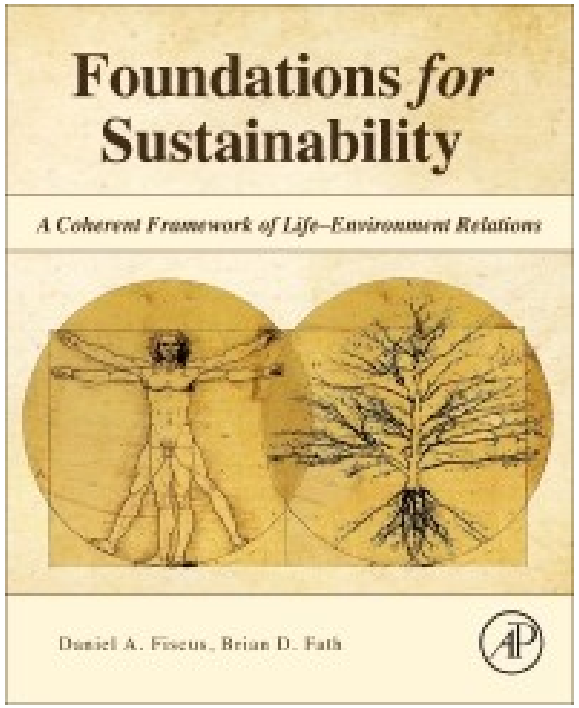

Foundations *for* Sustainability

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Chapter 5: Reforming Reductionism with six core principles

Your reaction

1) Earth.

    What does this mean and do you agree?

1) What part was most confusing or most difficult to understand?

Need for science reform

- Science and society do not recognize and achieve a self-enhancing Life-environment relationship
- Repair fragmentation

Six core principles of the new science

1) Is consciously, intentionally, and transparently value-based centered on the value of Life;
2) Is anticipatory and accelerates the pace and process of scientific change, including paradigm shifts, toward sustainable human-environment relation and Life-environment relation;
3) Balances and synergizes holism with reductionism and synthesis with analysis;
4) Equally emphasizes internalist and self-referential as well as objectivist perspectives;
5) Is complex and is able to reconcile seeming opposites and handle multiple scales and fluid boundaries of focal entities;
6) Is radically empirical with constant capacity for questioning, challenging, and transforming ingrained assumptions and structures

P1: Holistic science is centered on value of Life

- Covered in Chapter 2
- Value neutral
  - Is it?
- Systemic Death

P2: Holistic science is anticipatory toward sustainability

- Ecological perspective can alter how we see the rest of the world

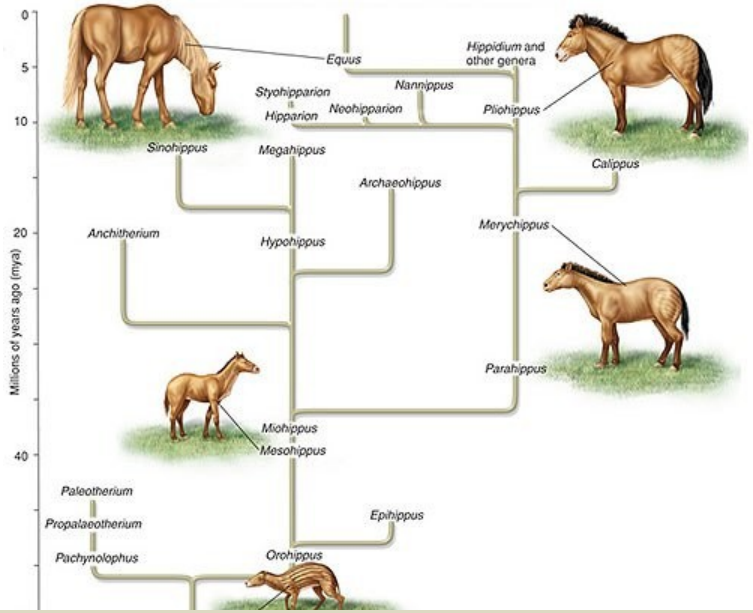
- Precautionary Principle
  - Be risk averse with respect to Life

- Restoration efforts cannot be “clean-ups” treating the symptoms
  - Revitalize self-healing autocatalytic cycles
  - The place will be home to and supportive of sustained Life

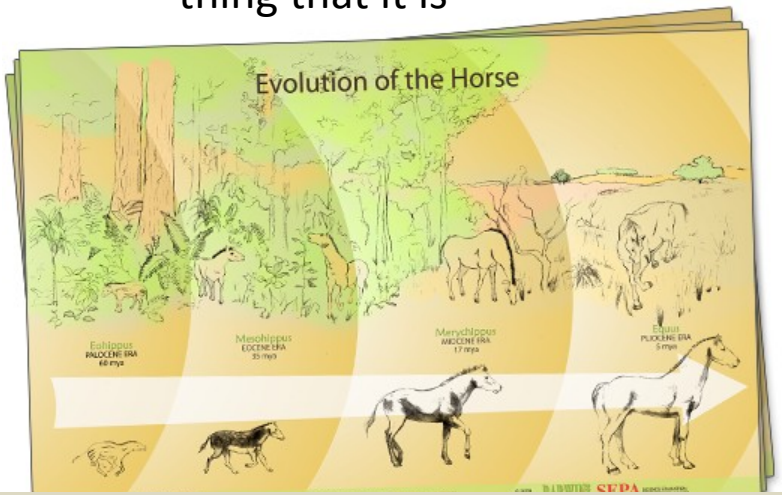
- Avoid leaving messes

P3: Holistic science balances holism with reductionism

- Back to nature:
  - Darwinian evolutionary theory contained a very great error in its identification of the unit of survival under natural selection.
  - The unit of survival is not the breeding organism, or the family line, or the society. (Bateson p. 32)



Biology texts explain evolution as a species thing not as an ecosystem thing that it is



"The unit of survival is a flexible organism-in-its-environment."

P3: Holistic science balances holism with reductionism

- a definition of a thing or event must include definition of its environment, we realize that any given thing goes with a given environment so intimately and inseparably that it is more difficult to draw a clear boundary between the thing and its surroundings. (Watt p. 67-68)

- Environmental Science/Studies, Ecology, Sustainability Sciences have built methods, habits and infrastructure to see more than isolated bits
- Tracing an atom shows three material cycles are unified

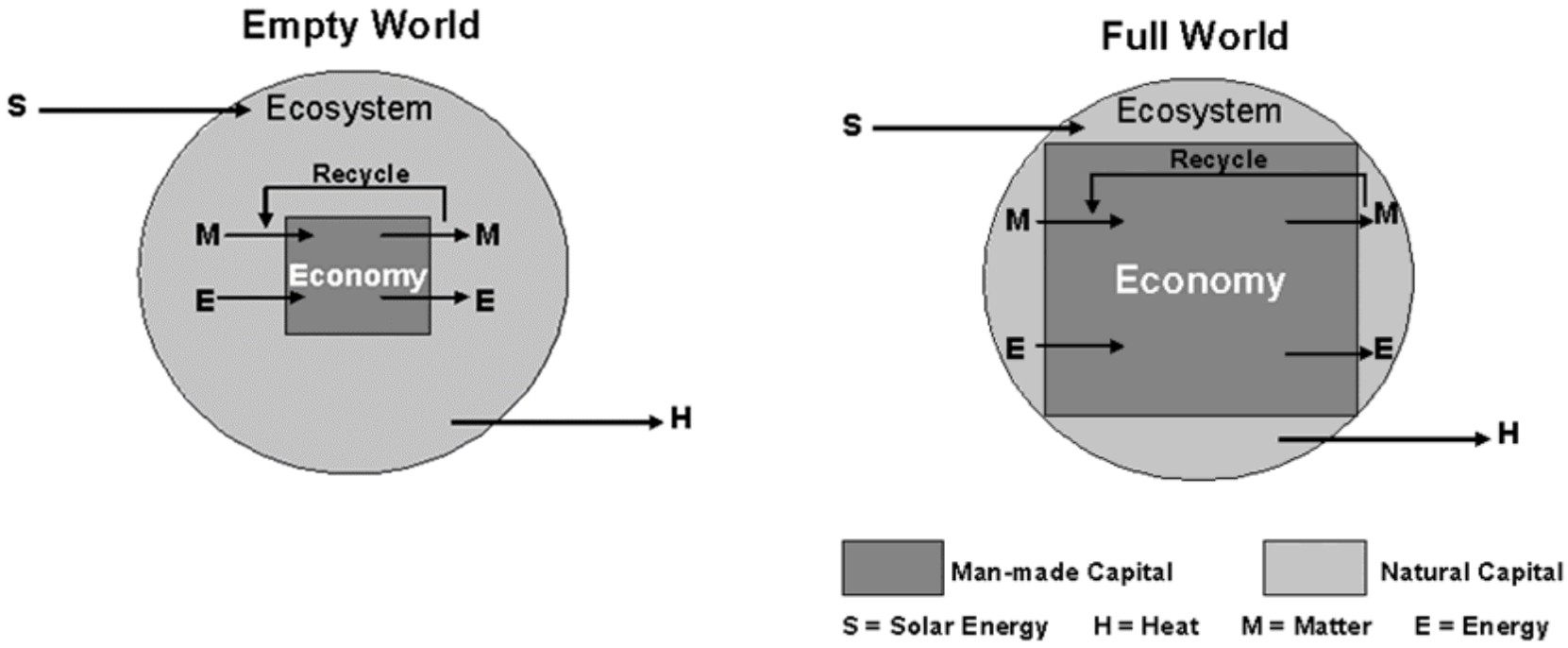
P3: Holistic science balances holism with reductionism

"We fat all creatures else to fat us, and we fat ourselves for maggots. Your fat king and your lean beggar is but variable service, two dishes, but to one table; that's the end." Shakespeare, Hamlet

Art work of Jan Heath, entitled "food chain"

P4: Holistic science equally emphasizes internalist and externalist perspectives

- Objectivity is excellent when used in moderation
- Working assumptions have changed



P4: Holistic science equally emphasizes internalist and externalist perspectives

- Entanglement
- “investigators are (and should be) not only observers, but actors in their own interests at the same time (Salthe 2001)

- “(i) we have to assume that those systems are able to interpret our interpretation, and hence (ii) our own behavior, our own choices, values and decisions have an essential place in the theory of self-organizing systems. (van de Vijver 1998)

P5: Holistic science is complex

- Complexity cannot be measured as an independent state variable, but rather in context with its environment
- Necessity of multiple distinct modes of description and interaction
- Complex systems are beyond formalization, simulability, and computability.
- “self-making of the self-makers”

P6: Holistic science is radically empirical

1) resist peer pressure to conform or to avoid certain types of questions, such as challenging questions related to sustainability;
2) resist pressure to remain within paradigm and continue the normal science program of “puzzle solving” (Kuhn, 1962); and
3) make questions and forays into “postnormal science” (Funtowicz and Ravetz, 1993)

Putting into practice

- hard-won lessons of the Hubbard Brook experiment were treated as for “academic purposes”

- use university campuses as a laboratory and for experiments to transform our universities to sustainable operations – David Orr

Summary of the six principles

Discussion questions

- Must holism end at the universe as the mode of study?
- Why such difficulty with internalist approaches?
- How does internalism not become shaming?
- What is the goal of the food system?

- How to implement in place at the university?

Discussion questions

- What is the relevance of Hierarchy in the hexaflexagon

- Is the whole idea of autocatalysis and closure making sense:
  - The result of systemic operations are once more systemic operations