Economics 145 **THE ECONOMICS OF OCEAN RESOURCES** Winter, 2020

Course Hours: MWF 4:00 – 4:50 PM **Classroom**: WLH 2001

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Instruction Dates:	Monday, January 6 – Friday, March 13
Midterm:	Friday of week 6, February 14
Assignment 1 Due Date:	Friday of week 3, January 24
Midterm Review Session:	Monday, February 10, 6pm-8pm
Assignment 2 Due Date:	Friday of week 8, February 28
Final Review Session 1:	Friday, March 13, 6pm-9pm
Final Review Session 2:	Sunday, March 15, 1-4pm
Final:	Friday March 20, 3pm
Holidays:	Martin Luther King, Jr. January 20 President's Day Monday, February 17

Course Objectives

The Economics of Ocean Resources is designed to provide students with both the economic theory and management concepts of natural resource use as they apply to ocean resources, and the factual and institutional knowledge necessary for well-informed applications.

The course develops several basic themes and applies them to different resources. First, the common thread running throughout the course is the theme of optimal allocation of ocean resources. Second, property rights for ocean resources are often limited or incomplete, and many resource allocation decisions are inter-temporal in nature. As a consequence, competitive markets for ocean resources often fail to form, or when they do form, they fail to optimally allocate ocean resources among the competing uses. The market failure and subsequent suboptimal use of ocean resources therefore calls into play explicit options of management and public regulation. Third, population dynamics of species forms the basis of bioeconomic models for renewable resources, which combines population dynamics, habitat, biodiversity, and economics. Fourth, the economic concepts of total economic value (use, existence, and option value) and mixed goods (a mixture of private and

public goods or common resources) are applied to dolphins, whales, sea turtles, and coral reefs in which management requires attention to both private and public uses and total economic value.

This first section of the course covers issues related to the conservation and management of fisheries. After a review of environmental and resource economics concepts, the course first develops simple population dynamics. The course subsequently integrates the population dynamics with economics to form a bioeconomic model. The basic static bioeconomic model then forms the basis for subsequent discussion of public management of fishing industries. The first section includes one video discussing the current plight of the world's fisheries and discussing various policy measures.

The second section of the course is more applied and broader in nature, covering environmental issues associated with living marine resources. The section first develops an overall economic analytical framework, focusing on management of impure public goods and also called mixed goods (a mixture of private and public goods) and accounting for total economic value. Mixed good management forms one the current "hottest" environmental issue of the oceans, including dolphins, whales, sea turtles, and coral reefs. Specific analytic topics covered include common resources, public and mixed goods, total economic value, biodiversity, habitat, and wildlife management. Ecosystems management and sustainability are also touched upon. Videos and guest lectures will supplement the in-class treatment of several topics. Students are responsible for the readings on their own.

Course Requirements and Grading

1. Midterm examination on last Friday of week six, February 14 -- 40% of course grade.
    - Covers the concepts but not the mathematics of the bioeconomic model.
    - Review session, Monday, February 10, 6pm-8pm

2. Final examination March 20 is 40% of course grade.
    - Covers all of the course material between the midterm and the class end, but not explicitly the material covered by midterm. The Final exam is **NOT** cumulative.
    - Review sessions, Friday March 13 6pm-9pm and Sunday March 15, 1pm-4pm

Midterm and Final Exam Re-grade Requests

- You may request that one or more individual questions be re-graded, but for each question on which you request a regrade that does not result in additional points you may be penalized 0.75 points.
- Requesting a regrade means that we may regrade your entire exam, and your score may increase or decrease.
- If you are requesting a regrade because your score differs from another student with a similar answer, we will email the other student for permission before regrading BOTH exams. This may result in both students getting the lower of the two scores if that is what would be more consistent with the rubric.
- For instructions on how to submit regrade requests through Gradescope, see the following video. https://www.youtube.com/watch?v=6oFVeHvDPYU

3.. Two short assignments for 10% of the grade will be provided during the course and will be graded as good / pass / not pass, with 5 points for Assignment 1 (property rights essay) and 5 points for Assignment 2 (impure public goods and biodiversity conservation).
For each assignment: (1) good = 5 points; (2) pass = 2.5 points; (3) no pass = 0 points). You will have to upload a copy to Canvas (note that Canvas checks for plagiarism, duplicate essays among students, etc.).

- Assignment 1 due date: Friday of week 3, January 24
- Assignment 2 due date: Friday of week 8, February 28

4. Weekly TA session to discuss lectures and readings.

- Dates, times, and location to be determined.

5. Weekly online quizzes, total of 7, for 10% of grade.

- Some questions from online quizzes will be included on the exams.
- Lowest two quizzes dropped
- Questions are directly from lecture notes or conceptual in nature
- These are due 3 p.m. on the relevant Wednesday. Thus, week 1 quiz is due on week 2.
- You will have two attempts. Check the notes to correct any wrong answers.

Reading Material

- All of the required reading is available as PDF files on the class website.

Department of Economics
University of California, San Diego
Economics 145

Dale Squires
Winter, 2020

THE ECONOMICS OF OCEAN RESOURCES
READING LIST

I. INTRODUCTION

1. Ocean Resources: An Overview

Required Reading Skim for general idea	• Willmann, R. and K. Kelleher. 2010. "Economic Trends in Global Marine Fisheries." Chapter 2 in Grafton, Hilborn, Squires, Tait, and Williams, eds., *Handbook of Marine Fisheries Conservation and Management.* Oxford University Press. • Selig, E. 2018. "Mapping Global Human Dependence on Marine Ecosystems." *Conservation Letters*. • Watson, R. and A. Tidd. 2018. "Mapping Nearly a Century and a Half of Global Marine Fishing: 1869-2015." *Marine Policy* 93: 171-177.

2. Property Rights, Public Goods, Common Resources, Externalities, and Environmental and Resource Problems

2.1. Property Rights	
Required Reading Read thoroughly	Squires, D. 2010 "Property and Use Rights in Fisheries." In R. Allen, J. Joseph, and D. Squires, editors, *Conservation and Management of Transnational Fisheries*. Blackwell Publishing.
Required Reading Read thoroughly	Arriagada, R. and C. Perrings. 2011. Paying for International Environmental Public Goods. *Ambio* 40:798–806. (Discusses different types of public goods and implications for their provision.)
PowerPoint Lecture 1	1.Environmental Externalities and Market Failure (1 lecture)
PowerPoint Lecture 2	2.Public Goods and Common Resources (1 lecture)
PowerPoint Lecture 3	3.Property Rights (2 lectures)
YouTube Video (optional)	Coase Theorem http://www.youtube.com/watch?v=pdz3rvfbNe4&feature=related
YouTube Video (optional)	How Markets Fail: Positive and Negative Externalities http://www.youtube.com/watch?v=Jax-ZyL7DkI&feature=related
YouTube Video (optional)	Tragedy of the Commons http://www.youtube.com/watch?v=MLirNeu-A8I

2.2. Law of the Sea	
PowerPoint Lecture 4	4.Law of the Sea (2 lectures)

II. THE ECONOMICS AND MANAGEMENT OF RENEWABLE MARINE RESOURCES

3. The Theory of Open Access and Bioeconomics

Required Reading Skim for general idea	Wilen, J. **"**Life Histories of Organisms,**"** pp. 77-84,89-94, in "Bioeconomics of Renewable Resource Use,**"** Chapter 2 in A.V. Kneese and J.L. Sweeney, eds., *Handbook of Natural Resource and Energy Economics*, Vol. I. New York: Elsevier Science Publishers B.V., 1985.
Required Reading Read thoroughly	Flaaten. *Fisheries Economics and Management*. Chapters 2 & 3.1-3.2., Chapter 5 through page 76.
Optional Reading (Skim for example for bioeconomic application and Reference)	Ahmed, M. et al. 2007. "Overfishing in the Gulf of Thailand: Policy Challenges and Bioeconomic Analysis." *Environment and Development Economics* 12(1): 145-172. (Example of bioeconomic application) Squires, D. 2005. "Introductory Lecture on Bioeconomics, Parts I, II, III." (Reference) • Word and pdf files available on class website.
PowerPoint Lecture	None available.
Assignment 1	Required. See below.
YouTube Videos (optional)	Various types of fishing methods **Trawlers:** http://www.youtube.com/watch?v=aAuqBghv1Ck http://www.youtube.com/watch?v=7sqv9Xf8YlA&feature=related **Longline:** http://www.youtube.com/watch?v=err9JXTzymg Purse Seine: http://www.youtube.com/watch?v=348apH3pe3k **Albacore Jig Fishing:** http://www.youtube.com/watch?v=TUXum0Lnexg&feature=related **Pole-and-Line:** http://www.youtube.com/watch?v=lp_Rs75-5vI&feature=related http://www.youtube.com/watch?v=KlvsDYM0ABI&feature=related **Crab Pots:** http://www.youtube.com/watch?v=SsfDNNTNdFU&feature=related

Required Assignment 1	
Due Date	Friday of Week 3, January 24
Conceptual Background	Read Hardin and *either* (1) Wade *or* (2) Seabright (more theoretical than Wade; Seabright uses theory of repeating cooperative and noncooperative games).
Application. Either one is required of all students.	Read either (1) Acheson or (2) Cinner
Conceptual Assignment Reading. Required of all students.	Hardin, G. 1968. "Tragedy of the Commons." *Science*, 162: 1243-1248.
Conceptual Assignment Reading. Read this or Seabright.	Wade, R. 1987. "The Management of Common Property Resources: Finding a Cooperative Solution." *World Bank Research Observer* 2(2): 219-234. • pdf file is available on class website.
Conceptual Assignment Reading. Read this or Wade.	Seabright, P. "Managing Local Commons: Theoretical Issues in Incentive Design*." Journal of Economic Perspectives* 7(4): 113-134.
Application Assignment Reading. Read this or Cinner.	Acheson J. 1975. "The Lobster Fiefs: Economic and Ecological Effects of Territoriality in the Marine Lobster Industry." *Human Ecology* 3:183-207.
Application Assignment Reading. Read this or Acheson.	Cinner, J. 2005. "Socio-Economic Factors Influencing Customary Marine Tenure in the Indo-Pacific. *Ecology and Society* 10(1):1-36.
Assignment	4-page paper (typed, double spaced, 12 Arial font, 1" margins) discussing the possible use of common property to address the commons problem. Please develop your discussion within the context of either (1) Acheson and the lobster fiefs or (2) Cinner and customary marine tenure in the Indo-Pacific. Note: you don't have to read Acheson if you read Cinner and vice versa, but in either case you should show evidence of having read Hardin and either Wade or Seabright.

4. Regulation and Public Policy within a Bioeconomics and Property Rights Framework

Required Reading Read thoroughly	Flaaten. *Fisheries Economics and Management*. Chapter 3.3-3.4, Chapter 5.
Required Reading Skim for general idea	Grafton *et al.* 2006. "Incentive-Based Approaches to Sustainable Fisheries," *Canadian Journal of Fisheries and Aquatic Sciences* 63: 699-710.
Required Reading Skim for general idea	Birkenbach, A. 2017. "Catch Shares Slow the Race to Fish." *Nature* 544: 223–226
PowerPoint Lecture	5.ITQs • Available on class website.
Video	*Empty Oceans Empty Nets*
Computer Simulation	*Abasim*

5. Global Fisheries Issues (Optional: If Sufficient Time, is after Midterm)

Required Reading Skim Worm and Watson for general idea You have already Willmann and Watson and Tidd	• Worm, B. et al. 2009. Rebuilding Global Fisheries. *Science* 325: 578-585. • Watson, R. and D. Pauly. 2013. "The Changing Face of Global Fisheries: The 1950s to the 2000s. *Marine Policy* 42:1-4. • Willmann, R. and K. Kelleher. 2010. "Economic Trends in Global Marine Fisheries." Chapter 2 in Grafton, Hilborn, Squires, Tait, and Williams, eds., *Handbook of Marine Fisheries Conservation and Management.* Oxford University Press. • Watson, R. and A. Tidd. 2018. "Mapping Nearly a Century and a Half of Global Marine Fishing: 1869-2015." *Marine Policy* 93: 171-177.
PowerPoint Lecture	6.Global Fisheries Issues (1 lecture)
Video	http://www.babelgum.com/html/clip.php?clipId=3020495
YouTube Video (optional)	State of World Fisheries Parts 1,2,3 – Ray Hilborn http://www.youtube.com/watch?v=frfOi2P0wIo http://www.youtube.com/watch?v=etSjm0zZs9U&feature=related http://www.youtube.com/watch?v=J49rCgFo1Ko&feature=related
Video (optional)	Ray Hilborn http://www.uwtv.org/video/player.aspx?dwrid=2515

MIDTERM EXAMINATION
Friday of Week 6, Friday February 14

III. THE MANAGEMENT OF IMPURE PUBLIC GOODS GOODS IN AN ECOSYSTEMS FRAMEWORK: DOLPHINS, WHALES, SEA TURTLES, AND CORAL REEFS

6. Common Resources, Impure Public Goods, Total Economic Value, Biodiversity, Ecosystems

Required Reading Read thoroughly	"Total Economic Value," pp. 129-137 in D. W. Pearce and R.K. Turner, 1990.*Economics of Natural Resources and the Environment*. London: Harvester Wheatsheaf.
Required Reading Read thoroughly	Arriagada, R. and C. Perrings. 2011. Paying for International Environmental Public Goods. *Ambio* 40:798–806. (Discusses different types of public goods and implications for their provision.)
Required Reading Read for basic ideas of direct regulation, incentive-based, and intrinsic motivation approaches to marine conservation	Lent, R. and D. Squires. 2017. "Reducing Marine Mammal Bycatch in Global Fisheries: An Economics Approach." *Deep Sea Research II* 140:268-277.
PowerPoint Lecture	7.Conservation and Markets (Reconciling Biodiversity Conservation with Markets and Resource Use) (1.5 lectures)
Optional Reading Questions conservation's biology biodiversity mitigation hierarchy	Squires, D. and S.M. Garcia. 2018. "Economic Efficiency and the Biodiversity Mitigation Hierarchy with a Focus on Marine and Fishery Issues." *Conservation Biology* 32(5): 989-997.
Optional Reading Questions conservation's biology biodiversity mitigation hierarchy	Griffiths V.F., J.W Bull, J. Baker, and E.J. Milner-Gulland.2018 in press. "No Net Loss for People and Diversity." *Conservation Biology* https://doi.org/10.1111/cobi.13184
PowerPoint Lecture	8.Impure Public (Mixed) Goods and Public Bads (2 lectures)
PowerPoint Lecture	9.Policies for Externalities (2 lectures)
YouTube PES (optional/alternative explanation)	http://environment.yale.edu/teeb/policymakers/bruner/
YouTube Ecosystem Services & Biodiversity (optional/alternative explanation)	http://environment.yale.edu/teeb/policymakers/rosenberg/

Required Assignment 2	
Due Date	Friday of Week 8, February 28
Conceptual Background	Read Arriagada and Perrings. 2011. Paying for International Environmental Public Goods. *Ambio* 40:798–806 Bulte, E., G. van Kooten, and T. Swanson. 2003. Economic Incentives and Wildlife Conservation. Working paper.
Assignment	4-page paper (typed, double spaced, 12 Arial font, 1" margins) discussing incentives to conserve marine biodiversity conservation within the framework of impure public goods. The intent of the assignment to insure that you understand the conceptual framework for the rest of the class. Discuss what an impure public good is, the types of externalities associated with impure public goods, the technology of public good supply (best shot, weakest link, etc.), and the types of economic incentives (positive and negative) that are created for impure public goods with different technologies of public good supply.

7. Sea Turtles

Required Reading Read thoroughly	Dutton, P. and D. Squires. 2008. "Reconciling Fishing with Biodiversity: A Holistic Recovery Strategy for Pacific Sea Turtles," *Ocean Development and International Law* 39:200–222.
Optional Reading	Squires, D., V. Restrepo, S.M. Garcia. 2018 "Fisheries Bycatch Reduction within the Least-Cost Biodiversity Mitigation Hierarchy: Conservatory Offsets with an Application to Sea Turtles." *Marine Policy* 93: 55-61.
Guest Lecture	Peter Dutton unless scheduling conflict
PowerPoint Lecture	14A.Sea Turtles Econ 145 (3 lectures total)
PowerPoint Lecture	14B.Sea Turtles Econ 145
Video	https://www.dropbox.com/s/lmtgv22vlwr2uu4/saving%20sea%20turtles.mov

8. Whales

Required Reading Read thoroughly	Schneider, V. and D. Pearce. 2004. "What Saved the Whales? An Economic Analysis of the 20th Century Whaling." *Biodiversity and Conservation* 13(3): 543-562.
Required Reading Skim for general idea	Costello, C., L. Gerber, and S. Gaines. 2011. "A Market Approach to Saving the Great Whales." *Nature* 481: 139-140.
Required Reading Skim for general idea	Butler-Stroud, C. 2016. "What Drives Japanese Whaling Policy?" *Frontiers in Marine Science* 22 June 2016 | http://dx.doi.org/10.3389/fmars.2016.00102
PowerPoint Lecture	12.Whales (2 lectures)
Video on Scientific Whaling by Marc Mangel	http://panopto.uw.edu/Panopto/Pages/Viewer.aspx?id=0512ca7b-0a3a-4929-8397-a9d1f03963f6

9. Coral Reefs

PowerPoint Lecture	13A.Coral Reefs (1 lecture both 13A & 13B) 13B.Coral Reefs
Required Reading Read for general idea	McClanahan, T.R., M.J. Marnane, J.E. Cinner, and W.E. Kiene. 2006. A comparison of marine protected areas and alternative approaches to coral reef management. *Current Biology* 16(14): 1408-1413. Cinner, J. et al. Bright spots among the world's coral reefs. *Nature* 535 (7612). pp. 416-419.

10. Marine Mammals: Dolphins (Could be skipped if insufficient time)

Required Reading Skim for general idea	Hall, Martin. 1998. "An Ecological View of the Tuna-Dolphin Problem: Impacts and Trade-Offs," *Reviews in Fish Biology and Fisheries*, 8: 1-34.
PowerPoint Lecture	10.Dolphin-Tunas (1 lecture) Could be alternative guest lecture on marine mammals
YouTube Video for 10 (optional)	Tuna Fishing, Parts I & II http://www.youtube.com/watch?v=qEuioCqTjjo&feature=fvsr
PowerPoint Lecture	11.Ecological Trade-Offs in the ETP (1 lecture)
YouTube Video for ETP_11 (required)	Ray Hilborn on sea- and land-based food http://www.youtube.com/watch?v=hjiZA4pDiPg