MARINE RESERVES PCB 4467-C
ADVANCED MARINE RESERVES PCB 5418-C
A Global Learning Course
Fall 2020

Instructor
Dr. Alain Duran

Office hours: contact via **email at alduran@fiu.edu**
Semester: Aug 24 – Dec 12, 2020
Successful completion of General Biology I and II is a prerequisite.
"This is a discipline-specific course that counts toward your Global Learning Graduation requirement."

Required textbook:

Marine Protected Areas: tools for sustaining ocean ecosystems. National Research Council, National Academy Press. Washington D.C. 2001. 272 p. ISBN: 0-309-07286-7. **Provided by the instructor. (Here on NRC-MPA)**

Salm, R. V., J. R . Clark, and E. Siila. 2000. Marine and coastal protected areas. A guide for planners and managers. Third Edition. IUCN. Washington D.C. xxi: 371 p. **Provided by the instructor. (Here on IUCN-MCPA)**

Examples of complementary books *(several other marine biology books can be used as a complementary information source)*

Castro, P. and M. Huber. (7th-9th editions). Marine Biology. McGraw-Hill Publishing Company. ISBN 978-0073524207.

Speight, M. and P. Henderson. 2010. Marine Ecology. Concepts and applications. Wiley-Blackwell. 276 p. ISBN 978-1-4051-2699-1 (hardcover) or ISBN 978-1-4443-3545-3 (pbk).

Introduction

Coastal zones and particularly the Caribbean region, are well known for their beautiful beaches and complex ecosystems. The extremely rapid tourist development, accompanied by high population growth, has modified the human and biological communities' structure, causing significant adverse environmental impacts to our marine resources. Coastal problems are also affected by local, regional, and global stressors that need to be incorporated in any analysis. Therefore, management of these resources has become a need and a challenge. The goal of establishing Marine Protected Areas (MPA) is to protect the fisheries, ecosystems, and the biodiversity of highly affected or threatened areas or species and benefit the dependent human communities and their cultural values. Knowledge of social concepts such as co-management, respect of native cultures, and property rights; and biological concepts, such as connectivity, food web size and networks, the demography of threatened species, and monitoring are essential for the design and management of a successful MPA. These activities are complex and only well-trained people with global awareness and perspective will handle the various challenges of designing, establishing, and managing an MPA.

Course description

The course employs active learning strategies to increase students' global awareness, global perspective, and global engagement attitude. Global perspectives will be achieved through lectures and various learning strategies that will provide information on biological and sociological concepts and methods for the design and management of marine protected areas worldwide.

Class Objectives (CO)

By the end of the semester, the students will be able to:

- CLO1. Describe direct and indirect human stressors impacting marine biodiversity
- CLO2. Discuss the value of biodiversity and relate bio-social-eco aspects of sustainability
- CLO3. Explain the most important global oceanographic processes governing the distribution and functioning of marine environments
- CLO4. Describe the biological composition and the interactions with physical factors of common marine ecosystems found within MPAs
- CLO5. Illustrate how oceanographic and ecological processes influence MPA functioning
- CLO6. Evaluate the level of public environmental awareness/understanding
- CLO7. Review the impact of fisheries marine ecosystem and the need for MPAs
- CLO8. Describe benefits, approaches, and challenges of integrated coastal zone management
- CLO9. Explain the principles and justification to create and design MPAs as an effective conservation approach to marine resources
- CLO10. Recognize the social, cultural, and economic complexity of different approaches in conservation biology
- CLO11: Describe the need for community engagement and multi-cultural education program in conservation biology
- CLO12: Critically analyze MPA management taking into biological, social, political, cultural, and economic aspects

Provide students with a global perspective by analyzing multiple marines protected areas around the globe. Particular emphasis will be on South Florida and the Caribbean within a worldwide context.

Global Learning Outcomes

1. Through the study of Marine Protected Areas, students demonstrate knowledge of the interrelatedness of social concepts such as co-management, respect of native cultures, property rights, and biological concepts, such as diversity, fisheries, connectivity, food webs, and coral reefs networks at local, and global scales.
2. Through exposure to different "real" situations, students experience the causes and effects of regulating human activities to protect marine resources. Students design an ideal MPA with its regulations and participate in two town hall meetings to solve Marine reserves' real problems.
3. Students evaluate the functioning of an MPA, identify weaknesses and strengths and propose management improvements. Among other factors, students analyze Biological value of the site, Cultural significance of the site, Social benefit of having an MPA and Human capacity to manage the MPA.

This course has lecture (50%) and laboratory (50%) sections, which are complementary, and thus, performance is equally important.

Lecture section

Through lectures, guest speakers and readings the students will get acquainted with the biological, economic, and social aspects of MPAs. Integrative analysis of domestic and international (from different countries and cultures) MPAs will provide the student with opportunities to understand the diversity of issues involved in MPAs while reasoning the importance of a global approach as they get exposed to distinct stakeholders' perspectives.

Two midterm exams (20% each) will make up the rest 40% of the lecture portion. Questions in quizzes and exams can take any format (from multiple choice to short answer questions).

Laboratory section

The lab section is interactive (question-answer/discussion and in-depth analyses of scientific research) via ZOOM, and all students must "attend" (connect). A video camera is not mandatory, but it is highly recommended to promote a dynamic interaction during the class.
Lab sections are designed to complement the material covered in lectures with actual examples and allow the students to conduct independent (small) research projects. You are expected to complete weekly tasks, read and discuss scientific papers and actively participate in lab exercises such as simulated townhall meetings, design and create monitoring programs of MPAs. Please, check the schedule at the end of the syllabus and make sure you do not have conflicts that prevent you from participating in these activities. Each lab's evaluation will be partially dependent on the

corresponding quiz (10%) based on the readings. 15% of the lab grade is based on in-class lab activities, 15% lab assignments, and the other 20% is gained by completing the final project. Notice, there is not making up for any of the lab evaluations. Thus, fail to turn in your work on time or missed the lab will result in a grade of 0.

The email you received before the beginning of the semester

If you are receiving this email, you have enrolled in my fully Online class of Marine Reserves. So, informally, welcome to the class.

As you all know, this is a 4-credits (Global Learning) class that includes weekly lectures and virtual laboratory discussions/work. The lectures and independent assignments can be completed within the week (preferably early in the week); however, for the virtual lab, you need to commit one hour to a specific day and time for team activities in small groups via Zoom. More details about the virtual lab tasks will be provided at the beginning of the semester. Still, in general, we (me included) will discuss your readings, your independent work results, and other. The virtual lab's only requirement is to have your video on during our one hour Zoom discussion and participate actively. You'll be able to select your semester lab time in the first week of class, so be ready for it.

The times will be:

1- Wednesday: 2:00 – 3:00 pm
2- Wednesday: 4:00 – 5:00 pm
3- Thursday: 2:00 – 3:00 pm
4- Thursday: 4:00 – 5:00 pm
5- Friday: 7:00 – 8:00 pm

Class grading break up the table

Evaluation	Percentage	Description
Lect. Exam 1	20	Exam with multiple-choice and short answer questions evaluation all the material (readings and lectures) covered up to week 6)
Lect. Exam 2	20	Exam with multiple-choice and short answer questions evaluation all the material (readings and lectures) covered up from week 7 to week 14)
Quizzes	10	Weekly quizzes from week 2 to week 11 (n=10). Quizzes are multiple-choice and short answer questions evaluating the materials covered in the PREVIOUS lecture and lab (including readings, lab discussion, and assignments) and the CURRENT week reading. For example, quiz 2 will evaluate the material covered in lectures 1a and 1b, lab 1, and the reading for lab 2 discussion. Remember that lectures and lab are complementary.
In-class lab activities	15	

Lab assignments	15	1. Explore local MPAs (Ind. submission, 2%) 2. Interview (Ind. Submission, 2%) 3. Elaborate biological conceptual map (team submission, 1%) 4. Video analysis (team submission, 1%) 5. Global footprint calculations (team submission, 3%) 6. Elaborate user consequence map (Team submission 1%) 7. Stakeholder list (Team submission, 2%) 8. Zonation exercise (Team submission, 2%) 9. Monitoring exercise (Team submission, 2%)) 10. Townhall meeting II (Team submission, 1%)
Final project	20	Written document (10%) Oral presentation (10%) The main goal of this exercise is to develop critical thinking about management and functioning of MPA worldwide. The project is a semester-long jwhere students regularly apply the newly acquired knowledge to their real study case. As the semester goes on, stundentsw will collect information on ecosystem functioning, role of stakeholders, the economic value of marine resources and apply it to their selected MPA. The final discussion entails comparison across their study cases to contrast conservation biology approaches in different world regions. The main steps are: 1-Select an established marine protected area and summarize all information related with it. 2- Describe the weakness (eg., lack of information, poor monitoring program, low economic support) of the management plan and actual functioning of the MPA 3- Propose practical and realistic ways to improve the functioning of the MPA using its previously identified weakness(es)

GRADING SCALE

- You will be evaluated based on lecture and lab activities.
- Grade scale: A: 90-100%, B: 80-89%, C: 70-79 D: 60-69%, F:<60%.

Recovery missed exams policy

Given the Online Format, students have the in its entirety to complete the assignments. Thus, no make-ups will be allowed except for well-justified cases that missed the exam. In that case, make-up exams will be taken orally. Notice that the lab encompasses several Team activities and weekly discussions. YOU ARE RESPONSIBLE FOR COORDINATE WITH YOUR PEERS AND WORK IN TEAM.

PLEASE BE RESPECTFUL WITH YOURSELF, PROFESSOR, AND PEERS

Instructor Communication: All instructor communication and announcements will be made by email and through the course's CANVAS section. Only students' FIU email addresses will be used. If students do not use their FIU email account, use the easy-to-set-up automatic mail forwarding option to the email account you are regularly using.

Students must maintain an active FIU email account and observe the "News" web page. Emails that are returned due to "over quota" email accounts will not be re-sent. All emails from students must contain "**PCB 4467C, or PCB 5468C**" or "MPA course," or "Marine Reserves course" in the subject line; student emails without proper subject line and the student's **name** will **not** be answered!

Sexual harassment policy: FIU is committed to eliminating sexual harassment. Per the FIU Faculty Senate guidelines, this syllabus includes a warning that any misconduct will be reported.

Academic misconduct: FIU is committed to not tolerating any academic misconduct by students. Per the FIU Faculty Senate guidelines, this syllabus includes a warning that any academic misconduct, particularly cheating in exams, will be reported and penalized.

ALWAYS STAY INFORMED!
FOR MORE INFORMATION AND UPDATES CHECK OUT THE COURSE CANVAS SITE

Marine Protected Areas. Fall 2020 Schedule (Lecture + Laboratory)				
Date	**Module**	**Topic**	**Lecture activity**	**Lab activity**
August				
Aug 24 - 30	1	Introduction to conservation biology and the need for marine protected areas. MPA class introduction and the global learning approach	**Lecture 1 (video-lecture 1)** **Readings** • NRC-MPA textbook: chapters 1 and 2 (pages 10-30) • Scientific article: Rebuilding marine life (Duarte et al. 2020)	**Virtual Laboratory 1** **In-class activities** • Get to know each other. • Introduction to the lab, including the final project • Form groups select region/ecosystem to work.

				To be submitted (Ind.) • What is your relationship with the ocean? (video)
Aug 31 – Sep 6	2	Value of Biodiversity, nature conservation, and associated philosophical and ethical issues	**Lecture 2 (video-lecture 2)** **Readings** • IUCN-MCPA textbook: part 1 (pages 13-35) • Scientific article: Scientific results to support the sustainable use and conservation of marine life	**Module_2. Quiz_1** **Virtual Laboratory 2** **In-class activities** • Discussions of both papers **To be submitted (Ind.)** • How much do we know about our local MPAs? Interview assignment (excel)
Sep 7 – 13	3	The marine environment	**Lecture 3 (video-lecture 3)** **Readings** • NRC-MPA textbook: Chapter 5 (pages 96) • Scientific article: The central importance of ecological spatial connectivity to effective coastal marine protected areas and to meeting the challenges of climate change in the marine environment (Carr et al. 2017)	**Module_3. Quiz_2** **Virtual Laboratory 3** **In-class activities** • Discussion of interview assignment and assigned readings **To be submitted (Team)** • Global footprint estimation? (excel)
Sep 14 –20	4	Structure and function of marine ecosystems. (Estuaries, Mangroves, Rocky Shores, and Beaches)	**Lecture 4 (video-lecture 4)** **Readings** • Marine and Coastal Protected Areas (IUCN) Part II. Protected areas for lagoons and estuaries (pages 185-197), Protected Areas for Beaches (pages 231-238). Case examples: Negombo Lagoon (CZM-MPA page 255) and Boca Grande Key (page 253), Protected Areas for Beaches (pages 231-238), • Scientific article: The value of estuarine and	**Module_4. Quiz_3** **Virtual Laboratory 4** **In-class activities** • Discussion of Global Footprint results and assigned readings **To be submitted (Team)** • Estimate of local boat density? (excel)

			coastal ecosystem services (Barbier et al. 2011)	
Sep 21 – 27	5	Structure and function of marine ecosystems II. (Seagrass beds, Coral reefs, and kelp forest)	**Lecture 5 (video-lecture 5)** **Readings** • Marine and Coastal Protected Areas (IUCN) Part II. Protected areas for coral reefs (pages 161-172), Protected Areas for small islands (pages 209-218). Case examples: Florida Keys: Distant Influence on Coral Reefs (page 2271) and Chumbe Island: Experiences of a private Marine Conservation Project (page 265) • Scientific article: Coral reef management and conservation in light of rapidly evolving ecological paradigms (Mumby and Steneck 2008)	**Module_5. Quiz_4** **Virtual Laboratory 5** **In-class activities** • Discussion of Boat density results and assigned readings **To be submitted (team)** • Individual biological conceptual map (work)
Sep 28 – Oct 4	6	The open ocean conventional management of fisheries	**Lecture 6 (video-lecture 6)** **Readings** • NRC-MPA textbook: Chapter 3 (pages 30-41) • Scientific article: Climate change impacts on the biophysics and economics of world fisheries (Sumaila et al. 2011)	**Module_6. Quiz_5** **Virtual Laboratory 6** **In-class activities** • Discussion of biological conceptual map **To be submitted (team)** • **Consequence Map**. Make a list of all the stakeholders (users) in your MPA and their relationship with the MPA. Include them in your biological conceptual map indicating their effect on MPA resources
Oct 5 – 11	**Exam 1**			

Oct 12 – 18	7	Integrated coastal zone management - MPA	**Lecture 7 (video-lecture 7)** **Readings** • IUCN-MCPA textbook: Part I (pages 37-43) • Scientific article: Challenges and opportunities in promoting integrated coastal zone management in Algeria: demonstration from the Algiers coast (Khelil et al. 2019) **Extra reading** • Overview of ICZM	**Module_7. Quiz_6** **Virtual Laboratory 7** **In-class activities** • Discussion of consequence map • **1st Townhall meeting** **To be submitted (team)** • A list of all stakeholders involved with your research MPA
Oct 19 – 25	8	Types and design of MPAs	**Lecture 8 (video-lecture 8)** **Readings** • IUCN-MCPA textbook: Part I (pages 43-60) • NRC-MPA textbook: Chapter 6 (pages 97-125) • Scientific article: Designing MPA networks to address the impacts of Climate Change (McLeod et al. 2009) **Extra reading** • Definitions and classification system for U.S Marine Protected Areas • Guidelines for applying the IUCN protected area management categories to MPA	**Module_8. Quiz_7** **Virtual Laboratory 8** **In-class activities** • Revision of stakeholder list **To be submitted (team)** • **Zonation exercise**
Oct 26 – Nov 1	9	Monitoring of MPAs	**Lecture 9 (video-lecture 9)** **Readings** • NRC-MPA textbook: Chapter 7 (pages 126-144) • Scientific article: Adaptive management of the GBR (McCook et al. 2010)	**Module_9. Quiz_8** **Virtual Laboratory 9** **In-class activities** • Discussion of zonation exercise **To be submitted (team)** • **(instruction for second townhall meeting)**

Nov 2 – 8	10	Management of MPAs	**Lecture 10 (video-lecture 10)** **Readings** • IUCN-MCPA textbook: Part I (pages 121-129) • NRC-MPA textbook: Chapter 4 (pages 43-70) • Scientific article: The worldwide costs of marine protected areas. Balmford et al. 2004 **Extra reading** • Limits of acceptable change (Stankey et al. 1984) • Assessing carrying capacity on coral reefs (Estrada et al. 2004)	**Module_10. Quiz_9** **Virtual Laboratory 10** **In-class activities** • Second townhall meeting **To be submitted (team)** • Instructions for the monitoring exercise
Nov 9 – 15	11	Community engagement and education	**Lecture 11 (video-lecture 11)** **Readings** • IUCN-MCPA textbook: Part I (pages 65-80) • NRC-MPA textbook: Chapter 4 (pages 66-70) • Scientific article: Integrating environmental education in marine protected areas management in Colombia (Zorrilla-Pujana and Rossi 2014)	**Module_11. Quiz_10** **No_Virtual Laboratory 11 (Veterans day)** Submission of monitoring exercise **To be submitted (team)**
Nov 16 – 20	12	Historical background and legal framework of MPAs	**Lecture 12 (video-lecture 12)** **Readings** • IUCN-MCPA textbook: Part I (pages 131-157) • NRC-MPA textbook: Chapter 8 (pages 145-173) **Readings** Scientific article: Traditional Marine Conservation Methods in Oceania and their demise. (Johannes 1978)	**Virtual Laboratory 11** **In-class activities** ***Final project (written documents)*** ***Final project (oral presentations) Day 1***

			Extra reading • Marine Ecology: Reserves do have a key role in fisheries. Callum Roberts • Historical development of fisheries Science and Management (NOAA)	
Nov 23 – 27	13	Study case 1	**Lecture/video** • Gardens of the Queen • California	**Virtual Laboratory 12** **In-class activities** ***Final project (oral presentations) Day 2***
Nov 30 - Dec 4	14	Study case 2 Class wrap up	**Lecture/video** • British Columbia • Hawaii	**Virtual Laboratory 13** **In-class activities** ***Final project (oral presentations) Day 3***
Dec 6 - Dec 12	**Exam 2**			