

Earth Education International  
**Environment and Conservation in the Tropics**  
**Natural Resource Planning & Interpretation (NRPI) 480**  
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**COURSE DESCRIPTION**

An overview of environment and conservation in the tropics, with emphasis on Costa Rica. Fundamental principles of ecosystems, biological diversity, conservation, restoration, environmental services, and human impact. Includes lecture, class discussions based upon assigned readings, and field study (3 cr.). No Prerequisite.

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**COURSE OBJECTIVES**

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

1. Describe basic elements of tropical ecosystems and their characteristics
2. Analyze anthropogenic environmental impacts in the tropics
3. Evaluate historical and political contributions to conservation in Costa Rica
4. Synthesize ecological perspectives to conservation and restoration

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**COURSE OUTLINE**

***I. Introduction***

- A. Course overview
- B. Environment & conservation in the tropics
- C. Natural history of Costa Rica: Biodiversity and the physical environment

***II. Tropical Ecosystems***

- A. Tropical ecology: An overview
- B. Tropical community ecology and ecosystem function
- C. Systematics: Flora & fauna
- D. Aquatic and terrestrial ecosystems in Costa Rica

***III. Environmental Conservation***

- A. Historical & social perspectives
  1. National parks & protected areas
  2. Ecotourism
- B. Ecological principles: Diversity, endemism & extinctions
- C. Preservation & Restoration Ecology
  1. *In situ* and *ex situ* conservation
  2. Collections & artificial reproduction
  3. Restoration, rehabilitation, mitigation
  4. Environmental services
- D. Agroecology

***IV. Anthropogenic Influences***

- A. Agriculture: Coffee, bananas, sugar cane, etc.
- B. Deforestation & cattle ranching
- C. Habitat degradation and fire
- D. Urban ecology and human health: Population growth, pollution & waste
- E. Current Issues in Environment and Conservation

***V. Summary & Conclusions***

## COURSE GRADING

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<b>Course evaluation procedures</b>	
1- Assignments, reading tests, participation (includes class attendance and case postings)	20%
2- Field trips (participation 10%; reports 10%)	20%
3- Term paper (10%) and presentation (10%)	20%
4- Mid term and final tests	40%
<b>TOTAL</b>	<b>100%</b>

### Grade equivalence:

97-100% = A+	77-79.9% = C+
93-96.9% = A	73-76.9% = C
90-92.9% = A-	70-72.9% = C-
87-89.9% = B+	65-69.9% = D+
83-86.9% = B	60-64.9% = D
80-82.9% = B-	<60% = F

It is the responsibility of the students to keep track of course requirements (due dates and requisites for documents). If a student skips a class, it is his/her responsibility to find out if there were assignments or announcements given during the class.

## COURSE REQUIREMENTS

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### 1. Assignments, readings tests and participation

The assignments will be indicated through the course. Subjects and due dates to be announced or already included in the program. Reading materials will be provided and evaluated every week. The assignments will include readings, summaries, presentations, and group discussions. One case posting will be requested for each student on a selected subject related with any of our field trips. Details about how to make and post the information will be offered at the beginning of the course.

### 2. Field trips

Two field trips will be required for the course. Both participation during the field trip (10%) as well as elaboration of a report (10%) will be evaluated. Report due date is indicated in the schedule

### 3. Term paper and presentation

Each student will investigate a subject of interest and will develop a term paper and will prepare a brief (20-min presentation) about it. The students must turn in the written paper the day of the presentation. Format and requirements:

- The written paper should include all the general parts required in a paper: title, introduction, subsections, conclusions (and recommendations for Costa Rica if needed) and references (only the ones consulted).
- Title Page: Institution, course, title, student name, date.
- Length: at least 6 pages of text (besides the title page and the references).
- Paper: typed in 8 ½ x 11 " paper, with a font of 12 Arial-type letter, 1.5 spaces. Margins: 3".
- At least 4 references **from scientific articles** (from periodicals). In addition, other sources that may be included (beyond the 4 articles) are newspapers, web pages, interviews. References within the text should follow the standard used in the Ecology Journals listed below.

Internet pages are not primary sources of information.

- A list of suggested topics follows, but the class is open to other topics related to the subject. Discuss with the professor about these and other subjects.

	<b><i>Suggested topics for term paper</i></b>
1	Conservation and people in Costa Rica
2	Agroforestry
3	Forest restoration
4	Coral reefs and climate change
5	Ecology of Human Health
6	Economy and Ecology: kin or enemies?
7	Ecotourism and conservation: myth or reality?
8	Habitat fragmentation and species distribution
9	River restoration
10	Human impact on conservation areas
11	The effects of dry seasons on species ecology
12	Monitoring and Conservation
13	Nutrient cycling ecology and agriculture
14	Pros and cons of organic agriculture
15	Relationship of diseases outburst and human distribution
16	Water and ecology
17	Sustainable agriculture
18	The effects of pesticides on terrestrial ecology
19	The impact of agriculture on tropical soils
20	The importance of mangroves for land protection and sea production.
21	Tropical soil conservation

#### **4. Mid-term and Final tests**

At the middle and the end of the course, students will take comprehensive written final tests (20% each), which will include all information studied during the course (lectures readings, assignments and field trips).

### **COURSE MATERIALS**

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Class lectures and discussion will be based on required readings, which will be provided in the form of a course packet, as well as handouts during the semester (or in electronic form, if available). The packet will contain journal articles and selected readings. There will a specific reading indicated here that will be evaluated in a 10 minutes test at the beginning of each class.

#### **Assigned Readings:**

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

Novotny V. and Y Basset. 2005. Host specificity of insect herbivores in tropical forests. *Proc. Royal Society B* 272: 1083-1090.

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 (online)

- Laurence, WF. 2006. Have we overstated the tropical biodiversity crisis? *Trends in Ecology and Evolution* 22(2): 65-70
- Gaston, K. 2000. Global patterns in biodiversity. *Nature* 405: 220-227
- Wilmers, CC. 2007. Understanding ecosystem robustness. *TREE* 22(10): 504-506
- Bradley C.A. and S. Altizer. 2006. Urbanization and the ecology of wildlife diseases. *Trends in Ecology and Evolution* 22(2): 95-102
- 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

### **Additional References:**

Some extra material will be available from the following main references to complement the lectures, among others:

- 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. 3<sup>RD</sup> Ed. Sinauer Associates. Wisconsin, USA. 698p.

**NOTE:** Currently, there is also a variety of Field Guides for Costa Rica that are a good companion (eg., Birds, mammals, amphibians, whales & dolphins, fish, butterflies, trees, mushrooms, wildlife, etc.).

### **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 Areas 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, Ecotrópicos

**Environmental Conservation:** Forest Ecology and 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://faculty.unlv.edu/abellas2/ecology_journals.htm) and <http://www2.lib.udel.edu/subj/agr/ejrnls/ecology.htm>

## COURSE SCHEDULE

WEEK	DATE	TOPIC	ACTIVITIES
1	Mon Feb 14 Session III & IV: 13:30	Introduction Class 1: Course overview Environment & conservation in the tropics Class 2: Natural history of Costa Rica: Biodiversity and the physical environment	Readings
1	Tue Feb 15 Session III & IV: 13:30	Class 3: : Natural history of Costa Rica: Biodiversity and the physical environment Class 4: Tropical ecology: An overview	Reading 1
2	Tue Feb 22 Session III & IV: 13:30	Class 5: Tropical community ecology and ecosystem function Class 6: Aquatic and terrestrial ecosystems in Costa Rica	Readings 2 :
3	Tue Mar 1 Session III & IV: 13:30	Class 7: Historical & social perspectives Class 8: Historical & social perspectives	Readings 3: <b>Invited speaker</b>
4	Tue Mar 8 Session III & IV: 13:30	Class 9: Ecological principles: Class 10: Ecological principles:	Reading 4 Presentation 1
5	Tue Mar 15 Session III & VI: 13:30	Class 11: Preservation & Restoration Ecology Exam 1 (1.5 hours)	Reading 5 : Presentation 2
5	Mar. 19-20	Field Trip:	Cerro de la Muerte
6	Tue Mar 22 Session III & VII: 13:30	Class 12: Preservation & Restoration Ecology Class 13: Agroecology	Reading 6: Presentation 3
7	Tue Mar 29 VIII:13:30	Class 14: Agriculture: Coffee, bananas, sugar cane, etc Class 15: Deforestation & cattle ranching and Habitat degradation and fire	Deadline fieldtrip 1. Reading 7 : Presentation 4
8	Tue Abr 5 Session III & IV: 13:30	Class 16: Urban ecology and human health: Population growth, pollution & waste Class 17: Current Issues in Environment and Conservation	Reading 8 <b>Invited speaker</b> Presentation 5
8	Abr. 9-10	Field Trip:	Volcán Tenorio, Mangroove and Dry forest
9	Tue Abr 12 Session III & IV: 13:30	Exam 2 (2 hrs.)	Presentation 6 and 7. Deadline Field trip 2.
9	Fri Abr. 15 Session I & II: 8:30	Grading	Last meeting