Ecosystem Services ∎ (∎∎∎∎) ∎∎∎–∎∎∎

Contents lists available at ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser

Value, institutional complementarity and variety in coupled socio-ecological systems

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ARTICLE INFO

Article history:
Received 21 October 2013
Received in revised form
11 August 2014
Accepted 24 August 2014

Keywords:
Economic valuation
Institutional complementarities
Biological value
Requisite variety
Coupled socio-ecological systems

ABSTRACT

Taking an interdisciplinary and complex systems approach, theoretical ground is prepared for bridging the divide between economic value assessments and adequate policy responses – the deviation problem. A conceptual framework is developed which explains how plural values emerge in a variety of interaction domains and how deviation problems in value assessments are created and can be overcome by means of institutional complementarities. Conceptualizing value as an emergent property of diverse behavioral patterns resolves the deviation problem, turns attention to behavioral assessments rather than value assessments and opens up the valuation toolbox for methods from the behavioral sciences. Conventional economic valuation approaches, especially benefit transfer methods are analyzed with respect to their ability to overcome the value deviation problem and the development of a comprehensive societal valuation system is proposed which builds on knowledge of behavioral instead of value assessments.

Background

The financial crisis of 2008 and the institutional failures which presumably caused the collapse of the financial service sector, have received much attention from institutional economists (Krugman, 2009; Stiglitz, 2010; Rhode, 2011). Although the economic losses from the degradation of ecosystems and biodiversity (E&B) were said to dwarf those of the financial crisis (Black, 2008; Jones undated) far less attention has been paid to the institutional failures which continue to cause them. The Economics of Ecosystems and Biodiversity (TEEB) project aimed at providing an account of the dimensions in which economic values of E&B occur and are being lost due to failures which can predominantly be ascribed to institutional failures.

TEEB argues that not acting in favor of conservation and sustainable use of the economic benefits of E&B, will cause enormous economic losses. Therefore, it is necessary to "measure what you want to manage" (Sukdev, 2012). Measurement, however, requires criteria and indicators, like words and their meanings of a language. As values are not objectively given or pre-existing a common language of valuation (Martinez-Allier, 2008) cannot capture the diversity of values emerging from coupled and complex social and ecological systems.

Complex systems are defined as emergent structures. Emergent structures evolve when the system or system component show characteristics that the individual components of the system do not show themselves (Axelrod and Cohen, 1999: 15). From a complex systems perspective, value can therefore be defined as an "emergent property of interaction patterns" in coupled socio-ecological systems. Such definition is useful as there are obviously very different types of interaction domains in social and ecological systems. An interaction domain is a space in which different system components interact, either people or other biological organisms among themselves or between living and non-living components of nature.

Economic and other human values emerge out of the recognition that ecosystems and biodiversity (E&B) have functions and generate benefits which contribute to ecosystem health which is linked to human well-being. There is a fundamental biological link between ecosystem health and human wellbeing which affects the experience of the state of nature by human brains (Damasio, 2010). This linkage is configured according to cultural specificities. Therefore, in the following I identify three domains in which value emerges: Economy, culture and biology. Performance indicators in each domain are different and difficult to compare or assess by means of a common metric. In the economy the performance criteria may be 'wealth', in biology it could be 'health or fitness' and in culture the performance criteria could be a moral standard, like 'good', or 'right', or a feeling.

Feelings are relevant in this context because "… we are still part of earth's fauna and flora. We are bound to it by emotion,

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http://dx.doi.org/10.1016/j.ecoser.2014.08.004
2212-0416/

physiology, and not least, deep history" (Wilson, 2004: 199). In evolutionary economics "…it is the lack of a connection between aspiration formation and objective knowledge that allows emotions to play such an important role" (Foster and Metcalfe 2011: 25). And according to Damasio (2011): 1804, "… in modern neurobiological terms, emotions are complex programs of actions triggered by the presence of certain stimuli, external to the body or from within the body, when such stimuli activate certain neural systems. Feelings (of emotion), on the other hand, are perceptions of the emotional action programs."

Recognizing the plurality of values and and the ways they are articulated by language is however just a first step. The next challenge is that of institutionalizing the values emerging from the diverse interactions in coupled social–ecological systems. Therefore, an appropriate set of institutions is necessary to regulate and constrain interactions and to motivate action and thereby make complex interdependencies more predictable and less uncertain. Such institutions often do not 'naturally' come about by processes of selection or spontaneous order (Sugden, 1989). More often they are conscious efforts of people investing in the design of institutions at various levels of decision-making. Such efforts can be economically costly but still worthwhile to undertake, depending on the complexity and uncertainty of interactions addressed.

Establishing institutional complementarities for diverse values is necessary for appropriate policy responses, as policy making builds on an existing institutional infrastructure. For making values part of the policy cycle (Gatzweiler, 2009: 4), values need to be complemented by institutions at more aggregate levels of choice and decision-making. This involves investments into human and social capital. Despite E&B being highly valued, actions which takes those values into account, e.g., by taking precautions or restraining use, do not automatically follow. Behavioral change does not automatically follow statements of value as expressed in willingness to pay studies. This is because changing once established interaction patterns is costly. Experiments by Arkes and Ayton (1999); Arkes and Blumer (1985) or Jannsen et al. (2003) suggest that humans are influenced by investments they made in the past although from the rational actor perspective they should not be influenced by sunk costs and only take incremental costs and benefits into account for decision making. Sunk costs have also been used to explain the resistance to change in behavior when confronted with environmental change. Diamond (2011) provides examples of ancient societies such as the Greenland Norse, the Mayans or the population of Easter Island who were not able to change values, habits and traditions in the face of major environmental changes and collapsed. That means, central for changing behavior is not only a change in values, but a change in the complementary institutions which eventually lead to behavioral change.

Institutional complementarity (Aoki, 2001; Gagliardi, 2013; Amable, 2000; Hall and Gringerich, 2004) has also been referred to as fit and interplay of institutional and organizational structures at multiple scales of socio-ecological organization. Institutions complement and reinforce each other and thereby improve the robustness of social and ecological systems and respective performance (Folke et al., 2007; Vatn and Vedeld, 2012; Young, 2002). Such complementarity is specific to different types of interaction domains (Fig. 1). Therefore, Young refers to institutional fit and interplay in the context of "issue-specific institutional arrangements" (Young, 2008: 15). I will refer to institutional complementarities in order to establish the link to different types of values emerging from different interaction domains. As an example, interacting with other drivers in the traffic happens in a different type of interaction domain as interaction between producers and consumers on the market, interacting in the family or between friends, or interaction among species in ecosystems.

If we define values as emergent properties of interaction patterns, value is closely tied to action and behavior. This fact is also strongly grounded in economic theory which says that value is defined by how people behave and decide – not by their value statements (Friedman, 1996). What has largely been neglected in the literature on valuation is the link between more aggregate levels of institutions and the most fundamental level, that of values. Given the enormous attention paid to the valuation of ecosystems and biodiversity, the gap between value assessment and implementing effective policies which match the value assessments, is large. Despite the fact that extremely high economic values are attached to ecosystems and biodiversity (see e.g., Costanza et al., 1998) actual behavioral change can not be expected unless different types of institutions are in place which work as incentives constraining or rewarding respective decision-making (Kamenica, 2012; Gneezy et al., 2011; Camerer, 1999; Glimcher et al., 2009).

There is obviously a gap between how people behave towards nature under current institutional arrangements and how they should be or would want to be acting in order to avoid the unintended social costs of their behavior. What creates these gaps are sets of social, economic and political institutions which are not adjusted to the dimensions defining interaction domains. Our conceptual framework illustrates how behavior evolves in interaction domains, which are defined by the type of rationality, the type of human interaction and the type of the good. A dominant approach for changing undesired behaviors towards nature is by building institutions which are responsive to the model of the rational individual which is perfectly informed, socially independent and makes coherent and consistent decisions in an instrumental manner. This is, e.g. done by economic valuation and subsequent correcting of the prices attached to ecosystem goods and services.

Because of the uncertainty of behavioral outcomes in interaction domains such institutional fit cannot easily be achieved. In many cases, however, in which behavior is predominantly defined by the rational actor model behavioral change can be achieved by market mechanisms, e.g. by adjusting prices. When we are dealing with common pool resources and public goods, correcting prices or enforcing a system of punishments or rewards are not necessarily effective in avoiding socially unwanted behavior (Fehr and Gächter, 2000).

We conclude that for avoiding ecologically and socially adverse behavior, more attention needs to be paid to identifying the interaction domains in which people actually make decisions, act and behave. The behavioral responsiveness increases the better the instruments match the values which emerge in each interaction domain[1]. We have only recently begun to understand these behavioral patterns emerging from specific interaction domains in experimental and behavioral economics and the neurosciences. Simultaneously investments need to be made in human and social capital to facilitate more comprehensive social processes of deliberation and decision-making. These types of deliberative social processes do not only strengthen social capital, they are communicative processes in which people become aware of behavioral patterns they are part of and are enabled to consciously change them.

The following sections aim at preparing theoretical ground from the perspective of complex systems for bridging the divide between assessment and accounting of values and adequate policy responses – the deviation problem. For that purpose I will 1. elaborate a conceptual framework and explain how values emerge

[1] For example, friendship cannot be built by paying a price for it and consumer behavior is difficult to change if prices remain unchanged.

Please cite this article as: Gatzweiler, F.W., Value, institutional complementarity and variety in coupled socio-ecological systems. Ecosystem Services (2014), http://dx.doi.org/10.1016/j.ecoser.2014.08.004