CIEE Monteverde, Costa Rica

Course name:	Sustainability: Environment, Economy, and Society
Course number:	ENVI 3001 MTVE
Programs offering course:	Costa Rica, Monteverde - Sustainability and the Environment
Language of instruction:	English
U.S. Semester Credits:	4
Contact Hours:	60
Term:	Spring 2020

Course Description

The United Nations World Commission on Environment and Development (1987), in its seminal publication of the Brundtland Report, defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The conceptual framework proposed to the global community therein was the first to articulate the importance of evaluating development based upon its concomitant environmental, economic and social merit, or what is now commonly referred to as the triple bottom line. This course introduces the interdisciplinary concept and practice of sustainable development and explores contemporary development issues drawn from examples in the Monteverde region, throughout Costa Rica, and around the world. We focus on "systems thinking" and the principal systems that we explore are energy systems, food systems, aquatic ecosystems, international trade and tourism systems All under the framework of system resilience.

Learning Objectives

The knowledge and skills derived from this course will prepare students to:

- Understand the concept of planetary boundaries and Global Change in the social, economic and environmental context of the tropics.
- Understand, analyze, and critique the resilience and adaptability of critically important economic, social, and environmental systems of Costa Rica. Examples include: energy systems, water systems, food systems, international travel and tourism systems.
- Explain major trends associated with urbanization and population growth in Costa Rica; link urban poverty and wealth to issues of environmental injustice; critically assess whether the conditions for environmental justice have been met in a case study of a Costa Rican marginal community
- Interpret eco-labels and sustainability certification; critically examine tourism and agriculture certification for evidence of 'green-washing' versus transparent and honest advertising; identify key advantages of eco-labeling and ways to minimize their downsides
- Compare and contrast cradle-to-grave versus cradle-to-cradle production principles; identify and critically assess life cycle stages for common household products; draw parallels between natural cycles and cradle-to-cradle production; explain the shortcomings of the cradle-to-cradle paradigm
- Understand and explain the basic components and operations of power plants that convert water, wind, geothermal heat, plants, and fossil fuels into electricity in Costa

Rica; debate the advantages and disadvantages of alternative energies in Costa Rica in terms of their social, economic, and environmental impacts

- Define “common-pool resources” and give examples of them in Costa Rica; explain the requirements for their adaptive governance; critically assess whether Costa Rican fisheries clamming industries are being adaptively governed, Ostrom (2008)
- Describe and explain the basic production methods as well as the socio-political and economic history of coffee, bananas, cacao, and pineapple in Costa Rica; analyze and evaluate the overall sustainability of Costa Rica’s principal cash crops in terms of the three pillars of sustainability; critique Costa Rica’s agricultural trade and production practices in terms of dependency theory, food sovereignty and food security
- Understand the differences between rural, adventure, and eco- tourism, and be able to judge conditions under which they lead to tourism treadmills and mass tourism; critically judge whether eco-tourism undermines or enhances the protection of biodiversity in Monteverde; analyze and articulate the potential for tourism as a poverty-reduction strategy in indigenous communities
- Relate poverty and poverty traps to food security and food sovereignty. Asses the sustainability of different types of agriculture and their potential within the context of Global Change.

Course Prerequisites: No prerequisites for this course.

Methods of Instruction:

This course is taught through the use of lectures, readings, field visits, interviews, surveys, group discussions, debates, and written assignments. Field excursions in Monteverde, throughout Costa Rica, and into Panama provide opportunities to link theory with practice plus engage stakeholders in discussion. Completing the required text and readings is an essential component to the individual and collective learning experience of this course and is expected. You should have copies of the required textbooks for their own use. A course folder (binder), containing the additional readings (listed above), is in the CIEE Study Center student. PowerPoint lectures are maintained on the CIEE Study Center student computers.

Assessment and Final Grade

Participation in class and field	10%
Worksheets	20%
Midterm exam	20%
Final exam	20%
Quizzes	30%

Course Requirements

Classroom and field participation (10%). Attendance and participation is noted for each lecture, discussion, and field activity. Points are earned for thoughtful commentary, questions, and overall engagement.

Worksheets (20%). There will be take-home assignments in the form of worksheets (including short answer and essay questions) regarding each unit of the course.

Midterm exam (20%). You will take a 100-point exam consisting of multiple choice, short answer, and essay questions on materials related to the lectures, field activities, and assigned readings. Lectures, discussions, activities, and readings that are included on the midterm are indicated in the schedule below, as is a set of midterm review questions.

Final Exam (20%). You will take a 100-point exam consisting of multiple choice and short essay questions on materials related to the lectures, field activities, discussions, and assigned readings. Lectures, activities, discussions, and readings that are included on the final exam are indicated in the schedule below.

Quizzes (5; 30% total). You will take a total of 5 quizzes. The first half of each quiz will be made of short answer and true/false questions to be answered in class.

Weekly Schedule

Week 1 Topic: Orientation to the program, Introduction to sustainability and the Anthropocene

1.1 Lecture. “Concepts and Indicators of Sustainability”. The 3 pillars of sustainability, the Brundtland Report definition, intergenerational equity, Rio Declaration of rights and responsibilities; Doughnut economics; I = PAT; ecological footprints; ecological overshoot.

Readings
World Commission on Environment and Development. (1987).
Raworth,K. (2018)
Population Reference Bureau staff (2004).
Bryant, B. (2015)
IPCC (2018)

1.2 Lecture. “Global Change: Trends in the Age of the Anthropocene”. Population growth worldwide and in CR; rural-urban; Demographic transitions; Planetary Boundaries: climate change, ocean acidification, novel entities, ozone depletion,

atmospheric loading, biogeochemical flows, freshwater use; land systems change; biosphere integrity, Environmental justice.

1.3 Lecture. “Global Change: Trends in the Age of the Anthropocene”. Population growth worldwide and in CR; rural-urban; Demographic transitions; Planetary Boundaries: climate change, ocean acidification, novel entities, ozone depletion, atmospheric loading, biogeochemical flows, freshwater use; land systems change; biosphere integrity, Environmental justice.
Discussion: The Anthropocene debate.

1.4 Lecture. “Resilience and systems thinking”. Systems thinking, complex adaptive systems, adaptive cycle, socio-ecological systems, Characteristics of resilient systems.

1.5 Excursion. Visit to La Carpio landfill and community.

1.6 Discussion. Environmental justice in landfill communities
Readings.
Complex Adaptive Systems (2017)
Walker & Salt (2006)

Week 2 **Topic: Common pool resources**

2.1 “Common-pool Resources”. Definitions and examples of commons, common pool resources, stakeholder mapping, subtractable resources, and the tragedy of the commons; governance vs. adaptive governance; requirements (and enhancing factors) for adaptive governance of common pool resources and for creating institutional sustainability; examples of CPRs from Costa Rica; case studies of clamming and fishing associations of Isla de Chira, learn to do a rapid resilience evaluation.

2.2 Excursion: Field trip to Chira Island and fishing community
Interviews with key informants about the community managed resources

2.3 Discussions and assignment.
Sustainability of the Palito Fisher’s association
Assignment 1: Application of Ostrom’s requirements for adaptive management to Chira’s fisher’s association.

2.4 Assessment (in class). Quiz 1: Covers readings to date

Week 3 **Topic: Sustainable energy production**

3.1 Lecture. “Energy Distribution and Consumption in Costa Rica.” Basic Energy terminology. Energy sources and storages. Essential Background for Field Trip 1. Energy consumption by sector; electricity for export; SIEPAC; consumption trends for electricity and for transportation fuel; Clean Development mechanisms of the Kyoto Protocol.

Readings.

Partridge, W.L. (1993)

3.2 Lecture. “Hydropower”. Basic mechanics, types of hydro-electric plants, trends and changes in technology, impacts of hydroelectric dams. Case studies: Arenal and Diquís. Costa Rica’s future plans for hydropower.

3.3 Lecture. “Wind energy”. Basic mechanics, types of wind turbines, trends and changes in technology, impacts wind farms, Case studies Costa Rica (CDM, carbon trading and BOT modality).

3.4 Excursion. Visit to hydroelectric plant.
Discussion: Sustainability of the Arenal hydropower plant project

3.5 Excursion. Visit to Wind farm

3.6 Discussion. The challenge of switching from fossil fuels to renewable energies

3.7 Assessment in class. Quiz 2: Covers readings

Week 4 **Topic: Sustainable energy production, continued**

4.1 Lecture. “Geothermal power”. Basic mechanics, types of geothermal turbines, trends and changes in technology, Impacts and limitations of geothermal energy, Case study: Costa Rica.

4.2 Lecture. “Solar energy”. Basic mechanics, types of solar energy available, trends and changes in technology, Impacts and limitations of solar energy, solar energy storage, Costa Rica’s solar potential and solar plans.

4.3 Excursion. Visit to Geothermal plant

4.4 Excursion. Visit to Solar plant

4.5 Excursion. Visit to Rincon de La Vieja National Park

4.6 Discussion. Sustainability of Using National Parks for energy production
Assignment. Sustainability evaluation of electric production technologies.

Week 5 **Midterm exam**

Week 6 **Topic: Fresh water Resources and Sustainable Tourism in the Tropics**

6.1 Lecture. “Freshwater Resources in Costa Rica: Legal framework for freshwater use and protection; management and distribution of freshwater in city and rural settings; freshwater consumption by sector; water footprints of important Costa Rican crops; freshwater conflicts in Costa Rica and Monteverde; treatment and disposal of grey and black water in city and rural settings; water use in relation to

tourism development. Previously students should interview their homestay families about where their water comes from, where does their waste water go to? And whether they perceive there is a water problem (drinking and waste waters) in Costa Rica.

Readings.
Honey (2008)
Davis (2009)

6.2 Lecture. “Tourism”. Global Trends and Costa Rican Trends. Eco-, agro-, rural, and mass tourism defined and distinguished; tourism treadmills explained with examples from Costa Rica; history of tourism and conservation in Monteverde; introduction to MV’s original watershed, Monteverde Cloud Forest Preserve, Children’s Eternal Rainforest, Monteverde Conservation League; tourism infrastructure in MV; use, abuse, and protection of local resources; impacts of visitation on the human community; tourism certification; third party versus first party certification; green-washing; certification pitfalls, myths, and impacts on consumer psychology, especially in context of eco-tourism

6.3 Excursion. Visit to Monteverde Cloud Forest Reserve

6.4 Excursion. Visit to Certified Sustainable Hotel

6.5 Documentary and Discussion.
Documentary. Cracking the Golden Egg (2008)
Discussion. Tourism and freshwater issues in Costa Rica.

6.6 Documentary and Discussion.
Documentary. Gringo Trails (2012)
Discussion. Can tourism really be sustainable?
Assignment. Sustainable tourism assessments.

6.7 Assessment in class
Quiz 3: Covers readings

Week 7 No SEES Classes

Week 8 Topic: Food production

8.1 Lecture. “Food Security, community food security, food sovereignty”. Food production, famine, and food availability in the tropics; the Green Revolution; concepts of food security, community food security, and food sovereignty compared; rise of transnationals and corporate agriculture. Coffee and food security.
Readings
Clapp, J. (2010)
Chappell, M. J., et al. (2013)
Lutz, A.E., et al. (2007)

8.2 Lecture. “Conventional agriculture in the Tropics”. Legacy of the green revolution. Industrialized agriculture, synthetic fertilizers, synthetic pesticides (POPs), GMO’s. Banana and pineapple farming in Costa Rica.

8.3 Lecture. “Livestock production”. Why livestock? Why not livestock? World trends in animal product consumption. Impact mitigation. History of dairy farming in Costa Rica and in Monteverde; dairy cattle-pig connection; water and carbon footprints, waste water, and other environmental impacts of large and small dairy and pig production systems; economics of dairy and pig farming in Monteverde; livestock husbandry in CAFO’s contrasted with traditional Monteverde farms.

8.4 Excursion: Visit to integrated livestock farm
Discussion: Ethics of meat eating.

Week 9 **Topic: Food production, continued**

9.1 Excursion: Visit to traditional coffee farm
Discussion: Future of coffee production?

9.2 Excursion: Visit to organic farm

9.3 Presentation (Assignment). Presentations to decision makers on climate smart practices for Monteverde.

9.4 Assessment in class
Quiz 4: Covers readings

Week 10 **No SEES Classes**

Week 11 **Food and forests**

11.1 Lecture. “Agroforestry”. Agroforestry production basics; agroforestry contrasted with permaculture; history and trends in cacao production and consumption; Monilia infections; livelihood analysis for Talamanca cacao farmers; BriBri cacao production.

Readings
Shaver et al.(2015)
Dahlquist et al. (2007)

11.2 Lecture. “Alternative agricultural practices”. Overview of alternative farming trends. Organic agriculture, 11.permaculture, hydroponics and vertical farming. Benefits and impacts of each type of agriculture. How are pests managed and where do fertilizers come from in this type of agriculture.

11.3 Excursion. Visit to permaculture farm

11.4 Excursion. Visit to Fair-trade Banana Coop in Panama

Discussion. Fair trade in industrialized agriculture.

Week 12 Food and forests, continued
12. 1 Excursion. Visit to Traditional Cacao plantation in Bribri Indigenous Territory
Discussion. Food security and resilience in Bribri agroforestry.

12.2 Excursion. Visit to Organic Pineaple plantation in the Atlantic lowlands
Discussion. How sustainable is organic pineapple?

Week 13 Food and forests, continued
13.1 Assignment (in class): Creating a sustainability evaluation for food production systems

Week 14 Circular economies; Final Exam
14.1 Lecture. "Introduction to circular economies in theory and practice".
Quiz 5 on Cradle to Cradle book.

Readings
McDonough & Braungart (2002)

14. 2 Lecture and quiz.
Lecture. "Great problems great solutions". Course wrap up.

14.3 Final exam

Readings

Bryant, B. (2015). Environmental justice. Retrieved 10 August 2015 from http://www.eoearth.org/view/article/51cbedbe7896bb431f693980

Chappell, M. J., Wittman, H., Bacon, C. M., Ferguson, B. G., Barrios, L. G., Barrios, R. G., Jaffee, D., Lima, J., Méndez, V. E., Morales, H., Soto-Pinto, L., Vandermeer, J., & Perfecto, I. (2013). Food sovereignty: an alternative paradigm for poverty reduction and biodiversity conservation in Latin America [v1; ref status: indexed, http://f1000r.es/23s] F1000Research 2:235. doi: 10.12688/f1000research.2-235.v1.

Clapp, Jennifer. 2012. Food. London: Polity Press.

Dahlquist, R. M., Whelan, M. P., Winowiecki, L., Polidoro, B., Candela, S., Harvey, C. A., Wulfhorst, J. D., McDaniel, P. A., & Bosque-Pérez, N. A. (2007). Incorporating livelihoods in biodiversity conservation: A case study of cacao agroforestry systems in Talamanca, Costa Rica. Biodiversity Conservation 16, 2311-2333. doi: 10.1007/s10531-007-9192-4.

Davis, J. (2009). The creation and management of protected areas in Monteverde, Costa Rica. Global Environment 3-2009. Retrieved 7 January 2013, from http://www.globalenvironment.it/DAVIS.pdf. Pp 96-119

FAO (2013) Climate Smart Agriculture Sourcebook. E-ISBN 978-92-5-107721-4 (PDF). Executive Summary. Rome: Food and Agriculture Organization of the United Nations,.

Hawken, P. (2017). Drawdown: The most comprehensive plan ever proposed to reverse global warming. New York, New York: Penguin Books.

Honey, M. (2008). Ecotourism and sustainable development: Who owns paradise? 2nd edn., pp. 202-214. Washington: Island Press.

IPCC (2018) Global warming of 1.5°C: Summary for Policymakers. Intergovernmental Panel on Climate Change, Pp. 6-19.

Lutz, A.E., Swisher, M. E., & Brennan, M. A. (2007). Defining community food security. University of Florida, IFAS Extension. Document AEC 383. Retrieved 7 January 2013, from: http://edis.ifas.ufl.edu/wc064

McDonough, W., & Braungart, M. (2009). Cradle to cradle: Remaking the way we make things. London: Vintage.

Partridge, W.L. (1993) "Successful Involuntary Resettlement: Lessons from the Costa Rican Arenal Hydroelectric Project." In Anthropological approaches to Resettlemment. Policy, Practice, and Theory. Cerna, M.M. and Guggenheim, S.E. Editors. Westerview Press, San Francisco

Ostrom, E. (2008). The challenge of common-pool resources. Environment, 50, 8-21, doi: 0.3200/ENVT.50.4.

Population Reference Bureau staff (2004). Transitions in World Population. Population Bulletin Vol. 59. No 1. Population Reference Bureau. Pp1- 22.

Shaver, I. et al.(2015) Coupled social and ecological outcomes of agricultural intensification in Costa Rica and the future of biodiversity conservation in tropical agricultural regions. Global Environmental Change 32 (2015) Pp. 74-86.

Walker, B. & Salt, D. (2006). Resilience thinking: Sustaining ecosystems and people in a changing world. Island Press: Washington, D.C. (Chapters 1, 2, 3 and 6)

World Commission on Environment and Development. (1987). Our Common Future. (pp. 44-65). Oxford: Oxford University Press.

Online Resources

Raworth,K. (2018)A healthy economy should be designed to thrive, not grow. https://www.ted.com/talks/kate_raworth_a_healthy_economy_should_be_designed_to_thrive_not_grow

Systems Academy. (2015) Complex Adaptive Systems. https://www.youtube.com/watch?v=jBgq9eS6t_I&list=PLsJWgOB5mIMCiKZu61rKFT_-TncWzylN8&index=3