

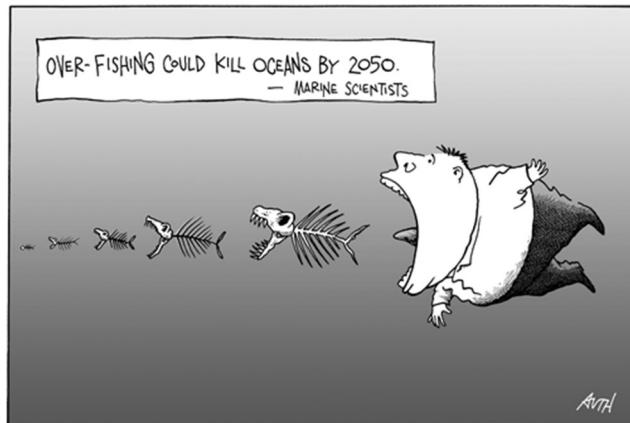
Marine Conservation

EVPP 521

3 credits

Fall Semester, 2024

(Recommended Prerequisite:
BIOL/EVPP/GEOL 309)



Source: *The Philadelphia Inquirer*.

INSTRUCTOR: Diego Valderrama.
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CLASSROOM: Enterprise Hall, Room 173.

CLASS MEETINGS: Mondays, 4:30 PM to 7:10 PM.

OFFICE HOURS: By appointment.

COURSE DESCRIPTION: An introduction to the topic of marine conservation - the science of protecting, recovering and sustainably using the living seas. This is a critical subject as over 70% of our planet is ocean and 80% of the world's population and 50% of Americans live within 50-60 miles of the ocean. The course provides an overview of threats to the marine environment and discusses the scientific, socioeconomic, and political issues behind marine conservation. Covers categories of marine pollutants (chemical, biological, and physical contaminants) and their impacts on the marine ecosystem, as well as impacts on humans (health, social, and economic), threats to key marine species (e.g., coral, sharks, turtles, and marine mammals) and initiatives and laws developed to reduce these threats. Scientific and socioeconomic problems that hinder sustainable fisheries management are also discussed.

COURSE LEARNING OUTCOMES: By the end of this course, students should be able to:

- demonstrate knowledge of the most relevant conservation issues affecting marine ecosystems.
- identify and suggest emerging solutions to a number of marine conservation challenges.
- critically evaluate progress and failures associated with a number of marine conservation initiatives.
- communicate their knowledge about marine conservation orally and in writing, to a variety of audiences.
- apply the course information and skills to real-world situations.

REQUIRED READING:

- *Marine Conservation Biology: The Science of Maintaining the Sea's Biodiversity*, edited by Elliot A. Norse and Larry B. Crowder. Marine Conservation Biology Institute. 2005, Island Press. Available online through the GMU Library.

SUGGESTED READING:

- *The Unnatural History of the Sea*. Callum Roberts. 2008, Island Press.
- *Ocean Recovery: A Sustainable Future for Global Fisheries?* Ray Hilborn and Ulrike Hilborn. 2019, OUP Oxford.
- Knowlton, N. 2021. Ocean Optimism: Moving beyond the obituaries in marine conservation. *Annual Review of Marine Science* 13: 479-499.
- Borja, A. 2022. #OceanOptimism: Balancing the narrative about the future of the ocean. *Frontiers in Marine Science* 9:886027.

LEARNING MANAGEMENT SYSTEM: This course will be hosted on Blackboard for the Fall 2024 semester. Please ensure you are familiar with accessing and navigating this platform. Resources and support are available at: <https://lms.gmu.edu/getting-started-students/> to help you get started.

COURSE STRUCTURE: The course will consist of three modules that will run parallelly throughout the semester:

1. Lecture module based on the textbook *Marine Conservation Biology*, which outlines the conceptual framework for the science of marine conservation based on contributions from leading thinkers in the field. Delivered by the class instructor.
2. Review of essential documentaries and landmark articles in marine conservation.
 - a. Documentaries will be featured in class, followed by a discussion accompanied by a study guide:
 - i. *A Plastic Ocean* (2017).
 - ii. *The Cove* (2009).
 - iii. *Chasing Coral* (2017).
 - iv. *Seaspiracy* (2021).
 - v. *The Last Ocean* (2012).
 - vi. *Sea of Shadows* (2019).
 - b. The following landmark articles will be reviewed by the class instructor, with the exception of Hilborn et al. (2020), Cabral et al. (2020) and Sala et al. (2021), which will be presented by students with guidance from the class instructor:
 - i. Pauly, D. V. Christensen, J. Dalsgaard *et al.* 1998. Fishing down marine food webs. *Science* 279: 860-863.
 - ii. Worm, B., E.B. Barbier, N. Beaumont *et al.* 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science* 314: 787-790.

- iii. Hilborn, R., R.O. Amoroso, C.M. Anderson *et al.* 2020. Effective fisheries management instrumental in improving fish stock status. *Proceedings of the National Academy of Sciences* 117: 2218-2224. **TO BE PRESENTED BY STUDENTS.**
- iv. Cabral, R.B., D. Bradley, J. Mayorga *et al.* 2020. A global network of marine protected areas for food. *PNAS* 117: 28134-28139. **TO BE PRESENTED BY STUDENTS.**
- v. Sala, E., J. Mayorga, D. Bradley *et al.* 2021. Protecting the global ocean for biodiversity, food and climate. *Nature* 592: 397-398. **TO BE PRESENTED BY STUDENTS.**
- vi. Duarte, C.M., S. Agusti, E. Barbier *et al.* 2020. Rebuilding marine life. *Nature* 580: 39-51.

3. Student-led presentations of Grand Challenges for Ocean Conservation. Guidelines and recommended references/sources for these presentations will be provided by the class instructor (at least two weeks before the presentation date):

- i. A blue revolution for oceans: Re-engineering aquaculture for sustainability.
- ii. Ending and recovering from marine debris.
- iii. Transparency and traceability from sea to shore and ending over-fishing.
- iv. Protecting critical ocean habitats & new tools for marine protection.
- v. Engineering ecological resilience in nearshore and coastal areas.
- vi. Reducing the ecological footprint of fishing through smarter gear.
- vii. Arresting the alien invasion & combating invasive species.
- viii. Combating the effects of ocean acidification.
- ix. Ending marine wildlife trafficking.
- x. Reviving dead zones: combating ocean deoxygenation, dead zones, and nutrient runoff.

A link to a sign-up sheet will be posted in Blackboard on the first day of classes. Each presentation is to be delivered by a maximum of three students.

COURSE GRADING: Grades will be determined by the results of a midterm exam, a final exam (not comprehensive), two presentations (analysis of landmark article and Grand Challenge for Ocean Conservation), and class attendance/participation as measured by quizzes delivered through the Poll Everywhere application. Weighting of these activities will be as follows:

| | |
|-----------------------------------|--------------|
| Midterm Exam | 25.0% |
| Final Exam | 25.0% |
| Presentation of landmark article | 20.0% |
| Grand Challenge presentation | 15.0% |
| Average score of quizzes | 5.00% |
| Attendance as measured by quizzes | <u>10.0%</u> |
| TOTAL | 100.0% |

Notice Regarding Quiz Grades: If the average score of quizzes is lower than the average grade of exams/presentations, quiz scores will be disregarded. In other words, quiz scores will not lower the overall course grade, regardless of performance. However, not taking the quizzes (because of unexcused

absences, for example) will negatively affect the student's grade.

Final scores will be calculated based on the percentage grade earned on each of the course activities listed above, multiplied by the weighting listed for each activity. Letter grades will be assigned based on the final course score as follows:

- A+ = 97-100%
- A = 93 - 96%
- A- = 90 - 92%
- B+ = 87 - 89%
- B = 83 - 86%
- B- = 80 - 82%
- C = 70 - 79%
- F = 0 - 69%

PLEASE NOTE THAT I DO NOT ROUND UP. FOR EXAMPLE, AN 89.99 IS A B+ AND IT WILL NOT BE ROUNDED UP TO AN A-.

Proposed dates for the in-class exams are indicated in the class schedule section of this syllabus. Any changes to these proposed dates will be announced in class at least one week in advance.

Notice Regarding the Poll Everywhere System:

Poll Everywhere is a web-based student response system. Student e-mails will be registered by the instructor prior to the first day of classes (students can confirm their registration by logging in at <https://www.polleverywhere.com/login> with their Mason credentials). Normally at a random moment during each class period, the instructor will display a Poll Everywhere quiz on-screen and students will provide their responses through their phone apps or by logging in at the web address **pollev.com/dvalder** using their laptops or tablets. Results will appear live on the screen for the class to discuss. Students are strongly advised to download the phone app for quick, regular access to Poll Everywhere.

TENTATIVE CLASS SCHEDULE: Subject to changes.

| Date | Module 1: <i>Marine Conservation Biology</i> Textbook | | Module 2: Documentaries and Landmark Articles in Marine Conservation | Module 3: Grand Conservation Challenges | | |
|-----------|---|---------|---|---|--|--|
| | Theme | Chapter | | | | |
| August 26 | Presentation of syllabus, Introduction to Marine Conservation | | | | | |
| Sept. 2 | Labor Day, NO CLASSES | | | | | |
| Sept. 9 | Introduction | 1-2 | Documentary: <i>A Plastic Ocean</i> (2016). Director: Craig Leeson. Available at Peacock. www.PlasticOceans.org | | | |
| Sept. 16 | Marine Populations | 3-4 | Pauly, D. V. Christensen, J. Dalsgaard <i>et al.</i> 1998. Fishing down marine food webs. <i>Science</i> 279: 860-863. | Marine Debris | | |
| Sept. 23 | | 5-6 | Documentary: <i>The Cove</i> (2009). Director: Louie Psihoyos. Available at Hulu. | | | |
| Sept. 30 | Threats | 7-8 | Documentary: <i>Chasing Coral</i> (2017). Director: Jeff Orlowski; available at Netflix. https://www.chasingcoral.com/ | | | |
| Oct. 7 | Threats | 9-10 | | Ecological Resilience Ocean Acidification; Dead Zones | | |
| Oct. 14 | FALL BREAK, NO CLASSES | | | | | |
| Oct. 21 | Fisheries | 11-12 | Worm, B., E.B. Barbier, N. Beaumont <i>et al.</i> 2006. Impacts of biodiversity loss on ocean ecosystem services. <i>Science</i> 314: 787-790. | Invasive Species | | |
| Oct. 28 | MIDTERM EXAM | | | | | |
| Nov. 4 | Fisheries | 13-14 | Documentary: <i>Seaspiracy</i> (2021). Director: Ali Tabrizi. Available at Netflix. https://www.seaspiracy.org/ | | | |
| Nov. 11 | Fisheries | 15 | Hilborn, R., R.O. Amoroso, C.M. Anderson <i>et al.</i> 2020. Effective fisheries management instrumental in improving fish stock status. <i>PNAS</i> 117: 2218-2224.* | Overfishing; Fishing Gear | | |

| Date | Module 1: <i>Marine Conservation Biology</i> Textbook | | Module 2: Documentaries and Landmark Articles in Marine Conservation | Module 3: Grand Conservation Challenges |
|---------|---|---------|---|--|
| | Theme | Chapter | | |
| Nov. 18 | Marine Protected Areas | 16-17 | Documentary: <i>The Last Ocean</i> (2012). Director: Bruce Peter Young. http://www.lastocean.org/ | |
| Nov. 25 | Marine Protected Areas | 18-19 | Cabral, R.B., D. Bradley, J. Mayorga <i>et al.</i> 2020. A global network of marine protected areas for food. <i>PNAS</i> 117: 28134-28139.* Sala, E., J. Mayorga, D. Bradley <i>et al.</i> 2021. Protecting the global ocean for biodiversity, food and climate. <i>Nature</i> 592: 397-398.* | |
| Dec. 2 | | | Documentary: <i>Sea of Shadows</i> (2019). Director: Richard Ladkani. Available at Disney+. https://films.nationalgeographic.com/sea-of-shadows | MPAs |
| Dec. 9 | | | Duarte, C.M., S. Agusti, E. Barbier <i>et al.</i> 2020. Rebuilding marine life. <i>Nature</i> 580: 39-51. | Wildlife Trafficking; Sustainable Aquaculture |
| Dec. 16 | FINAL EXAM, 4:30 pm – 7:15 pm | | | |

*Presented by students.