Ocean Science and Public Policy

CAS NS 320 (3 credits)

Course Catalog Description:
Culture, history, economics, political systems, and science shape ocean policy. Practice current strategies to build, analyze, and communicate diverse policies. Examine the power, use, and limitations of science and the scientist's voice in determining ocean policy.

Instructor(s): Sea Education Association Maritime Studies faculty, visiting scholars and guests.

Location: SEA campus in Woods Hole, MA, at field station in U.S. Virgin Islands, at sea on SEA's sailing school vessel *Corwith Cramer*, and ashore during several island port stops.

Prerequisites: Admission to SEA Semester. Sophomore standing or consent of instructor.

Course Philosophy and Approach:
Ocean Science and Public Policy (OSPP) is a three-credit course taught by SEA Maritime Studies faculty, augmented by numerous visiting scholars and guest lecturers. Most of the work of this course will be completed during the six-week shore component at SEA's campus in Woods Hole, although additional work extends throughout the second half of the program in the U.S. Virgin Islands and at sea on the *SSV Corwith Cramer*. In the *OSPP* course, students observe, monitor, and ask questions about current coral reef uses, threats, ecosystem-based management, marine protected areas, and marine spatial planning as they get to know how science informs and shapes these cutting-edge marine management techniques from the inside out. Coral reefs provide diverse ecosystem services such as storm buffering, habitat for food fish, species spawning and nursery areas, and tourism and resource-harvest jobs, and protecting them bolsters the health of nature and economies. Promoting coral reef biodiversity probably is one of our best defenses against climate change effects; a healthy reef community has the best chance of surviving warming-induced coral bleaching events and ocean acidification. Given the Caribbean's reliance on tourism and extractive industries, governments in the region want to manage reefs effectively. Numerous challenges to reef health stem from climate change, ocean acidification, overharvest, pollution, and careless maritime and coastal practices. Students complement and build on their scientific surveys of reefs completed as part of other *Caribbean Reef Expedition* coursework with interviews and a census of local human ocean and coastal uses.

OSPP also introduces, through place-based case studies, the fundamental drivers of local, U.S., and international policy addressing coral reefs. The agendas of stakeholders such as scientists, resource users and managers, policy makers, industry, property owners, and others influence the science-policy dialectic; marine environmental policy; international ocean law; communication of policy options; and politics and practices in the eastern Caribbean region. Understanding history and debating the ideals of ethics, justice, fairness, law, liberty, effective government, property rights, and good jobs can bring us to wise management of resources. Experts and field trips will illuminate: marine conservation; scientists in

policymaking and the law; coastal management, development, and resilience economics; and power generation.

This course consists of 19 lecture/discussion sessions (1.5 hours each), three field trips (3 hours each), three workshops/symposiums (3 hours each), and several research group meetings. Some of these sessions are joint activities integrated with other *Caribbean Reef Expedition* courses, and the weekly contact hours given in the preliminary course calendar below reflects only the portion allocated to *OSPP*.

If we each do a little, we'll achieve only a little.
–David MacKay, *Sustainable Energy without the Hot Air*

Learning Outcomes:

1. **Recognize what public policy is:** an adapting body of "processes and players involved in making governmental decisions, the factors that influence their decisions, and the manner in which those decisions are carried out" or "the best course of action for addressing an issue of public concern." (Neal, Smith, and McCormick, 2011)
2. Critically **evaluate whether policy is based on scientific knowledge**.
3. Assess an array of coral reef-related communications material (readings, film, discussions, etc.) and **pose questions** about them: questions of exegesis (what does the author mean?), application (how do the ideas in the material apply to marine environmental issues in our research?), and evaluation (what are the strengths and weaknesses of a strategy?).
4. **Assimilate resource management strategies** and suggest ways to apply them via multimodal **communication** methods.
5. Be able and inclined to **evaluate the costs and benefits of marine policy** that supports human and ecosystem needs.

Evaluation:

Coral Reef Conservation Plan (50%)	
• Policy Timeline Presentation (group project)	10%
• Annotated Critical Bibliography, 10 entries (individual)	5%
• Topic/Question and Outline (group)	5%
• Peer-reviewed and Edited Draft (group)	5%
• Peer Review comments on classmates' draft (group)	5%
• Presentation (group)	10%
• Final Document (group)	10%
Caribbean Cruise Tourism Meeting Testimony and Outline	15%
Participation/Engagement & Final Exam	20%
At sea: Addendum to Coral Reef Action Module or Podcast Story	10%
At sea: Reflection Blog	5%

Assignments:

Coral Reef Conservation Plan: Working in teams, our class will research and produce one integrated and comprehensive document that recommends biodiversity-conservation and coastal-risk-management strategies for coral reef preservation in the face of threats such as land-based pollution, tourism, resource harvest, ocean acidification, and climate change. Our work will be guided by: local leaders' descriptions of challenges and successes in coral ecosystem conservation; *Improving the Outlook for Caribbean Coral Reefs: A Regional Plan of Action 2014-2019* (*Coral Reef Plan of Action);* The U.S. National Oceanic and Atmospheric Administration's *Coral Reef Conservation Program Social Science Strategy 2016-2021; A Marine Management Proposal for the Sargasso Sea;* and current academic thought and practical case studies from other locations. As we evaluate existing reef management documents, we will ask, "does it integrate marine management for a specific place; does it contain 1) ecosystem-based management, 2) marine protected areas, 3) marine spatial planning, 4) stakeholder engagement, and 5) strategies based in behavioral economics?" We will then formulate and ask questions for Caribbean leaders and, finally, propose a *Coral Reef Plan of Action*. To complete this project, students will identify and choose place-based information sources that inform the research project *and* make connections with broader concepts. This is for the most part a group project. Only the initial topic selection and annotated bibliography steps will be individual. For the group components of this project, each group member will report on their contributions to the project, and all group members will receive the same grade. The components of the *Coral Reef Conservation Plan* assignment include:

- *Topic:* Each **individual** will choose one of these topics affecting coral reef health: land-based pollution, tourism, resource harvest, ocean acidification, and climate change.
- *Annotated Critical Bibliography:* Each **individual** will complete their own annotated bibliography in phases.
- *Reef Policy Timeline Story Presentation:* Each research **group** will present to the class the background story of the problem reflected in its chosen policy topic, using creative communication methods. Each **individual** will email to the instructor a reflective essay on how the research group divided tasks, how individuals took leadership, and difficulties and successes encountered.
- *Outline (or Concept Map):* Each **group** will prepare a 2-page research project outline *or* concept map.
- *Draft and Peer Review Comments*: Each **group** will exchange its full draft (~8-12 pages, single-spaced magazine-article format, including images and figures with captions and sources, and references) for the draft of another group (its "partner group"), review the partner group's draft from the perspective of "the common reader" (what emotions and reactions does the writing evoke?), and write comments for the partner group.
- *Presentation of Recommendations at Coral Reef Conservation Symposium Part I*: a professional, 15-minute **group** presentation featuring results of your team's on-shore research.

- *Final Coral Reef Conservation Plan*: Building on course materials and place-based investigations each student **group** will produce an original 8-to-12 page, magazine-format document analyzing contemporary coral reef-related coastal and ocean conservation/management issues and solutions as well as plans for evaluation and adaptation of strategies for the specified place. We encourage telephone and E-mail interviews and require use of standard academic protocols for study of human research subjects. The class's final *Coral Reef Conservation Plan* will address the delicate balances and multiple facets of ecosystem health and sustainable human use.

Caribbean Tourism Meeting Testimony and Outline: How should human use of marine and coastal space look, in the Caribbean? Does economics rule the field of conservation? If so, what are the implications? The class will simulate a meeting to consider methods for promoting reef-conscious tourism in the Caribbean. Each student will produce a summary of their meeting testimony in outline form.

Participation and Exam: This class requires thoughtful engagement. Students are expected to complete all readings and assignments, actively participate in class discussions, and promptly ask questions about readings, class experiences, and troublesome ideas. Office hours and class time should be used for maximum academic benefit. Students should study together for the exam given in Week 5 of the shore component, covering environmental attitudes and marine policy topics found in the readings.

At Sea: *Coral Reef Conservation Plan* Addendum or Podcast

1) Perform a Human Uses of Ocean Space Survey
2) Discuss Caribbean coral reef policy with experts from, for example:
    - United States Fish and Wildlife
    - United States Geological Survey
    - National Oceanic and Atmospheric Administration
    - University of the Virgin Islands
    - Government of the United States Virgin Islands
3) Each student will either: a) build an Addendum to their *Coral Reef Conservation Plan* that draws on the *Coral Reef Conservation Plan,* their on-the-ground research results from the Human Uses of Ocean Space Survey, and discussions with experts to explain additional recommendations based on their new field-based understanding; ***OR***, b) write and record a podcast telling the story of coral reef conservation and next steps in St. Croix, based on their *Coral Reef Conservation Plan* research, their Human Uses of Ocean Space observations in St. Croix, and their discussions with marine policy experts.
4) Policy presentations: 10 minutes per group, with highlights from findings

At Sea: Coral Reef Conservation Reflection Essay for the Ship's Blog: In port stops and while at sea, students will keep a personal journal to enhance their experience, note observations and thoughts, and plan the final assignment product: a 1-page reflection essay of coral reef policy observations prepared as an entry for the ship's blog. Each watch group will produce one blog entry.

Music for Extra Credit: Students may research and present to the class a song of the sea or sea chantey and its history. Lyrics and musical style tell stories about maritime industry, trade, practices, lifestyle, and marine places. Understanding music of the sea adds complexity and humanity to the study of marine policy.

References:

Commonwealth of Australia, *Improving the Outlook for Caribbean Coral Reefs: A Regional Plan of Action 2014-2019,* 2014

Avery and Madin, *Protect the Scientific Deliberative Process*, 2012

Bertness, *Marine Community Ecology and Conservation*, 2014

Brizan, *Grenada: Island of Conflict,* 1998

Craig, *Comparative Ocean Governance: Place-based protections in an era of climate change,* 2012

Global Coral Reef Monitoring Network, International Union for the Conservation of Nature, and United Nations Environment Programme, *Status and Trends of Caribbean Coral Reefs: 1970-2012,* 2014

Goodwin, *International Environmental Law and the Conservation of Coral Reefs,* 2016

Honychurch, *The Dominica Story: A History of the Island,* 2009

Jackson and Johnson, We Can Save the Caribbean's Coral Reefs, Op-Ed, *New York Times*, 2014

Life and Debt, 2001 (film)

Massachusetts Executive Office of Energy and Environmental Affairs, *Massachusetts Storm Smart Coasts* website

National Oceanic and Atmospheric Administration, *Coral Reef Conservation Program Social Science Strategy: 2016-2021,* 2016

Nelson and Vucetich, On Advocacy by Environmental Scientists: What, Whether, Why, and How, *Conservation Biology*, 2009

Ocean Frontiers I and II, 2013 (film)

Pielke, *The Honest Broker,* 2007

Reddy and Camilli, Science out of Context, *Boston Globe*, 2012

Revkin, Fresh Views on Climate Scientists as Advocates, *The New York Times,* 2014

U.S. National Oceanic and Atmospheric Administration, *Coral Reef Conservation Program Social Science Strategy 2016-2021*

Waitt Institute, Blue Halo

Williams, *From Columbus to Castro: The History of the Caribbean,* 1970

World Bank, Nature as the First Line of Defense Against Floods, 2016

Expectations and Requirements:

- Punctually attend every class meeting.
- Participate actively in class discussion.
- To earn credit for assignments, submit them on or before their deadlines.
- We will follow SEA's policy on academic accuracy, quoted below.

  We expect the papers that you submit in this course are ***your original work.*** You must take care to distinguish your own ideas and knowledge from wording or substantive information that you derive from one of your sources. The term "sources" includes not only published primary and secondary material, but also information and opinions gained directly from other people and text that you cut and paste from any site on the Internet.

  The responsibility for learning the proper forms of citation lies with you. Quotations must be placed properly within quotation marks and must be cited fully. In addition, all paraphrased material must be acknowledged completely. Whenever ideas or facts are derived from your reading and research, the sources must be indicated. (Harvard *Handbook for Students,* 305)
- Considerations for use of internet sources:

  As you browse websites, assess their usefulness very critically. Who posted the information and why? Can you trust them to be correct? Authoritative? Unbiased? (It's okay to use a biased source as long as you incorporate it knowingly and transparently into your own work.) Keep track of good sources that might be useful for subsequent assignments, and annotate in your bibliography any sites you cite. Your annotation should include the name of the author or organization originating any material that you reference. If you can't identify the source, don't use it!

Course Calendar:

Topic	Readings/Assignments Due
Week 1 – What is marine public policy? (10 hours) – on shore in Woods Hole	
Introduction to *Caribbean Reef Expedition* program and *Ocean Science and Public Policy (OSPP)* class; Overview of course goals & assignments Lecture/Discussion Topics: • How is Public Policy Made in the Caribbean and the U.S.?	***Readings:*** Craig (2012): Chapters 1, 4 & 5 Goodwin (2016): Selected portions Jackson and Johnson (2014) ***Research topic choices due***

• Governance and Economics of Coral Preservation • International Law of the Sea • Environmental Law Timeline Research Group Meetings Woods Hole Science & Policy Field Trip	
Week 2 – Coral Reef Policy: How do science & policy interact? (8 hours) – on shore in Woods Hole	
Lecture/Discussion Topics: • Marine Biodiversity Policy Experts Panel Discussion • Science and Policy Dialectic • The Role of Scientists in Making Policy • Skills: Research & Peer Review; Survey Design & Practice Policy Timeline Presentations by Students	***Readings:*** Avery and Madin (2012) Bertness (2014): Selected portions Goodwin (2016): Selected portions Nelson & Vucetich (2009) Pielke (2007) Reddy and Camilli (2012) Revkin (2014) ***Policy Timeline Presentation and Outlines due***
Week 3 – Addressing Coral Reef Threats, the Big Three: Pollution, Coastal Uses, Climate Change (8 hours) – on shore in Woods Hole	
Lecture/Discussion Topics: • Reef Ecosystem Decline – Impacts on Small Island Developing States & Conservation Efforts • Field Trip Survey Follow-up Agricultural Runoff and Water Treatment Field Trip & Survey Woods Hole Human Uses and Tourism Field Trip & Survey	***Readings:*** Bertness (2014): Selected portions Goodwin (2016): Selected portions Blue Halo World Bank ***Annotated Bibliography due*** ***Prepare questions about Organizations readings***
Week 4 – Marine Policy Tools to Address Vulnerability (8 hours) – on shore in Woods Hole	
Lecture/Discussion Topics: • Woods Hole Sea Grant and Caribbean Sea-level Rise/Storm Surge Planning; Natural Buffers • Ocean Frontiers Film & Discussion • Marine Spatial Planning with Marine Protected Areas • Examining Human Uses and Ocean Health: How do U.S. Media and Policy Reflect Understanding of Ocean Acidification?	***Readings:*** Craig (2012): Selected portions MA Storm Smart Coasts *Ocean Frontiers* I and II (film) ***Outlines due*** ***Drafts due to Peer Review Partner Groups*** ***Prepare questions on marine conservation tools***

Week 5 – Caribbean Biodiversity Mitigation; Human Uses Past & Present (8 hours) – on shore in Woods Hole	
Lecture/Discussion Topics: • Atlantic World; Columbian Exchange • Caribbean Political Histories; Reasons for Stakeholder Struggles • Case Study: St. Croix Conservation Coral Reef Conservation Workshop Exam	***Readings:*** Bertness (2014): Selected portions Goodwin (2016): Selected portions NOAA *Coral Reef Conservation Program* ***Peer Reviews due*** ***Edited Drafts due*** ***Public Meeting testimony & briefing outline due***
Week 6 – Research and Conservation in the Caribbean (8 hours) – on shore in Woods Hole	
Lecture/Discussion Topics: • The Last Words: Research, Adapt, Mitigate, Evaluate, Adapt Caribbean Cruise Tourism Meeting; Tourism Simulation by Students Policy Symposium Part I	***Readings:*** Craig (2012): Conclusion
Weeks 7-8 – Coral Reef Policy Implementation (12 hours) – at field station in the U.S. Virgin Islands	
Coral Reef Conservation Workshops and Symposium Part II with local experts in St. Croix	***Coral Reef Conservation Plan Addendum or Podcast due*** ***Symposium presentations due***
Weeks 9-12 – Coral Reef Uses: culture, history, economics (4 hours) – at sea and during port stops	
Coral reef conservation: observations at sea and in port stops including Grenada and Dominica	***Readings:*** Brizan, 1998: Selected portions Honychurch, 2009: Selected portions ***Coral Reef Conservation Reflections Blog due***