

Economics 472
Economics of Renewable Resources

December 8, 2010

Time: 2 hours

Answer any THREE questions. Do not attempt to answer more than three questions. The three questions that you answer will be given equal weight.

This examination is to be returned with your examination booklets.

1. Economists have argued for over sixty years that the economics of natural resources, both renewable and non-renewable, is basically an application of the economist's theory of capital and theory of investment. After distinguishing between the theory of capital and the theory of investment, explain why the renewable natural resources studied by you, such as fishery resources and forests, can clearly be seen as forms of "natural" capital. In what sense can society "invest" positively in such resources. Take a forestry or fishery example.

It is argued that the tendency to engage in excessive disinvestment (overexploitation) of renewable natural resources will be heavily influenced by the nature of the property rights surrounding such resources. With this in mind, explain why overexploitation of world capture fishery resources has been a chronic problem, while such overexploitation is not a chronic problem in Canadian forests, e.g., the forests of British Columbia.

- 2.(a) When a stand of trees is harvested for commercial purposes, the land can then be replanted to produce a new crop of trees. What impact does the opportunity for successive re-planting have upon the determination optimal rotation period? In particular, does the existence of this re-planting opportunity tend to lengthen or shorten the optimal rotation period? Why?

Once successive re-planning is taken in to account, what impact does the social rate of discount have to play upon the rotation period and harvest policies. Illustrate by taking the extreme cases, i.e., $\delta = 0$ and $\delta = \infty$, where δ denotes the social rate of discount. Would it, in fact, be correct to say that decisions regarding the optimal rotation periods to be used in the management of British Columbia forests are insensitive to the rate of discount used? Explain.

- (b) The problem which we face in British Columbia is that we continue to have a large amount of our original natural endowment in the form of old growth forest. Explain why the exploitation of this old growth forest over time is certain to lead to the so called "fall down" effect, regardless of how well we manage the forests. Discuss how the application of the "Hanzlik Formula" is designed to address this problem.

- 3.(a) The static economic model of the fishery, associated with the name of H. Scott Gordon, has had a powerful impact upon policy makers. Several of its key conclusions continue to be highly relevant today. Nonetheless, the static model has, in comparison with the dynamic, or explicitly capital theoretic, economic of the model of the fishery certain weaknesses. Two of these are: (i) the fact that the underlying biological model is pushed firmly into the background and largely ignored, (ii) the fact that the static model implicitly assumes a social rate of discount of zero per cent.

The Gordon model, resting upon the Schaefer biological model, predicts that, while, under Pure Open Access, the fishery resource will be overexploited, economic factors will come into play to prevent the resource from being driven to extinction. Why is this so? Is it possible that in fisheries, in which the Schaefer model is not really applicable, Pure Open Access could lead to the fishery resource being driven to the brink of extinction? Discuss.

The implicit assumption of a social rate of discount equal to zero percent, plus the underlying Schaefer model, leads the Gordon model to predict that the *optimal* biomass level will always be greater than the MSY level and will NEVER be below the MSY level. Show that, once the assumption that the social rate of discount is equal to zero is relaxed, we can no longer predict with confidence that the optimal biomass level will always be greater than the MSY level.

(b) “The chief consequence of Regulated Open Access, the dissipation of resource rent through the build up of excess fleet capacity, is relevant only in the context of a static economic model of the fishery. In the context of a dynamic economic model of the fishery, this consequence of Regulated Open Access is simply irrelevant.” Discuss, explaining why you agree, or disagree with statement.

4. A chronic problem faced by Canadian capture fisheries, and by capture fisheries throughout the world, is that of overcapitalization – what we have termed the Regulated Open Access Problem.

(a) Why, in your view, have resource management schemes using direct controls, (incentive blocking schemes) e.g. Limited Entry Type programs, generally yielded disappointing results?

(b) A popular, and controversial, alternative to limited entry schemes in addressing the Regulated Open Access Problem consists of using Individual Transferable Harvest Quotas (ITQs). Discuss the nature of the advantages and disadvantages of ITQ schemes.

Discuss, in general terms, one other possible alternative to both direct controls and ITQs in dealing with the problem of overcapitalization in fisheries.

5. A particularly important fisheries management problem to have arisen under the New International Law of the Sea, and the accompanying EEZ regime, is the management of internationally shared fishery resources.

(a) The two major classes of such internationally shared fishery resources are: (i) transboundary fish stocks, and (ii) straddling fish stocks. What is the distinction between the two classes? Would it be correct to say that the two classes, (i) and (ii), are necessarily mutually exclusive? Explain.

(b) Suppose now that two neighbouring coastal states, A and B, share fishery resource. The fishery resource is not to be found outside of the EEZs of A and B. The two coastal states agree to manage the fishery resource cooperatively. The coastal states are identical in every respect, except that A has lower fishing effort costs than B. Could this difference in fishery effort costs lead to differences in the resource management goals of A and B? If so, how? After defining the term “side payments”, explain what role, if any, “side payments” could play in alleviating difficulties arising from conflicting management goals.