Institutt for samfunnsøkonomi

Eksamensoppgave i SØK3524 – Miljø- og ressursøkonomi

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Eksamensdato: 28. november 2016
Eksamenstid: 6 timer (09.00-15.00)
Sensurdato: 19. desember 2016

Målform/språk: Engelsk
Antall sider: 2 (inkl. forside)
Antall sider vedlegg: 0

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Question 1
The abatement cost function of a firm writes \( C_i = \alpha_i (\hat{M}_i - M_i) + \beta_i (\hat{M}_i - M_i)^2 \) where \( \hat{M}_i \) is the emission without abatement ('business as usual') and \( M_i \) the actual emission. \( \alpha_i > 0 \) and \( \beta_i > 0 \) are parameters. Altogether there are two polluting firms.

a) The regulator (‘Statens Forurensningstilsyn’) has established a market for tradable emission permits and where the total amount of permits is \( M \). Assume that the initial amount of permits to each of the firm is given as \( M_i^0 \) and the quota price is \( p \). Find the demand for emission by the firms and the quota price.

b) Formulate instead the problem if the regulator wants to minimize the total abatement costs subject to the emission cap \( \hat{M} \).

c) Discuss finally any possible connections between the solution of the above problem a) and b).

Question 2
a) Discuss briefly the concept of ‘sustainable development’.

b) Discuss briefly problems of how to regulate a fishery

Question 3
A landowner is controlling a wildlife stock that grows according to \( \frac{dX}{dt} = F(X) - h \). She sells hunting licences for a fixed price \( p \). The wildlife also causes a value due to tourism etc. This value is assumed to be related to the stock, and the value function writes \( W = W(X) \). The current profit of the landowner hence writes \( \pi = ph - W(X) \).

a) Formulate the optimal management strategy of the landowner and find the stock and hunting when the goal is to maximize present-value profit. Consider both the transitional dynamics and the steady-state.

b) Find how the price \( p \) and the discount rent \( \delta \) influence the optimal landowner steady-state stock and hunting.

c) Assume that the natural growth is governed by the logistic function \( F(X) = rX(1 - X/K) \). Interpret the parameters of this function, and find how these parameters influence the above optimal steady-state.

d) Assume finally that the wildlife also causes a negative externality on the general public in the form of browsing damage. How would you have incorporated such value in the management problem if you had been the social planner?