Resource Economics Preliminary Examination

June 14, 1985

You have until 12:00 (four hours) to complete this examination. Exams will be collected promptly. Pace yourself in responding to questions so that you do not spend an undue amount of time on any one question at the expense of other questions. Write your student ID number at the top of each page of your answers, and do not write your name anywhere on the answers you turn in.

A. Answer all three of the following questions.

1. A major issue in the Northwest concerns management of the extensive reservior system in the Columbia River Basin. Hydroelectric facilities can provide large amounts of electricity; irrigation diversions can provide large amounts of water for agricultural production. These uses of water are in competition for a fixed water supply, and, moreover, both uses serve demands with peak loads during the summer. Supply is uncertain from year to year. How would you evaluate this problem? What are the relevant concepts and what is your preferred methodology? How might you advise policy makers on this matter?

2. Economists tend to think that the primary objective of limited entry is economic efficiency. Fishermen think the primary objective is to improve the economic condition of fishermen. Who is right? Are these the same thing? Explain.

3. $U = R^2N$ is a utility function for the consumer of a rival good R and a nonrival good N. R is provided in the marketplace, and N is provided in fixed quantity by the government.
   (a) By solving the expenditure minimization problem determine the consumer's compensated demand for N at arbitrary prices and utility level.
   (b) The consumer has 18 units of income which she spends entirely on R. The price of R is 2 so she purchases 9 units of R. Initially, the government is providing 9 units of N. The responsible agency is considering a project which will increase N to 16. Assume the consumer's income and the price of R will be unaltered by the project. Using the results of (a) define and find two different Hicksian welfare measures for this change.
   (c) Suppose the project cost is 500 units and there are 100 identical beneficiaries of the project. Should it be built? Explain.

B. Answer any one of the following questions.

4. Natural resources are a component of an ecosystem which provides many services to consumers (or economic agents). These resource services are a result of resource uses which are complementary in some cases and competitive in others. Often the services yielded from a particular resource use may not be exchanged in unfettered competitive markets. And some uses of natural resources may "forever" preclude other uses. Thus, there is an economic problem to be addressed when determining which natural resource use(s) to choose.

   Discuss the economic issues which must be confronted and the measurement techniques which are available to evaluate choices among alternative resource uses.

5. The two major costs of soil erosion, loss of land productivity and environmental degradation, are responsible for a major U.S. problem. There is evidence that wind and water erosion are increasing significantly.

   Deliberations have been initiated to develop federal policies to reduce soil erosion to economically efficient levels. Explain how you would evaluate losses due to erosion. Under what conditions might a cost-sharing arrangement (splitting the costs of soil-conserving investments) with landowners be justified? Are there alternative policies which seem attractive?