Managing nature : the case of Fisheries

ECTS : 6

Volume horaire : 21

Description du contenu de l'enseignement :

The purpose of the course is to provide scientific insight into the way modern society interacts with its environment. Fisheries provide a good example. They have been exploited since the earliest times to feed human populations, but since the industrial revolution they have undergone a dramatic transformation, leading in some cases to collapse, and transformation of the oceanic ecosystem. The first part of the course will model fish populations, the effect of commercial fishing, and of regulations such as subsidies and quotas. In the second part, the course will investigate how to take into account, not only the needs of the present generation, but also the needs of future generations, so that fisheries management strikes a balance between profit and conservation.

Program

Part 1: bioeconomics (6 sessions of 1:30 hour)

I. Introduction to the oceans

1. Global warming, acidification, desoxygenation. Consequences on marine populations
2. The two sides of fisheries: catches and alimentation. North/South disequilibrium

II. The Economics : Gordon-Schaefer model and beyond

1. The model, Allee effect, MSY
2. Economics: open vs. restricted access, the role of interest rates
3. Managements instruments :

-Subsidies and taxes
-Quotas, transferable or not
-Protected marine areas

III. Ecosystem models

1. Using ECOPATH and ECOSYM
2. Alternative models and complementarity : OSMOSE APECOSM ATLANTIS EWE viability : what are they used for ? What is the complementarity ?

Part 2: Beyond optimization (6 sessions of 1:30 hour)

IV. The concept of optimization (1 session)

1. Individuals: utility function, expectations, time preference
2. Groups: Condorcet paradox, Pareto optimum,
3. Groups: Nash equilibrium

V. The economics of natural resources (1 session)

1. The unitary model : Ramsey
2. Solving for optimality :

-Finding the equilibrium
-Writing the HJB equation
-Solving the HJB equation

3. Non-renewable resources :

-The Hotelling rule
-The Hubbert curve

VI. **The economics of fisheries (1 session)**

1. The Gordon-Schaefer model as a particular case of the Ramsey model
2. The tipping point

VII. **Intergenerational equity part 1 (2 sessions)**

1. The Chichilnisky criterion and time inconsistency

2. The intergenerational game and equilibrium Markov strategies
3. The HJB equation
4. Finding equilibrium strategies

VIII. **Intergenerational equity part 2 (1 session)**
1. The Sumaila-Walters criterion and time inconsistency
2. The HJB equation
3. Finding equilibrium strategies

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