Abstract

Ecosystem services are usually interpreted as a free of charge "favour" provided to us and our society by nature. In other words, nature supplies us with a functionality that we would otherwise have to pay for. Our cost would be to provide resources either (1) to ensure the necessary inputs to drive our society, or (2) to assist in counteracting, absorbing or remediating unwanted effects that are results of our societal activities. Through ecosystem studies it has been found that a substantial part of the functionality of nature is laid out in all types of components—the compartments of the ecosystems together with the transactional interrelations (flows) and controls between them. Eventually, many so-called indicators have been proposed during the last decades. Such measures are dedicated to tell us about the quality side of ecosystem functionality, e.g. to tell us how well the system performs relatively to a theoretical maximum efficiency possible. As an additional hypothesis, such functions are thought to orient the systems and thus increase through time development, i.e. to be optimised under the given the constraints, through the evolution of the system. Recently is has been pointed out that natural and societal systems share the feature of being complex in their organisation. Meanwhile, it was remarked that societal systems in many ways evolved in opposite direction of how natural evolution would drive an ecosystem. Many philosophers of biology have stated that biological systems posses information and memory functions which improve their long-term capability to survive. This information is believed to be contained in the organisational structures of the system as much as in its gene pool. If we accept such arguments it means that studies of organisation and function of natural systems will provide us with another type of ecosystem services. This would namely give us information about in what direction to drive society in order to achieve a more sustainable system.

This paper discusses what measures derived from modern ecosystem theory can possibly be used to study and compare the functionality of the two types of systems. The discussion takes an entrance point in two graphs—one that represents a natural system and one of a socio-economic system. The systems possess similar levels of complexity in terms of number of compartments whereas their connectivities do differ in quantity and quality. The differences between the systems are compared from both a network and a thermodynamic perspective. Indications of the best available options that we have at present, will help to increase our knowledge about and understanding of the systems given. As a main conclusion it is possible to view and treat our society as an ecosystem. This means that it is possible to apply the same measures (indicators) that we use in ecological theory. The idea to use these features is so clear, obvious and at the same time cheap that this option necessarily has to be tried out. It seems a bit surprising that we – from a "natural science point-of-view" – to a certain extent understand natural systems better than socio-economic ones. One major reason is that the latter type includes a large set of regulatory mechanisms that are exerted on a subjective basis as opposed to natural systems. As a consequence societal systems become much more difficult to evaluate, forecast and regulate than ecosystems.

Keywords

Ecosystems; Socio-economic systems; Complexity; Evolution; Compartmentalisation; Flows; Cybernetics; Cycling; Networks; Openness; Dissipation; Diversity; Ecosystem services

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