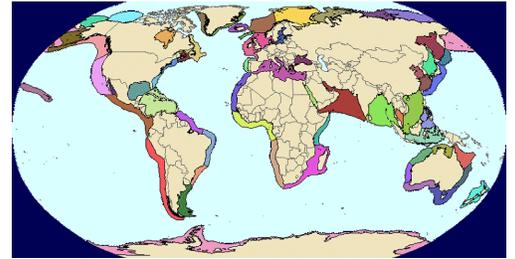


Class meets on Mondays at 5:30 – 8:00 pm

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Course Description: Coastal Ecosystem Management: What? Where? Why? How? When?

In general, coastal ecosystem management is a complex study and practice that integrates multidisciplinary natural and social sciences. It requires continuous exploration and knowledge about the relationships between habitats, applied ecology, climate, oceanography, watersheds and all types of human activities that affect coastal ecosystems as well as coastal communities (e.g. urban development, tourism, fisheries, protected areas, aquaculture, agriculture, etc.). There are numerous issues facing the world's coastlines and the key question is whether the coasts can be managed to successfully and sustainably absorb the pressures. Understanding of coastal ecosystem's "function, health and resilience" is an imperative for successful adaptive coastal ecosystem management. Although it is a huge challenge to manage world's coasts, we do have the knowledge, science and technology to use coastal resources in a sustainable way. My premise in teaching this course is that *"The environment sets the limits for sustainable development and coastal stewardship."*

Background for Discussion: "Coastal management arenas in the past 40 years established profound phrases that seemingly capture the substance and urgency of the habitat component of the larger coastal and ocean planning equations. Examples include: ecosystem-based management, no net loss of wetlands, precautionary management, adaptive management, effective stewardship, compensatory mitigation, sustainable tourism, sustainable fisheries; phrases that all fit under Integrated Coastal or/and Ocean Management and Planning. However, projects that directly eliminate habitat, or watershed decisions that indirectly eliminate even larger habitats, continue to occur at high rates with relatively few constraints on the issuance of permits for new projects. A variety of problems, widely known in the permitting world, yet absent from workshops and conferences, are present and require urgent attention. Commonly, environmental impact assessments are little more than explicit efforts to justify any project, any time. Cumulative impacts are still rarely considered in any detail, even in thick, expensive documents regarding environmental sites that have already endured a dozen prior anthropogenic disturbance events. Millions of dollars have been spent on monitoring of human use impacts, commonly using protocols that often do not meet minimum standards of scientific rigor. Mitigation is simply the cost of doing business with a similar absence of quality monitoring, particular in terms of long term "compensation". Lobbyists for various industries have an order of magnitude more influence with decision makers than any other expert or user-group. Without explicit recognition and action regarding these unmentionable issues, integrated coastal and recently ocean management and planning and its entire component phrases will remain a theoretically robust and functionally hollow paradigm. What is the answer? What would nature do? Ultimately, the environment sets the limits of our world's sustainable development. Therefore it is our responsibility to address the question: How does nature 'feel' about what we do and how we do it?" (Frankic, 2009)

Chapters and Texts from below books will contribute to your assignments

1. Tools & Criteria for Sustainable Coastal Ecosystem Management: Examples from Baltic Sea and other Aquatic Systems. Andreas Bryth, 2008, Springer.
2. Ecology and Management of Coastal Waters. Gilbert Barnabe and Regine Barnabe-Quet, Springer, 2007.
3. Coastal Zone Management. T. Beatley, D.J. Brower, and A.K. Schwab, Island Press. 2002.
4. Biomimicry – Innovation inspired by nature. Janine Benyus, 1997. www.biomimicryinstitute.org
5. A Lasting Impression – Coastal, Lithic, and Ceramic Research in New England Archeology. Edited by Jordan E. Kerber. Native Peoples of America. 2002.
6. Gaining Ground – A History of Landmaking in Boston. Nancy Seasholes. MIT Press. 2003.
7. The World Without Us. Alan Weisman, 2007. St. Martin's Press.

Grade Evaluation and Policies

Grading will be based on three papers/essay (20% each), working group's study projects and presentations (35%); attendance/preparedness/participation (5%).

Your final letter grade will be based on the following percentile ranges:

92 - 100 = A 81 - 91 = B 70 - 80 = C

To be successful in this course, you are expected to attend class regularly, prepare for class by reading assigned work prior to class meetings, participate in discussions and group class assignments; participate in the field trips; and ask questions in/out of class.

Teaching goals & Objectives

The students will be introduced to: (1) a comprehensive but brief overview of different types of coastal ecosystems; (2) the brief history of coastal management; (3) different uses and impacts on coastal ecosystems, (4) major issues facing coastal areas today and emerging issues of importance in the future; (5) an overview of major international, federal and state coastal laws and policies; (6) basic principles and methods in adaptive coastal ecosystem management, based on the best available knowledge and technologies for optimal and sustainable uses of coastal resources; and (7) students will have to be able to use and apply GIS in their individual and group project assignments.

The prerequisite to engage and enjoy this course is to think critically, eloquently and to be curious.

COURSE ASSIGNMENT DESCRIPTIONS

What, where, why, how and when?

#1 Nature Case Study (10 pages, 12 font, times, without references and attachments): consider the list of *Species/habitats of Concern in MA/NE region*: <http://www.mass.gov/dfwele/dfw/nhesp/nhesp.htm>

Student is required to develop 'a profile' about an animal/plant species or/and a habitat and its conservation management regime that has been established to protect the animal/plant or habitat. Preferably, student **might consider writing this like YOU are this species, or a habitat!** Although in some parts of the coastal world, humans are endangered species as well, we are not going to include humans as a target of this assignment.

This profile should include the following information:

- 1) Information on the “life cycle/ecology” of the species/habitat;
- 2) Characterization of the abundance and distribution of the species or habitat (use of GIS maps a must)
- 3) Characterization of the habitat needs/requirements and/or migration patterns of the species;
- 4) Characterization of the relevant ‘ecosystem based management’ related (or any other type of existing management) to the selected species or habitat; and
- 5) Overview and assessment of potential future scenario of selected species or habitat in light of your approach (e.g. what would you do?).

#2 Coastal Issue Case Study (10 pages same as above): describe a particular issue or problem facing coastal environments preferable in MA (e.g., wetland loss/restoration, beaches loss, human health, biodiversity loss, brown fields, etc), or NE region in terms of the available knowledge (science and technology), including relevant state and federal policies or programs that are currently in place to address the issue you select as your paper’s topic. Also, provide recommendations and suggestions **what would you do!**

<http://www.mass.gov/czm/>; <http://www.mass.gov/envir/massbays/pdf/sob2004.pdf>

#3 Policy Essay: 10-page policy essay should be written as if a student is a policy analyst for a state (e.g. MA CZM, DCR, DOER) or federal agency (e.g. EPA, NOAA, USGS), and should focus on: 1) a statement of the problem (what, where, why); 2) how state or/and federal policy addresses or fails to address the problem; and 3) recommendations for program development in the policy and management areas.

Problem examples:

- Impacts from the MWRA discharge to Massachusetts and Cape Cod Bays
- Levels of toxic contaminants (e.g. cumulative effect) in tissues of shellfish in Massachusetts and Cape Cod Bays
- Restoration efforts and improvements to coastal wetland areas
- Invasive marine species in MA and Cape Code bays
- Local beaches and human health risks
- Energy uses in coastal/marine areas
- Climate change and impacts, etc.

#4 WORKING GROUP ASSIGNMENT (30 page report document and presentation)

How might we use holistic approach in research, education and outreach? Is this a new ‘receipt’ for coastal ecosystem management?

The working group course assignment will introduce students to a holistic science approach to coastal ecosystem research, education, and stewardship. The purpose of the approach is to help scientists, policy-makers and communities ensure that “the environment sets the limits” for human activities in coastal areas and watersheds. The working group project main goal is to introduce a holistic *process* that includes the full range of both analytic and intuitive knowledges, holistic *content* including geological, chemical, biological and ecological data, and holistic *communities* (scientists, local citizens, and in particular, indigenous communities).

Including time in the field and in GIS lab, students will work together to integrate each of their own special knowledge areas (chemistry, biology, policy, geology etc.) into a comprehensive and interdisciplinary simulation of holistic science, education and stewardship addressing a selected environmental issue in Boston Harbor area.

Successful completion of the working group project may enable the group to present and publish their results in any desired venues.

Please check and join the Green Boston Harbor Project: www.gbh.umb.edu

Related Readings

- Adger, W.N. 2000. Social and ecological resilience: are they related? *Progress in Human Geography* 24, 3: 347-364.
- Berry, W. The Idea of Local Economy. Orion (Winter 2001).
<http://www.orionmagazine.org/index.php/articles/article/299/>
- Clark J.S., et al. 2001. Ecological Forecasts: An Emerging Imperative. *Science* 293. 27 July: 657-660.
<http://www.sciencemag.org/cgi/content/full/293/5530/657>
- Dulvy, N.K., R.P. Freckleton, and N.V.C. Polunin. 2004. Coral reef cascades and the indirect effects of predator removal by exploitation. *Ecology letters* 7: 410-416
- Hershman, M.J., et al. 1999. The Effectiveness of Coastal Zone Management in the United States. *Coastal Management* 27: 113-138.
- Jackson, J.B.C. 2001. What was natural in the coastal oceans? National Academy of Sciences colloquium, "The Future of Evolution," held March 16-2000. Irvine, CA: 5411-5418.
<http://www.pnas.org/cgi/content/abstract/98/10/5411>
- Jackson J.B.C., et al. 2001. Historical Overfishing and the Recent Collapse of Coastal Ecosystems. *Science* 293. 27 July: 629-637.
- Malone, T.C., R. O'Malley, and M. G. Altalo. 2007. Quantitative Assessments of the Condition of Marine Ecosystems: The Need for the Coastal Module of the Global Ocean Observing System. NOAA/IO
- Meadows, D. 2009. Economics and Limits to Growth: What's Sustainable?
<http://www.energybulletin.net/node/51127>
- Norton, B. 1995. Ecological Integrity and Social Values: At What Scale? *Ecosystem Health* 1, 4:228-241.
- Noss, R.F., E.T. LaRoe III, and J.M. Scott. 1995. *Endangered ecosystems of the United States: A preliminary assessment of loss and degradation*. Biological Report 28. US Department of the Interior. Washington, DC.
<http://biology.usgs.gov/pubs/ecosys.htm>
- Pew Ocean Commission. 2004. *America's Living Ocean*. <http://www.pewoceans.org/>
- US EPA. 1996. *Environmental Indicators of Water Quality in the United States*. Office of Water.
<http://www.epa.gov/bioindicators/>
- U.S. Commission on Ocean Policy. 2004. *Preliminary Report*. <http://oceancommission.gov/>
- Watson, R. and D. Pauly. 2001 The Systematic Distortion in World Fisheries catch trends.
<http://www2.fisheries.com/archive/members/dpauly/journalarticles/2001/systematicdistortionsworldfisheriescatchtrends.pdf>

Attendance Policy

Attendance is mandatory and will be monitored. Attendance will be considered when deciding borderline grades. **Any excused absence requires a neatly written or typed explanation of why you will miss or have missed and must have supporting documentation** (Dr. excuse, tow bill, etc.). It is your responsibility to submit the documentation during office hours and discuss the missed test, class or assignment with me when you return to class and before the end of the semester – no exceptions.

For matters regarding academic dishonesty and misconduct, please refer to the UMASS Boston Code of Student Conduct: www.umb.edu/student_affairs/programs/judicial/csc.html
www.cpcs.umb.edu/support/studentsupport/red_book/policies_academic_dishonesty.html

If you have a disability and feel you will need accommodations in order to complete course requirements, please contact the Ross Center for Disability Services (Campus Center 2nd floor, Room 2010, at 617-287-7430.

WHY BIOMIMICRY?

www.biomimicryinstitute.org

The premise of biomimicry is that Life has been performing design experiments in Earth's R&D lab for 3.85 billion years and what is flourishing on the planet today are the best ideas-those that perform well in context, while economizing on energy and materials. Whatever a company's design challenge, the odds are high that one or more of the world's 30 million creatures has not only faced the same challenge, but has evolved effective strategies to solve it: www.asknature.org

Among many activities, the Biomimicry Guild helps companies find, vet, understand, and emulate these effective strategies, while the Biomimicry Institute works to integrate these ideas into educational systems from early childhood to the university level. Tying these efforts together, the new social enterprise will have an educational platform to deliver a professional pathway in biomimicry.

For centuries, biologists have been in labs and fields taking notes on the adaptive strategies life has developed. Unfortunately, much of this information is inaccessible, locked up in technical, scientific papers written for other biologists, and rarely organized by engineering or design function. The Biomimicry Group unlocks this information for companies and communities by sorting through it and translating relevant strategies into language that can be understood by non-biologists who are seeking strategies to emulate.