Resource Economic Preliminary
Examination

June 11, 1982

You have four hours to complete this written examination, 8:00 to 12:00. Pace yourself in responding to questions. Exams will be collected after four hours; i.e., do not spend an undue amount of time on any specific question at the expense of the other questions. Write your student ID number on the top of each page of your answers; your name should not be on the answers you turn in.

A. Answer all of the following three questions.

1. Much publicly owned land, some sections of which are quite unique, e.g., the Grand Canyon, has been argued to have economic value. Often these lands have economic value for a variety of different uses, e.g., energy production, timber production, recreation. Discuss the concept of economic value and the types of economic value which may exist for a natural resource. If confronted with a project which will alter a natural area, e.g., Big Bend, Grand Canyon, Lake Tahoe, how would you determine the benefits and costs to be used in the project analysis calculations (i.e., benefit-cost ratio or net present value)?

2. Both fisheries and timber are commonly considered to be renewable resources. How does a renewable resource differ from an exhaustible resource? The literature surrounding fisheries has developed in such a way as to make fish resources appear as though they have a unique set of economic problems associated with them. What are these problems and why do they exist? Now, back to timber. If forest resources are also renewable, are they also subject to the same economic problems as fishery resources? Why or why not?

3. Suppose that Texas produces only two goods, beef (B) and electricity (E). Over time, high-sulphur fuels such as lignite are substituted for petroleum in electricity generation. As a result, sulphur oxides are emitted as air pollutants which then react with atmospheric moisture to form a weak sulphuric acid. Acid rain then falls and damages the forage which cattle feed upon. This negative effect clearly represents a new externality.

   Beef is produced in Texas from costless forage (F) according to the following production function: $B = \frac{1}{2} F$. Assume a short-run situation in which plant capacity limits electricity generation to 30 units. Texas electricity is produced from petroleum (P) and lignite (L) according to the following production function: $E = 3P + 2L$. The externality relationship is given by: $F = 400(1 + L)^{-\frac{1}{2}}$.

   Prices are exogeneously determined and are as follows: $P_B = 10$, $P_F = 0$, $P_E = 15$, $P_P = 40$, and $P_L = 22$.

   Suppose that beef production and electricity production are managed by two different profit-maximizing individuals. What is the competitive equilibrium? Are the state's resources being allocated efficiently in this competitive equilibrium?

B. From the following set of four questions, answer any two.

4. The concept of economic surplus is increasingly used in the profession to evaluate the social consequences of governmental policies and new technologies. Carefully define the concept of economic surplus, and discuss its strengths and weaknesses from both theoretical and practical viewpoints.

5. Water is often managed and allocated by institutions which establish water rights and fix quantities to a specified use such as irrigation. Compare and contrast the economic implications of water allocation under a market system and under the current institutional allocation framework.

6. Most local leaders in rural communities lack even the most basic knowledge of economic base models. How would you explain to these local decision-makers what a community economic base model is and how it might be used in community planning? You might also include alternate approaches and the implied trade-offs.

7. Resource scarcity is a topic which has received considerable attention in Texas and elsewhere, e.g., groundwater depletion, bauxite and other minerals. What does "resource scarcity" mean and how would you go about determining whether or not a particular resource is scarce?