

# Geoethics – Sensing the tension between the way the world is and the way it should be – in our classroom

Tim Lutz  
Dept. of Geology & Astronomy  
West Chester University  
[tlutz@wcupa.edu](mailto:tlutz@wcupa.edu)

## Questions motivating this research:

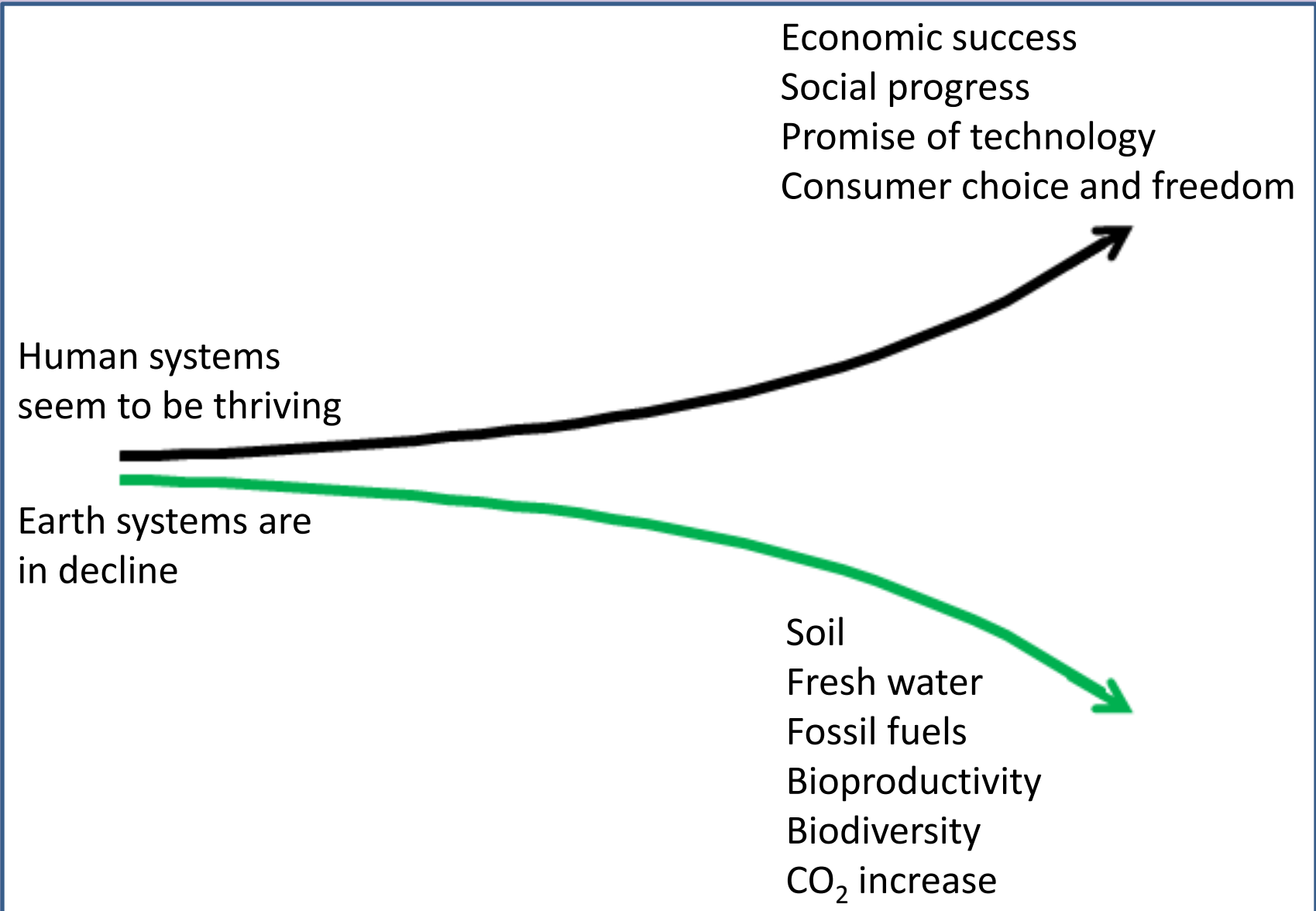
- Why have humans not lived sustainably as organic parts of earth systems?
- After recognizing that we live unsustainably, why has it proven impossible to change?
- How does ethics arise as an integral part of a holistic earth systems perspective?
- How do we bring geoethical perspectives to geoscience education?

Patterns of human behavior that are *uniquely* disruptive to earth's systems were recognized more than 150 years ago.

“The object of the present volume is: ...to point out the dangers of imprudence and the necessity of caution in all operations which, on a large scale, interfere with the **spontaneous arrangements of the organic or the inorganic world**; to suggest **the possibility and the importance of the restoration of disturbed harmonies** and the material improvement of waste and exhausted regions; and, incidentally, to illustrate the doctrine, that **man is, in both kind and degree, a power of a higher order** than any of the other forms of animated life, which, like him, are nourished at the table of bounteous nature.”

G. P. Marsh, Man and Nature, Scribner's (1864), emphasis added.

Humans have created two co-existing but conflicting realities...



**...that have been diverging for centuries**

Gregory Bateson called this type of divergent situation a **double-bind**, and used it to model the origin of schizophrenia in humans. A double-bind occurs when we are exposed to:

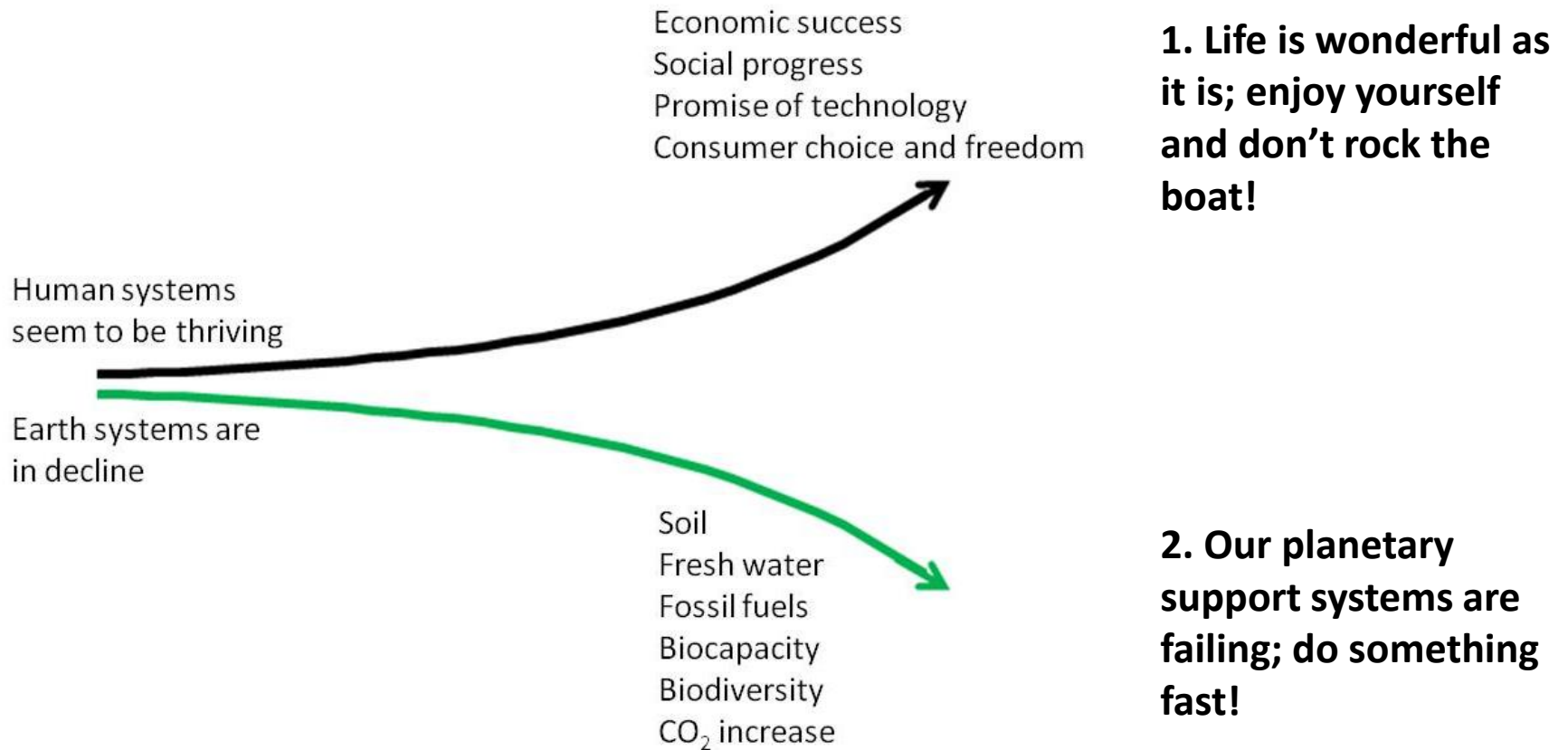
- 1) Two conflicting commands or instructions at different levels of abstraction.
- 2) Exposure to the conflict is repeated.
- 3) There is no escape.

Gregory Bateson, Steps to an Ecology of Mind (Chicago University Press, 1972)

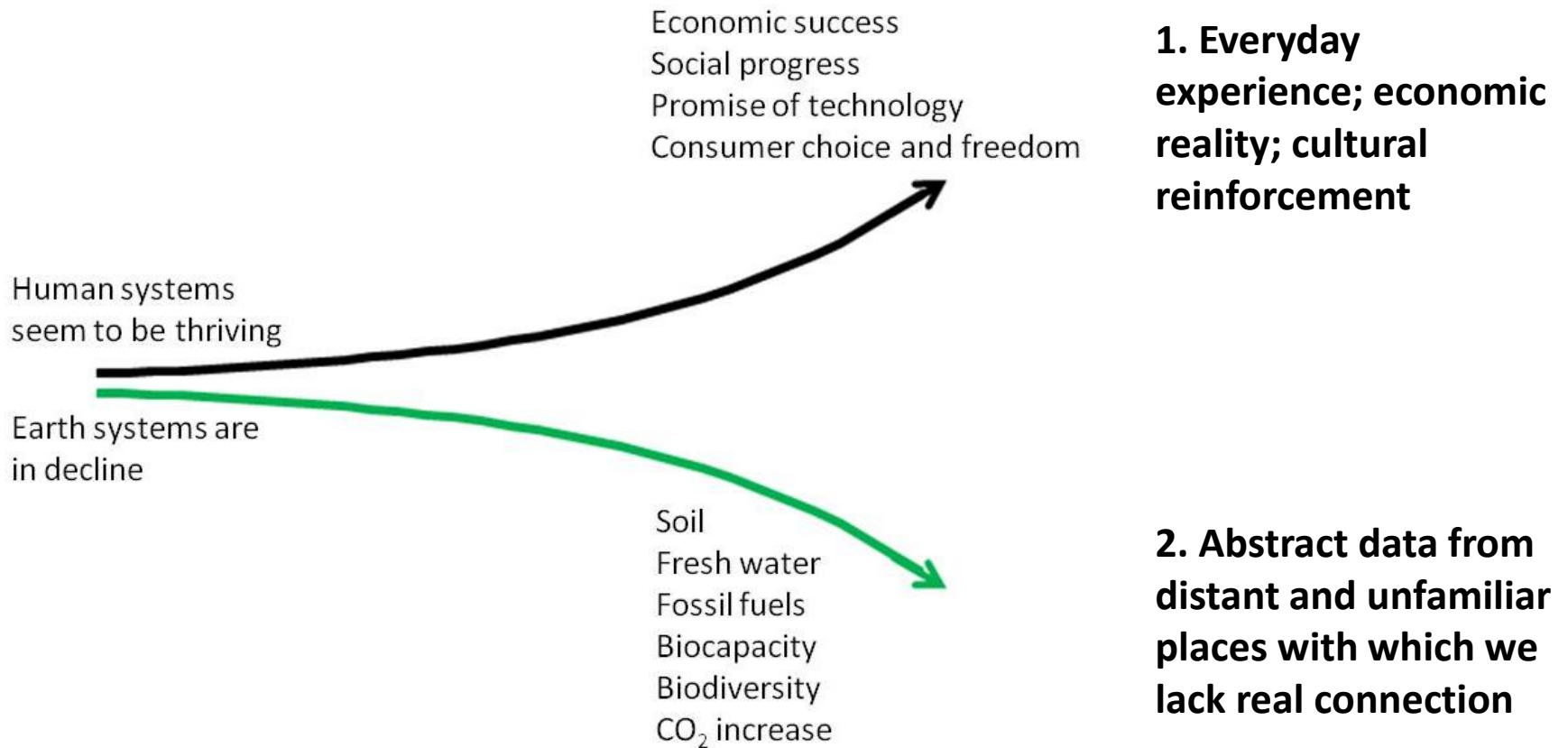
A double-bind at the cultural level leads to social schizophrenia

Gloria Flora – *Remapping Relationships: Humans in Nature* in The Post Carbon Reader: Managing the 21st Century's Sustainability Crises: R. Heinberg & D. Lerch, eds., (Post Carbon Institute, 2010)

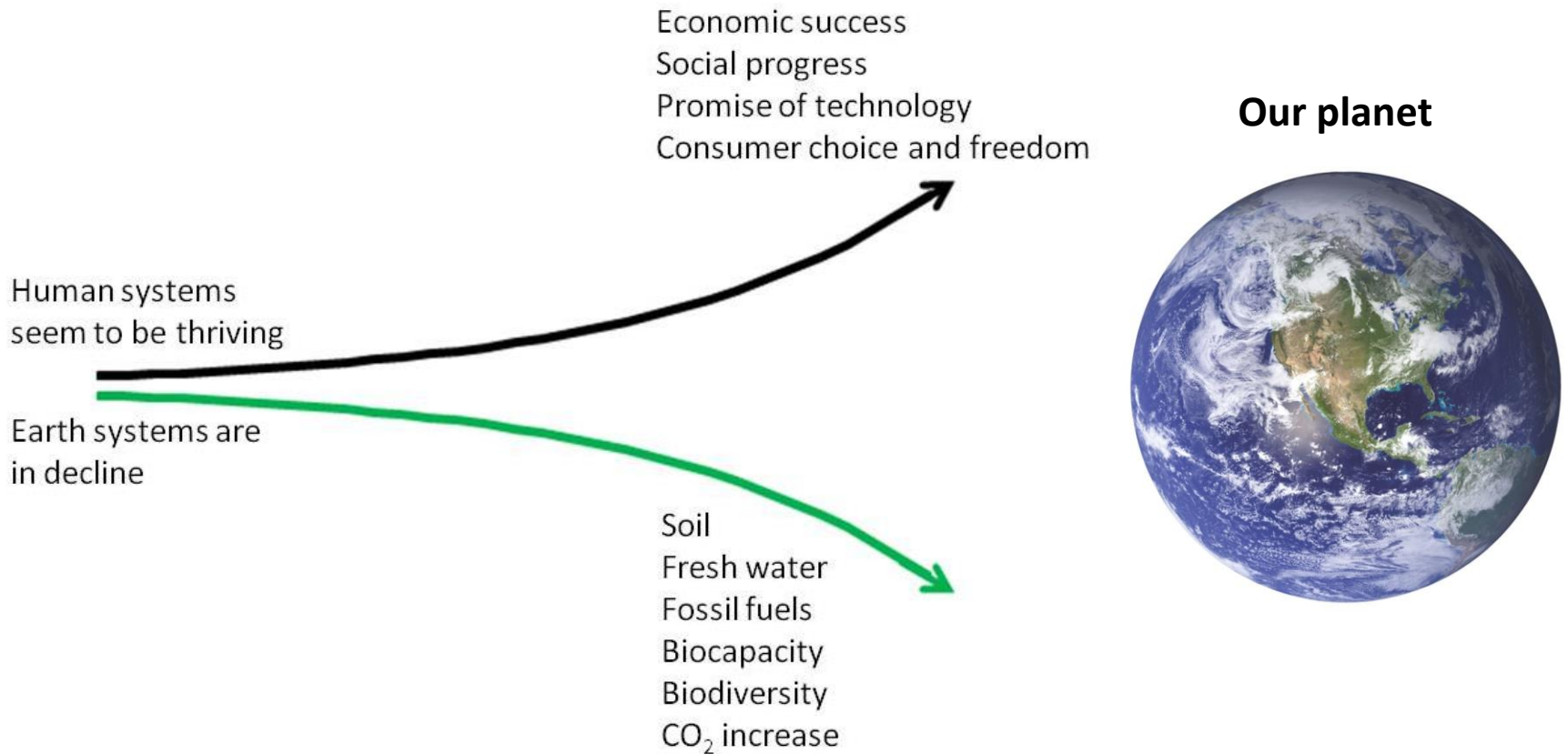
These two conflicting trends, experienced simultaneously, form a **double-bind** consisting of two conflicting commands...



These two conflicting trends, experienced simultaneously, form a **double-bind** consisting of two conflicting commands, delivered at different levels of abstraction...

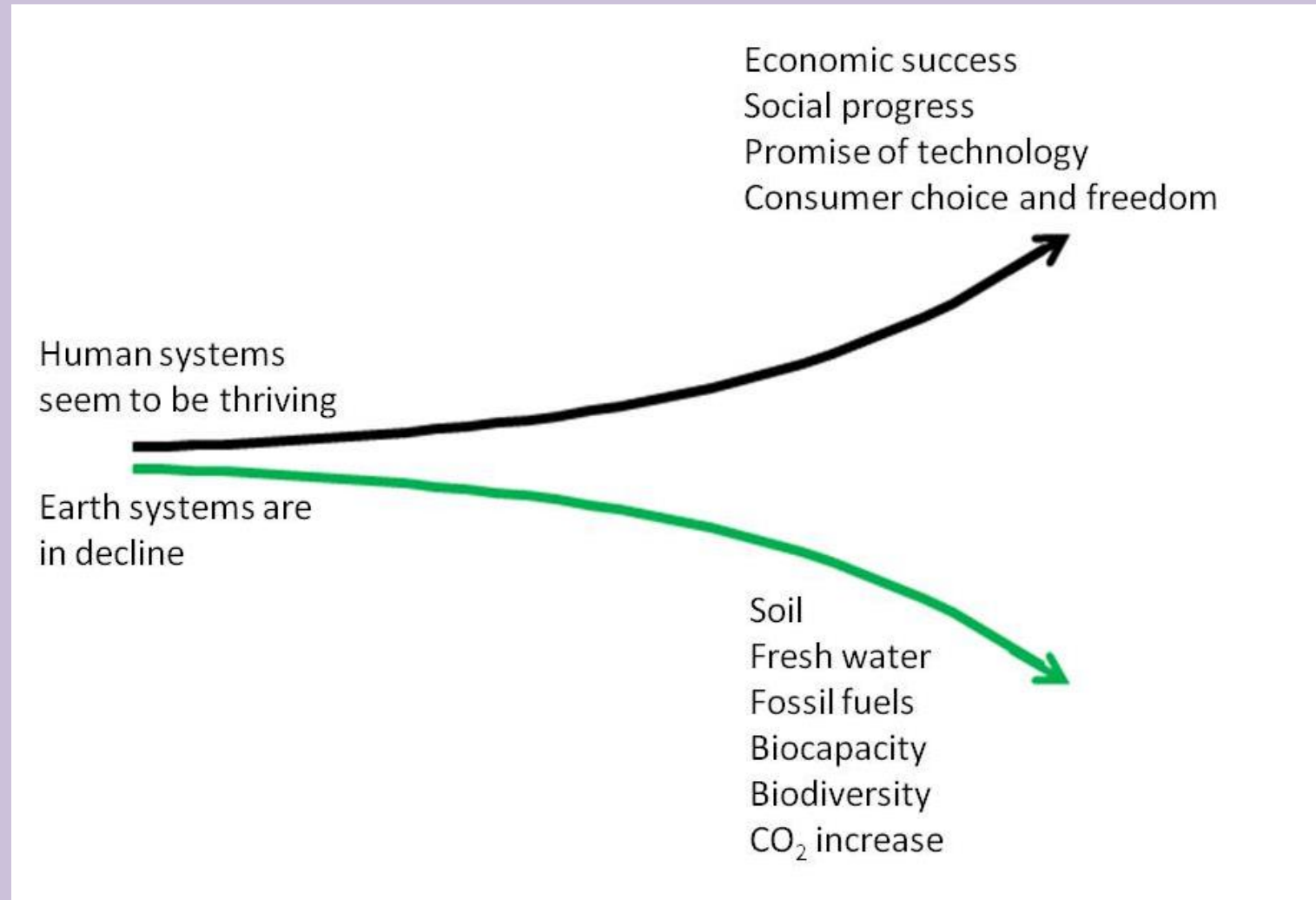


These two conflicting trends, experienced simultaneously, form a **double-bind** consisting of two conflicting commands, delivered at different levels of abstraction, and from which we cannot escape.

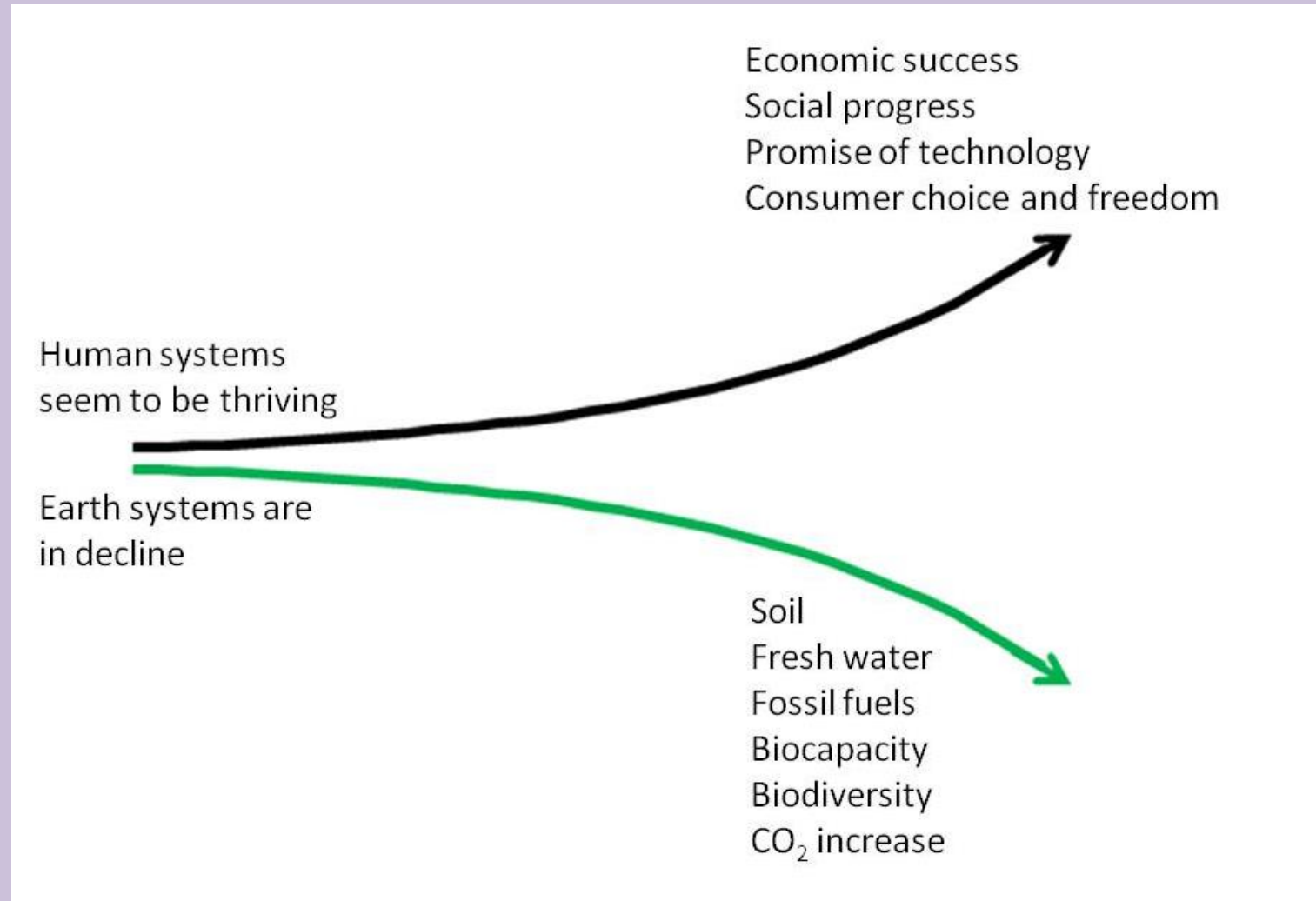




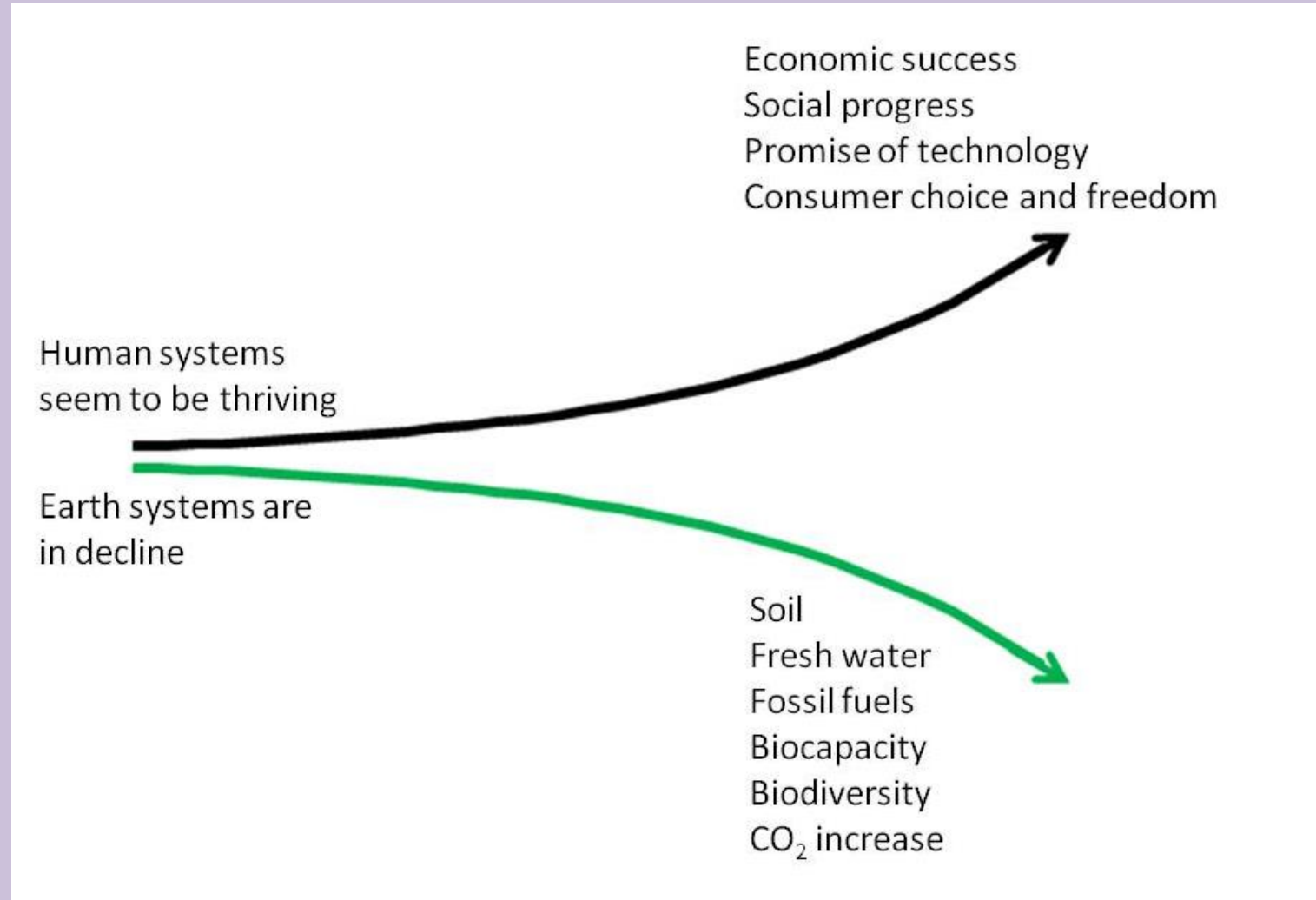
Morality and ethics have to do with the tension between the way the world is and the way it should be. But conceptions of rights, duties, fairness, and responsibility, as we understand them now, are defined entirely by human ethical systems.



To creatively escape the double-bind pathology, we have to work with both diverging realities, not just one. A geoethical framing of the double bind recognizes the tension between the two trends and the need for an ethic steeped in the values of complex systems.



From this perspective, education has not been powerless to stop divergence but valueless to stop it. In fact, education has been one of the most effective cultural forces that maintains divergent reality. **A route to finding the values we need is complexity thinking.**



*Complexity thinking* is not a set of tools but an attitude toward inquiry.

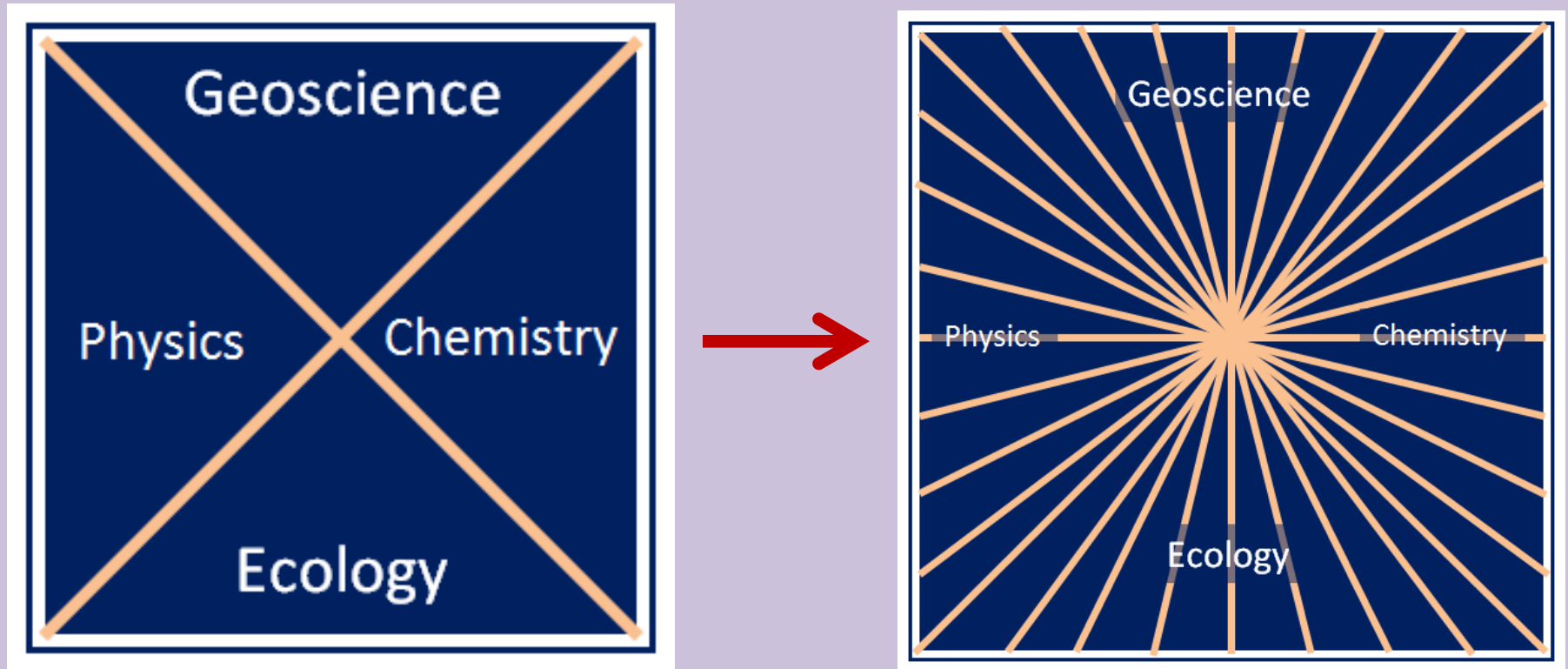
“... complexity thinking has a much more pragmatic emphasis than hard and soft attitudes toward complexity science. Its principal orienting question is neither the fact seeking “What is?” nor the interpretation-seeking “What might be?”, but the practice-oriented **“How should we act?”**”

“Significantly, complexity thinking in no way represents an abandonment of science. However, it does reject an uncritical – and, at times, as unjustified – faith in the analytic method, its mechanical and statistical tools, and other features of much of educational research through the 20<sup>th</sup> century.”

B. Davis & D. Sumara, *Complexity and Education: Inquiries into learning, teaching, and research* (Routledge, 2006). Bold emphasis added.

- To teach the values of complex systems, we don't have to, nor should we, change our science or our professions.
- We do need to look at teaching and learning from a “one level up” perspective because the divergent patterns are of such longstanding practice that we rarely perceive them.
- In some cases, they have become the *ideals* that we view as central to our professional identities; and they are embedded in our landscapes, universities, classrooms and buildings.

Systems understandings are built on relationships. Challenge disciplinary thinking dedicated to continuous fragmentation of knowledge.



Who's in charge of putting this stuff back together again?  
(As though it could be done....)

Recognize that the patterns in our built world embody divergent realities and conflict with those of complex systems. Can we “Think outside the box” when our world consists of boxes...



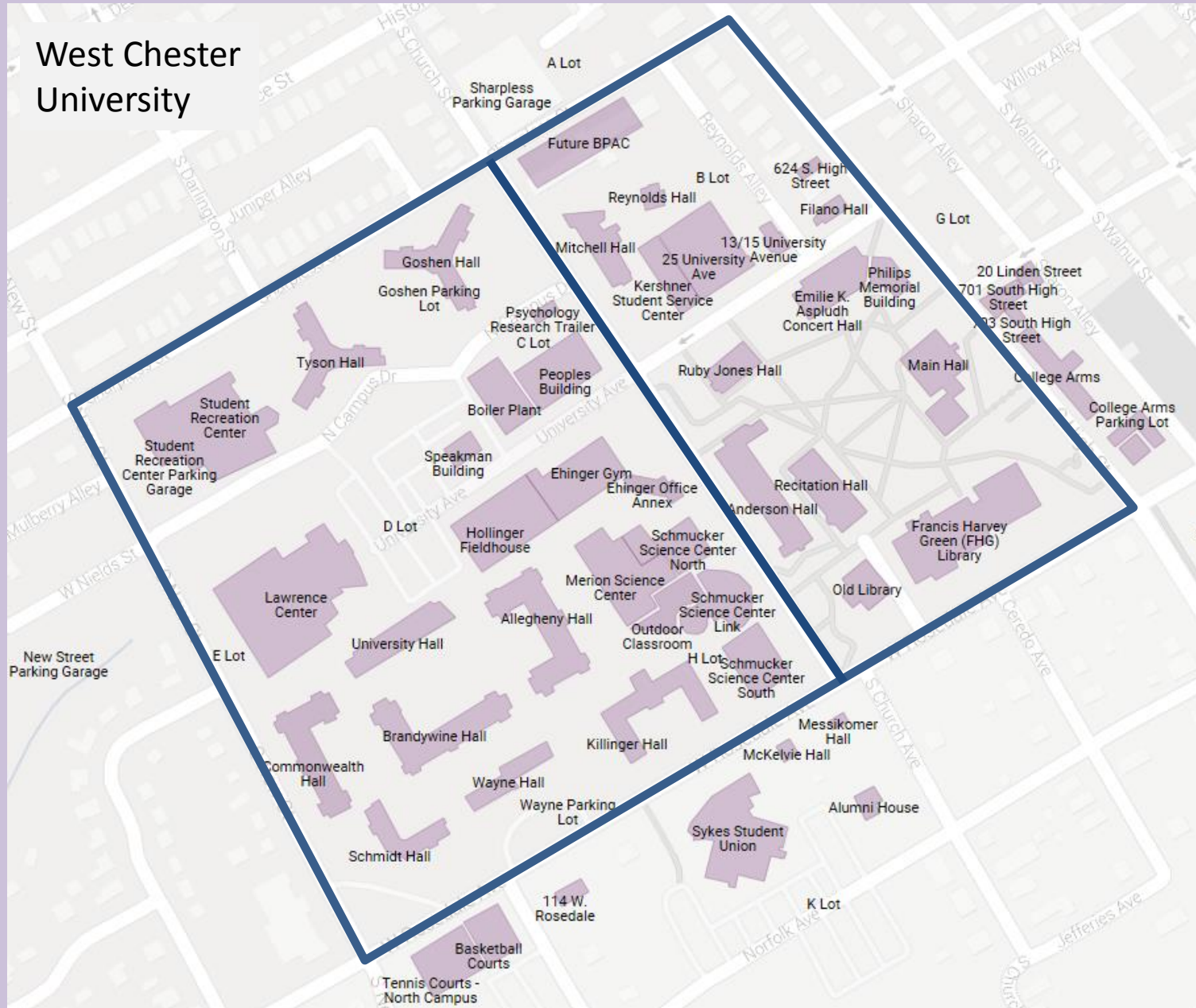


... inside boxes...



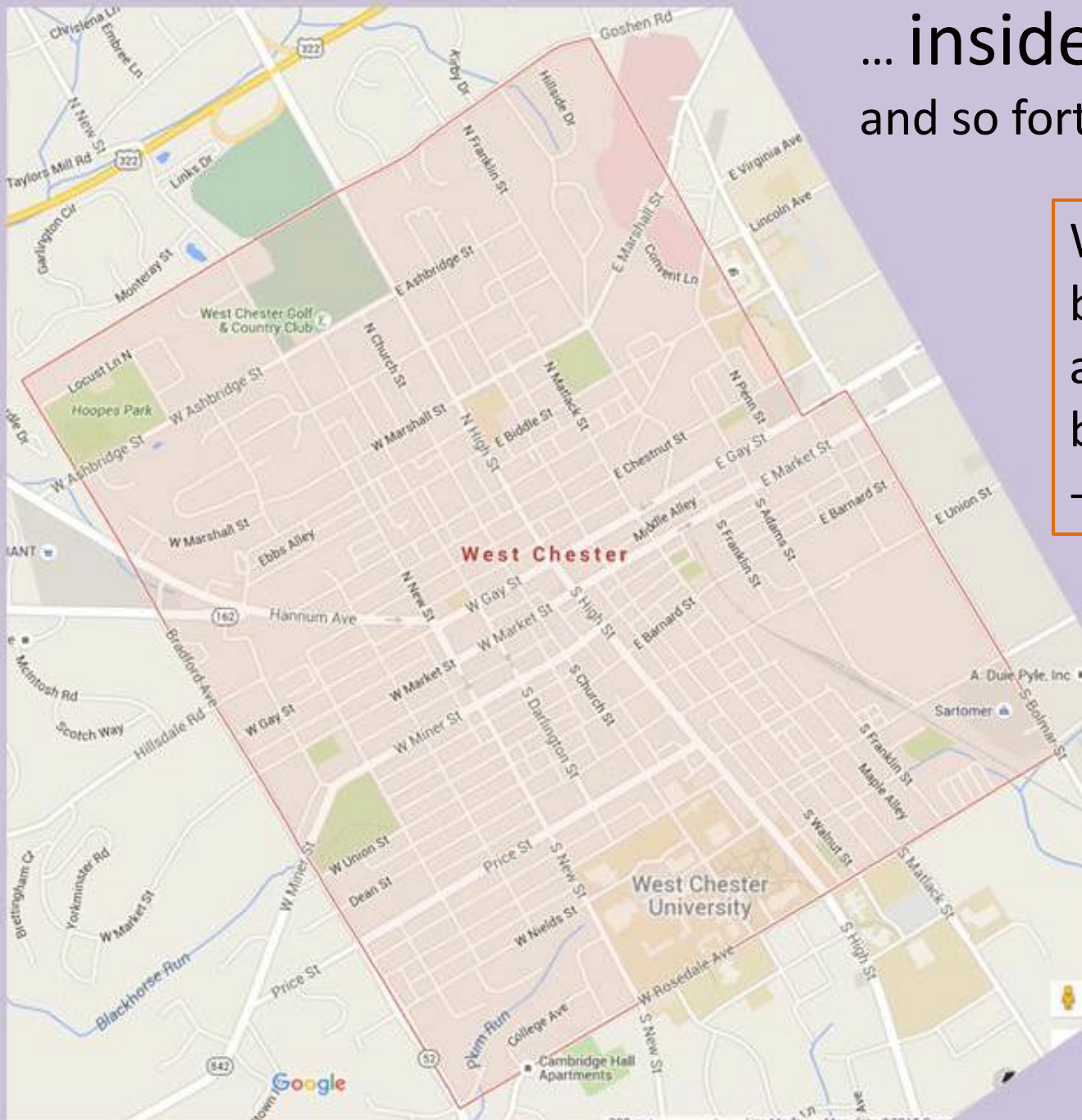


... inside boxes...



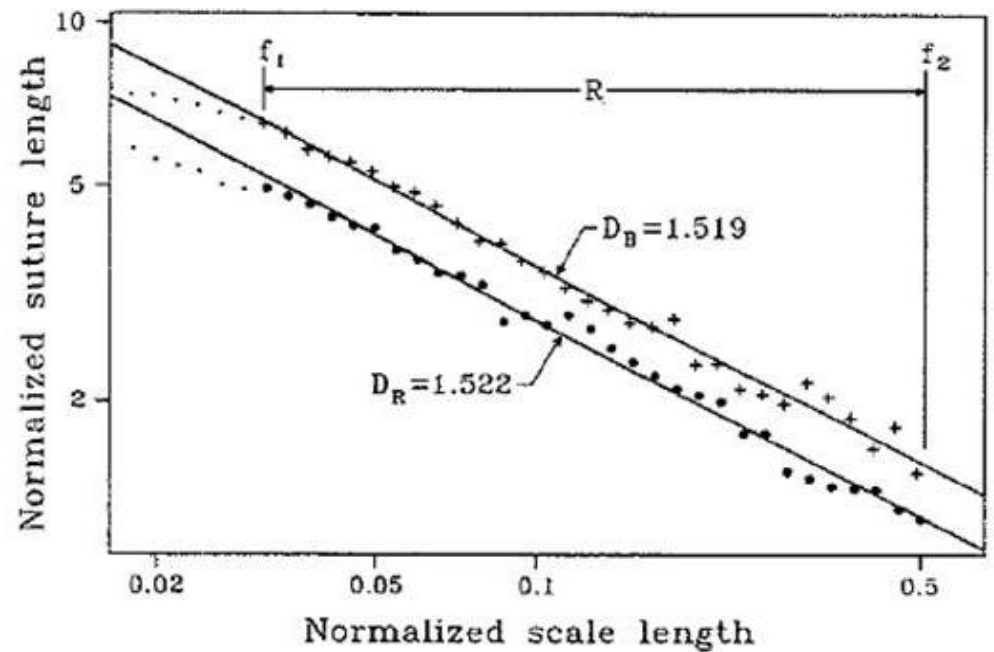
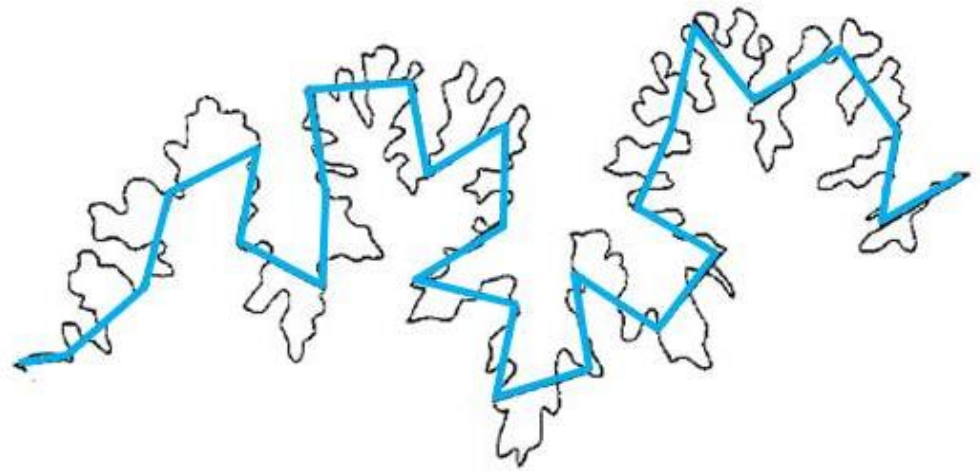
... inside boxes...  
and so forth.

We shape our  
buildings, and  
afterwards our  
buildings shape us.  
-- Winston Churchill



The geometry of complexity is fractal. Call attention to fractal relationships: they model the patterns of natural systems in ways that differ from the geometries of human design. They connect human measurement (x-axis) with natural action (y-axis) to display a relationship.

Lutz, T.M. & G.E. Boyajian, 1995, Fractal geometry of ammonoid sutures: Paleobiology 21(3) 329-342.





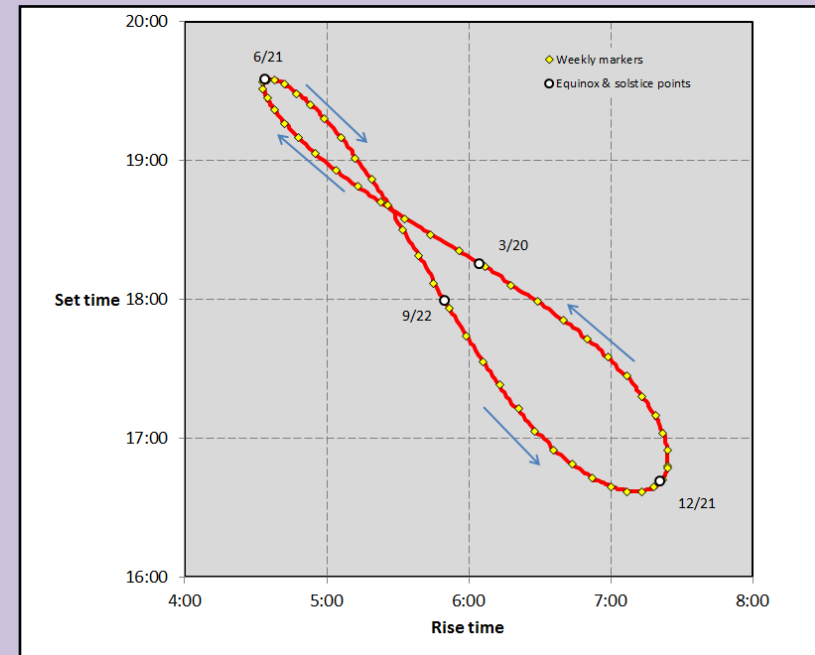
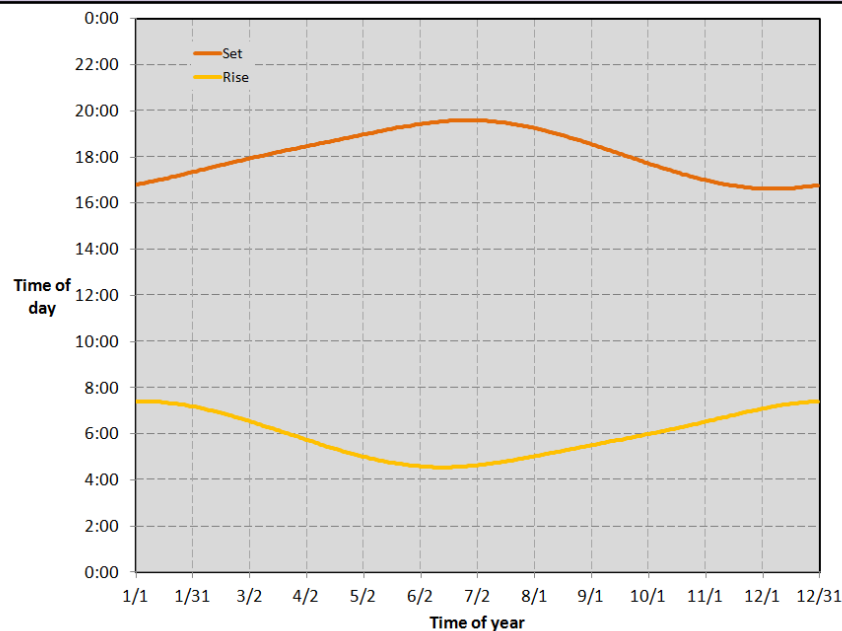
Complex systems are ***made of*** surprise! Data are not just food for models: explore, visualize & apply abductive reasoning to find it!

“Whither field hydrology? The need for discovery science and outrageous hydrological hypotheses”

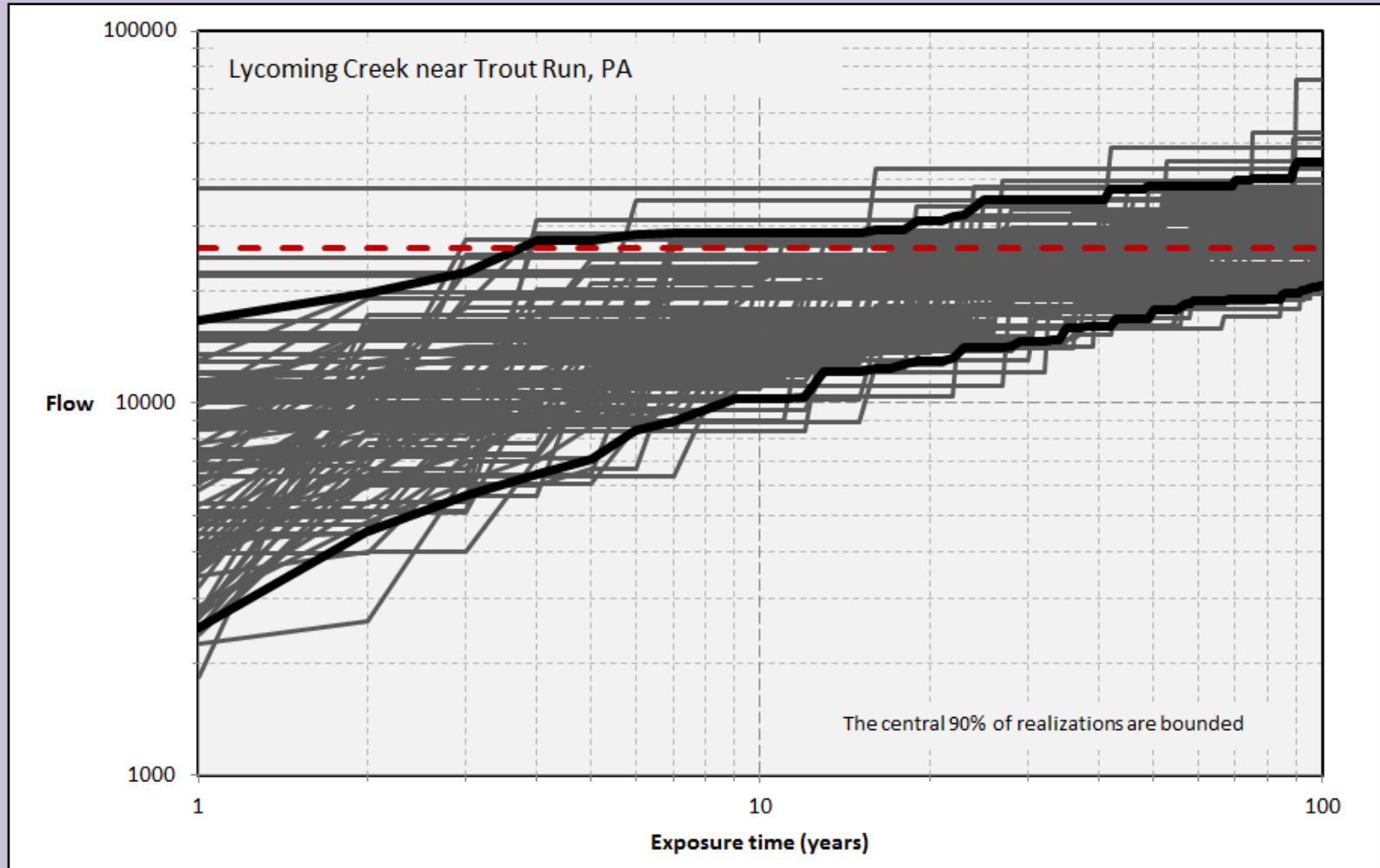
“Charting unknown waters—On the role of surprise in flood risk assessment and management

Burt & McDonnell (top); Merz et al. (bottom)

Water Resources Research, Special 50<sup>th</sup> Anniversary Section, 2015.



Are humans parts of natural systems or not? Find ways to connect human action (x-axis) with natural action (y-axis) and to reflect the open-ended (in this case, stochastic) aspects of systems.



See also: Lutz , T., 2011, Toward a new conceptual framework for teaching about flood risk in introductory geosciences courses: Journal of Geoscience Education, 59 (1), 5-12

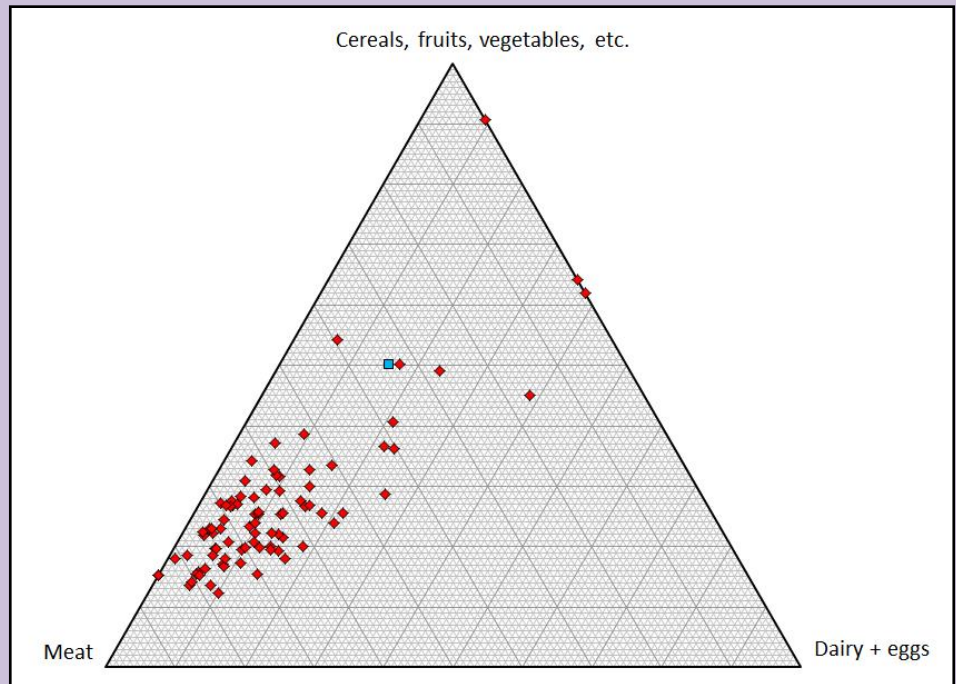
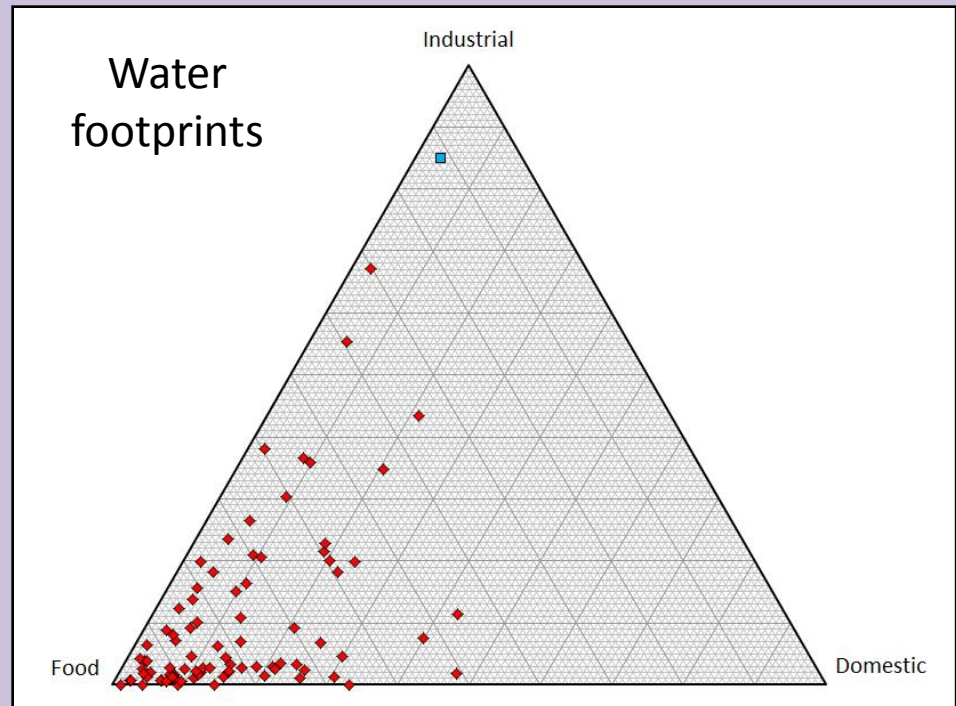
“Models develop the habit in their users and developers of seeking patterns of correlation and locating systemic constraints that over time lead to more desirable results...

“Good models are potentially powerful *democratic* tools putting expertise at the service of people with less knowledge; they [make] the assumptions and selective construction of the “real” visible and its implications readily available...”

John St. Julien, Complexity: Developing a more useful analytic for education: in Chaos, Complexity, Curriculum and Culture: a Conversation, W.C. Doll et al., eds., (Peter Lang Publishing, 2005)

Complexity thinking thrives on variation but 'dies' on averages. Models can help you pay attention to the complexity in your classroom.

Water dependence among students: the students in my classroom are systems components that relate humans to fresh water resources.



# What is the value of complexity thinking in education?

“...one of the issues that continually emerged was that teaching and learning were about expanding the space of the possible, and in so doing, creating conditions for things that have not yet been learned nor imagined, for surprise, for evolution through the known to the unknown.”

R. Uptis, 2004, School architecture and complexity: Complicity: An international journal of complexity and education, 1 (1), 19-38.



## Questions motivating this research:

- Why have humans not lived sustainably as organic parts of earth systems?
- After recognizing that we live unsustainably, why has it proven impossible to change?
- How does ethics arise as an integral part of a holistic earth systems perspective?
- How do we bring geoethical perspectives to geoscience education?