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.

Course Prerequisites
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 30%
5. Classroom & 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

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 & Field Participation

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

Attendance

Regular class attendance is required throughout the program, and all absences will result in a lower participation grade for any affected CIEE course. Due to the intensive schedules for Open Campus and Short Term programs, absences that constitute more than 10% of the total course will result in a written warning.

Students who transfer from one CIEE class to another during the add/drop period will not be considered absent from the first session(s) of their new class, provided they were marked present for the first session(s) of their original class. Otherwise, the absence(s) from the original class carry over to the new class and count against the grade in that class.

For CIEE classes, excessively tardy (over 15 minutes late) students must be marked absent.

Attendance policies also apply to any required co-curricular class excursion or event, as well as to any required field placement. Students may not miss placement/work hours at an internship or service learning site unless approved in advance by the Academic Director and placement supervisor. All students must complete all of the requisite 100 minimum work hours on site at the internship or service learning placement to be eligible for academic credit.
Students who miss class for personal travel, including unforeseen delays that arise as a result of personal travel, will be marked as absent. No make-up or re-sit opportunity will be provided.

Attendance policies also apply to any required class excursion, with the exception that some class excursions cannot accommodate any tardiness, and students risk being marked as absent if they fail to be present at the appointed time.

Absences for classes will lead to the following penalties:

<table>
<thead>
<tr>
<th>Percentage of Total Course Hours Missed</th>
<th>Minimum Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 10%</td>
<td>Participation graded as per class requirements</td>
</tr>
<tr>
<td>10 – 20%</td>
<td>Participation graded as per class requirements; 3% grade penalty &amp; <strong>written warning</strong></td>
</tr>
<tr>
<td>More than 20%</td>
<td>Automatic <strong>course failure</strong>, and possible expulsion</td>
</tr>
</tbody>
</table>

N.B. Course schedule is subject to change due to study tours, excursions, or local holidays. Final schedules will be included in the final syllabus provided to students on site.

**Weekly Schedule**

**Week 1**

**Class 1.1** Orientation to the Program / Introduction to Sustainability & 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:


Raworth,K. (2018)


Bryant, B. (2015)

IPCC (2018)

Class 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.

Class 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.

Class 1.4 Lecture: Resilience & Systems Thinking
Systems thinking, complex adaptive systems, adaptive cycle, socio-ecological systems, characteristics of resilient systems.

Class 1.5 Excursion: Visit to La Carpio Landfill & Community

Class 1.6 Discussion: Environmental Justice in Landfill Communities

Readings:


Walker & Salt (2006)

Week 2

Class 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.

Class 2.2 Excursion: Field Trip to Chira Island & Fishing Community

Interviews with key informants about the community managed resources.

Class 2.3 Discussions & 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 Assessment (in class)

Quiz 1: Covers readings to date

Week 3
Class 3.1 Sustainable Energy Production


Readings:

Partridge, W.L. (1993)

Class 3.2 Lecture: Hydropower


Class 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).

Class 3.4 Excursion: Visit to Hydroelectric Plant

Discussion: Sustainability of the Arenal hydropower plant project

Class 3.5 Excursion: Visit to Wind Farm
Class 3.6 Discussion: Challenge of Switching from Fossil Fuels to Renewable Energies

Class 3.7 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 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 Excursion: Visit to Geothermal Plant

Class 4.4 Excursion: Visit to Solar Plant

Class 4.5 Excursion: Visit to Rincon de La Vieja National Park

Class 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 & 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  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  Excursion: Visit to Monteverde Cloud Forest Reserve

Class 6.4  Excursion: Visit to Certified Sustainable Hotel
Class 6.5  Documentary & Discussion


Discussion. Tourism and freshwater issues in Costa Rica.

Class 6.6  Documentary & Discussion

Documentary. Gringo Trails (2012)

Discussion. Can tourism really be sustainable?

Assignment. Sustainable tourism assessments.

Class 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)

Class 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.

Class 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.

Class 8.4 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 Excursion: Visit to Organic Farm

Class 9.3 Presentation (Assignment)

Presentations to decision makers on climate smart practices for Monteverde.
Class 9.4  Assessment (in class)

Quiz 4: Covers readings

Week 10
Class  No SEES Classes

Week 11
Class 11.1  Food & 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  Lecture: Alternative Agricultural Practices

Overview of alternative farming trends. Organic agriculture, 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  Excursion: Visit to Permaculture Farm

Class 11.4  Excursion: Visit to Fair-Trade Banana Coop in Panama

Discussion. Fair trade in industrialized agriculture.

Week 12
Class 12.1  Food & Forests, continued
Excursion. Visit to Traditional Cacao plantation in Bribri Indigenous Territory

Discussion. Food security and resilience in Bribri agroforestry.

Class 12.2 Excursion: Visit to Organic Pineapple Plantation in the Atlantic Lowlands

Discussion. How sustainable is organic pineapple?

Week 13
Class 13.1 Food & 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 Lecture & Quiz

"Great problems great solutions". Course wrap up.

Class 14.3 Final Exam

Course Materials
Readings


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


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