RESOURCE ECONOMICS PRELIMINARY EXAMINATION
January 19, 1993

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.

Part I: Answer all of the following three questions

1. Midwestern power companies generate much of their electricity by burning coal. Tall smokestacks, required because of concerns about local pollution, carry the sulfurous smoke high into the atmosphere and it eventually falls in the northeastern states and eastern Canada as acid rain. For the purposes of this problem, suppose that each megawatt of electricity produced in the midwest caused $100 worth of acid rain damage in the northeastern U. S. Discuss each of the following proposed solutions to the problem.

   Proposal A: Do nothing.
   Proposal B: Impose regulations on the power companies that would force them to reduce the sulfur content of the smoke to the point where the rain returns to its natural level of acidity.
   Proposal C: Impose a tax of $100 per megawatt on electricity production in the midwest and use the revenue to give people in the northeast an income tax rebate.
   Proposal D: Give northeasterners the right to clean air.

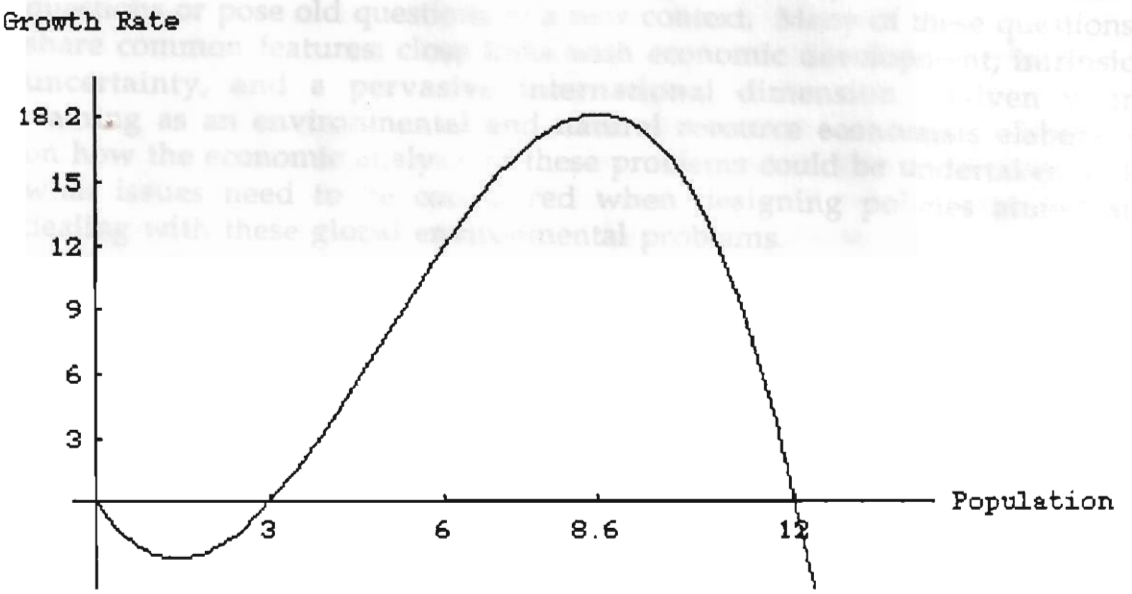
   Be sure to consider all of the following questions for each proposal:
   I. Is the proposal economically efficient?
   II. How will the proposal affect the welfare of the people in the two regions?
   II. Is the proposal technically and politically feasible?

2. Suppose there are two individuals in society. The demand curve for mosquito control for person A is given by $Q_a = 100 - P$. For person B the demand curve for mosquito control is given by $Q_b = 200 - P$.

   a. If mosquito control is a pure public good, what would be the optimal level of this activity if it could be produced at a constant marginal cost of $120?

b. If mosquito control were left to the private market, how much might be produced? Is the private amount optimal? Why?
c. If the government were to produce the optimal amount of mosquito control, how much will this cost?
d. How will the tax bill be allocated between the two individuals if they are to share it in proportion to benefits received from mosquito control?

3. Answer the following questions using the population growth curve for lobsters shown in the graph below.



a. If there were no harvesting of lobsters, what would be the eventual population size of lobsters if initial population were above 3? Below 3? Why?
b. Why must the efficient steady state population lie to the right of the maximum sustained yield population?
c. Even though it might be inefficient (as well as morally objectionable) to cause the extinction of lobsters, why might it happen in an open access outcome?
d. Suppose the lobster fishery is currently operating at the inefficient population level of 6. Graphically illustrate how the government could implement a policy that moves the lobster fishery to a more efficient level, say between 8.6 and 12.

Part I: Answer one of the following two questions

4. Overgrazing of grassland in Sub-Saharan Africa is causing serious erosion and there are concerns that most areas may not be able to regain the topsoil that supports rangeland agriculture. Some argue that the nomadic lifestyle of the region's people is to blame and that this problem could be solved by simply specifying exclusive rights to land. Do you agree?

5. In the last few years scientists have highlighted a set of "new" environmental problems such as ozone layer depletion, global warming, deforestation, and the loss of biodiversity. These problems raise new questions or pose old questions in a new context. Many of these questions share common features: close links with economic development, intrinsic uncertainty, and a pervasive international dimension. Given your training as an environmental and natural resource economists elaborate on how the economic analysis of these problems could be undertaken and what issues need to be considered when designing policies aimed at dealing with these global environmental problems.