
Letter to the Editor

Johansson, A. 1997. **Industrial Ecology**. Letter to the editor regarding Ehrenfeld and Gertler's (Winter 1997) "Industrial Ecology in Practice: The Evolution of Interdependence at Kalundborg," *Journal of Industrial Ecology* 1(1): 67–79. (See Ehrenfeld and Gertler for reply.)

A recent article in the *Journal of Industrial Ecology* (Ehrenfeld and Gertler 1997) inspired me to some critical thinking. The criticism applies, not so much to the actual Kalundborg example per se, but rather to the interpretation that is read into the industrial cooperation in Kalundborg, and as such to the whole concept of Industrial Ecology. But allow me to start with some general reflections.

First, environmental consciousness is not such a recent phenomenon as we like to believe, words of warning about the impact of uncontrolled human actions have been raised from time to time throughout human history. In fact the Greek philosopher Plato warned of the detrimental effects of excessive human economic activity. With good reason it appears, as the sterile beauty of the Greek islands today is a result of a monumental eco-catastrophy caused by overdimensioned economic activity in ancient times, probably in the form of too intensive sheep farming on the islands (Fries and Arkadien 1979). A reminder of the often forgotten fact that our value notions in preserving nature is much a question of which particular period in history we want to preserve.

Further, in the article it is indicated that, from an environmental point of view the product stream is only a tiny fraction of the production itself. I do not agree. Although it is true that every production of goods creates a substantial flow of by-product streams or waste I would argue that simply closing off the by-product streams does not solve the environmental predicament in which we currently find ourselves. The real challenge lies in designing production concepts that include the whole product life-cycle in an environmentally acceptable way.

The authors of the article claim that the concept Industrial Ecology adds additional insight to environmental management by drawing on an ecological metaphor which should result in a better design of industrial processes, the closing of material loops and avoidance of toxic emissions. Also it is claimed that application of the metaphor results in dematerialization of industrial operations and aids in designing thermodynamically more energy efficient processes. I do not question the possibility of finding successful examples of industrial symbiosis, like the Kalundborg case, on the contrary the history of industrialization bears ample evidence of them.

However, the central issue is, does the concept bring new elements for preventive environmental management in industry, or is it only another popular label to play around with. Does it really help to plan our future activities better in order to avoid

environmental conflicts? Apparently not, as a key feature in the concept appears to be spontaneous evolution rather than conscious action. This fact, in my opinion, makes the concept less useful than the almost synonymous metaphor industrial metabolism (Ayres 1989) which also alludes to the living nature while describing the material flows within the industrial society much like the material flows through a living organism, but without trying to read in any hidden wisdom in the parallel. The mass balances established through the latter concept offer a solid basis for exploring the border between anthropogenic activity and the biosphere.

Key terms in the concept of Industrial Ecology are closed material loops and the notion that inefficiencies in parts of a synergistic cooperation of industrial companies can not only be tolerated for the benefit of the totality, but in fact may result in an improved overall performance. Based on the Kalundborg example it is deduced that the synergistic approach requires geographical proximity. The generality of this assumption can be questioned, and at this point the concept of Industrial Ecology still appears as a vision without a vision to me. While it is still true for the core of the Kalundborg example, the co-generation of electricity and heat, which for that matter is a well established and widespread industrial practice, it is not true for the scrap iron trade, cited as an example, as this is a well established international exchange in its own right. Integration and symbiosis in the food industry also has long traditions and furthermore constitutes a special case, as it represents an industry which in fact already is, and should remain, a part of the natural material cycle.

It is claimed that the strength and uniqueness of the Kalundborg example is the fact that it has evolved more or less spontaneously, but is this not what has happened to the industrial system as a whole? Thus it is not a very useful guide for future activities. In fact one could argue that this lack of overall vision is really the source of our difficulties as one consequence has been large interdependent systems that are obsolete but difficult to dismantle due to social and economic reasons. It appears to me that in accepting such a passive attitude we throw away one of the best assets we have compared to the living nature in general, our ability to foresee and act rather than passively adapt to changes.

In fact much of the attraction of the Industrial Ecology concept as described by the Kalundborg example derives from a biased analysis implying that all the good things are Industrial Ecology while the bad are not. Following such an analysis many more examples of profitable symbiosis throughout the history of industrialization could easily be pointed out (i.e. development of the pulp and paper industry-- energy production and the whole synergy through the naval stores sector and lately pharmaceuticals (Johansson 1982), integration of the petrochemical industry, carbon dioxide and cattle feed in breweries, etc). On the other hand recent negative examples of industrial ecology could be furnished by the evident economic failures of the former soviet kolhoses, which really were set to make the most of synergy and geographical proximity.

It may well be that a much greater value could be derived from the metaphor of Industrial Ecology by trying to learn more from the development "strategy" of Mother Nature and focus less on the material balances per se. The survival of the fittest is as valid a motto in

the industrial society as it is in nature. Perhaps one could deduce from this that qualities like versatility, flexibility and diversity may be valuable qualities even in a future struggle for industrial development?

References

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Received October 10, 1997