

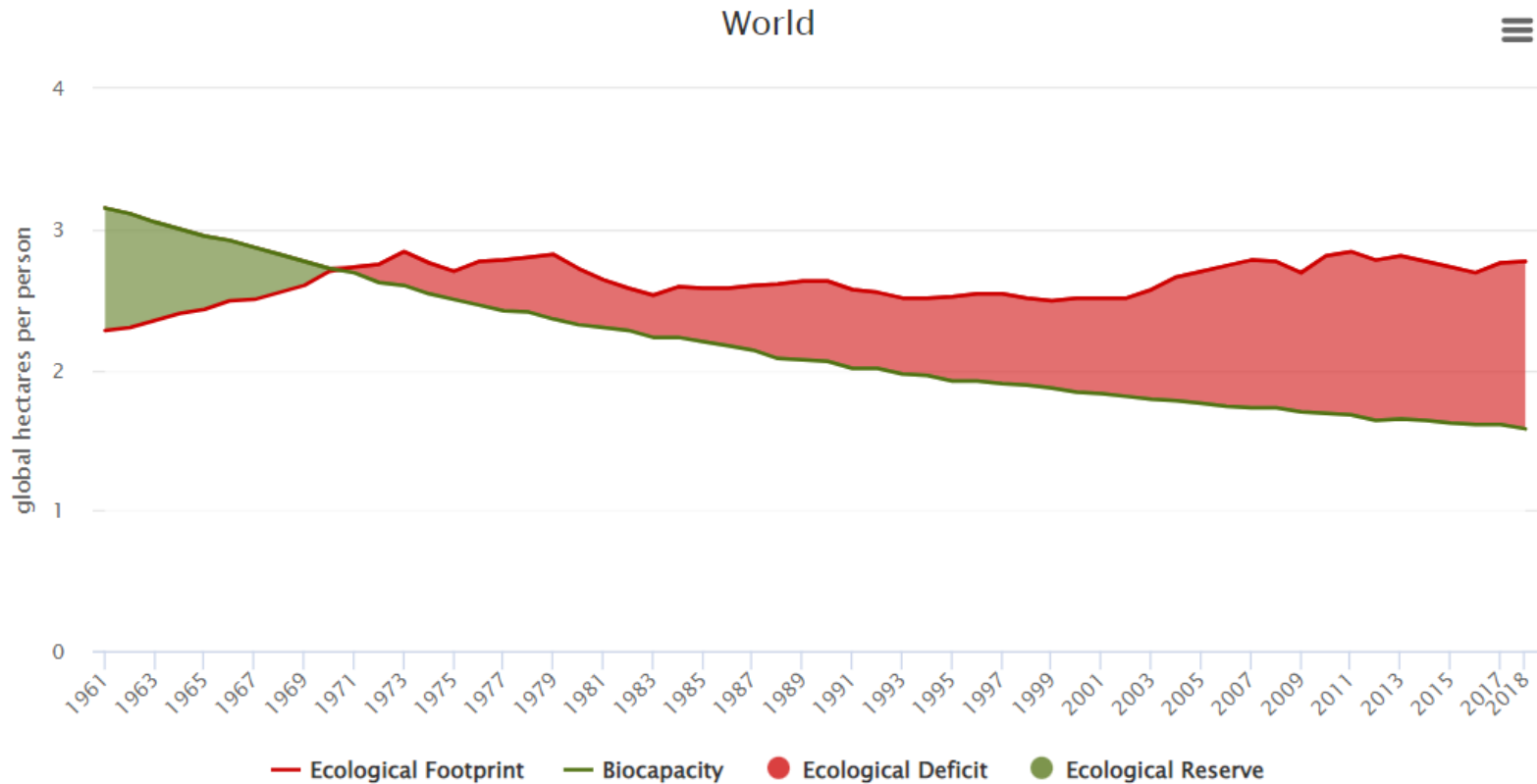
Blue Marble Photo
Dec 1972, Apollo 17

Planetary limits



Learning to flourish within them

Overshooting the limits



Overshooting the limits – July 25, 2024

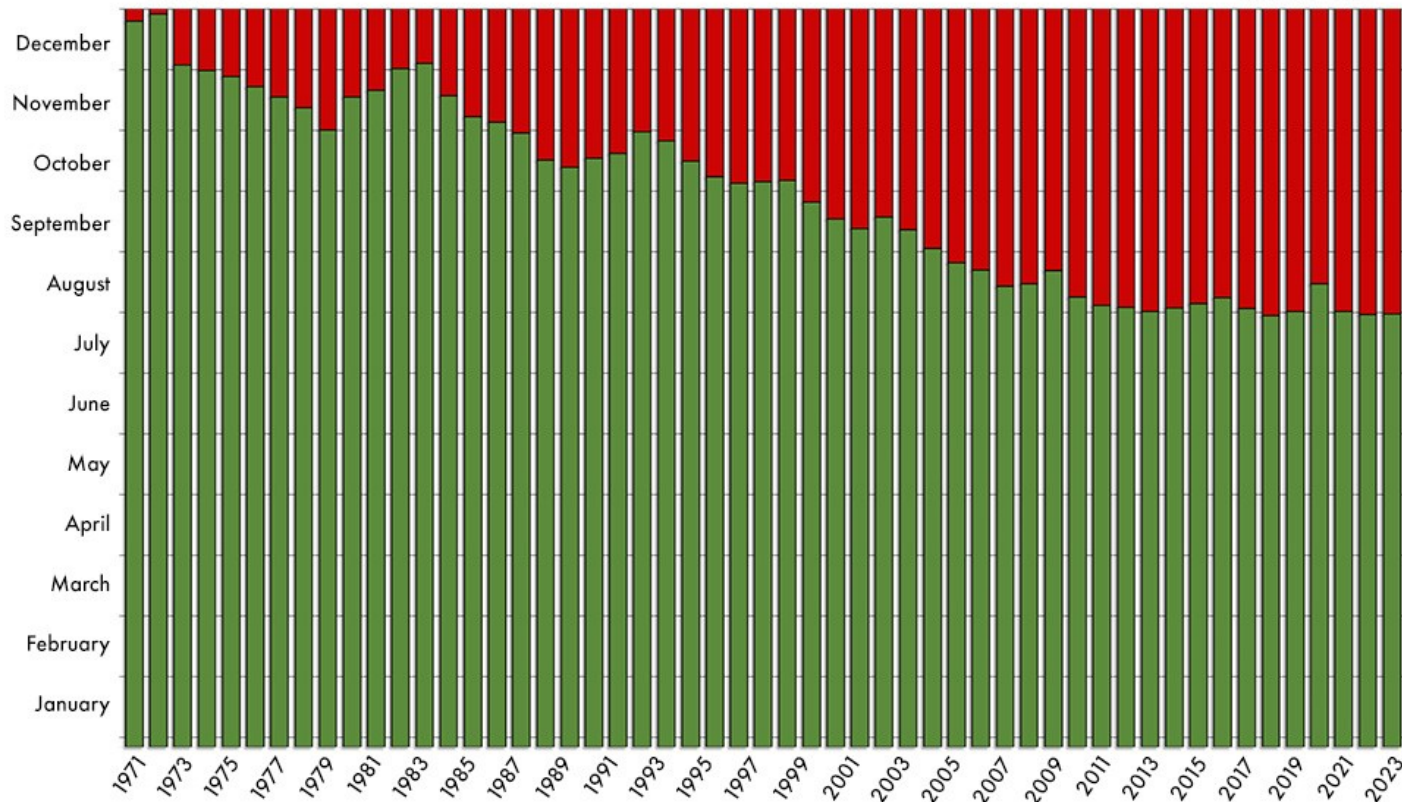


1 Earth

Earth Overshoot Day 1971 - 2023



1.7 Earths



Flourishing within Limits to Growth

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- ▶ Fulbright Distinguished Chair, Dept of Environmental Studies, Masaryk University, Brno, CR



Background

- ▶ B.S. Physics. B.S. Aeronautics (Miami University, Oxford, Ohio)
- ▶ Started M.S. program in Aeronautical Engineering, switched to Environmental Science with focus on energy resources (peak oil modelling) (Ohio State University, Columbus, Ohio)
 - During this time exposed to systems ecology (Patten, Odum, Jorgensen), ecological economics (Daly, Costanza), environmental history and philosophy (Cobb, Rawls, Cronon)
- ▶ Ph.D. in Systems Ecology developing and applying network methods for whole system analysis – direct and indirect effects. (University of Georgia, Athens, Georgia)
- ▶ Currently, applying these approaches on socio-economic-ecological networks, namely urban metabolism, food-energy-water, regenerative economy, etc.

Course Goals:

1. To provide students with a basic understanding of the environment as a system including the biological, physical, and chemical foundations of ecosystem services
2. To understand how nature provides resources and constraints to socio-economic development and to students' everyday life.
3. To learn how human activities impact and interfere with this ecological functioning
4. To explore how human activities could promote sustainable, win-win, flourishing outcomes within these limits

Course Outline: Arranged in 6- 3 hour blocks; specific readings (in bold) from Encyclopedia of Ecology, Fath and Jørgensen (eds). 2019. Elsevier.

Feb 29 - 3 hours (virtual) 12:00–15:00 CET

Lecture 1: Systems thinking: Where it comes from and where it goes; Human Ecology; Energy resources

Readings: Ecological Systems Thinking: D W Orr; Human Ecology: Overview: F Steiner

March 7 - 3 hours (virtual) 12:00–15:00 CET

Lecture 2: Natural ecosystems, ecological succession, ecosystem services; Limits to Growth

Readings: Ecosystem Services: K A Brauman and G C Daily; Limits to Growth: B D Fath

March 14 - 3 hours (virtual) 12:00–15:00 CET

Lecture 3: Flourishing within limits

Readings: Flourishing within limits: Jørgensen et al. 2015 Chapters 1, 2 & 3
Student groups to lead the chapters

March 20 ???

March 21 - 3 hours In person 12:00–15:00 CET

Lecture 4: Flourishing within limits

Readings: Flourishing within limits: Jørgensen et al. 2015 Chapters 4, 5 & 6
Student groups to lead the chapters

March 28 - 3 hours (virtual) 12:00–15:00 CET

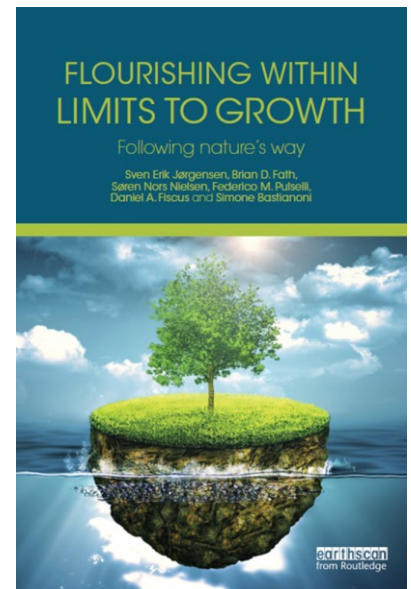
Lecture 5: Flourishing within limits; summary

Readings: Flourishing within limits: Jørgensen et al. 2015 Chapters 7, 8 & 9
Student groups to lead the chapters

April 4 - 3 hours (virtual) 12:00-15:00 CET

Lecture 6: A path to Sustainability

Readings: Ecological Footprint: M Wackernagel and J Kitzes



Introductions



“The greatest discovery of the past century had nothing to do with nuclear physics, or computer science, or genetic engineering. Rather it was the discovery of the essential connectedness of life and environment.”

Orr 2019

“It is a century now since Darwin gave us the first glimpse of the origin of species. We know now what was unknown to all proceeding caravan of generations: that men are only fellow-voyagers with other creatures in the odyssey of evolution.

Leopold 1949

Moving toward the Ecozoic!!

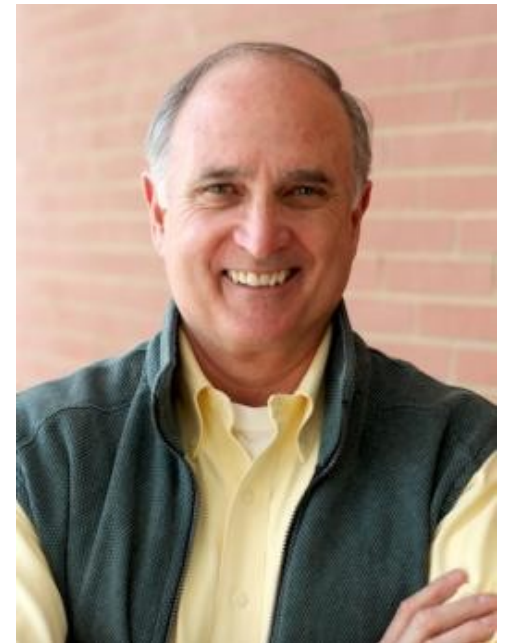
Professor David Orr

Oberlin College

Paul Sears Distinguished Professor of Environmental Studies and
Politics Emeritus

Senior Advisor to the Oberlin College President

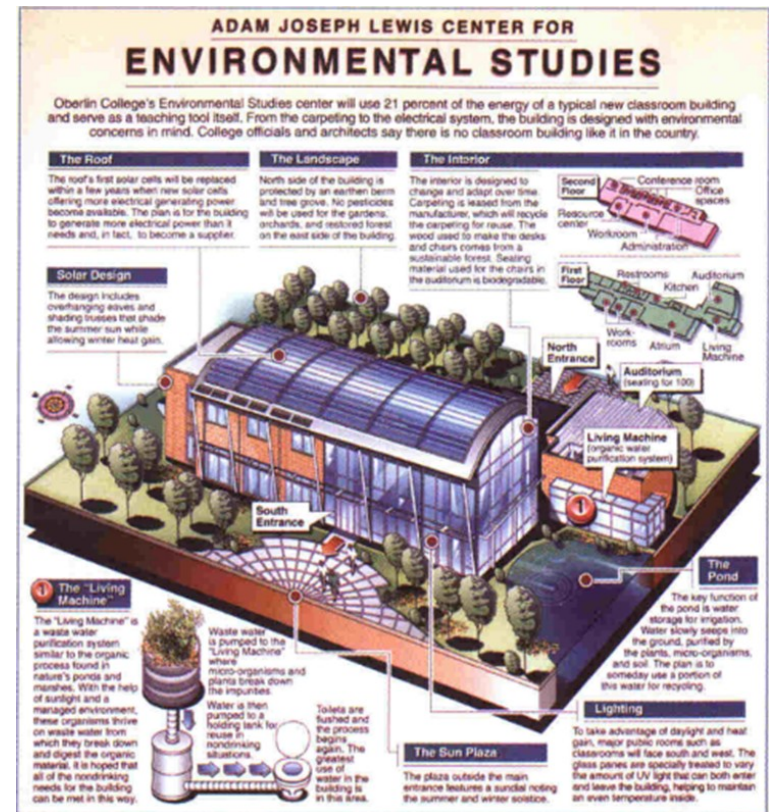
Systems thinker, writer, and orator.





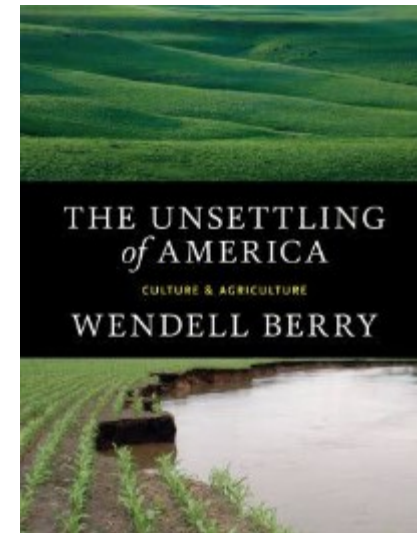
Oberlin's Environmental Science Building:

Adam Joseph Lewis Center, was named by an AIA panel in 2010 as “the most important green building of the past 30 years,” and as “one of 30 milestone buildings of the twentieth century” by the U.S. Dept of Energy.



“Systems thinkers see the world as networks of interdependence” Orr, 2017, p. xv

- ▶ “There is no such thing as autonomy; there is only a distinction between responsible and irresponsible dependence” p.116 – Berry 1977

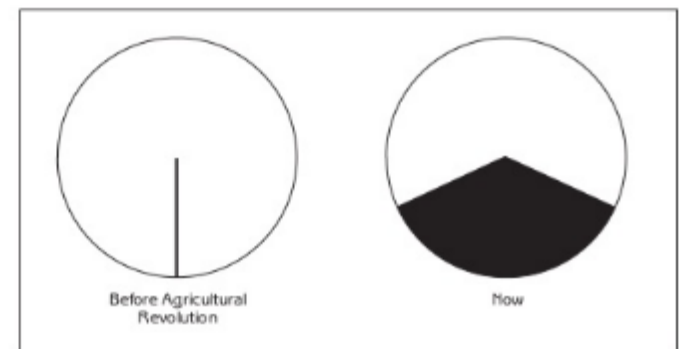


Systems thinking

- ▶ “We live in a web of obligations and relationships that transcend the conventional boundaries by which we organize academic disciplines and bureaucracies” Orr, 2017, p. xv
- ▶ “humans have appropriated the majority of the planet’s net primary productivity” Orr, 2017, p. xvi



Figure 3.8
Approximate
percentage of the
Earth's land-
based biological
production
controlled by
humans



Environmental education – gaining Eco-literacy

should constitute a comprehensive *lifelong education* ... and the provision of skills and attributes needed to play a productive role *toward improving life and protecting the environment with due regard given to ethical values.*

By adopting a *holistic approach*, rooted in a broad interdisciplinary base, it recreates an overall perspective which acknowledges the fact that *natural environment and manmade environment are profoundly interdependent....*

UN-sponsored Conference at Tbilisi, Georgia, 1978

the idea of interrelatedness has yet to take hold of us in a deep way.

We still live in thrall to a world created by Descartes, Bacon, Galileo, and their heirs who taught us to dissect, divide, parse, and analyze by reduction but not how to put things back together or see the world as systems and patterns.

Orr, 2019


What educational experiences have had the most effect on you?

How can the current educational system be reformed to focus on these items?

How will education be different in the future?



AN ASSIGNMENT FOR THE CAMPUS

- ▶ Does four years at college make you a better planetary citizen?
 - ▶ Does this college contribute to the development of a sustainable regional economy or, in the name of efficiency, to the processes of destruction?
- 

Examine resource flows on campus: food, energy, water, materials, and waste

- ▶ Where does stuff come from? Where does it go?
- ▶ “No student should graduate without understanding how to analyze resource flows and without the opportunity to participate in the creation of real solutions to real problems.”

Ecological literacy

Every student should graduate with basic comprehension of:

- ▶ the laws of thermodynamics
- ▶ the basic principles of ecology
- ▶ carrying capacity
- ▶ energetics
- ▶ least-cost, end-use analysis
- ▶ how to live well in a place
- ▶ limits of technology
- ▶ appropriate scale
- ▶ sustainable agriculture and forestry
- ▶ steady-state economics
- ▶ environmental ethics

Are you learning these topics

Pause



Understanding Reality

Complex Reality

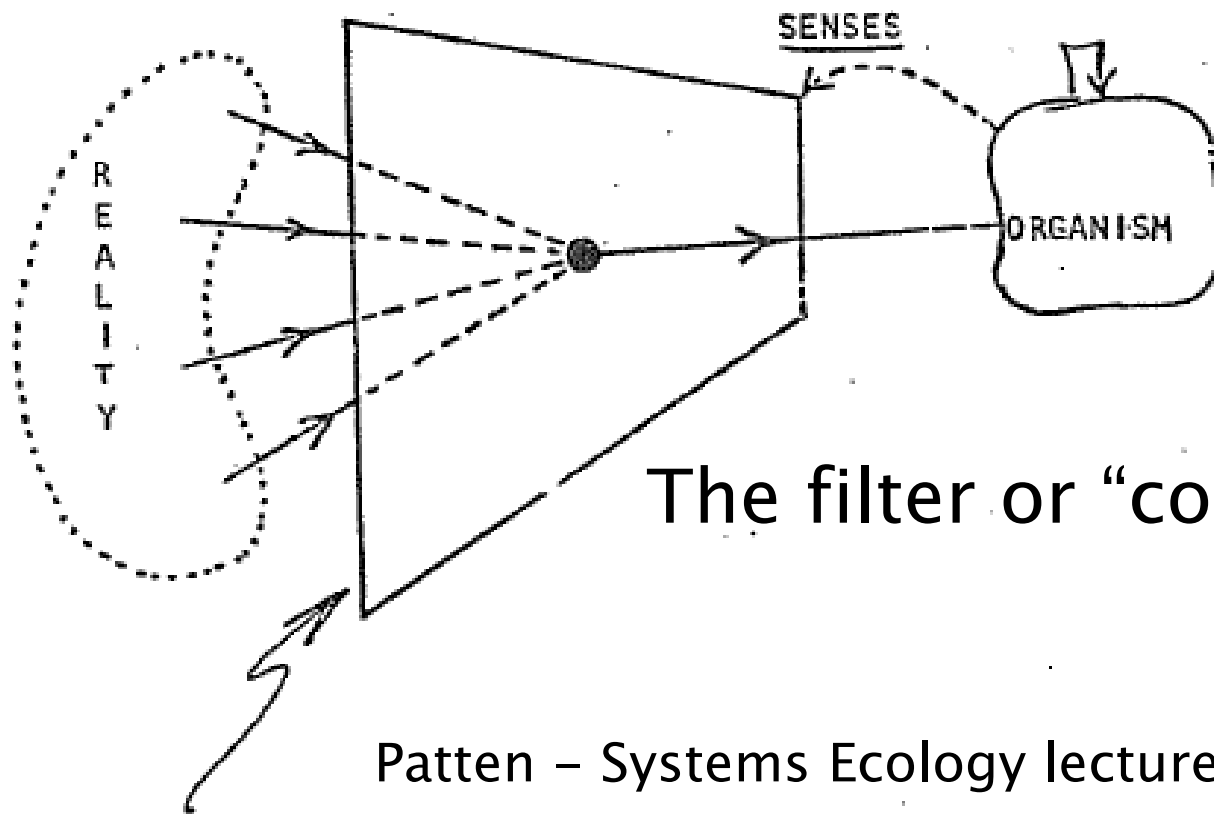


Abstract Model



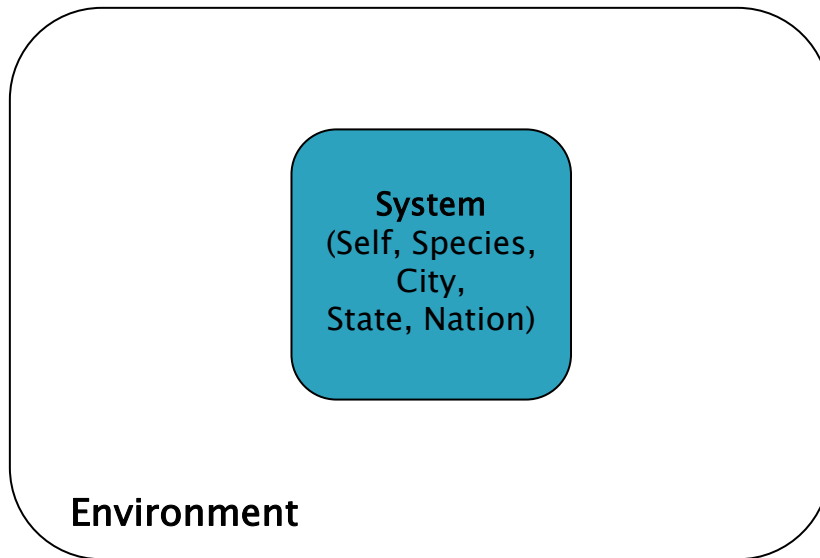
Modelling Function

Understanding Reality



Patten - Systems Ecology lecture notes

Fragmentation: What we get wrong about Environment

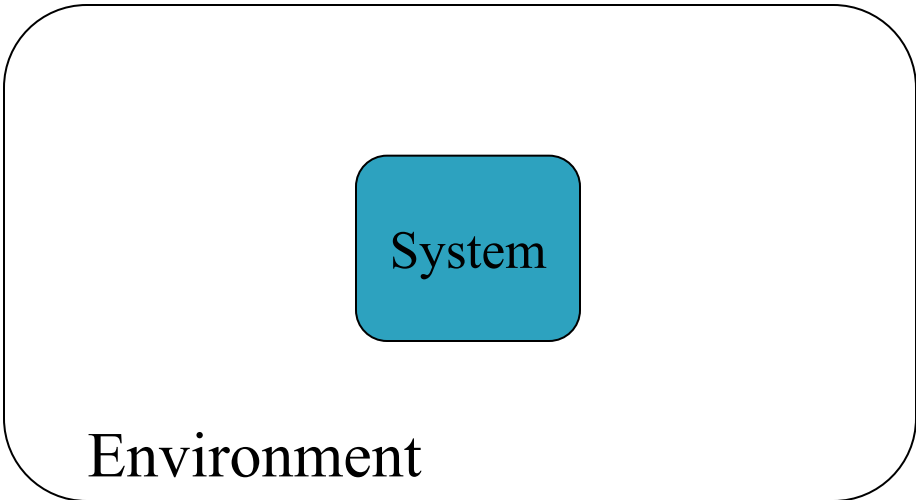


Separation and fragmentation of the system from its environment

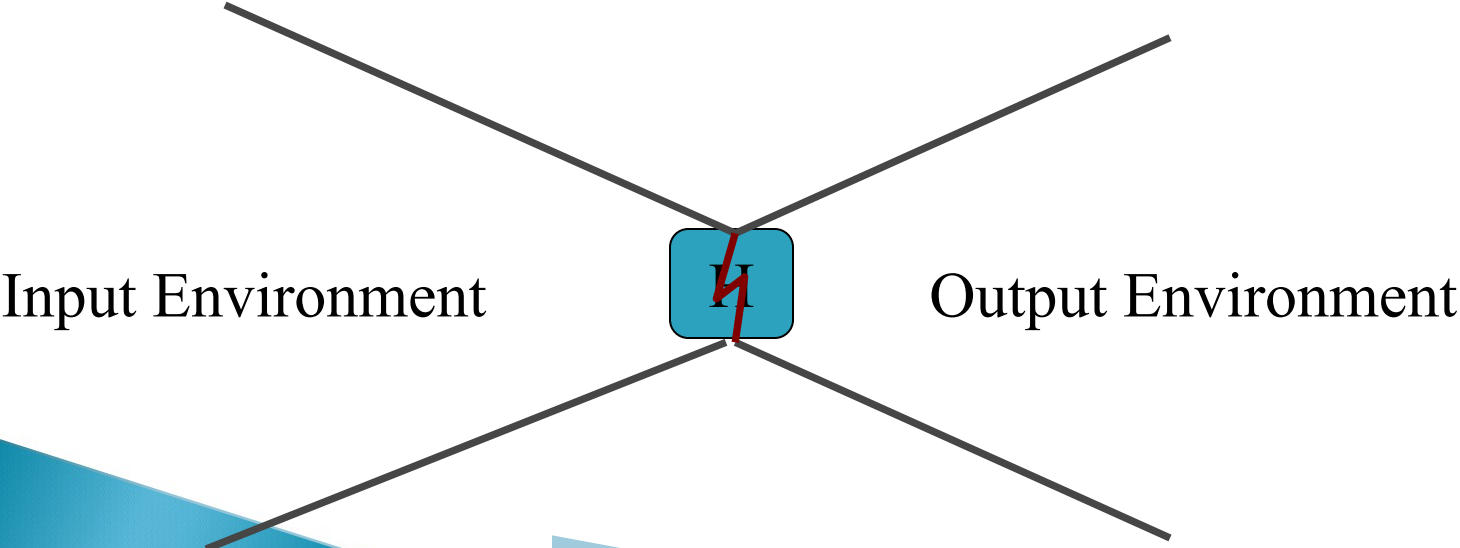


Environment is “out there”

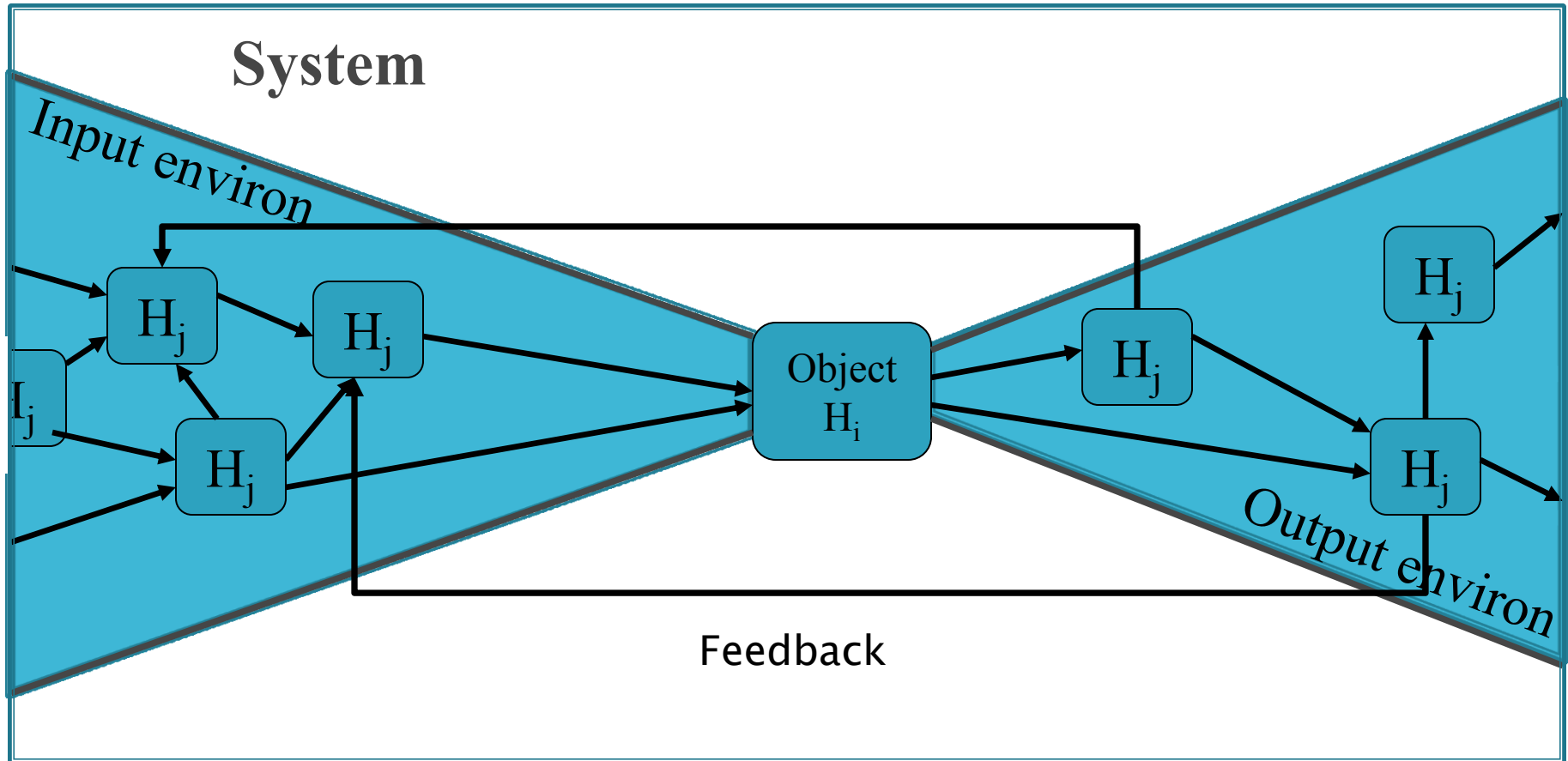
Old perspective, dichotomy between system and environment



New perspective, system is focus of two environments



Environment



Any object/system is inseparable from its TWO ENVIRONMENTS

“What is Environment”

System
(Self,
Campus,
City,
State,
Nation)

The concept of ... place becomes simplified as ‘the environment’ that is, what surrounds us.

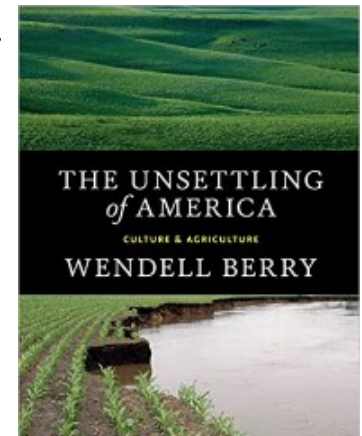
Once we see our place, our part of the world, as surrounding us, we have already made a profound division between it and ourselves.

We have given up the understanding - dropped it out of our language and so out of our thought - that we and our country create one another, depend on one another, are literally part of one another;

our land passes in and out of our bodies just as our bodies pass in and out of our land; all who are living as neighbors here, human and plant and animal, are part of one another, and so cannot possibly flourish alone;

our culture must be our response to our place, our culture and our place are images of each other and inseparably from each other, and so neither can be better than the other.

Berry (1977, p. 24).




How are ways that you depend on the environment?

The environment is not “out there”, but rather in you and on you, a part of you

Homework – identify 1 mineral element that is used in the making of your smart phone, describe where it comes from and the extraction methods to get it. What happens to it when you are done with the phone? Post your findings on the Blackboard discussion page.

Systems Perspective

- ▶ See how things are connected and interrelated
 - ▶ Where does it come from?
 - ▶ Where does it go?

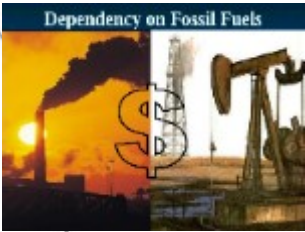
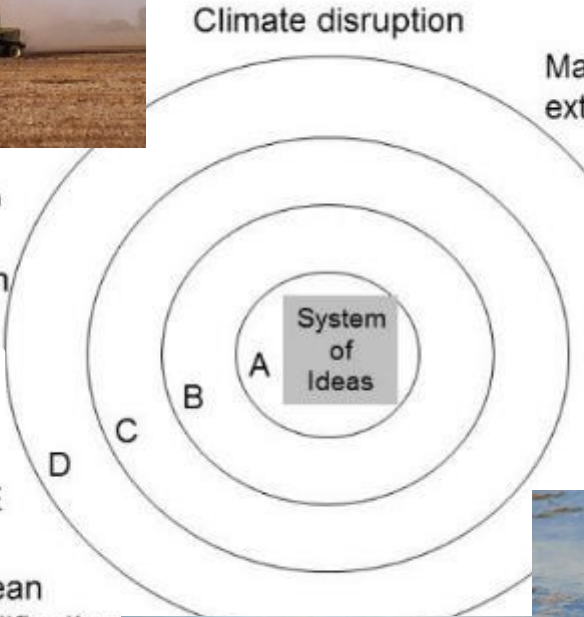
 - ▶ **Complex** – many parts, many interactions
 - ▶ **Adaptive** – respond and change
 - ▶ **Systems** – set of parts interacting together to function as a whole
- 

In other words, the action intended to solve the problem actually makes it worse because unintended side effects change the system & end up exacerbating the problem.

Unintended consequences

- ▶ Acid precipitation/rain
- ▶ Ozone depletion
- ▶ Eutrophication
- ▶ Global climate change
- ▶ Automobile dependency
- ▶ ...
- ▶ All of today's major environmental problems emerge from yesterday's solutions.

Environmental challenges are symptoms of deeper problems



Human Ecology summary

- ▶ Humans are part of the biosphere;
- ▶ We are living organisms like other animals in many respects, but
 - we have an advanced social organization, and
 - the ability to extract and use energy and resources that characterizes us and our impacts on the planet.
- ▶ That does not make us independent from the environment though

Flourishing within limits to growth

- ▶ Recognize physical, planetary boundaries and capacities
- ▶ Understand sustainable system design and function
- ▶ Act accordingly, in all things, at all times, as part of a routine with nature

