FISH 561/461
Resource Economics for Management & Policy

Fall 2018
MW 9:00-10:20, Tu 12:30 -1:20
4 Credits

Instructor

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Objectives

This course is designed to introduce advanced students in natural science and policy to the economic tools applied in the management of fisheries and other natural resources, with the objective of understanding how economic outcomes are introduced into the policy process alongside resource outcomes. To develop this understanding, we will examine how and why people interact with natural resources, and why these interactions often threaten resource health. Our inquiry will focus two major threats to aquatic resources: overfishing and low fishery profits, and pollution and global change. For each issue, we will assess the problem; identify the incentives that lead people to choose problem-causing actions; consider alternative policies to manage those incentives; and discuss why effective management has not yet been broadly implemented. Through this process, we will develop familiarity with economic tools used to support policy decisions related to fishery and aquatic resource management.

Learning Goals

All students (461 and 561) will be able to apply new frameworks explain behavior and outcomes:

- Know the status of fisheries
    - Understand global trends in stock health, economic and social outcomes
    - Understand, in detail, outcomes and management of regionally important fisheries
- Interpret and apply the model of competitive equilibrium
    - Explain how prices, quantities and allocations are determined through markets to predict the effects of supply and demand shocks, including taxes and subsidies.
    - Understand why economists think of markets as efficient.
    - Explain pollution as an externality problem, and understand how commonly discussed policy approaches work.
    - Apply the model to infer changes in price and quantities based on news events.
- Analyze fisheries as a renewable common pool resource

  - Use a model to explain the predicted outcome for unregulated common pool resources.
  - Explain how commonly discussed policy approaches are addressing the problem.
  - Apply the model to infer economic and ecological outcomes in new situations.
- Identify who bears the costs and receives the benefits of policies, and identify when policy effects are sufficient to motivate political activity.
  - Analyze the incentives present in the political system to identify policies that are or are not politically viable.
- Interpret results from the tools of environmental economists use to evaluate policies that trade off between people's welfare and environmentally destructive activities.

Pedagogical and evaluation methods will practice skills in:

- Critical reading of agency reports developed in support of management to understand described motivations and effects.
- Developing and structuring arguments that explain how and why.
- Applying and interpreting graphical and mathematical models.

In addition, students in FISH561 will develop skills in:

- Applying simple mathematical models to explain behavior and outcomes in substantially different complex cases
- Synthesizing and presenting agency reports
- Practice skills in presenting results of complex analyses

Prerequisites

This course is intended to be an introduction to applied natural resource economics for analytically sophisticated students. For 461, appropriate sophistication is developed in previous coursework through two 300-level FISH courses, or an introductory resource economics course like FISH230 or ENV235. This course does not presuppose previous economics coursework, though experience with microeconomics will be useful.

Readings

This course is unique in the varying backgrounds of its students, its range of topics, and its depth in fisheries economics. As a result, there is no single book that covers a majority of the material adequately and at an appropriate level. Lectures will based on material covered in:

Intermediate Microeconomics by Hal Varian

Environmental Economics and Management by Scott Callan and Janet Thomas

If you have not had any economics, you may find it useful to have a *Principles of Microeconomics* text, like the one by N. Gregory Mankiw (referenced in the reading list); it is fine to save money by purchasing an older edition (8 is current, back to 3 is fine).

In addition, we will draw heavily from several supplemental readings. Links to the readings will be provided on the course's Canvas site.

Canvas

Readings and other critical information, including some homework assignments, will be distributed on the course page on Canvas. You will be responsible for accessing the site on a regular basis.

Grading

This class covers wide range of tools and factual material, including new ways of thinking about and managing natural resources and the environment. Daily preparation is expected.

Undergraduate students (461) will be assessed on mastery of concepts presented, and graduate students (561) will be assessed on mastery of concepts and extension of them novel applications through a case study and a final project.

For **561**, grades will be determined as follows:

Homework	10%	Discussion*	20%
Midterm	20%	Case Study	10%
Final Project	40%		

For **461**, grades will be determined as follows:

Homework	20%	Discussion*	20%
Midterm	30%	Final Exam	30%

* Your discussion grade will be based on the level and quality of contributions to the Discussion sections, which includes the preparatory Canvas discussion list and the discussion session itself.

Methods of Teaching

Lectures (Monday and Wednesday)

Led by me, lectures allow me to introduce the frameworks we will be using for analysis, drawing on models and interpretations from different sources. Textbook readings are supportive of lecture materials, and may be referenced as needed. Lectures will make extensive use of the board, and will involve constructing graphical and numerical models. We will also use lecture sessions to play a handful of illustrative games for homework credit during the quarter. Lectures will be your primary guide to the material I think is important, and thus will appear on homework and exams.

Discussion Section

The Tuesday discussion section will be used to review and discuss particular studies that demonstrate the use of the tools introduced during the previous week. To prepare for class, everyone must:

- Read and think about the readings provided

- Post thoughtful discussion questions on the discussion board on the Canvas site, by 6pm the day before (usually Monday); completion of this task is part of your grade.

Each week, one or two students from 561 will be appointed as discussion leaders. Their job will be to synthesize the readings with class material, facilitate discussion on the Catalyst site, and use posted questions to structure discussion during section. A think-pair-share format has worked well in the past, but I am open to other approaches. Students in 461 will follow and participate in the discussion, with an emphasis on understanding how class material is applied within the readings.

Homework Assignments

There will be regular homework assignments, slightly less often than weekly when other projects are not outstanding, designed to reinforce important concepts from class. Homeworks are due at the beginning of class on the day for which they are assigned. Late assignments will be accepted until that assignment is graded, but will be penalized 5% for each day they are late.

Exams

There will be a mid-term exam for all students (461 and 561) over core microeconomic models related to common pool resources.

Case Study Presentation

We will introduce case studies in various methods for fishery management through student researched and presented case studies. 561 students will identify fisheries that are managed using particular methods. To these fisheries, they will apply a framework for assessing the ecological, economic and community performance of the management outcome. They will present their findings in an oral/Powerpoint presentation of approximately 8 minutes to the class. The case study will emphasize how the structure of the fishery and management system has established incentives that have led to observed outcomes. Students in 461 will be accountable for understanding the incentives in case study, and to use ideas from class to explain differences in outcomes across cases. A list of suggested case studies—to ensure we examine easy and difficult cases of each major management method—will be provided. A grading rubric for the presentations will be provided later in the quarter.

Final Project (561 only)

In lieu of a final exam, FISH561 students will write a five-page final project that requires comparison of management in two similar fisheries (or other natural resource management situations that can be analyzed with the tools presented in class) that have experienced different outcomes based on different management approaches. The focus of the assignment will be in applying the range of tools discussed in class to explain the differences in outcomes between the cases examined. An assignment and rubric will be distributed later in the quarter; there will be intermediate due dates.

Policies

Collaboration

Your peers are often your best resource for learning. Working in groups to complete the homework and plan and revise your final paper is strongly encouraged. However, work you turn in must be in your own words. It is suggested you make sparse notes in a group setting, and then write up your own answers to turn in.

Academic (Mis)Conduct

At the University level, passing anyone else's scholarly work (which can include written material, exam answers, graphics or other images, and even ideas) as your own, without proper attribution, is considered academic misconduct. Because I am interested in how well you understand and can explain the situations and models discussed in class, it is imperative your work is in your own words. Shared homework or test answers or plagiarized assignment answers, will receive a zero for the assignment for involved parties and will be referred to the university for disciplinary action.

Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). I expect that you will know and follow the university's policies on cheating and plagiarism. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the College of the Environment Academic Misconduct Policy and the University of Washington Community Standards and Student Conduct website. University plagiarism policies apply

Disability

Full participation in this course requires the ability to read and synthesize written material, attend three classroom sessions a week (up to 80 minutes), participate in class discussion, and compose mathematical and graphical answers to homeworks and projects. If you anticipate or experience barriers to your learning or full participation in this course based on a physical, learning, or mental health disability, please contact the instructor to discuss possible accommodation(s) within the first week of class, or at least a week before you anticipate an issue. The instructor will maintain confidentiality of the disability and associated accommodations.

A more complete description of the disability policy of the College of the Environment can be found http://coenv.washington.edu/intranet/academics/teaching/disability-accommodation/. If you have, or think you have, a temporary or permanent disability that impacts your participation in any course, please also contact Disability Resources for Students (DRS) at: 206-543-8924 V / 206-543-8925 TDD / uwdss@uw.edu e-mail / http://www.uw.edu/students/drs.

Reading List (Subject to change)

Acheson, J. and R. Gardner. 2011. Modeling Disaster: The Failure of Management of the New England Groundfish Industry. *North American Journal of Fisheries Management* 31(6):1005-18.

Anderson, J., C. Anderson, J. Chu, J. Meredith, F. Asche et al. 2015. The Fishery Performance Indicators: A Management Tool for Triple Bottom Line Outcomes. *PLoS ONE* 10(5): e0122809. doi:10.1371/journal.pone.0122809

Anderson, C., M. Krigbaum et al. 2017. How Commercial Fishing Effort is Managed. Working paper.

Callan, S. and J. Thomas. 2010. *Environmental Economics and Management: Theory, Policy and Applications*, 5th ed. Florence, KY: Cengage.

Cinner, J., T. McClanahan, M. McNeil, N. Graham, et al. 2012. Comanagment of Coral Reef Social-Ecological Systems. *Proceedings of the National Academies of Sciences* 109(14):5219-22.

Conrad, J. 2010. *Resource Economics*, 2nd ed. Cambridge: Cambridge University Press.

Deschenes, O. and M. Greenstone. The Economic Impacts of Climate Changes: Evidence from Agricultural Output and Random Fluctuations in Weather. American Economic Review 97(1):354-85.

Duffield, J., D. Patterson and C. Neher. 2007. Economics of Wild Salmon Watersheds: Bristol Bay, Alaska. http://alaskamag.com/resources/pdf/pebblemine100301/Fishmoney.pdf

IEM. 2010. A Study of the Economic Impact of the Deepwater Horizon Oil Spill. http://gnoinc.org/wp-content/uploads/Economic_Impact_Study_Part_I_-_Full_Report.pdf

Field, B. *Natural Resource Economics: An Introduction*. 2001. Long Grove, IL: Waveland.

Gelcich, S., J. Sinner, C. Donlan, S. Tapia-Lewin, N. Godoy and J. Castilla. 2017. Fishers' Perceptions on the Chilean Coastal TURF System after Two Decades: Problems, Benefits, and Emerging Needs. Bulletin of Marine Science 93(1):53-67.

Greenberg, P. 2013. Specific reading TBD.

Knapp. G. 2011. Economic Objectives. Draft book chapter.

Knapp, G., C. Roheim and J. Anderson. The Great Salmon Run: Competition Between Wild and Farmed Salmon. Washington, DC: TRAFFIC North America.

Northern Dynasty Minerals. 2011. *Preliminary Assessment of the Pebble Project, Southwest Alaska*. http://www.northerndynastyminerals.com/i/pdf/ndm/Pebble_Project_Preliminary%20Assessment%20Technical%20Report_February%2017%202011.pdf

Rosenberg, R., J. Swasey and M. Bowman. 2006. Rebuilding US Fisheries: Progress and Problems. *Frontiers in Ecology and the Environment* 4:303-8.

Toufique, K. and B. Belton. 2014. Is Aquaculture Pro-poor? Empirical Evidence of Impacts on Fish Consumption in Bangladesh. World Development 64:609-20.

Varian, H. 1996. *Intermediate Economics: A Modern Approach*, 4th ed. New York: WW Norton.

Weber, M. and J. Gradwohl. 1995. *The Wealth of Oceans*. New York: WW Norton.

Class Schedule (Preliminary and subject to revision) *Italicized readings to be completed before class*

Date	Topic	Content	Readings	Discussion (Tue)
9/26	Resource management or *people* management?	Prisoner's dilemma		
Consumer Basics				
10/1	Opportunity sets, scarcity and tradeoffs	Opportunity sets Indifference curves Budget constraints	Varian 2,3	*Knapp Objectives* (Mon?)
10/3	Utility maximization	Lagrangians MRS Demand Trading for scarce goods	Varian 4,5	
Market Basics				
10/8	Where do prices come from?	Trade experiment Competitive Equilibrium PS,CS, Efficiency	Varian 15,16 Callan & Thomas 2 Mankiw Ch. 4, 7	*Knapp et al*. or *Toufique and Belton (2014)*
10/10	The market for fish	Applied Shocks & curve shifts		
Economic Models of Fisheries and Harvesters				
10/15	Game Models: Static model of CPR	Goat farming game Nash equilibrium	Mankiw 232-237 Gibbons	*Weber & Gradwohl Ch. 8* *Rosenberg et al (2006)*
10/17	The steady-state bioeconomic model	Rent dissipation	Field Ch. 13	
10/22	Fishery Management Methods	Overview **Project assignment**	*Anderson et al. 2018*	*Fina (2005)* *BSAI Crab Rationalization 10 yr review*
10/24	Political economy: Identifying politically		*Gardner & Acheson (2011)*	

	feasible policies			
10/29	Harvester's problem (production)			*Discussion Wed 11/14? Cinner et al. 2012* or *Gelcich et al. 2017*
10/31	**In-Class EXAM**			
11/5	Policy with risk and uncertainty	Expected value Risk aversion Uncertainty aversion	Callan & Thomas Ch. 6	
11/7	West Coast Trawl Program Case Study			
11/12	*Veteran's Day No Class*			*Greenberg 2013* (Mon)
11/14	Dynamic bioeconomics	Excel exercises	Conrad	
11/19, 20	***Fishery management case study presentations***	Fishery Management case study project presentations		*Thanksgiving Break (no class 11/21)*
Comparing Resource Uses Policies				
11/26	Cost-benefit analysis and Economic Impact	Cost benefit analysis Opportunity cost Uncertainty (EV) Discounting Multiplier studies	Callan & Thomas Ch. 9	*N. Dyn. Min. 18, esp 18.8 Duffield et al (2007)*
11/28	Valuation of ecosystem services	Public goods? CV WTA/WTP	Callan & Thomas Ch. 7	

Pollution and Climate & Ocean Change

12/3	Externalities in markets		Callan & Thomas Ch. 3 Mankiw 203-209	*Aquaculture readings TBD (Mon?)*
12/5	Policy options (Taxes, subsidies, transferable permits)	Tradable permit experiment	Callan & Thomas Ch. 5 Mankiw 6	
12/13	FINAL PROJECT DUE NOON			