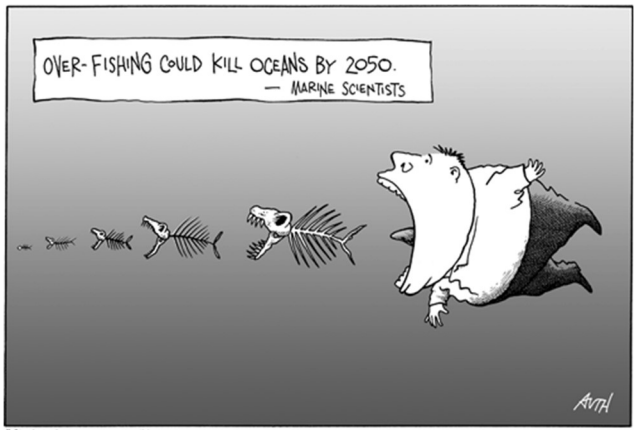
Marine Conservation

EVPP 421 / BIOL 450

3 credits

Fall Semester, 2021

(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: Nguyen Engineering Building, Room 1108.

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

OFFICE HOURS: Fridays, 2 PM to 4 PM, or 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.
- *Launching the Grand Challenges of Oceans Conservation*. World Wildlife Fund (WWF) and Conservation X Labs (http://www.oceansxlabs.org/the-challenge/).

SUGGESTED READING:

- Knowlton, N. 2021. Ocean Optimism: Moving beyond the obituaries in marine conservation. *Annual Review of Marine Science* 13: 479-499.
- *Ocean Solutions That Benefit People, Nature and the Economy*. High Level Panel for a Sustainable Ocean Economy (https://www.oceanpanel.org/ocean-action/people-nature-economy-report.html). 2020.
- *A Sustainable Ocean Economy in 2030: Opportunities and Challenges*. The Economist Group World Ocean Initiative (http://www.woi.economist.com/sustainable-ocean-economy-2030). 2020.
- *The Unnatural History of the Sea*. Callum Roberts. 2008, Island Press.

COURSE STRUCTURE: The course will consist of three modules that will unfold simultaneously 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 peer-reviewed papers 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. Presentations based on the selected peer-reviewed papers will be delivered by students registered in EVPP 521 with guidance from the class instructor:
        i. Worm, B., E.B. Barbier, N. Beaumont *et al.* 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science* 314: 787-790.
        ii. Levin, L., D. Amon and H. Lily. 2020. Challenges to the sustainability of deep-seabed mining. *Nature Sustainability* 3: 784-794.
        iii. Pauly, D. V. Christensen, J. Dalsgaard *et al.* 1998. Fishing down marine food webs. *Science* 279: 860-863.
        iv. 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.
        v. Duarte, C.M., S. Agusti, E. Barbier *et al.* 2020. Rebuilding marine life. *Nature* 580: 39-51.

    c. Student-led presentations of the 10 grand challenges faced by the oceans as identified by WWF and Conservation X Labs in the handbook *Launching the Grand Challenges of Oceans*

Conservation:

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.

Updated information on some of these challenges can also be found at the *Sustainable Ocean Economy in 2030* and the *Ocean Solutions* reports recently released by *The Economist* and the High Level Panel for a Sustainable Ocean Economy, respectively. Links to sign-up sheets for the peer-reviewed papers and grand challenges presentations will be posted in Blackboard.

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), and class attendance/participation as measured by iClicker performance and attendance quizzes. Weighting of these activities will be as follows:

Midterm Exam	32.5%
Final Exam	32.5%
Grand Challenge presentation	15.0%
Average score of performance quizzes	10.0%
Average score of attendance quizzes	10.0%
TOTAL	100.0%

Your final score in the course 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 your final course 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%

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 iClicker Quizzes: Between eight and ten iClicker quizzes will be administered throughout the semester. The top four scores will be averaged to compute the "iClicker Performance Quiz" grade. The remaining scores will be aggregated to compute the "iClicker Attendance Quiz" grade (students will get full credit for taking the quiz, regardless of the score). Quizzes will be asked during lectures at random moments, and students will respond by using their iClicker Reef apps.

IMPORTANT: All students are required to have an iClicker remote device (not the phone app) to participate in iClicker quizzes and participation questions. The phone app is not reliable because it generates recording errors up to 25%, whereas the iClicker remote devices typically show 0% recording errors. Students must click on "Tools" in the course menu in Blackboard to register their iClicker within the first two weeks of the semester.

SAFE RETURN TO CAMPUS: All students taking courses with a face-to-face component are required to follow the university's public health and safety precautions and procedures outlined on the university Safe Return to Campus webpage (https://www2.gmu.edu/safe-return-campus). Similarly, all students in face-to-face and hybrid courses must also complete the Mason COVID Health Check daily, seven days a week. The COVID Health Check system uses a color code system and students will receive either a Green, Yellow, or Red email response. **Only students who receive a "green" notification are permitted to attend courses with a face-to-face component.** If you suspect that you are sick or have been directed to self-isolate, please quarantine or get testing. Faculty are allowed to ask you to show them that you have received a Green email and are thereby permitted to be in class.

Students are required to follow Mason's current policy about facemask-wearing. As of August 11, 2021, **all community members are required to wear a facemask in all indoor settings**, including classrooms. An appropriate facemask must cover your nose and mouth at all times in our classroom. If this policy changes, you will be informed; however, students who prefer to wear masks either temporarily or consistently will always be welcome in the classroom.

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 Peer-reviewed articles.	Module 3: Grand Conservation Challenges (challenge number in handbook)
	Theme	**Chapter**		
August 23	Presentation of syllabus, Introduction to Marine Conservation			
August 30	Introduction	1-2	Documentary: *A Plastic Ocean* (2017). Director: Craig Leeson. Available at Netflix. www.PlasticOceans.org	
Sept. 6	Labor Day, NO CLASSES			
Sept. 13	Marine Populations	3-4	Worm, B., E.B. Barbier, N. Beaumont *et al.* 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science* 314: 787-790.*	Marine Debris (2)
Sept. 20		5-6	Documentary: *The Cove* (2009). Director: Louie Psihoyos.	
Sept. 27	Threats	7-8		Invasive Species (7); Dead Zones (10); Ocean Acidification (8)
Oct. 4	Threats	9-10	Documentary: *Chasing Coral* (2017). Director: Jeff Orlowski; available at Netflix. https://www.chasingcoral.com/	
Oct. 11	FALL BREAK, NO CLASSES			
Oct. 12 (Tuesday)			Levin, L., D. Amon and H. Lily. 2020. Challenges to the sustainability of deep-seabed mining. *Nature Sustainability* 3: 784-794.*	Ecological Resilience (5)
Oct. 18	MIDTERM EXAM			
Oct. 25	Fisheries	11-12	Pauly, D. V. Christensen, J. Dalsgaard *et al.* 1998. Fishing down marine food webs. *Science* 279: 860-863.*	Overfishing (3)
Nov. 1	Fisheries	13-14	Documentary: *Seaspiracy* (2021). Director: Ali Tabrizi. Available at Netflix. https://www.seaspiracy.org/	

Date	Module 1: *Marine Conservation Biology* Textbook		Module 2: Documentaries and Peer-reviewed articles.	Module 3: Grand Conservation Challenges (challenge number in handbook)
	Theme	**Chapter**		
Nov. 8	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.*	Fishing Gear (6), MPAs (4)
Nov. 15	Marine Protected Areas	16-17	Documentary: *The Last Ocean* (2012). Director: Bruce Peter Young. http://www.lastocean.org/	
Nov. 22	Marine Protected Areas	18-19	Documentary: *Sea of Shadows* (2019). Director: Richard Ladkani. https://films.nationalgeographic.com/sea-of-shadows	
Nov. 29			Duarte, C.M., S. Agusti, E. Barbier et al. 2020. Rebuilding marine life. *Nature* 580: 39-51.*	Wildlife Trafficking (9), Sustainable Aquaculture (1)
Dec. 13	FINAL EXAM, 4:30 pm – 7:15 pm			

*Presented by students registered in EVPP 521.