Economics of Fisheries Management

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Objective

The objective of this course is to develop a practical understanding of the main concepts of resource economics, their applications to fisheries, and their implementation in real life settings of fisheries management. The course is structured in way that the theoretical concepts covered in the classroom will be applied in the context of real-life management challenges. At the end of the course, students should have a clear understanding of (i) the linkages between fisheries biology and the economics incentives from a user's perspective, (ii) the sources of conflict and inefficiency, and (iii) the methodologies to overcome management challenges.

Contents

The topics covered in the course span several categories, but the core contents can be defined as:

- Population dynamics
- Constrained optimization
- Fisheries economics
- Conservation economics
- Public policy for natural resources

Grading

Grades in this class are based on three homework assignments (20% each) and a final project (40%). Students will work in groups, and a minimum performance of 80% is required to get a pass. The assignments and the final project are based on the application of concepts learned in class to a real-life fishery setting. Each assignment will require the students to propose and evaluate a strategy to address different problems that may rise in typical fisheries management situations. Students are encouraged to use all the resources provided in class, as well as any other they may consider necessary, if they effectively meet four criteria:

1. Sound explanation of the fisheries problem using the theoretical topics covered in class (25%).
2. Effective communication of the reasons for a certain policy prescription (25%).
3. Clear assessment of the pros and cons of their policy prescription (25%).
4. Pertinent proposal of indexes to measure the effectiveness of their prescription (25%).

Readings

There is no required textbook for this course. Readings are assigned for each module from text books, peer-reviewed journals, and media articles concerning fisheries issues.

Attendance

This course covers an ambitious amount of material in five weeks. Attendance will not be taken during lectures, but it is expected that students will attend and participate actively in every class.

Collaborations

Real-life professional settings often require people to work in groups. Students will be free to choose their group-mates for each assignment, yet groups for the final project will be assigned randomly. This process provides the incentive for every student to have a fair amount of knowledge of the concepts and the techniques required to answer the questions, and avoids the common problem of free-riding while working in groups.

Programming

The goal of this course is to link economic theory and fisheries in a realistic context. To propose a resource management strategy in the assignments or the exam, students are free to use every resource at their disposal that allows them to propose a solution satisfactorily. This freedom includes the use of analytical solutions and/or any other numerical programming software/language. I would encourage any student that wants to sharpen his or her programming skills in an applied setting to take advantage of this opportunity, I would be more than happy to help you achieve this goal.

Sessions

Module 1: The Static Model for Fisheries

Students will be exposed to the concept of equilibrium in a fishery setting. They will become familiar with the ideas of open access, maximum sustainable yield, and maximum economic yield. Additional notions for the social-economic consequences behind the equilibrium concepts will be covered, which include the concepts of job generation and social cost.

Session 1: Preliminaries to fisheries economics

- Supply and demand
- Market equilibrium
- Population dynamics

Session 2: Fish and fisheries in the market paradigm

- Production in a fishery context
- Open access
- Maximum sustainable yield
- Maximum economic yield
- Reference points for fisheries
- The social cost of fisheries

Readings:

- Chapter 4 in: *Mankiw, N., 2006. Principles of microeconomics. Vol. 10. Cengage Learning*.
- Chapter 2 in: *Panayotou, T., 1982 Management concepts for small-scale fisheries: economic and social aspects. FAO Fish.Tech.Pap., (228): 53 p*.
- Business & Financial Times, 2016. *Too many boats and too many fishers chasing too few fish*.

Module 2: The Dynamic Model for Fisheries
Students will expand the static model to include interactions between users and time dynamics that take place in a decision making process. This session will cover the ideas behind constrained maximization and intertemporal dynamics.

Session 3: Strategic interaction between users

- Prisoner's dilemma
- Nash equilibrium

Session 4: Resource dynamics over time

- Time preferences
- Policy function
- Uncertainty
- Steady state

Readings:

- Prisoner's dilemma discussion (Chapter 16) in: *Mankiw, N., 2006. Principles of microeconomics. Vol. 10. Cengage Learning*.
- *Bailey, M., Sumaila, R., and Lindroos M., 2010. Application of game theory to fisheries over three decades. Fisheries Research 102.1 (2010): 1-8.*
- The New York Times, 2012. *In Mackerel's Plunder, Hints of Epic Fish Collapse*.

Module 3: The Spatial Model for Fisheries
Building on the dynamic notion of fisheries management, the spatial dimension will be introduced so students gain familiarity with the possibility of spatial distribution of a stock and users over time.

Session 5: Spatial dynamics for fisheries

- Spatial distribution of fish stocks
- Spatial distribution of fishers

Session 6: Strategic response to spatial dynamics

- Policy functions with spatial dynamics

Readings:

- *Basurto, X., 2005. How locally designed access and use controls can prevent the tragedy of the commons in a Mexican small-scale fishing community. Society and Natural Resources 18.7: 643-659.*
- *Costello, C., and Polasky, S., 2012. Optimal harvesting of stochastic spatial resources. Journal of Environmental Economics and Management 56.1: 1-18.*
- The World Bank, 2016. *Safety and Sustainability for Small-Scale Fishers*.
- Radio New Zealand, 2016. Anger in the Cooks as tuna deal sewn up.

Module 4: Managing Fisheries
This session is focused in the discussion of the current canonical models to manage fisheries. Students will examine concepts of property rights and transaction costs, and their application for current management approaches.

Session 7: The role of institutions

- Individual Transferable Quotas
- Territorial User Rights for Fisheries

Readings:

- *Grafton, Q., 1996. Individual transferable quotas: theory and practice. Reviews in Fish Biology and Fisheries 6.1 (1996): 5-20.*
- *Hilborn, R., Orensanz, L., and Parma A., 2005. Institutions, incentives and the future of fisheries. Philosophical Transactions of the Royal Society of London B: Biological Sciences 360.1453: 47-57.*
- The Economist, 2012. *Lost property*.

Session 5: Managing Fisheries, People and the Environment
The final session is focused on the adaptation of fisheries management concepts to more realistic settings that includes multiple stakeholder perspectives, and the challenge that complexity entails for managers.

Session 8: Government policy

- The cost of science and enforcement
- Transfers

Session 9: Heterogeneity

- Multiple species
- Multiple stakeholders

Readings:

- *Hilborn, R., 2007. Managing fisheries is managing people: what has been learned? Fish and Fisheries 8.4: 285-296.*
- The Guardian, 2016. *'A silent catastrophe': Chilean fishermen protest failure to mitigate toxic 'red tie.'*
- Vice, 2016. *Countdown to extinction*.