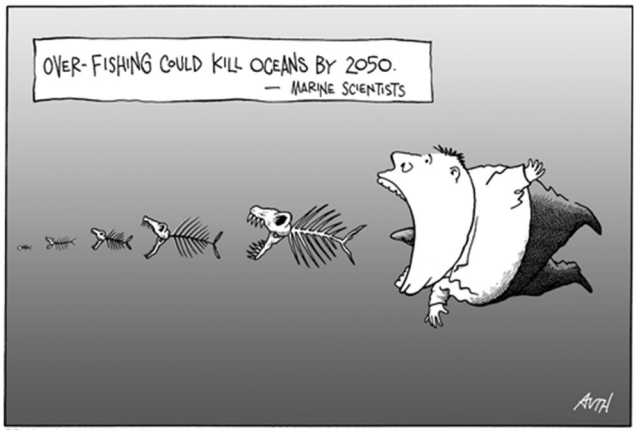
Marine Conservation

EVPP 421 / EVPP 521 / BIOL 450

3 credits

Fall Semester, 2023

(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: Exploratory Hall, Room L111.

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 and the science and policy behind the global warming debate are also discussed.

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.

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 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.
        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.

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: For students enrolled in EVPP 421 and BIOL 450, grades will be determined by the results of a midterm exam, a final exam (not comprehensive), one presentation (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	35.0%
Final Exam	35.0%
Grand Challenge presentation	15.0%
Average score of quizzes	5.0%
Attendance as measured by quizzes	10.0%
TOTAL	100.0%

For students enrolled in EVPP 521, 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	10.0%
TOTAL	100.0%

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 apps for quick, regular access to Poll Everywhere.

Notice Regarding Quiz Grades:
Quiz scores will be closely monitored by the instructor throughout the semester to ensure that the overall course grade is not impacted negatively in case of poor student performance.

ACADEMIC INTEGRITY: GMU students, faculty and staff are bound by the GMU Honor Code. Adherence to the GMU Honor Code is expected of all students, specifically:

Members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

In all assignments and communications, plagiarism will not be tolerated. This applies equally to oral and written communications in the context of any evaluated (graded) course assignments. As stated in the Honor Code, infractions may result in invalidated credit for dishonorable work and lowered grade, including failure from the class, suspension or dismissal. Inquiries for clarification from the professor are welcome. For more information see the complete Honor Code in the university catalog.

DISABILITY ACCOMMODATIONS: 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 http://ds.gmu.edu/ 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.

DIGITAL COMMUNICATION: Students must use their MasonLive email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.

DIVERSITY STATEMENT: George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth. An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

NOTICE OF MANDATORY REPORTING OF SEXUAL OR INTERPERSONAL MISCONDUCT: As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-993-3686 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

TENTATIVE CLASS SCHEDULE: Subject to changes.

Date	Module 1: *Marine Conservation Biology* Textbook		Module 2: Documentaries and Landmark Articles in Marine Conservation	Module 3: Grand Conservation Challenges
	Theme	Chapter		
August 21	Presentation of syllabus, Introduction to Marine Conservation			
August 28	Introduction	1-2	Documentary: *A Plastic Ocean* (2017). Director: Craig Leeson. Available at Peacock TV. www.PlasticOceans.org	
Sept. 4	Labor Day, NO CLASSES			
Sept. 11	Marine Populations	3-4	Pauly, D. V. Christensen, J. Dalsgaard *et al.* 1998. Fishing down marine food webs. *Science* 279: 860-863.	Marine Debris
Sept. 18		5-6	Documentary: *The Cove* (2009). Director: Louie Psihoyos.	
Sept. 25	Threats	7-8	Documentary: *Chasing Coral* (2017). Director: Jeff Orlowski; available at Netflix. https://www.chasingcoral.com/	
Oct. 2	Threats	9-10		Ecological Resilience Ocean Acidification; Dead Zones
Oct. 9	FALL BREAK, NO CLASSES			
Oct. 10 (Tuesday)	Fisheries	11-12	Worm, B., E.B. Barbier, N. Beaumont *et al.* 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science* 314: 787-790.	Invasive Species
Oct. 16	MIDTERM EXAM			
Oct. 23	Fisheries	13-14	Documentary: *Seaspiracy* (2021). Director: Ali Tabrizi. Available at Netflix. https://www.seaspiracy.org/	
Oct. 30	Fisheries	15	Hilborn, R., R.O. Amoroso, C.M. Anderson *et al.* 2020. Effective fisheries management instrumental in improving fish stock status. *PNAS* 117: 2218-2224.	Overfishing; Fishing Gear

Date	Module 1: *Marine Conservation Biology* Textbook		Module 2: Documentaries and Landmark Articles in Marine Conservation	Module 3: Grand Conservation Challenges
	Theme	Chapter		
Nov. 6	Marine Protected Areas	16-17	Documentary: *The Last Ocean* (2012). Director: Bruce Peter Young. http://www.lastocean.org/	
Nov. 13	Marine Protected Areas	18-19	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.*	
Nov. 20			Documentary: *Sea of Shadows* (2019). Director: Richard Ladkani. Available at Disney+. https://films.nationalgeographic.com/sea-of-shadows	MPAs
Nov. 27			Duarte, C.M., S. Agusti, E. Barbier *et al.* 2020. Rebuilding marine life. *Nature* 580: 39-51.	Wildlife Trafficking; Sustainable Aquaculture
Dec. 11	FINAL EXAM, 4:30 pm – 7:15 pm			

*Presented by students enrolled in EVPP 521.