

Can Industrial Ecology Become the “Science of Sustainability”?

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White's Definition of Industrial Ecology

...the study of the flows of materials and energy in industrial and consumer activities, of the effects of these flows on the environment, and of the influences of economic, political, regulatory, and social factors of the flow, use and transformation of resources.

Frosch's Vision

The idea of an industrial ecology is based on a straightforward analogy with natural ecological systems. In nature an ecological system operates through a web of connections in which organisms live and consume each other and each other's wastes. The system has evolved so that the characteristic of communities of living organisms seems to be that nothing that contains available energy or useful material will be lost. There will evolve some organism that will manage to make its living by dealing with any waste product that provides available energy or useful material. Ecologists talk of a food web: an interconnection of uses of both organisms and their wastes. In the industrial context we may think of this as being use of products and waste products. The system structure of a natural ecology and the structure of an industrial system, or economic system, are extremely similar.

Modern vs. Sustainability Paradigm

Modern	Sustainability
Reductionist	Interconnected
Complicated	Complex
Determinate	Indeterminate
Atomistic	Holistic
Mechanistic	Organic
Anthropocentric	Biocentric
Individualistic	Communitarian
Quantitative	Qualitative
Disenchantment	Enchantment
Competition	Cooperation
Geo-political bounds	Natural bounds
Linear, predictable	Non-linear, unpredictable
Equilibrium	Steady-state

Kay's Definition

Industrial ecology is taken to be the activity of designing and managing human production-consumption systems, so that they interact with natural systems, to form an integrated (eco)system, which has ecological integrity and provides humans with a sustainable livelihood.

Maturana's Contribution

The constitutive nature of our biological process of living together is also our great possibility for the future because we all have the natural ability to participate with others in consensual domains (an attribute which Maturana calls intelligence). By the laborious, but rewarding, bootstrap process of our cognition, we will continue our structural dance together and make a history for human society, which will be synthetically determined, but analytically indeterminable. We cannot know what the future holds, but we can know that everything we do (or say) contributes significantly to it. This awesome responsibility is what we regard as the biological basis of our human ethics. (Fell & Russell, 1994)