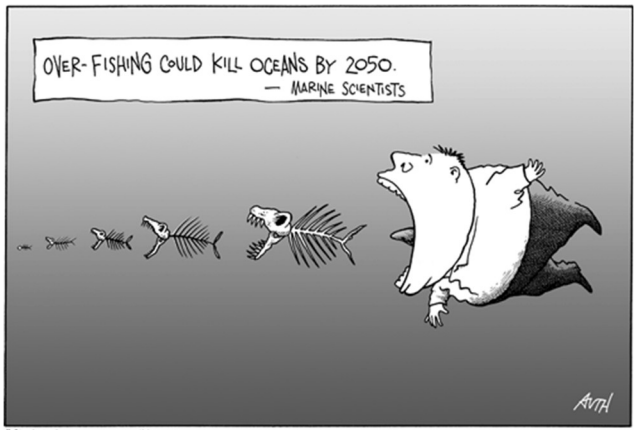
Marine Conservation

BIOL 450 / EVPP 421

3 credits

Fall Semester, 2025

(Recommended Prerequisite: BIOL/EVPP/GEOL 309)



Source: *The Philadelphia Inquirer*.

INSTRUCTOR: Diego Valderrama.
3033 David King Hall
Tel: 703-993-1029
Email: dvalder@gmu.edu

CLASSROOM: Innovation Hall, Room 208.

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 in 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.

SUGGESTED READING:

- *The Unnatural History of the Sea*. Callum Roberts. 2008, Island Press.
- 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 Canvas (https://info.canvas.gmu.edu/). 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 outlining 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 Grand Conservation Challenges. To be delivered by students.

    a. Some of the most impactful and highly regarded documentaries in marine conservation will be featured in class. Students will lead a discussion of the major issues introduced in the documentary, along with a summary of related developments and conservation challenges taking place since the documentary was released. The documentaries are listed below:

        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. 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). Some of these conservation challenges will be directly tied to the documentaries featured in class:

        i. Ending and recovering from marine debris (presented by the group leading the discussion on *A Plastic Ocean*).
        ii. Engineering ecological resilience in coral reefs (presented by the group leading the discussion on *Chasing Coral)*.
        iii. Combating the effects of ocean acidification.

iv. Reviving dead zones: combating ocean deoxygenation, dead zones, and nutrient runoff (challenges iii. and iv. will be presented by the same group).
v. Reducing the ecological footprint of fishing through smarter gear (presented by the group leading the discussion on *Seaspiracy*).
vi. Protecting critical ocean habitats & new tools for marine protection (presented by the group leading the discussion on *The Last Ocean*).
vii. Ending wildlife trafficking (presented by the group leading the discussion on *Sea of Shadows*).
viii. Arresting the alien invasion & combating invasive species.
ix. A blue revolution for oceans: Re-engineering aquaculture for sustainability.

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

3. Landmark articles on marine conservation. 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 enrolled in the EVPP 521 section 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 EVPP 521 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 EVPP 521 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 EVPP 521 STUDENTS.**
vi. Duarte, C.M., S. Agusti, E. Barbier *et al.* 2020. Rebuilding marine life. *Nature* 580: 39-51.

COURSE GRADING: Grades will be determined by the results of a midterm exam, a final exam (not comprehensive), one presentation (Grand Challenge for Ocean Conservation, which may be tied to the discussion of a related documentary), and class attendance/participation as measured by quizzes delivered through the Poll Everywhere application. Weighting of these activities will be as follows:

Midterm Exam	30.0%
Final Exam	40.0%
Documentary discussion and/or Grand Challenge presentation	20.0%
Average score of quizzes	5.0%
Attendance as measured by quizzes	5.0%
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. For undergraduate students, letter grades will be assigned based on the final score as follows:

- A+ = 97-100%
- A = 93 - 96%
- A- = 90 - 92%
- B+ = 87 - 89%
- B = 83 - 86%
- B- = 80 - 82%
- C+ = 77 - 79%
- C = 73 - 76%
- C- = 70 - 72%
- D = 60 - 69%
- F = 0 - 59%

For graduate students, 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.

USE OF AI TOOLS: The two exams in this course will be paper-based and administered in the classroom. Other than that, students may use generative AI tools (e.g., ChatGPT) whenever they believe it would be useful to their learning of course material. Student work will not be submitted through originality detection software focused on AI tools because the utilization of these types of tools is acceptable in assignments such as the preparation of presentations on peer-reviewed papers or grand conservation challenges. Students will nevertheless be responsible for any incorrect, biased, or unethical information that is submitted. Students are also expected to be transparent with the use of these tools.

TENTATIVE CLASS SCHEDULE: Subject to changes.

Date	Module 1: Major Concepts in Marine Conservation	Module 2: Documentaries – Grand Conservation Challenges	Module 3: Landmark Articles in Marine Conservation
August 25	Presentation of syllabus, Introduction to Marine Conservation		
Sept. 1	Labor Day, NO CLASSES		
Sept. 8	Introduction	Documentary: *A Plastic Ocean* (2016). Director: Craig Leeson. www.PlasticOceans.org	
Sept. 15	Marine Populations	*A Plastic Ocean*: Discussion/Update Grand Conservation Challenge: Marine Debris	Pauly, D. V. Christensen, J. Dalsgaard *et al.* 1998. Fishing down marine food webs. *Science* 279: 860-863.
Sept. 22		Documentary: *The Cove* (2009). Director: Louie Psihoyos. Available at Hulu.	
Sept. 29		*The Cove*: Discussion/Update Documentary: *Chasing Coral* (2017). Director: Jeff Orlowski; available at Netflix. https://www.chasingcoral.com/	
Oct. 6	Threats	*Chasing Coral*: Discussion/Update Grand Conservation Challenges: Ecological Resilience; Ocean Acidification / Dead Zones	
Oct. 13	FALL BREAK, NO CLASSES		
Oct. 20	MIDTERM EXAM		
Oct. 27	Fisheries	Documentary: *Seaspiracy* (2021). Director: Ali Tabrizi. Available at Netflix. https://www.seaspiracy.org/	
Nov. 3	Fisheries	*Seaspiracy*: Discussion/Update Grand Conservation Challenge: Fishing Gear.	Worm, B., E.B. Barbier, N. Beaumont *et al.* 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science* 314: 787-790.

Date	Module 1: Major Concepts in Marine Conservation	Module 2: Documentaries – Grand Conservation Challenges	Module 3: Landmark Articles in Marine Conservation
Nov. 10	Fisheries		Hilborn, R., R.O. Amoroso, C.M. Anderson *et al.* 2020. Effective fisheries management instrumental in improving fish stock status. *PNAS* 117: 2218-2224. *
Nov. 17	Marine Protected Areas	Documentary: *The Last Ocean* (2012). Director: Bruce Peter Young. http://www.lastocean.org/	
Nov. 24	Marine Protected Areas	*The Last Ocean*: Discussion/Update. Grand Conservation Challenge: MPAs.	Cabral, R.B., D. Bradley, J. Mayorga *et al.* 2020. A global network of marine protected areas for food. *PNAS* 117: 28134-28139.* Sala, E., J. Mayorga, D. Bradley et al. 2021. Protecting the global ocean for biodiversity, food and climate. *Nature* 592: 397-398.*
Dec. 1		Documentary: *Sea of Shadows* (2019). Director: Richard Ladkani. Available at Disney+. https://films.nationalgeographic.com/sea-of-shadows	
Dec. 8		*Sea of Shadows*: Discussion/Update. Grand Conservation Challenges: Wildlife Trafficking; Invasive Species; Sustainable Aquaculture.	Duarte, C.M., S. Agusti, E. Barbier *et al.* 2020. Rebuilding marine life. *Nature* 580: 39-51.
Dec. 15	FINAL EXAM, 4:30 pm – 7:15 pm		

*Presented by students enrolled in EVPP 521.

Common Policies Affecting All Courses at George Mason University

Updated August 2025

These four policies affect students in all courses at George Mason University. This Course Policy Addendum must be made available to students in all courses (see Catalog Policy AP.2.5).

Additional policies affecting this course, and additional resources or guidance regarding these policies, may be provided to students by the instructor.

Academic Standards

Academic Standards exist to promote authentic scholarship, support the institution's goal of maintaining high standards of academic excellence, and encourage continued ethical behavior of faculty and students to cultivate an educational community which values integrity and produces graduates who carry this commitment forward into professional practice.

As members of the George Mason University community, we are committed to fostering an environment of trust, respect, and scholarly excellence. Our academic standards are the foundation of this commitment, guiding our behavior and interactions within this academic community. The practices for implementing these standards adapt to modern practices, disciplinary contexts, and technological advancements. Our standards are embodied in our courses, policies, and scholarship, and are upheld in the following principles:

- **Honesty:** Providing accurate information in all academic endeavors, including communications, assignments, and examinations.
- **Acknowledgement:** Giving proper credit for all contributions to one's work. This involves the use of accurate citations and references for any ideas, words, or materials created by others in the style appropriate to the discipline. It also includes acknowledging shared authorship in group projects, co-authored pieces, and project reports.
- **Uniqueness of Work:** Ensuring that all submitted work is the result of one's own effort and is original, including free from self-plagiarism. This principle extends to written assignments, code, presentations, exams, and all other forms of academic work.

Violations of these standards—including but not limited to plagiarism, fabrication, and cheating—are taken seriously and will be addressed in accordance with university policies. The process for reporting, investigating, and adjudicating violations is outlined in the university's academic standards procedures. Consequences of violations may include academic sanctions, disciplinary actions, and other measures necessary to uphold the integrity of our academic community.

The principles outlined in these academic standards reflect our collective commitment to upholding the highest standards of honesty, acknowledgement, and uniqueness of work. By adhering to these principles, we ensure the continued excellence and integrity of George Mason University's academic community.

Student responsibility: Students are responsible for understanding how these general expectations regarding academic standards apply to each course, assignment, or exam they participate in; students should ask their instructor for clarification on any aspect that is not clear to them.

Accommodations for Students with Disabilities

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit the Disability Services website for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

Student responsibility: Students are responsible for registering with Disability Services and communicating about their approved accommodations with their instructor *in advance* of any relevant class meeting, assignment, or exam.

FERPA and Use of GMU Email Addresses for Course Communication

The Family Educational Rights and Privacy Act (FERPA) governs the disclosure of education records for eligible students and is an essential aspect of any course. **Students must use their GMU email account** to receive important University information, including communications related to this class. Instructors will not respond to messages sent from or send messages regarding course content to a non-GMU email address.

Student responsibility: Students are responsible for checking their GMU email regularly for course-related information, and/or ensuring that GMU email messages are forwarded to an account they do check.

Title IX Resources and Required Reporting

As a part of George Mason University's commitment to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community, the University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities. Accordingly, **all non-confidential employees, including your faculty member, have a legal requirement to report to the Title IX Coordinator, all relevant details obtained directly or indirectly about any incident of Prohibited Conduct** (such as sexual harassment, sexual assault, gender-based stalking, dating/domestic violence). Upon notifying the Title IX Coordinator of possible Prohibited Conduct, the Title IX Coordinator will assess the report and determine if outreach is required. If outreach is required, the individual the report is about (the "Complainant") will receive a communication, likely in the form of an email, offering that person the option to meet with a representative of the Title IX office.

For more information about non-confidential employees, resources, and Prohibited Conduct, please see University Policy 1202: Sexual and Gender-Based Misconduct and Other Forms of Interpersonal Violence. Questions regarding Title IX can be directed to the Title IX Coordinator via email to TitleIX@gmu.edu, by phone at 703-993-8730, or in person on the Fairfax campus in Aquia 373.

Student opportunity: If you prefer to speak to someone ***confidentially***, please contact one of Mason's confidential employees in Student Support and Advocacy (SSAC), Counseling and Psychological Services (CAPS), Student Health Services (SHS), and/or the Office of the University Ombudsperson.