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Analysis

Biocomplexity—conceptual challenges for institutional analysis in biodiversity governance

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ABSTRACT

Institutions for biodiversity governance are located at the interface of human and ecological systems. The analysis of such institutions is challenged due to addressing a multitude of complex interactions between these two systems occurring at different natural scales and levels of human organization. Due to this complexity, empirical analysis of biodiversity management often leads to context-specific explanations, providing little scope for comparative work or the development of more generalised, theory-based accounts. We aim at reducing complexity in understanding human–biodiversity relations, making cases comparable across sites, and propose that, in order to address complexity, we need a method of abstraction that leads to the development of a more structured analysis, based on selection of explanatory factors according to cconceptual models as well as empirical significance. We suggest that the stylisation of typical "resource use-perspectives" – the combination of typical transactions that are inextricably linked by the interest of the actor – can be a useful method for realizing appropriate model selection. In this paper, we provide an account of how use-perspectives can be developed and to what kind of analysis they can contribute, using the example of agrobiodiversity in grain as seed, food, or genetic material.

1. Introduction

Two important issues have emerged from recent research on institutions governing use and conservation of biodiversity. First, biodiversity governance involves a broad array of institutions that constrain and motivate interactions between human and ecological systems at a multitude of scales: from a gene to whole ecosystems (Millennium Ecosystem Assessment 2005). These institutions contain a number of mechanisms for responding to social heterogeneity and biophysical complexity. Second, such institutions frequently comprise a number of different governance structures, such as incentive-based mechanisms and reciprocal relationships that regulate different aspects of the human–ecosystem interface. Institutions are regulatory mechanisms at the interface between ecological and social systems (Gatzweiler and Hagedorn, 2002). They are sets of rules and regulations that constrain and motivate actors to interact with ecosystems and other human beings in certain ways. Institutions are also referred to as the 'rules of the game' (North, 1990).

We propose use-perspectives as an analytical tool for biodiversity governance. With a highly complex resource like biodiversity problems of coordination and competing targets are faced on matters such as food production, conservation or breeding. The resource at stake is highly complex, equally so the human use of it. Institutions are at the interface between the natural environment and the actors putting it into use for different ends. Therefore, we observe a multitude of institutions aiming at regulating resource use. The use-perspective introduces actor's interest as an explicit analytical category to biodiversity governance research. Inclusion of the perspective of the actor's undertaking a certain use – implying thereby alternative transactions – helps to distinguish cases and, at the same time, makes them comparable across contexts. To understand the vast array of existing rules and regulations, in order to improve resource governance by crafting new institutions, we suggest (1) considering the interests of users, stressing their perspectives and aims; (2) capturing the properties of transactions as the basic analytical unit; and (3) making cases across settings comparable.

The normative background for our endeavor is the pledge of the Convention on Biological Diversity (CBD) to halt the loss of biodiversity through conservation and sustainable use practices, requiring significant modifications in current institutional arrangements (Jungcurt, 2008). Designing such measures requires a sound understanding of the interaction between the natural processes that determine an ecosystem's reaction to human activities and the processes and factors that shape institutions (Heal 1999, 2004). Institutional analysis is key to approaching questions of natural resource governance and has yielded significant insights on the dynamics and impacts of human–ecosystem interactions, such as the sustainable management of common pool resources through collective arrangements (Ostrom, 1990; Ostrom et al., 1999). Nevertheless, institutional analysis still faces a

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number of problems. The comparability of different empirical analyses is limited and hinders consistent theorizing across different levels of social analysis and human organization: from the individual to the state. These problems are aggravated by the complexity of the interactions and interdependencies that affect the state of biodiversity. As we seek to develop ways and means to deal with the complexity inherent in the analysis of biodiversity governance, our investigation is guided by the heuristic and analytical tools that have been applied to other fields of natural resource management.

The objective of this paper is to develop an analytical tool for such research. We propose the identification and careful stylization of typical 'use-perspectives' on biodiversity by introducing actor interest as a core dimension as a means to facilitate empirical, comparative analysis as well as enriching conceptual approaches on multi-level institutional analysis. Interest as an explicit perspective for analyzing biodiversity governance research stylises certain uses and sequences of transactions in order to distinguish cases and make them comparable across contexts.

Existing frameworks generate a large number of highly context-specific explanations based on conclusions from case studies, primarily relevant for the sample under consideration, rather than applying more generally (Agrawal, 2001). Theories of collective action phenomena in biodiversity governance have little explanatory power beyond the specific empirical setting in which they were conducted as conceptual models are missing. What is thus needed is a method of adequate abstraction. Considering Agrawal's elaborate critique on missing conceptual models, we propose the approach "use-perspective" to allow for a systematic analysis of choice properties in biodiversity management.

The following section reviews the emerging literature on institutional analysis of biodiversity governance and clarifies the motivation behind the need for a new method of abstraction. Section 3 introduces transactions as the unit of analysis. Section 4 discusses commonly applied approaches to institutional analysis of resource governance and shows how results remain isolated findings in the absence of a tool for abstraction or simplification. Section 5 presents the use-perspectives approach and demonstrates how use-perspectives can be constructed step by step, using familiar examples from research on agricultural biodiversity. Section 6 discusses possible applications of the use-perspectives approach.

2. Sources of Complexity in Biodiversity Governance

We have identified at least four sources of complexity in institutional analysis of biodiversity governance: (1) the interrelationships between ecosystem functions, (2) the coexistence of different kinds of transactions for physically identical units and (3) the broader institutional and societal contexts. (4) We elaborate on the challenge to capture the provision of goods and services by an ecosystem with institutional means lies at the heart of the analytical need to make case comparable for institutional learning.

Ecosystem services depend, first, on several, often interdependent, ecosystem functions occurring on different ecological scales, which in turn differ from the scales of human appropriation and the levels of decision making (De Groot 1992, De Groot et al. 2002). Food production, for instance, depends on the maintenance of soil productivity on a local scale; regionally it is influenced by climate regulation and pathogen populations; while on a global scale the maintenance and accessibility of genetic resources for plant breeding is becoming increasingly relevant for maintaining productivity in a sufficient number of agro-ecosystems worldwide. This means that biodiversity governance involves a multitude of actor groups that is quite diverse and heterogeneous (Daily 1999). Some goods and services may be consumed exclusively by a small, local community, while others involve a broad number of different groups, some of which might not even be aware of their potential benefits. Some benefits naturally occur over large areas, while other goods, such as crops, livestock, fish, and medicines, are traded internationally, so consumer preferences can impact biodiversity over large distances without consumers realizing it (Vermeulen, 2004). Decision making regarding biodiversity – be it for the appropriation of goods and services, or in order to take measures for conservation – takes place at all levels of social organization. And, often decisions taken by one group of actors may lead to an impact on an entirely different group that takes its decisions with different interests in mind (Swanson, 2003).

Second, ecosystem goods and services vary in their properties, requiring different governance structures that take a range of transactions for their allocation and management into account (Dedeurwaerdere 2005). The conceptualization of natural resources in broad categories of different goods is not able to identify and distinguish the relevant transaction properties. The characterization of private goods, such as food, as being more adequately allocated through markets than public goods, such as climate regulation, cannot cover the relevant properties of a certain good or service from a particular perspective of use.

Third, institutions for biodiversity governance must thus include a variety of structures relating not primarily to goods and services, but rather more to the relevant properties of transaction, which are defined by the interest of the user. While the properties of the goods and services become obvious and palpable only when a transaction takes place, the anticipation of a user even without action taking place shapes the need for the governance structure to grasp conservation. The actor as a user with a certain interest in the good or service decides which property of transaction becomes analytically relevant. There are two more sides to the relevant properties of transaction in biodiversity management. First, even if we cannot observe an activity, it can imply a choice relevant for conservation and, equally, be shaped by actor interest. Second, the influence of the physical attributes of the resource and the process itself determine the transaction. Institutional diversity is not only important with respect to the multitude of scales of interaction and appropriation, but also with respect to a careful fitting of governance structures to the range of alternative transactions regarding biodiversity goods and services.

For the development of resource use-perspectives non-use values and ecosystem goods and services are relevant to the extent as they are considered by the actors. If they are not aware of them, they are exogenous to our approach, which of course does not mean that they are not relevant per se, simply they are not an active in the sense of "virulent" factor in our analysis. This is the case when the actor knows non-use values and ecosystem goods and services, honors them out of altruistic motives or believes in their intrinsic value and considers them in his decisions. There exists a trade-off between analytical rigor and the degree how to take into account complex interdependencies and feedback mechanisms. We distinguish between exogenous and dependent variables relevant for the actors' decision.

3. Transactions as the Unit of Analysis

It is important to be clear about the distinction between a transaction as a conceptual devise to support, on the one hand, movement of rights and, on the other hand, as an actual physical transfer of things. Transactions are closely liked to the interest and motivation of the actor: "Transactions are, not the exchange of commodities, but the alienation and acquisition, between individuals, of the rights of property and liberty created by society, which must therefore be negotiated between parties concerned before labor can produce, or consumers can consume, or commodities can physically be exchanged" (Commons, 1931: 652). In contrast, Williamson (2000) concentrates on the physical properties of goods, limiting transactions namely by specificity, frequency and uncertainty. These characteristics present obstacles to the realization of rights. The central analytical unit according to Williamson is the physical transaction, which has to be secured by contracts. The focus of Williamson on the physical transactions concentrates on the technologically