Resource & Environmental Economics Field Examination

May 2005

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. Upon turning in the exam make sure the pages are in order.
- You have four questions to answer with a choice of omitting any one of the five questions.

Answer four of the five questions.

1. Suppose that undisputed scientific evidence shows that the constant and invisible bombardment of people by certain electronic signals is causing gradual brain dysfunction (GBD). The chief consequence of GBD is gradual memory loss over a period of years. The evidence indicates that the problem is caused entirely by cellular phone signals. Research shows that reductions in the total hours of phone use in an area lowers GBD and elimination of phone signals halts GBD though prior memory damage remains. Because GBD is the result of signals sent from towers, all people are affected equally in cell-phone service areas, not just those who use cellular technologies.

   Make a contribution towards the solution of this problem by linking your detailed responses to the following interdependent tasks.

   a) Interpret and discuss the primary economic issue(s) that is(are) present here.
   b) Suggest a modeling approach that addresses this situation and could be used to test alternative policies.
   c) Identify some attractive policy options and important features of each policy as they could be used to address the GBD problem.

2. The Nature Conservancy (TNC) is a nongovernmental organization that purchases lands having environmental value. One of the interesting things about this organization is that it occasionally sells lands that are part of its portfolio.

   Suppose that the environmental characteristics of land parcels can be summarized in two indices – one for plant biodiversity and one for animal biodiversity. You have been hired by TNC to help in its program that makes sale and purchase decisions.

   a) Using only data on previous sales and purchases by TNC, how would you estimate the implicit relative weights that have been used by the organization in making decisions? Briefly explain the variables you would need, the modeling assumptions you would need to make, and the methods that you would employ.
   b) Suppose TNC's board wants to make sure that purchases are more in line with the preferences of the organization's members. Describe major features of the study that you would carry out to obtain the information necessary to help the board.
   c) Once you have identified the relative weights on animal and plant biodiversity, how would you recommend that the TNC make its annual purchase and sale decisions?

3. In recent years there has been an almost complete ban on the harvest of many whale species. Suppose that as an alternative to the international ban, a proposal has been submitted to make available each year a limited number of transferable licenses for the right to harvest a whale.
   a) Discuss the merits to this approach compared to the current approach, which grants very limited rights only to a few indigenous groups.
   b) Discuss whether you think the program should be "open" or "closed." That is, should anyone be allowed to purchase the permits or only registered parties? Would this affect the number of licenses that are actually issued?
   c) Would the difficulties of monitoring and enforcement increase or decrease under the new program?
   d) Taking into account that whales are a long-lived species, would you expect prices for these rights to change over time?

4. Suppose you are looking at water use in a region where
   - All users draw from a highly permeable aquifer where use by any one party has an effect on the total available stock.
   - All users have ground water rights allowing users to pump as much as they want from under their land.
   - The aquifer does not recharge from any natural water sources such as rainfall.

   Now suppose someone has alleged the aquifer is being depleted too rapidly and you have been hired to advise a government agency that is considering regulating water use. They want you to address the following

   a) Is there some reason based on economic theory and observation in other settings why the aquifer may be being overused?
   b) Is there some way of figuring out optimal aquifer usage levels? Be sure to state what you mean by "optimal".
   c) What policy alternatives could be used to bring water use to more optimal levels?
   d) If it is difficult to monitor individual withdrawals, but aggregate withdrawals can be estimated, could a mechanism be designed that would yield an efficient use of the aquifer?

5. Suppose you have been called in to advise an international organization on climate matters and are asked to address the following issues.

- there have been a number of studies that indicate developing country economies are vulnerable to climate change
- development historically has involved vast expansions in energy use
- the Kyoto Accord has been enacted, and developing countries are under pressure from countries like to U.S. to limit emissions

What are the economic issues here regarding the way developing countries choose to interact with developed countries and participate in international emission limitation efforts? What type of economic considerations and policies would you advise the organization to consider in forming a position given the simultaneous burdens associated with the costs of reducing emissions sharing and damages associated with climate change?