Learning Sustainability and Conservation by Experience
2021 Orientation Workshop, May 11, 2021
Conservation Leadership

• Minor and Grad. Certificate
  • 466/566 Mitigation and Adaptation Studies
  • 467/567 Sustainability Leadership
  • 369/669 Internship Conservation Leadership

• Minor:
  • two electives

• Grad. Certificate:
  • 668: Participatory and Agent-Based Modeling, Simulation and Visualization
  • one elective
Main Concepts: Core Questions to ask

What is the syndrome of modern global change; what is the prognosis, and is there a therapy?

Rockstrom and Klum, 2015
Main Concepts

Planetary Physiology
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Earth is a Life-Support System for many species
Main Concepts

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Everything is about Flows
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Limitations in the flows between a community and its life-support system limit the growth of the community
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Planetary Physiology

Earth is a Life-Support System for many species

Everything is about Flows

Limitations in the flows between a community and its life-support system limit the growth of the community

For Homo sapiens, the flows are regulated by ethical, social, and - recently - economic rules
Main Concepts

Planetary Physiology
Earth is a Life-Support System for many species

Everything is about Flows

Flows have been changed (accelerated) dramatically by modern society;
The planetary physiology is to a large extent dominated by a growing humanity
Strategies for Sustainability:

1. To consume nature’s flows while conserving the stocks (that is, live off the ‘interest’ while conserving natural capital).
2. To increase society’s stocks (human resources, civil institutions) and limit the flow of materials and energy.

*Brown et al. (2004)*
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Importance of Mainstream Economic Model

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Importance of Mainstream Economic Model

Transition to an economy that meets the need of the present while safeguarding the Earth’s life-support system
Main Concepts

Every problem is unique

No definite problem formulation

There is no stopping rule

Solutions are better/worse, not right/wrong

No immediate test for solutions

There is only a one-shot opportunity

There is no defined set of options and solutions

Every problem is a symptom of another problem

The solver has not right to be wrong

Explanation of discrepancies determines solution
Main Concepts

Wicked Problems

Examples

• Global Climate Change
• Involuntary migration
• Natural Hazards
• Global Change
• Social injustice
• Data security
• Conservation
• Pandemics
• Healthcare
• Inequality
• Nuclear

super wicked

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Wicked Problems

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- Global Climate Change
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Strategies and approaches to address wicked problems
Main Concepts

Wicked Problems

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Strategies and approaches to address wicked problems

Experience Transdisciplinary Approaches and Imagination to Tackle Wicked Problems
Main Concepts

Sustainability and Adaptation Science
Main Concepts

Sustainability and Adaptation Science

- What might happen?
- Possible threats and hazards
- Knowing the system trajectory

System knowledge

Current state and trends
Main Concepts

Sustainability and Adaptation Science

- What might happen?
- Possible threats and hazards
- Knowing the system trajectory
- What do we want to happen?

System Knowledge

Goal Knowledge

System knowledge
Current state and trends

Goal knowledge
Desirable future
Main Concepts

Sustainability and Adaptation Science

- What might happen?
- Possible threats and hazards
- Knowing the system trajectory
- What do we want to happen?
- How can we impact the system trajectory?

System Knowledge

Goal Knowledge

Transformational Knowledge

System knowledge
Current state and trends

Transformation knowledge
Facilitating pathways

Goal knowledge
desirable future
Main Concepts

Sustainability and Adaptation Science

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Goal knowledge
- Desirable future
Main Concepts

System State

Time

Foreseeability and Foresight

Safe Operating Space

desirable future
Main Concepts

Foreseeability and Foresight

System State

Time

Current trajectory

Safe Operating Space

desirable future
Main Concepts

Foreseeability and Foresight

System State

Time

Current trajectory

Desirable future

Safe Operating Space

Disturbance

1

2
Main Concepts

Foreseeability and Foresight

- Current trajectory
- Disturbance
- Correction
- Desirable future
- Safe Operating Space
Main Concepts

Foreseeability and Foresight

System State vs. Time

- Current trajectory
- Disturbance
- Correction
- Desirable future
- Safe Operating Space
Main Concepts: Learning by Experience

Active learning supported by learning assistants:
- problem-motivated: research case studies of real-world problems
- 1st course: individual studies based on literature
- 2nd course: group project in the real world (service learning)
- 3rd course: internship with an individual case study on a real-world problem
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All case studies:
• require systems thinking and transdisciplinary approach;
• involve modeling;
• focus on a wicked problem;
• are participatory;
• have a leadership component with a novel participatory leadership style;
• are in principle dynamic resource allocation problems.
Main Concepts: Learning by Experience

**Wicked Problem**
- Introduction
  - The wicked problem and its relevance
  - Why do we need to tackle the problem?
  - What are the ethical, economic, social, and environmental characteristics?
- Mapping the Decision Space
  - Who is related to the problem?
  - What is the societal, ethical, & legal decision framework?
  - Who can implement interventions?
- Participatory Modeling (PM)
  - PM or role playing to understanding the wicked problem
  - Conceptual model of the system
  - Stocks, flows, feedbacks, & agents

**System Science - Vulnerabilities**
- What are the system vulnerabilities?
- Are there system thresholds and tipping points?

**System Science - Hazards**
- What are the external threats?
- What are the internal threats?
- Probabilities of these hazards

**Foresight**
- Scenario approach: The range of possible futures
- Goal Knowledge: The desirable futures and why are they desirable

**Transformation Knowledge**
- What are effective and feasible interventions?
- Which interventions can point the system towards desirable future?

**Discussion and Conclusions**
- How well did the case study tackle the wicked problem?
- What are the main conclusions concerning the systems future?

**Recommendations**
Main Concepts: Learning by Experience

Case Study Template

All Case Study focus on Real-World Problems

Wicked Problem

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- The wicked problem and its relevance
- Why do we need to tackle the problem?
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Recommendations
Main Concepts: Learning by Experience

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Many of the Wicked Problems are related to Chesapeake Bay and adjacent watersheds.
Outlook

Strengthening of the Service Learning Experience:
- projects that allow for field experience and contact with stakeholders
- extending to service learning abroad
- stronger links to U.S. Fish and Wildlife Service Activities and Needs