


Earth Education International 
Environmental Sustainability & Field Planning

Environmental Management & Protection 480/580 (2)

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Course Description

An overview of environmental sustainability, with emphasis on tropical ecosystem conservation in Costa Rica. Fundamental characteristics and classification of ecosystems, biological diversity, deforestation, and environmental management and protection strategies. Includes lecture, class discussions based upon assigned readings, field study and/or associated volunteer service-learning work, and associated field planning. No Prerequisite. Co-requisite of 'Society & Sustainability'. Three undergraduate or graduate (post-baccalaureate) credits.

Course Objectives

At the completion of this course, the student will be able to:

1. Describe key issues associated with environmental sustainability in the tropics
2. Articulate general characteristics and classifications of tropical ecosystems
3. Evaluate historical and political contributions to conservation in Costa Rica
4. Synthesize environmental management and protection strategies within the context of sustainable development

Course Materials

A course packet of materials will be available for purchase which includes materials from the following primary texts. Handouts and/or articles may complement these materials.

Evans, Sterling. 1999. The Green Republic: A Conservation History of Costa Rica. University of Texas Press: Austin.

Montagnini, F. and C. Jordan. 2005. Tropical Forest Ecology: The Basis for Conservation and Management. Berlin/New York: Springer.

Course Requirements

1. **Attendance/Participation.** In order to achieve stated course objectives, attendance and active participation is essential. Evaluation in this category will consist of two parts: A) *Attendance* (your physical presence) in the classroom, during field study planning, and on field trips (please note that showing up late for class or an activity on more than two occasions is considered equivalent to missing one class period); and B) *Active participation* (quantity & quality of verbal interaction and/or other psychomotor tasks) during discussions, activities, field study planning, and field trips. NOTE: Once you have had a chance to speak/participate, please respect others need to do the same before you do so again. VALUE: 150 points (38%) total; 100 points (25%) associated with Environmental Sustainability, and the remaining 50 points (13%) associated with Field Planning. LATE POLICY: Not applicable (no make-up's for missed classes).

2. **Research Paper**

Each student will research a subject of interest and write a term paper on the selected topic. The paper must address the general subject and show evidence of the literature search, as well as any consequences for environmental sustainability. It should include all typical categories required in a professional paper: Title, introduction, subsections, conclusions (with recommendations for Costa Rica if needed), and references consulted. The title page should include the following information: Course, title, student name, and date. The length should be two pages, double-sided and double-spaced, in addition to the references (using no more than 2 pages double-sided to save paper). At least 4 references from scientific articles must be consulted (see supplemental materials for examples). Other sources (beyond the 4 articles) may include newspapers, web pages, and interviews. References within the text should follow the standard used in the Ecology Journals listed below. Possible topics include, but are not limited to, the following: Tropical environmental services, soil/water conservation, agroforestry, forest/wetland restoration, coral reefs, ecology of human health, ecotourism, habitat fragmentation, river restoration, organic/sustainable agriculture, pesticide use/effect, mangroves, tropical biodiversity, wildlife rehabilitation, etc. NOTE: For students enrolled at the graduate (post-baccalaureate) level, written papers will be held to a higher academic standard appropriate to the level of academic credit. In addition to all other criteria outlined here, this will consist of additional research (at least six references), as well as five pages in length (plus the bibliography for a maximum of three pages double-sided to save paper). VALUE: 100 points (25%) total. LATE POLICY: 10% deduction per day late.

3. *Research Presentation*

Once students have completed the above research assignment, they must prepare a brief 15 min. PowerPoint presentation about the topic. In addition to giving the presentation, the PowerPoint document itself must be emailed to the instructor for detailed evaluation by the due date (same as the presentation date). VALUE: 50 points (13%) total. LATE POLICY: Not applicable (no make-up's for missed presentations unless alternative arrangements are made ahead of time).

4. *Mid-Term and Final Quizzes*

At the middle and the end of the course, students will take comprehensive quizzes, which will include information from lectures, readings, assignments, and field trips. VALUE: 50 points (13%) each, 100 points (25%) total. LATE POLICY: Not applicable (no make-up's for missed quizzes unless alternative arrangements are made ahead of time).

Student Evaluation

The final letter grade for the course will be based on a maximum possible of 400 points according to the following grading scale:

93-100% = 372-400 pts. = A	77-79.9% = 308-319 pts. = C+
90-92.9% = 360-371 pts. = A-	73-76.9% = 292-307 pts. = C
87-89.9% = 336-359 pts. = B+	70-72.9% = 280-291 pts. = C-
83-86.9% = 332-335 pts. = B	65-69.9% = 260-279 pts. = D+
80-82.9% = 320-331 pts. = B-	60-64.9% = 240-259 pts. = D
	<60% = <240 pts. = F

Course Policies

Field Study Format. This course is designed to offer the student unique learning by doing opportunities through hands-on experiences. The course format will thus include significant field study as well as volunteer work at various sites. However, please remember that this is an academic experience equivalent to classroom time: Always adhere to all course and program policies, work safely in all activities, and have an emergency plan in mind at all times.

Field Study & Service-Learning Items. Please remember that various field study items are required for safety reasons. Although specific items will vary from site to site, the following general items are required for ALL overnight trips: a) A good *flashlight* with extra batteries; b) Basic *medical supplies* (anti-diarrhea and upset stomach medication, antiseptic, Band-Aids, antibacterial ointment, sting/itch reliever, motion sickness medication if applicable); c) *Enclosed shoes*; d) *Travel bag(s)/backpack*; e) *Water bottle* (at least 1 liter size); f) *Rain gear*; g) Required *personal medications*; h) Any type of *hat* (sun protection); i) *Sunscreen* and sunburn medication; j) *Notebook* for journal keeping; k) Portable Spanish-English *dictionary* or guidebook (not necessary for advanced Spanish speakers). For more details on service-learning/field study guidelines, see <http://www.earthedintl.org/Policies.htm#Academic>.

Absences. In accordance with general program policies, course absences will subject grades to being lowered. Unexcused absences from *class meetings* will subject the final course grade to a reduction of 1% (for 1 days missed), 2% (for 2 days missed), and 5% per day thereafter (for three or more days). Also note that excessive tardiness to class may be counted as missed class. Missed *field study/volunteer work days* will result in a 5% reduction in the final grade (1 day missed), and a 10% reduction per day thereafter (this is also considered class time). This means that if you are late and miss a departure for a field trip, you not only miss the trip, but also the equivalent amount of class time. For SPECIAL circumstances (beyond your control) where you are unable to attend, it is YOUR RESPONSIBILITY TO DIRECTLY CONTACT THE INSTRUCTOR PRIOR TO CLASS TIME, regardless of the reason for the absence. Otherwise, all policies previously outlined will be in force and there will be NO make-ups.

Participation. With the exception of illness, participants are expected to attend all program functions, activities, field trips, service-learning activities, guest presentations, etc. There are a variety of reasons for this including receiving academic credit for associated activities, facilitating program dynamics, assisting with personal adjustment issues, and contributing your effort toward group assignments.

Program Policies. Please be advised that all other policies identified on the program web site, and presented at the beginning of the program apply for the duration. See <http://www.earthedintl.org/Policies.htm> for details.

Course Outline

I. Environmental Sustainability: An Overview

- A. Introduction
- B. Environmental Quality in Costa Rica

II. Tropical Ecosystems

- A. Ecosystem Services
- B. Characteristics of Ecosystems
- C. Classification of Ecosystems
- D. Deforestation in the Tropics

III. Environmental Management & Protection

- A. Environmental Conservation: Costa Rica in Perspective
- B. Sustainable Management Techniques
- C. Environmental Protection: Anthropogenic Influences & Ecotourism

IV. Field Study Planning

- A. Logistics, Safety & Scheduling
- B. Socio-Personal & Cultural Considerations
- C. Field Study Planning & Monitoring
- D. Evaluation & Assessment

V. Summary & Conclusions

Course Schedule

WEEK	UNIT	TOPIC/ACTIVITY	READINGS & DUE DATES
1	IVA.	- Logistics, Scheduling (Mon, 20 Feb, Session I)	
	IA&B.	- Introduction - Environmental Quality in Costa Rica (6.3)	Montagnini, Ch. 1
2	IVA.	- Logistics & Safety	
	IIA.	- Tropical Ecosystem Services	Montagnini, Ch. 2
3	IVB.	- Socio-Personal & Cultural Considerations	
	IIB.	- Characteristics of Ecosystems	Montagnini, Ch. 3
4	IVB.	- Planning & Monitoring	
	IIC.	- Classification of Ecosystems *Mid-Term Quiz (14 Mar)*	Montagnini, Ch. 4
4	--	Field Trip	
5	IVC.	- Socio-Personal & Cultural Considerations	
	IID.	- Deforestation in the Tropics	Evans, Intro & Ch. 2
6	IVC.	- Planning & Monitoring	
	IIIA	- Environmental Conservation: Costa Rica in Perspective (6.2)	Montagnini, Ch. 7
7	IVD.	- Planning & Monitoring	
	IIIB	- Sustainable Management Techniques	Evans, Ch. 8 *Research Papers Due (4 Apr)*
8	IVD.	- Evaluation & Assessment	
	IIIC.	- Env. Protection: Anthropogenic Influences & Ecotourism *Research Presentations (11 Apr)*	Evans, Ch. 11
8	--	Field Trip	
9	--	*Final Quiz (18 Apr)*	
	V.	- Conclusions, grades, evaluations (Fri, 20 Apr, Session I)	

Supplemental Materials

Number	Reference
R1	Ceballo, G. et al. 2009. Conservation challenges for the Austral y Neotropical America Section. <i>Conservation Biology</i> 23(4):811-817.
R2	Chazdon, R. Tropical deforestation. Mongabay Interview. Internet.
R3	Clergeau, P. et al. 2006. Using hierarchical levels for urban ecology. <i>Trends in Ecol & Evol.</i> 21(12):660-661. Grim, N. 2008. Global Change and the ecology of cities. <i>Science</i> , 318: 756
R4	Cramer, W. et al. 2004. Tropical forests and the global carbon cycle: impacts of atmospheric carbon dioxide climate change and rate of deforestation. <i>Phil. Trans. R. Soc. Lond.</i> 359:331-343
R5	Dirzo, R. y A. Miranda. 1990. Contemporary neotropical defaunation and forest structure function and diversity. A sequel to John Terborgh. <i>Conservation Biology</i> 4(4):444-447
R6	Laurence, WF. 2006. Have we overstated the tropical biodiversity crisis? <i>Trends in Ecology and Evolution</i> 22(2): 65-70
R7	Shochat, E, et al. 2006. From patterns to emerging processes in mechanistic urban ecology. <i>Trends in ecology and evolution</i> 21(4):186-191
R8	Boza, M. 2002. Conservation in action. Past present and future of the national park systems of Costa Rica. <i>Conservation Biology</i> 7(2):239-247
R9	Silver, W., S. Brown, and A. Lugo. 1995. Effects of changes in biodiversity on ecosystems function in tropical forests. <i>Conservation Biology</i> 10(1):17-24.
R10	Wunder, S. 2007. The efficiency of payments for environmental services in tropical conservation. <i>Conservation Biology</i> 21(1):48-58

Additional Resources

- Gaston, K. 2000. Global patterns in biodiversity. *Nature* 405: 220-227
- Wilmers, CC. 2007. Understanding ecosystem robustness. *TREE* 22(10): 504-506
- Holl, K. et al. 2000. Tropical montane forest restoration in Costa Rica: overcoming barriers to dispersal and establishment. *Restoration Ecology* 8(4): 339-349
- Schlesinger, W.H. 2006. Global change ecology. *TREE* 21(6): 348-351
- Sánchez-Azofeifa et al. 2007. Costa Rica's Payment for environmental services Program: intention, implementation, and impact. *Conservation Biology* 5:1165-1173.
- Wunder, S. 2006. Are direct payments for environmental services spelling doom for sustainable forest management in the tropics. *Ecology and Society* 11(2):23
- Frankie, G. W., A. Mata and S. Bradleigh Vinson. 2004. Biodiversity conservation in Costa Rica: Learning the lessons in a seasonal dry Forest. Univ of California Press, USA. 341 p.
- Gentry, A.H. 1993. Four Neotropical Rainforests. Yale University Press, New Haven.
- Head, S. & R. Heinzman, eds. 1990. Lessons of the rainforest. Sierra club Books, USA. 275 p.
- Janzen, D.H., ed. 1983. Costa Rican Natural History. University of Chicago Press. Chicago, Illinois. USA.
- Kapelle, M. y A. D. Brown, Eds. 2001. Bosques nublados del Neotropico. Editorial INBio, Costa Rica. 698p.
- McDade, L.A., K. S. Bawa, H. A. Hespenheide and G. S. Hartshorn, Eds. 1994. La Selva: Ecology and Natural History of a Neotropical Rain Forest. University of Chicago Press, Chicago.
- Obando, V. 2002. Biodiversidad en Costa Rica- estado del conocimiento y gestión. Editorial INBio. Costa Rica. 82p.
- Primack, R. B. 2002. Essentials of Conservation Biology. 3RD Ed. Sinauer Associates. Wisconsin, USA. 698p.

Some Internet Resources Useful for the Course:

- National Biodiversity Institute (INBio) of Costa Rica: <http://www.inbio.ac.cr/ES/en/default2.html>
- Costa Rican Ecosystems: <http://www.inbio.ac.cr/ES/ecomapas/ecomapas.html>
- World Wildlife Fund – Central America: <http://www.wwfca.org/>
- Tropical Ecology, Assessment & Monitoring (TEAM) Initiative: <http://www.teaminitiative.org/>
- SER: The society for ecological restoration: <http://www.ser.org/>
- Ecology and Society: <http://www.ecologyandsociety.org/>
- Costa Rica Conservation Trust: <http://conservecostarica.org/>
- Sistema Nacional de Áreas de Conservación: <http://costarica-nationalparks.org/>

Brief list of some key periodicals related to environment & conservation in the tropics:

- Tropical Ecosystems: Ecology, Journal of Tropical Ecology, Revista de Biología Tropical, Biotropica, Ectrópicos
- Env. Conservation: Forest Ecology & Management, Conservation Biology, Restoration Ecology, Vida Silvestre Neotropical
- Anthropogenic Influences: Ecology & Society, New Forests, Biocenosis, Ambientico
- Also you can check the following internet pages for a fun list of ecological and environmental journals:
http://faculty.unlv.edu/abellas2/ecology_journals.htm & <http://www2.lib.udel.edu/subj/agr/ejmls/ecology.htm>