THE UNIVERSITY *of York*

Degree Examination 2004

ENVIRONMENT DEPARTMENT

BSc in Environment, Economics and Ecology, Part 1a

PRINCIPLES AND APPLICATIONS OF ECOLOGICAL ECONOMICS

Time allowed: **one and a half hours**

Answer **TWO** questions out of **FOUR**

University Calculators will be provided
Graph paper will be provided

Pay adequate attention to spelling, punctuation and grammar, so that your answers can be readily understood

Question 1: (50 marks)

This question relates to cost benefit analysis and the advantages and limitations of this approach in relation to projects which have environmental impacts.

i) Why would private firms carry out cost benefit analysis? Give two examples where such an analysis would be useful and explain the principles of the analysis. (15 marks)

ii) Why would governments appraise projects with environmental impacts using cost benefit analysis and how would their analysis differ from the analysis carried out by private firms? (15 marks)

iii) In the context of ii) explain discounting and discuss why it is often argued to be problematic with respect to the evaluation of such projects. Give examples to illustrate your points. (10 marks)

iv) Cost benefit analysis rests on several assumptions which have been claimed to limit the usefulness of this approach for environmental project appraisal. Select two of these assumptions and discuss their limitations. (10 marks)

Question 2: (50 marks)

Consider a steel factory operating close to a laundry company. Emissions from the steel factory impose a negative externality on the laundry company.

a) Briefly describe the Coase Theorem and explain what it can tell us about the situation. (10 marks)

b) Imagine that the steel factory can introduce abatement technology which reduces emissions. Equally, the laundry can install air filters which reduce the impact of emissions. There are two possible assignments of property rights: the laundry has the right to clean air or the mill has the right to pollute. The Table below gives the profits for the different alternatives.

	Steel Profits	Laundry Profits	
		Laundry install filters	Laundry does not install filters
Steel mill operate without abatement	£ 500	£ 150	£ 50
Steel mill close down	£ 0	£ 300	£ 600
Steel mill operate with abatement	£ 300	£ 350	£ 400

i) What is the social optimal outcome? (5 marks)

ii) What are the outcomes under the two different property rights regimes, when there is no possibility of bargaining? (5 marks)

iii) How does your answer to ii) change when the two firms can bargain costlessly? What compensations/bribes are needed? (10 marks)

c) Discuss the problems associated with realisation of social optimal bargaining outcomes in the real world, and alternative approaches to combat pollution problems. (20 marks)

Question 3: (50 marks)

Imagine that you are employed by the Forestry Commission to help them make decisions about their forestry operations.

a) What is the difference between maximising production of timber volume and maximising the return on the timber investment? Are there other economic values associated with forests which the Forestry Commission may want to consider? (15 marks)

b) Imagine that you are seeking to optimise the economic return of a forest stand of Scots pine. The table below gives the data for the accumulated volume [m^3] at given ages [years].

Age, years	20	35	40	45	50	55	60
Volume, m^3	78	150	170	200	225	250	260

Timber price is assumed constant at £50/m^3. Harvest costs are also assumed constant at £6/m^3. Planting costs are assumed to be £ 2000. Calculate the Net Present Value of the net benefits from timber production for varying harvest ages, using a discount rate of 2%, and identify graphically the optimal age to harvest the stand. Explain your analysis. (20 marks)

c) What are the main issues affecting the exploitation of forest resources around the globe? (15 marks)

Question 4: (50 marks)

a) What is the economic argument for government regulation of pollution. Illustrate your answer graphically. (15 marks)

b) Imagine a firm that produces a harmful chemical substance as a by-product from its production. Initially, the firm is not employing any abatement technology and is emitting 100 tons of pollutant. Abatement is possible at a cost given by the marginal abatement cost function, MAC = 2A, where A denotes the abatement carried out measured in tons. The marginal abatement costs are measured in £/ton.

The government wishes to reduce pollution levels.

i)   If the government imposes a tax of £50/ton, what would the tax bill be for the firm if no abatement was carried out? (2 marks)
ii)   What would the emissions and the tax bill be if the firm maximises profits? Explain your answer. (6 marks)
iii)   What is the optimal cost of abatement? Explain your answer. (6 marks)
iv)   What tax level is required to reduce the emissions to 25 tons? Explain your answer. (6 marks)

c) Explain the main differences between command and control policies and economic incentives to reduce pollution. (15 marks)