NATIONAL SOCIO-ENVIRONMENTAL SYNTHESIS CENTER



The Tagebau Garzweiler surface mine in Germany produces lignite, a form of soft brown coal. This image shows its devastating impacts on local ecosystems and implies its global impacts in contributing to climate change. Photo Credit: Martin Falbisoner via Wikimedia Commons, 4.0.

Lesson – Moving Human Societies from Parasitism to Mutualism with Earth

By Heidi Scott, SESYNC | January 23, 2024

Overview:

Have contemporary humans become a parasitic species? **Parasites** are predators that weaken their host by feeding on the host's body, in this case, planet Earth. Throughout the Holocene, the current geological epoch, humans have caused changes in global landscapes by clearing forests with fire and axe to seed agriculture; introducing invasive species to new habitats; and hunting game species, often to extinction. However, since the **Colonial Period** and the **Industrial Revolution** of the 18th and 19th centuries—and especially since the **1950s intensification** of fossil fuel use and mass consumerism (justified by growth economics and individualist values)—our species has greatly magnified negative impacts on the balanced systems of our host planet. These impacts affect our atmosphere, oceans, freshwater stores, terrestrial ecosystems, and the ecological communities of plants and animals that have co-evolved to support one another.

Industrial consumer culture led by the Global North produces volumes of durable (or non-biodegradable) waste and greenhouse gasses, and it drives land-use patterns like forest clear-cutting, surface mining, and car-dependent suburbs. Consequently, we are both author and witness to an unprecedented era in which climate change and species extinctions, driven by growth economics'

imperative to make more saleable things, endanger our future on the planet, as well as the future of non-human earthlings.

Must our behaviors, dictated by **cultural values and norms**, have this devastating effect on our host planet? How might societies consciously choose to reduce parasitic, weakening interactions with our planet and instead foster mutualistic, or beneficial, interactions? **Mutualism** is an interspecies dependency that emerges from an adaptive coevolution between partners and that benefits them both. Mutualists have evolved so that their fortunes depend on the well-being of symbiotic species, and their actions work to strengthen a community of mutual benefit. **Indigenous cultures** across the world have sustained their habitats for millennia by embedding mutualistic customs into their cultures, such as practicing reverent harvest rituals, granting personhood to non-human community members, and placing taboos on selfish behavior. Available mutualistic actions that involve modern technologies include implementing renewable energy systems, zero-waste and circular-production designs, and sustainable food-producing permacultures, as well as restoring industry-degraded habitats to support diverse ecological communities.

In this lesson, learners will consider how specific human activities tend toward a parasitic or mutualistic relationship with Earth. With a **socio-environmental paradigm shift** in our role from parasite to mutualist, we may nurse the recovery of Earth systems that support and sustain us, even as we enjoy new benefits to our own physical, mental, and cultural well-being. **This lesson's focus on humans as parasites of nature is provocative, even controversial. Instructors should anticipate some resistance and indignation and should use that energy to have learners inquire more deeply about the effects of humans on our environments and brainstorm potential solutions.** Importantly, the group activities focus on positive change and/or overcoming or reducing parasitic behaviors for better environmental outcomes.

Assumed Prior Knowledge:

Appropriate for undergraduate, graduate, and higher-level learners. It would be excellent as an introductory lesson in courses on socio-environmental research and solutions or as the beginning of an extended research-to-action group project.

Learning Objectives:

- Place today's human activities in a motivational narrative that illuminates how our impacts may align with biological understandings of parasitism and mutualism.
- Identify specific parasitic activities that may be redesigned as mutualisms.
- Explore and develop a plan to direct activities in a given sector toward restorative and sustainable outcomes for the biosphere.
- Learn how heroic narratives in which we are caretakers of Earth systems can be a powerful cultural force.
- Create a poster to share these ideas with stakeholders, peers, and community groups.

Key Terms and Concepts:

parasitism; mutualism; symbiosis; industrial consumerism; sustainability; Indigenous Knowledge; stewardship; zero waste; closed loops; renewable energy; permaculture; greenwashing; cultural narratives

The "Hook" (suggestions for quickly engaging students):



Image by Ruth Hartnup via Wikimedia, 2.0.

Evaluating Values: For 2 min., ask learners to write down a recent time when they felt guilty for the environmental impacts of something they did. It could be using a disposable plastic water bottle, or flying in an airplane for vacation, or eating lots of meat—a diversity of input is welcome. Have three to four learners share their responses with the whole group, and how they dealt (psychologically) with the guilt of this perceived impact. Then, for each volunteered example, have the class contribute ideas about which cultural values justified the impactful choice (i.e., single-use plastic is cheap, expedient, convenient, and ubiquitous!). Do certain values used to justify impactful activities repeat often in this conversation?

Teaching Assignments:

How Can Human Societies Evolve from Parasitism to Mutualism with Earth? (Two, 75-min. classes, with optional extension).

1. **Prior to Class:** As preparation for the session, have learners read the following web resources on parasitism, mutualism, and specifics of the Gaia hypothesis that support the metaphor of a planetary superorganism:
    - https://www.nhm.ac.uk/discover/mutualism-examples-of-species-that-work-together.html
    - https://necsi.edu/parasitic-relationships
    - https://courses.seas.harvard.edu/climate/eli/Courses/EPS281r/Sources/Gaia/Gaia-hypothesis-wikipedia.pdf

2. **(10 min.)** After The Hook, above, open the session by reviewing mutualism and parasitism using the below lesson PPT slides.

    Parasitism_&_Mutualism_Lesson_Slides_Accessible.pptx

3. **(5 min.)** Divide the class into small groups of three to five people. Assign or allow each group to choose one of the following nine areas of socio-environmental inquiry, to be developed in relation to parasitism and mutualism. For each topic, note the linked lessons and key concepts listed, and note how lessons may overlap across topics. (For example, Green Infrastructure can also involve Sustainable Agriculture.) Add any new ideas or links using the group's initial knowledge of the topic.
    - **Green Infrastructure:** closed loops, zero waste, stormwater management, energy efficiency, parks and paths, food forests, community gardens, urban heat island, street equity movement
        - Green Infrastructure: Urban Metabolism and Smart Cities

    - Green Infrastructure: Urban Stormwater, Policy, and Justice

- **Sustainable Agriculture:** zero waste, regenerative farming, urban farms, biodiversity, buffers, bioswales, local and bioregional agriculture, biodynamic farming
    - Sustainable Agriculture: Aquaculture Scenarios
    - Sustainable Agriculture: Strategic Reductions in Food Waste
    - Sustainable Agriculture: Resistance, Resilience, or Transformational Farming
    - Sustainable Agriculture: Community Gardens – Justice, Safety, and Climate Solutions
    - Advancing Sustainable Development Goals: Urban Agrobiodiversity
- **Wicked Waste:** zero waste, closed loops, circular economy, molecular plastic design, eliminate single-use plastics, biodigestion, reuse and recycling, compostable packaging
    - The Wicked Plastics Problem Lesson
    - Advancing Sustainable Development Goals: Systemic Change to Reduce Consumer Impact
- **Greenwashing:** false advertising, vagueness, no proof, lesser of two evils, injustice, profits over people, executional greenwashing, fast fashion, industrial site restoration
    - Greenwashing in the Fashion and Apparel Industry
    - Ecological Restoration and Corporate Greenwashing
- **Novel Ecosystems:** invasive species, non-native species, novel species assemblies, succession, forest patches, nature deficit disorder, biophilia, biophobia
    - Socio-Environmental Services & Management of a Novel Ecosystem: Urban Forest Patch Case Study
    - Novel Ecosystems and Natural Resource Management: For Whom? Part 1
    - Novel Ecosystems and Natural Resource Management: For Whom? Part 2
- **Environmental Sociology:** gender- and class-based discrimination, patriarchy, environmental justice, redlining, producers vs. consumers, the labor paradox, Indigenous Knowledge
    - Environmental Sociology on Campus: A Field Trip
    - Co-Evolutions: Indigenous Knowledge and Scientific Research
    - Cascading Effects in Complex Systems, Part 1: Species Interactions
    - Cascading Effects in Complex Systems, Part 2: Social Behavior Cascades to Support the Environment
    - Cascading Effects in Complex Systems, Part 3: Socio-Environmental Cascades
- **Environmental Psychology:** biophilia, biophobia, critical mass, first adopters, bias, behavioral nudges, nature deficit disorder, ecopsychology, green architecture
    - What Influences Pro-Environmental Behavior? Learning from Psychological Research

        - Classical versus Behavioral Economics: Environmental Applications
        - Behavioral Economics and Timescale Mismatches
        - Climate Change and Choices: Change Behavior, Mitigate, or Adapt?
    - **Creative "Righting":** critical discourse analysis, climate change narratives, science fiction to fact
        - Critical Discourse Analysis Resources (Explainers and Lessons)
        - Survive the Century: Climate Change Journalists of Tomorrow
        - Survive the Century: Climate Change Decisions for your Grandchild
    - **Spatial Ecology:** integrated uses, urban agriculture, walkable communities
        - Spatial Ecology: Landscape Design Contest
        - Spatial Ecology: Land Sparing versus Land Sharing

4. **(40 min.)** Each group should now look in depth into the lessons and concepts related to their topic. Read the lesson(s) and consider how specific human activities may tend toward parasitic effects. Then, discuss how to develop solutions around a mutualistic model, to achieve synergetic benefits for both human society and the ecosystems we rely upon, including non-human species. These questions may help direct your inquiry:
    - What specific **parasitic** activity causes degradation of earth systems and/or natural habitats?
    - Who **benefits** from this activity? Who, including non-human species, **suffers** from it?
    - How do **cultural values, economic models**, or groups of **powerholders** affect public perceptions of this activity? How might we **change the narrative** to convey the activity's destructiveness?
    - Can this activity be changed in **approach** or **degree**, to reduce its negative impacts (i.e., moving from extractive monoculture to regenerative polyculture farming)? Or does it require a complete redesign to form a mutualism (i.e., single-use plastic cannot be part of a mutualism)?
    - Name three elements of a **mutualist redesign**—a new paradigm that replaces the old parasitic one—for your topic. Pay attention not only to how the revision benefits Earth systems but also how **humans could benefit** from the shift in values and practice.
    - Note any **intractable challenges** with your proposed mutualistic solutions. These may include a lack of substitutes for the parasitic activity; political, economic, or cultural hostility to the solution; or potential new problems that may emerge from the solution.

5. **(15 min.)** For the remainder of this class, have groups give brief oral accounts of their initial findings, ideas, and further questions or challenges. Depending on group numbers, they may have 2–5 mins. each. Peers should actively engage in discussing further ideas, solutions, or problems for each group. If you need additional time for all groups to share, use the first 10–15 mins. of the next class meeting.

6. **As Homework:** Have groups conduct further research into the feasibility, scalability, and practicality of their proposed solutions. Each group should aim to bring in two-to-three new sources of information, which might come from peer-reviewed science, policy ideas or precedents, or Indigenous or environmental leaders. Have each group post this further research in the online class discussion space.

7. **(15 min.) In the Next Class:** Wrap up whole-group sharing about their initial ideas, as needed. If these discussions are complete, give this time to small groups to reassemble and share the research progress that emerged from the homework assignment. By the end of this segment, each group should be able to articulate their **specific topic**, elements of **parasitism** and **mutualism**, proposed **solutions** and paradigm shifts, and **challenges to implementation**.

8. **(10 min.)** Review the basics of creating a science poster that engages a general audience. Though the poster does not involve original research, each group can tailor a poster template (below) to illuminate their topic, while citing researched sources. Discuss how **conciseness**, **engaging writing**, and **immersive visuals** contribute to the audience's engagement with posters.

   Poster_Template_Mutualism_Accessible.pptx

   - **Introduction** to X topic in terms of parasitism
   - **Hypothesis** on how X topic may be redesigned around a mutualism
   - **Researched evidence** that support the hypothesis, as well as new ideas
   - **Discussion** of potential significance: environmental benefits, human benefits, and changes to cultural norms, all of which may result in concise conclusions
   - **Visual enrichments:** graphs, images, flow diagrams.

9. **As Homework:** Each group should finish any details for their poster and send the final poster to the instructor for printing. Instructors should use their resources to print and mount posters for each group.

10. **Poster Display:** Instructors should **identify a public space** in which the posters may be put on display. A default option would be the hallway in their academic department, but it would be even better to organize a **fun social event and poster session** that engages with local stakeholders and a wider university audience. Invite people from other disciplines and professions to attend.

11. **Group Discussion:** After an informal discussion period between small groups and their audiences, moderate a larger group discussion on how to implement some or all of these ideas at various scales: your department, your university, your community, your state, your country, and globally. What activities are essential to getting this idea started? If this is the beginning of a **longer research project**, have **learners identify two or three critical first steps** to transforming this parasitic activity into a mutualism. These steps may involve social, ecological, technological, and/or interdisciplinary elements that would benefit from engaged experts.

Background Information for the Instructor:

1. **Smithsonian Research Center's Resources on Restoration Ecology**

    - This web page details several restoration projects in the eastern United States that aim to recuperate and strengthen degraded land and aquatic ecosystems, with perspectives on both inherent value and ecosystem services.

    - Smithsonian Environmental Research Center. (n.d.) *Restoration Ecology*. Smithsonian. https://serc.si.edu/research/research-topics/biodiversity-conservation/restoration-ecology

2. **The ecology and evolution of human-wildlife cooperation**

    - This research article examines the social learning inherent in human-wildlife cooperation. The wildlife species of interest include honeyguide birds, wolves, dolphins, and orcas. Their approach integrates ecological, anthropological, and evolutionary perspectives to demonstrate the value of ancestral and contemporary mutualisms between humans and wildlife

    - Cram, D.L., van der Wal, J.E.M., Uomini, N. et al. (2022). The ecology and evolution of human-wildlife cooperation. *People and Nature, 4*(4), 844-855. https://doi.org/10.1002/pan3.10369

3. **Economic growth will continue to provoke climate change**

    - This informed opinion article argues that we must reduce material production and consumption in order to achieve the best outcomes in redressing climate change. The author elaborates on the objectives of planned "degrowth" as an alternative to the ideology of limitless growth. And the author establishes the principles inherent to degrowth: democracy, diversity, participation, and abundance—versus the principles of growth economics: hierarchy, competition, and scarcity. The series also links to an opposing opinion article that claims that a growth ideology can be brought into line with sustainable environmental practices.

    - Paulson, S. (2022, September 12). Economic growth will continue to provoke climate change. *Economist Impact*. https://impact.economist.com/sustainability/circular-economies/economic-growth-will-continue-to-provoke-climate-change

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- Harvard. (n.d.). *Gaia Hypothesis – Wikipedia*. https://courses.seas.harvard.edu/climate/eli/Courses/EPS281r/Sources/Gaia/Gaia-hypothesis-wikipedia.pdf

- New England Complex Institutes. (n.d.). *Parasitic Relationships*. https://necsi.edu/parasitic-relationships

- New York University Libraries. (n.d.). *How to Create a Research Poster: Poster Basics*. https://guides.nyu.edu/posters

- Osterloff, E. (n.d.). *Mutualism: Eight examples of species that work together to get ahead*. The UK Natural History Museum. https://www.nhm.ac.uk/discover/mutualism-examples-of-species-that-work-together.html

Related SESYNC Content:

- Scott, H. (2023, September 5). *Lesson – Behavioral Economics and Timescale Mismatches*. SESYNC. https://www.sesync.org/resources/lesson-behavioral-economics-and-timescale-mismatches
- Palmer, M.A. (2023, July 26). *Lesson – Climate Change and Choices: Change Behavior, Mitigate, or Adapt?* SESYNC. https://www.sesync.org/resources/climate-change-and-choices-change-behavior-mitigate-or-adapt
- Palmer, M.A. (2023, July 25). *Lesson – What Influences Pro-Environmental Behavior? Learning from Psychological Research*. SESYNC. https://www.sesync.org/resources/what-influences-pro-environmental-behavior-learning-psychological-research

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