

# **Biological diversity protection and self-regulation of local communities.**

## **Some implications of a reflexive institutionalist approach.**

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## **Abstract**

*Since the signature of the Convention on Biological Diversity (1992), there has been a growing interest in the role of community self-regulation in the protection of biological diversity. Extensive field research on the role of cooperative processes in rational behavior attests the possible efficiency of institutional design based on self-regulation. Our hypothesis is that this approach remains however insufficient, insofar as it does not take into account the asymmetrical conditions of contextual efficiency of the proposed strategies of regulation. We apply this epistemological critique to the recourse to self-regulation in the protection of biodiversity, in order to explore some policy implications. In that sense we consider the development of institutional incentive mechanisms oriented toward the capacitation of the reflexivity on the contextual efficiency, such as in the propositions of a hierarchical framing of self-regulation of Common Pool Resources in polycentric systems or in the development of ethical codes of conduct in epistemic communities concerned with the preservation of local knowledge.*

## Introduction

In the current literature on theories of governance, there is a growing interest in self-regulatory solutions to the problem of collective management of our natural resources. These solutions try to take into account the emergence of collective norms and rules within communities and the possible role of these norms and rules in the management of common resources. Recourse to self-regulation is however not limited to community self-regulation in the local management of natural resources, but occurs also in forms of market self-regulation such as labelling practices addressed to user communities or technical self-regulation through standardisation agencies. The term self-regulation thus stands for a various set of arrangements, including forms of spontaneous self-regulation in particular communities as well as forms of self-regulation by delegation, which are based on a delegation of power by government to a self-regulatory agency (Gunningham & Grabosky, 1998). Accordingly, the prefix “self” in self-regulation shouldn’t be understood literally, but points to a certain degree of collective constraint, other than the one emanating directly from government, and allowing to realize objectives that can’t be attained through individual market behavior alone. The current use of the term also implies that the collective constraint includes a series of well established rules, be it under the form of custom, or under the form of written rules, through which the activities are regulated (Ogus, 2000).

The object of this contribution is a point of common concern both to the literature on self-regulation and to the contemporary ethical discussion on democratic governance, which is the question of the conditions of emergence of collective action in a context of scientific uncertainty about the risks associated with the development of new technologies. The background of our research is a diagnosis of the insufficiency of formal deontological ethical models in actual discussions on the problem of regulation of new technologies. These models remain on an abstract level and do not integrate their possible contribution into a better construction of the social efficiency of the reflexive judgements on actual regulation means. In order to go beyond this insufficiency, one must take into account the recent developments within contemporary ethics – whether it be procedural (Habermas, 2000 ; Apel, 1993) or pragmatist ethics (Rorty, 1992) – which emphasize the importance of contextual conditions of elaboration of norms in public space, in order to translate concretely the evolution towards a universal moral viewpoint. From this point of view, what is important in the practical acceptance of a principle of action is not so much its semantic justification but the cooperative means through which the debate is organized in public space in order to allow for the emergence of collective action (Lenoble & Maesschalck, 2002).

In particular, in order to verify the relevance of these recent developments for specific problems of regulation, we will study the question of the emergence of collective action in relation to the more specific case of the recourse to self-regulatory solutions in the protection of biological diversity. Our hypothesis is that approaching the problem of collective action through the common concerns of theories of self-regulation and theories of democratic governance allows us to deal with this problem from two related but distinct viewpoints. First, from an empirical point of view, one can test and evaluate the effectivity of the recourse to self-regulation in the protection of biodiversity. This point of view shows the necessity to broaden our current conceptions of rational action in order to take into account the important role of cooperative processes in collective action. Second, from an epistemological point of view, one can show that such a broader approach to human behavior imposes some specific limitations on the practice of modelling, which in turn has its consequences for a possible contribution of strategies of self-regulation to democratic governance. If this intuition proved

correct, this combined approach indicates the necessity of a reflexive interrogation of the social programming of the democratisation process, taking into account the contextual efficiency of the proposed means of regulation.

## **1. Biodiversity protection, self-regulation and the limits of the model of rational action**

First of all, we will start with a brief overview of some empirical evidence on cooperative processes in collective action, as it relates to the problem of biodiversity. This empirical evidence shows that we have to broaden our conception of rational choice in a double direction, in order to take into account the bounded rationality of human behavior (Ostrom, 1998 : 9). A first direction tries to take into account human behavior in a context of uncertainty and incomplete information and shows the importance of normative heuristics and cognitive frames in rational decision. This first way to broaden rational choice models shows how the role of norms such as reciprocity and trust can lead to cooperative solutions in presence of certain enabling conditions such as face-to-face communication or low cost of agreement. A second way to broaden the models goes beyond a conception of the context as a fixed set of rules and resources in order to take into account second-order experimentation with rules. This experimentation allows for cooperative solutions to emerge through a process of trial and error, optimizing the net benefits for the participants.

In the context of the question of the emergence of collective forms of management of biological diversity, one can thus distinguish between two main strategies of cooperation within the self-regulation of the communities, depending on whether one puts the accent on the self-conscious crafting of the environment of rules and resources or on the role of the normative cultures and cognitive frames.

A first group of field research projects puts the accent on the experimentation of local rules that try to take into account the carrying capacity of the ecosystem on which a community is relying. As it has been shown, self-regulatory mechanisms tend to evolve in such a setting in sedentary agricultural societies when confronted with resource limitations. An example of such mechanisms is the role of *refugia* such as sacred ponds and groves as prevalent elements in indigenous resource-management systems (Gadgil, Berkes & Folke, 1993). These systems might have evolved through a process involving an implicit trade-off between the benefits of the use of the natural resource and the necessity to minimize the risk of its depletion or extinction (Joshi & Gadgil, 1991). Another, historically important example of such a trade-off is the accumulation of knowledge about the important role that species play in generating ecological services and natural resources. In his long-term field research in the Amazon basin, D. A. Posey discovered the role of *apete* or forest islands producing a range of useful products while enhancing the biodiversity through a number of devices. During their life span, the *apete* evolve from a diverse productive zone during a couple of years to a savannah-like open clearing, managed for fruit and nut trees, and “game farms” that attract wildlife (Posey, 1985). This type of management is in sharp contrast with the slash-and-burn that merely results in temporary clearings within the forest landscape. The evolution of such self-regulatory mechanisms isn’t however limited to indigenous people or subsistence farmers’ communities. For example, a case study on coastal fisheries in Sweden shows how different local communities have independently developed dynamic, self-regulating patterns in order to adapt to the naturally fluctuating fish resources. Examples of these are the integration between land based and fishery activities and the possibility to switch between a diverse set of occupation, or the seasonal rotation of fishing areas between the fishers in the

coastal community, where the allocation is decided by lot (Hammer, Jansson & Jansson, 1993). This first type of field research shows the importance of the experimentation with rules and the accumulation of local knowledge about effective rules that allow for cooperative solutions to emerge. Enabling conditions for this type of cooperative process are the presence of effective monitoring of the rules and the use of graduated sanctions that enforce rule compliance (Ostrom, 1998 : 8).

A second group of field research has shown the possible role of norms in the emergence of cooperative management of biodiversity. For example, in an empirical study of co-management of salmon fish stocks in the Pacific Northwest, S. Singleton shows the evolution of the norms of cooperation in a fixed rule setting (Singleton, 2000). When the co-management system was established in 1974, the involved parties, local American Indian and non-Indian fishermen, showed few willingness to collaborate. However, the enforcement of rules of conflict resolution by an independent judiciary, such as a rule that prohibits unilateral behavior or a rule imposing common management of the allocation of fish resources, provided for sufficient incentives for a self-regulatory solution to emerge. Even though this evolution can be at least partially explained by a common interest of the parties in maintaining the co-management regime, fearing for a fiercer control and stricter regulation if it failed, one still has to account for the emergence of cooperative behavior beyond the pursuing of personal interests and design informed policies that enable such a behavior. These policies try to enable those motivated to solve problems in a cooperative manner, whether through the enactment of incentives such as repeated face-to-face communication, which allows for the emergence of norms as trust and reciprocity (Ostrom, 1998 : 13-14), or through institutions that enable those who are motivated to solve problems in a cooperative manner (Ostrom, 2000b).

## **2. The epistemological role of the hypothesis of bounded rationality**

In this second paragraph, we would like to show that the hypothesis of bounded rationality, as it is used in the empirical research on self-regulation, also plays an epistemological role, in that it points to certain specific limitations of the modelling practice of rational action. In order to do so we will first consider these limitations within the context of the formal approaches of complex adaptive systems. In a second time, we will apply these limitations to the problem of the study of cooperative processes in self-regulatory strategies of natural resource management.

### *2.1. Self-regulated systems as complex adaptive systems*

The model of behavior that emerges from empirical research on self-regulation has received broad confirmation within the more general theoretical framework of complex adaptive systems. Such systems are characterized by a large number of active elements that produce emergent collective properties that are not present at the level of the elements, but only on the level of the combined effects of their interaction. A good example in the present context of such emergent collective properties within a decentralized organization of active elements is the analysis of Hutchins of the navigation of a sailing-ship. The analysis of Hutchins shows that successful navigation does not require a specified centralized scenario for all situations. Instead, when a member of the crew detects a failure in the organization, he communicates this to the closest competent person. This person executes a corrective task, which has a consequence in the further chain of interactions. In that manner, a collective behavior emerges through a history of local adaptations to a common self-organized

environment (Hutchins, 1995)<sup>1</sup>. In this example, we find back the different adaptive mechanisms that are also present in the research on self-regulation, i.e. the experimentation with a decentralized set of rules on the one hand and the role of heuristics in adaptive behavior on the other. Moreover, research on complex adaptive systems identifies some more specific mechanisms that also play a prominent role in the study of self-regulation (Ostrom, 1999 : 521-523). These are firstly the role of tags in the categorization of the relevant properties of the environment ; second, internal models including scenarios adapted to particular situations and partial cognitive maps of the environment ; and finally, clusters of distributed rules allowing for a progressive adaptation to changing conditions in the environment through what has been called context transforming generalizations (Clark, 1993).

Modeling human behavior in terms of bounded rational action in a self-organizing environment has some important epistemological consequences, which make this type of modeling different from the traditional rational choice models. First of all, the effect of the rules and mechanisms will vary according to the way the system itself constructs an interpretation of its operational context through tagging and internal modeling. Experimental evidence in cognitive science for example shows the role of different spatial reference systems in interpreting the information from the environment, such as reference systems linked to the body movement, the visual field or to the perceived object in the environment. As a consequence, the choice of the best fit rule or mechanism will depend on the way the environment is framed. Second, we also have to reconsider the role of the environment in a different way. Indeed, the stabilization of the self-organized dynamics of bounded rational systems will depend on the asymmetrical evolution of the autonomous environment. Even simple adaptationist models have to acknowledge this fact, in that the stabilization of the competition between species in an ecosystem depends on the sources of nutrition in the environment. If one artificially modifies those sources, then the system will evolve to a new equilibrium. The consequence of this interaction with the dynamics of the environment is that the collective behavior that results from a certain set of rules should not only be evaluated in terms of its short term consequences as a solution to a particular problem, but also in terms of its capacity to penetrate the self-organization of its environment. In that sense, a certain behavior also has an explorative function, in provoking and processing adequate feedback information from the environment. Combining these two limitations, one can say that a same behavior has a reversible and an asymmetrical effect : it is a produced effect adapted to a particular problem framed in a certain manner and it is an information addressed to the environment (Maesschalck, 2001, p. 185). An example of this effect in cognitive ethology is the way fish explore the autonomous flow dynamics of the stream they navigate in, and in particular the way they provoke themselves whirlpools and use the autonomous feedback of these whirlpools to accelerate their swimming (Triantafyllou & Triantafyllou, 1995). This kind of modelling was only made possible through a rethinking of the broader epistemological framework through which we approach dynamical systems in general.

Once we understand bounded rational action from the point of view of the asymmetry of its self-organized environment, this imposes some specific limitations on the practice of modeling and in particular on the role of background assumptions within the construction of particular models (Dedeurwaerdere, 2001). Indeed, because of the necessity to take into account the asymmetry of the evolution of the context in order to account for the stabilization of a particular system, the models have to include a hypothesis on the long-term behavior of the environment. Moreover, because of the hypothesis of bounded rationality, the way that

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<sup>1</sup> This is also the principle of “loose coupled systems” as it is developed in the organizational literature (cf. Weick K.E. and Roberts K.H., 1993).

this environment will act upon the system will vary according to the particular framing by the system. Taking into account this variability, one can show that one can construct different models of a same behavior, without being able to choose between these models without some broad assumptions on the broader evolution of the environment. So in a situation of bounded rationality, the choice between these models will not depend on scientific knowledge alone (*Ibid.*). Already within the field of evolutionary biology, one can see different conceptions of the role of the environment in terms of functional adaptation, enacting or co-evolution, depending on an interest in the modeling of the optimalization of the different parts of the living organism, the constitution of its life-world or the non-linear interaction with the local ecosystems to which it contributes. Within the social sciences, one has to take into account also the multiple ways in which a system both constructs an interpretation of its operational context through tagging and internal modeling and acts upon his environment through the crafting of rules. This even increases the possibilities of combining the choice and selection of basic variables within a broader interpretation of the evolution of the social context.

## 2.2. Bounded rationality in polycentric governance systems

As we saw before, empirical field research has shown that bounded rational action can give rise to sustainable self-organized management through experimentation with decentralized networks of rules and the use of normative heuristics adapted to particular situations. Now, if we want to take into account the epistemological limitations of this broader approach to rational action, we have to interrogate the specific assumptions on the asymmetrical evolution of the environment that are made when applying these models in specific contexts. For this, we have to consider the way the role of the broader environment of the self-regulatory systems is taken into account within the modeling.

First of all, it has been shown in the empirical research that sustainable self-organized management can be successful in a context where efficient communication and social control is possible, allowing for clear mechanisms for monitoring rule conformance and graduated sanctions for enforcing compliance (Ostrom, 1998 : 8). This can be the case as well in small scale communities where direct communication enhances the possibility of the emergence of norms of reciprocity, reputation and trust (Ostrom, 1998 : 13-14), as it can be the case in larger communities, such as certain user communities of the Internet, where the possibilities of coordination and control are enlarged by the means of modern technology (Ostrom E. *et alii*, 1999 : 279)<sup>2</sup>. However, in spite of the presence of these means of social control, the self-regulatory institutions remain subject to takeover by opportunistic individuals and to potentially perverse dynamics. In particular, self-organized governance systems can be dominated by a local leader or a power elite who only accepts changes that are an advantage to them or some appropriators will not organize because of the presence of low-cost alternatives sources of income not depending on the use of the resource (Ostrom, 1999 : 527). This can be addressed in “larger, general-purpose units that are responsible for protecting the rights of all citizens and for the oversight of appropriate exercises of authority within smaller units of government”(Ostrom, 1999 : 528). That’s why a polycentric governance system involving higher levels of government as well as the local self-regulatory units are more likely to provide incentives leading to self-organized, self-corrective institutional change (Ostrom, 2000a : 42).

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<sup>2</sup> The opportunistic appropriation of some « common good » by certain users of the Internet can be sanctioned through management of the mailing lists and the means of access to the network (Brousseau E., 2001 : 358).

This notion of polycentric political systems, which can account for the role of the broader environment, has been introduced by Vincent Ostrom in the context of his study of metropolitan governance and connotes a system of “many centers of decision making which are formally independent of each other” (Ostrom, Tiebout & Warren, 1961 : 831). This environment composed of interacting units can be said to function as a whole “to the extent that they take each other into account in competitive relationships, enter into various contractual and cooperative undertakings or have recourse to central mechanisms to resolve conflicts” (*Ibid.*). Following the analysis of Elinor Ostrom, this research demonstrates that “the study of the performance of a local public economy should be addressed at an interorganizational level of analysis rather than at the level of a single unit” (Ostrom, 2000a : 35). It is this “modified form of competition” that can be viewed as a “method for reducing opportunistic behavior”. Examples include the creation of larger consumption units in order to reduce the strategic behavior of the wealthy or to bear the costs of urban goods and services that do have large-scale effects (*Ibid.*).

However the evolution of this polycentric system depends on broader background beliefs such as a certain conception of democracy. In particular, one can point to the important role of civic education, which enables the intrinsic motivations of those motivated to solve problems on a conditional cooperative base. It thus seems that the contextual gain in cooperative behavior through the multiplication of interactions between local experimentations of self-regulation in a polycentric system depends in the long run on a broader theory of moral development. In that respect, one could ask if it is still possible to consider, as it is in the case of Habermas’s work on communicative rationality, a symmetrical relationship between the evolution of the collective normativity and the evolution of the individual competences (cf. Lenoble & Maesschalck, 2002). Even if several authors today consider that the emergence of the moral skills necessary to solve social dilemmas in polycentric systems is the fact of societies characterized by systems of liberal democracy, one cannot do without a clarification of the conditions of formation of these moral skills. In particular, the experimental work on moral development by L. Kohlberg has shown, through numerous comparative studies on a longitudinal basis, that one cannot juxtapose the moral evolution of individual persons and the evolution of a group as a practical space of experimentation of normativity (Kohlberg, 1981). According to J. Lenoble & M. Maesschalck, one can rather point to an asymmetrical relationship between two processes of moral development : “the group constitutes a kind of intermediary culture, with its own references, its own codes. It allows to experiment with different behaviors without having to reassess them in function of the already acquired attitudes or the cultural codes in force [...] It is this incentive reflexive role of the group that explains its enabling effect on the evolution of the individual competences” (*Ibidem*).

### **3. Consequences : the practical role of a reflexive programming of the democratisation process**

Applying the epistemological limitations of the practice of modeling based on a hypothesis of bounded rationality to the problem of self-regulation within a social context, one moves from a world of necessity to a world of possibility (Ostrom, 1998 : 16). The practice of modeling will depend on the way we interpret the normative orientation of the social system, and in particular the concept of democracy that guides its orientation. So one cannot longer maintain the correlation between the epistemological background beliefs and strategic choices of regulation mechanisms. Indeed, even when taking into account, in a political culture of democratization, the effects of this culture on mechanisms of regulation,



one cannot consider in a symmetrical manner that the democratization within the different self-regulatory units will be an automatic result of the strategic solutions elaborated.

As an example, one can think of the ambivalence of norms of reciprocity in self-regulatory settings. On the one hand, they play an important role as a strategy in the positive development of cooperative networks, but on the other hand, they can also give rise to important dysfunctional developments if interpreted in a restrictive sense and limited to a tight circle of individuals (Hardin, 1995). Another striking example is the profound ambivalence of the politics of environmental self-regulation of the European Commission's Fifth Environmental Action Program (1993-2000). The aim of this politics was to organize environmental self-regulation through a set of incentive mechanisms such as eco-labels, voluntary agreements and environmental management systems. But as it turned out, this incentive politics did not lead to the institutionalization of ecology in the social practices of production and consumption, but has led to a politics of technocratic management by the main actors. In order to put forward an interpretation in the policy networks in terms of a democratic, ecological approach one also need practical guarantees that environmental groups will be included in the monitoring and the implementation of the self-regulatory arrangements (Neale, 1997).

Thus, if one wants to take into account the importance of the normative orientation of the social system from the point of view of the asymmetry of its contextual interpretation in different self-regulated settings, a new question emerges, which relates to the internal purpose of the social programming of the amelioration of the different strategies of regulation. Instead of considering a social programming in the sense of a functional adaptation of the strategies in order to satisfy the normative background beliefs in a symmetrical manner, one could also consider, in an asymmetrical manner, the experimentation of particular communities with the epistemological background conditions through reflexive incentive mechanisms (Lenoble & Maesschalck, 2002).

An example of such a reflexive incentive mechanism would be to consider an evolution of the political culture of democracy in the direction of an enabling<sup>3</sup> of the user culture, through the development of incentive mechanisms enabling a process of collective learning in the polycentric stabilization of the self-regulatory arrangements. This type of mechanism could give rise to an alternative mode of social programming whose internal purpose is the enabling of the reflexivity of the user culture, through a communitarian experimentation with the normative beliefs of the political culture of democracy in intermediary cultures of normativity or interorganizational levels of polycentric interaction (Ostrom, 2000a : 35).

A related question, which we did not discuss in this contribution, is the independent but parallel evolution of the user culture (the indigenous people's conception of sovereignty for example) through discursive strategies addressed to the political culture. This should give rise to an incentive to multiply cooperative gatherings as obligatory passage points that have to be taken into account as social experiments in the potential transformation of the innovation capacities in the hierarchization of the political culture of democracy (Feenberg,

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<sup>3</sup> The term "enabling" is used here in its technical sense as introduced by J. Searle in his discussion of the preintentional background capacities (Searle, 2000 : 129) ; for a discussion of this concept cf. M. Maesschalck, 2001 : 66.

1999)<sup>4</sup>. This second incentive mechanism thus proposes an evolution of the user culture in the direction of the political culture of democracy. An interesting example in the context of biological diversity protection is the reflexive self-regulation of bio-prospecting research through codes of conduct in researchers associations, such as the ethical code of conduct of the International Society for Ethnobiology, which is co-written with indigenous peoples (D.A. Posey, 1995). Even if such codes of conduct are legally non-binding, the mode of organization of these associations in meetings such as in Belem (Brazil) in 1988, clearly had an influence on the political culture, initiating a culture of broader participation of indigenous peoples in international *fora*, such as in the Convention for Biological Diversity (CBD) or the World Intellectual Property Rights Organization (WIPO), or through their representation in Environmental NGOs which had an influence on the outcome of the TRIP's agreement (Rosendal, 1995 : 72-73).

Further research should allow to develop the conditions of effectivity of these two types of reflexive incentive mechanisms, whose main role resides in the reflexive programming of the evaluation of the strategies of self-regulation mobilized in the democratic governance of environmental change.

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<sup>4</sup> An example of an attempt in that direction, within the self-regulatory regime governing the Internet, is M. Mueller's analysis of discursive practices in the enabling of the reflexivity of different user communities of the Internet (Mueller, 1999 ; Maesschalck & Dedeurwaerdere, 2002).

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