



CIEE Monteverde, Costa Rica

Course title:	Sustainability: Environment, Economy, and Society
Course code:	ENVI 3001 MTVE
Programs offering course:	Monteverde SE
Language of instruction:	English
U.S. semester credits:	4
Contact hours:	60
Term:	Fall 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

By completing this course, students will:

- 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. Assess the sustainability of different types of agriculture and their potential within the context of Global Change.



None.

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

1. Worksheets	20%
2. Midterm Exam	20%
3. Final Exam	20%
4. Quizzes (5)	30%
5. Classroom and Field Participation	10%
TOTAL	100%

Course Requirements

Worksheets

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

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



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)

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.

Classroom and Field Participation

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

Weekly Schedule

Week 1

Class 1.1 Orientation to the program, Introduction to sustainability and the Anthropocene

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)

Class 1.2 Orientation to the program, Introduction to sustainability and the Anthropocene

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

Class 1.3 Orientation to the program, Introduction to sustainability and the Anthropocene

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.

Class 1.4 Orientation to the program, Introduction to sustainability and the Anthropocene

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

Class 1.5 Orientation to the program, Introduction to sustainability and the Anthropocene

Excursion. Visit to La Carpio landfill and community.

Class 1.6 Orientation to the program, Introduction to sustainability and the Anthropocene

1.6 Discussion. Environmental justice in landfill communities

Readings.

Complex Adaptive Systems (2017)

Walker & Salt (2006)

Week 2

Class 2.1 Common pool resources

“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.

Class 2.2 Common pool resources

Excursion: Field trip to Chira Island and fishing community

Interviews with key informants about the community managed resources

Class 2.3 Common pool resources

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.

Class 2.4 Common pool resources

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

Week 3

Class 3.1 Sustainable energy production

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)

Class 3.2 Sustainable energy production

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.

Class 3.3 Sustainable energy production

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).

Class 3.4 Sustainable energy production

Excursion. Visit to hydroelectric plant.

Discussion: Sustainability of the Arenal hydropower plant project

Class 3.5 Sustainable energy production

Excursion. Visit to Wind farm

Class 3.6 Sustainable energy production

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

Class 3.7 Sustainable energy production

Assessment in class. Quiz 2: Covers readings

Week 4

Class 4.1 Sustainable energy production, continued

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

Class 4.2 Sustainable energy production, continued

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.

Class 4.3 Sustainable energy production, continued

Excursion. Visit to Geothermal plant

Class 4.4 Sustainable energy production, continued

Excursion. Visit to Solar plant

Class 4.5 Sustainable energy production, continued

Excursion. Visit to Rincon de La Vieja National Park

Class 4.6 Sustainable energy production, continued

4.6 Discussion. Sustainability of Using National Parks for energy production

Assignment. Sustainability evaluation of electric production technologies.

Week 5

Class Midterm Exam

Week 6

Class 6.1 Fresh water Resources and Sustainable Tourism in the Tropics

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)

Class 6.2 Fresh water Resources and Sustainable Tourism in the Tropics

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

Class 6.3 Fresh water Resources and Sustainable Tourism in the Tropics

Excursion. Visit to Monteverde Cloud Forest Reserve

Class 6.4 Topic: Fresh water Resources and Sustainable Tourism in the Tropics

Excursion. Visit to Certified Sustainable Hotel

Class 6.5 Fresh water Resources and Sustainable Tourism in the Tropics

Documentary and Discussion.

Documentary. Cracking the Golden Egg (2008)

Discussion. Tourism and freshwater issues in Costa Rica.

Class 6.6 Fresh water Resources and Sustainable Tourism in the Tropics

Documentary and Discussion.

Documentary. Gringo Trails (2012)

Discussion. Can tourism really be sustainable?

Assignment. Sustainable tourism assessments.

Class 6.7 Fresh water Resources and Sustainable Tourism in the Tropics

6.7 Assessment in class

Quiz 3: Covers readings

Week 7

Class No SEES Classes

Week 8

Class 8.1 Food Production

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)

Class 8.2 Food Production

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.

Class 8.3 Food Production

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.

Class 8.4 Food Production

Excursion: Visit to integrated livestock farm

Discussion: Ethics of meat eating.

Week 9

Class 9.1 Food production, continued

Excursion: Visit to traditional coffee farm

Discussion: Future of coffee production?

Class 9.2 Food production, continued

Excursion: Visit to organic farm

Class 9.3 Food production, continued

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

Class 9.4 Food production, continued

Assessment in class

Quiz 4: Covers readings

Week 10

Class No SEES Classes

Week 11

Class 11.1 Food and Forests

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)

Class 11.2 Food and Forests

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.

Class 11.3 Food and Forests

Excursion. Visit to permaculture farm

Class 11.4 Food and Forests

Excursion. Visit to Fair-trade Banana Coop in Panama

Discussion. Fair trade in industrialized agriculture.

Week 12

Class 12.1 Food and forests, continued

Excursion. Visit to Traditional Cacao plantation in BriBri Indigenous Territory



Discussion. Food security and resilience in Bribri agroforestry.

Class 12.2 Food and forests, continued

Excursion. Visit to Organic Pineapple plantation in the Atlantic lowlands

Discussion. How sustainable is organic pineapple?

Week 13

Class 13.1 Food and forests, continued

Assignment (in class): Creating a sustainability evaluation for food production systems

Week 14

Class 14.1 Circular economies; Final Exam

Lecture. "Introduction to circular economies in theory and practice".

Quiz 5 on Cradle to Cradle book.

Readings

McDonough & Braungart (2002)

Class 14.2 Circular economies; Final Exam

Lecture and quiz.

Lecture. "Great problems great solutions". Course wrap up.

Class 14.3 Circular economies; Final Exam

Final exam

Course Materials

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 1.5oC: 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 Resettlement. Policy, Practice, and Theory*. Cerna, M.M. and Guggenheim, S.E. Editors. Westview 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

Systems Academy. (2015) Complex Adaptive Systems.
https://www.youtube.com/watch?v=jBgg9eS6t_I&list=PLsJWgOB5mIMCiKZu61rKFT_-T