system more commonly adopted in the drier portions of the United States?
- b) Economists often argue that the appropriative water rights system without trading is very inefficient. Provide an economic model to demonstrate this market inefficiency between agricultural and urban uses, and explain how water markets could improve social welfare. Include graphs to show water prices, quantities, and social benefits before and after water markets are introduced.
- c) Discuss some of the potential equity and efficiency concerns with water markets in the real world, and discuss steps to reduce these potential negative impacts.

**Question #2**

Several economists who do non-market valuation in order to provide estimates of benefits to be used in cost-benefit analyses related to environmental changes now recommend the use of the stated choice model (SCM) as the "best" approach to take in valuing these changes. Provide a detailed, but concise appraisal of the strengths and weaknesses of the stated choice model approach, plus at least two alternative valuation approaches that might be taken. The two alternatives should be commonly used valuation approaches taken in the literature. In your answer, be sure to explain what each method is, and the basics of how each approach is undertaken. Also provide your own, clear statement: do you agree that the SCM is the way valuation should be done now, and if not, why and when would another approach be better than SCM?

### Question #3

Consider the management of a regional park that is used by surrounding residents for recreational activities, such as bird-watching and hiking. Assume that the marginal costs of park management are given by  $MC = 80A$ , where  $A$  is the land area of the regional park in square miles. There are only two types of residents attracted to the regional park: 10 bird-watchers and 20 hikers. The individual marginal benefits are given by  $MB_b = 20 - 2A$  for each bird-watcher, and  $MB_w = 20 - A$  for each hiker.

- a) What is the aggregate demand function for park land area?
- b) What is the socially optimal land area of the regional park?
- c) Consider two options for managing the regional park. In the first option, the local government operates the park and collects an entry fee. In the second option, the government contracts a concession to a private firm to manage the park, and the private firm charges an admission fee to residents. Discuss *qualitatively* how the objective function for the managing entity and park entry fee would vary between these two options. (Note: Assume that the marginal costs of park managements are the same for both options.)

### Question #4

Many changes in natural resource situations involve risk or uncertainty. For example, society may wish to manage a biological/renewable resource such as an aquatic species, but not be able to characterize important aspects of habitat or stock dynamics beyond some probability distribution. Worse still, society might be faced with several possible distributions for the risk associated with optimal management, but not know which among these, is the correct distribution for an analysis to obtain the optimal strategy.

Address the following questions/comments.

- (i) One economist says, well, in cases like above, there is simply no role for an economist. Agree or disagree? Explain your answer.
- (ii) Another economist says that even with “uncertainty” (note, he meant to say uncertainty and not “risk”), an economist can do some empirical analysis to shed light on the optimal management of the stock.
  - Again, do you disagree or agree with her (or him) here? Start by explaining the difference between uncertainty and risk. Also explain why you agree or disagree.
  - Give an example of what could be done in evaluating the effect of risk/uncertainty in terms that a policy manager (say, a committee person on an aquatic species management group who is not an economist) would understand. Comment on whether the stock should be extracted more slowly, more quickly, or at the same rate when there is uncertainty, as opposed to known risk.

### Question #5

One current controversy regarding biofuels production is its effects on the global environment including greenhouse gas emissions globally due to indirect effects on land use conversion. Some are arguing that expanded biofuels production will increase cropland use and cause (a) increased fertilizer runoff; (b) discontinuation of conservation reserve program lands (a fragile lands preservation program that holds croplands out of production by paying a proportion of land rental rate with a 10 year commitment); (c) deforestation of existing US timberlands; and (d) expansion of production internationally with rainforest being cleared. Analyze this economically examining

- Basic rationale for arguments that expanded biofuels could lead to results such as above
- Policy approaches that might be used in addressing above problems.
- Role of a new possible biofuels production approach that generates biofuels from agriculture and forestry production residues (corn stalks and logging residuals)