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enabling social learning and building reflexive abilities in biodiversity
governance.**

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The Contribution of Network Governance in Overcoming Frame Conflicts: Enabling Social Learning and Building Reflexive Abilities in Biodiversity Governance¹

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I. INTRODUCTION

THE EMERGING NETWORKS of state and non-state actors aim to offer innovative answers to the present difficulties of the multi-lateral environmental governance system (Kanie and Haas 2004; Delmas and Young 2009). These new forms of governance can be characterised by an attempt to take into account the increasing importance of non-hierarchical forms of governance based on the negotiated interaction between a plurality of public, semi-public and private actors (Sørensen and Torfing 2007). Prominent examples of networks that have been instrumental in forging successful working arrangements are the World Commission on Dams, the Global Environment Facility and the flexible mechanisms of the Kyoto Protocol (Streck 2002). Another ongoing effort is the United Nations Global Compact which combines multiple stakeholders in a trilateral construction, composed of representatives from governments, private sector and non-governmental organisations (Haas 2004: 6).

This chapter addresses the dynamics, the successes and the failures of governance networks in the particular field of global environmental governance. One of the main advantages of network governance, both over traditional command and control regulation and incentive politics, is its capacity to deal with situations of intrinsic uncertainty and decision-making under strong bounded rationality

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(Ostrom 2001, Brousseau and Curien 2001). In these situations, network institutions can create a synergy between different competences and sources of knowledge. Because of their capacity to deal with complex dynamic and global interrelated problems, it is expected that governance networks can make an important contribution to global environmental governance (Haas 2004).

From a theoretical point of view, however, the notion of network governance is characterised by a profound ambiguity. According to the analysis of network governance by Schout and Jordan, there are two very different approaches to network governance: one that focuses on networks as self-organising systems, and one involving active steering and support to the network dynamics (Schout and Jordan 2005).

The first approach, based on self-organisation, aims to reform our modes of governance by delegating a number of tasks to networks of self-regulated actors who negotiate their own collective coordination agreements. The main shortcoming of this model is that it presupposes the existence of a set of actors who share a commitment to a cooperative inquiry into decentralised solutions to their coordination problems (Koppenjan 2007). In the specific case of European governance, for example, the absence of such conditions for the emergence of collective action by self-organisation has condemned the policy of environmental policy integration through network governance to go unheeded. For instance, in spite of the high-level support for environmental policy integration through self-regulation, no supplementary capacity has been created for building a common information base, or for common agenda-setting between different sectoral officials (Schout and Jordan 2005: 12–14). As a consequence, very little horizontal articulation has been created between sectoral Directorates General of the Commission or between national experts. Ultimately, the policy of integration through self-regulation has remained limited to some temporary bursts of coordination activity by the Council of Ministers, driven by short-term crises or intense lobbying by pressure groups (Lenschow 1999).

As Schout and Jordan demonstrate, a second approach is possible, which is not based on the assumption of an automatic institutionalisation of self-regulated networks of activity, but which explicitly addresses the question of the appropriate institutional framework for network operation. Accordingly, in their analysis, Schout and Jordan propose that networks should be supplemented with institutions that help to steer the network design, carry out audits, adopt a critical stance and formulate management alternatives (Schout and Jordan 2005: 9). Such institutions could also accompany processes of social learning in the networks, which aim to integrate common objectives into the network as a whole (Schout and Jordan 2005: 14–15). Several questions are raised by this second approach. Under what conditions can the processes of institution-building lead to effective governance systems? When, and to what extent, is there a need for steering the networks or for accompanying the social learning processes? Under what conditions do governance networks contribute to issues of general interest, and, if they

do, how is the learning process organised that allows defining a notion of general interest amongst the network participants?

The hypothesis of this chapter is that the debate on the contribution of steering and accompanying social learning processes in the governance networks could benefit from its confrontation with the debate on the use of reflexivity in the theory of governance (Lenoble and Maesschalck 2010: part II chapter 6). Such a broadening of the debate allows the identification of a double insufficiency that characterises the conception of reflexivity that guides the actual propositions for overseeing the governance networks. The alternative position we would like to elaborate is based on a reorientation towards an incentive politics that is better adapted to the reflexive resources of the context.

Indeed, both the approaches of network oversight in terms of external regulation of self-regulation (Ogus 2000) and the approaches in terms of joint regulation or co-regulation by state and non-state actors (Grabosky and Braithwaite 1986) mobilise a certain form of reflexivity in order to reform the conventional structures of command and control governance of the Welfare State. The defenders of regulated self-regulation, on the one hand, tend to privilege a first order reflexivity of automatic adjustment of the actor strategies in various sub-networks, through appropriate external institutional design of the network dynamics. Regulation of self-regulation occurs, for example, in forms of market self-regulation, such as in eco-labelling or the adoption of codes of conduct (Neale 1997), in instances of technical standard setting at the science-policy interface (Lessig 2000), or between the different levels of management of local common pool resources in polycentric arrangements (Ostrom 2001). Defenders of co-regulation, on the other hand, point to the necessity of second order procedures of social learning on the overall normative orientation of the network interaction. Examples of co-regulation are the social learning processes in stakeholder forums (Kanie and Haas 2004) and collaborative policy networks for natural resource management (Innes and Booher 2003). A well studied example of the latter is the Water Sacramento forum in California, where various stakeholders were able to enhance their knowledge and to reach a strategic consensus on the goals for regional water management, without the involvement of a centralised water regulation agency (Innes and Booher 2003).

On both sides of the debate, one can observe recourse to reflexive capacities, either of adjustment or of social learning, that are likely to ameliorate the structures of regulation. However, the use of reflexivity differs considerably from one case to another. In the first case, one only looks for a functional adjustment of the actors taking part in the game, while in the second case the organisational context itself is mobilised directly in order to favour a social learning process oriented towards the emergence of norms of reciprocity in behaviour, relying on existing resources of reciprocity in a retrospective manner.

Whether it occurs through a functional or a retrospective mechanism, in both cases the use of reflexivity is not elaborated for itself. Reflexivity is presupposed given as a resource that can be mobilised in the support to the network dynamics.

A closer analysis of the governance networks should allow, first, to point to this deficiency of the mechanisms of network oversight and, secondly, to propose an orientation based on a different use of reflexivity which explicitly constructs the conditions of success of the reflexive learning operation, leading to the satisfaction of the normative expectations of the network participants.

In order to study these questions, we first discuss the situations where governance networks were mobilised to perform various functions of governance in the field of global environmental governance. Then we introduce our theoretical framework for analysing regulation of self-regulation and social learning in the governance networks. In the third and fourth section, we present two in-depth case studies of network governance and analyse the conditions under which the normative expectations of the participants in the networks can be addressed. A final section draws some conclusions of the analysis.

II. EMERGING MODES OF MULTI-LEVEL ENVIRONMENTAL GOVERNANCE

In this chapter, we explore the character of two major responses to the shifting demand for governance — decentralised network governance (Ostrom 2001) and earth system governance (Biermann 2007) — and ask a series of questions about the capacity of these forms of governance to handle a range of concerns relating to complexity of rule-making on environmental issues of global concern.

Decentralised network governance and earth system governance emerged as innovative responses to the collective action problems raised by environmental goods and the need to address them by the creation of a global order. Earth system governance plays an important role in addressing systemic problems such as climate change, in which actions occurring anywhere affect the entire earth system, while decentralised network governance has been developed to deal with cumulative problems, such as the loss of biological diversity, in which actions whose initial effects are local or regional add up to consequences that are significant at the global level (Turner et al 1990). Two important features are common to these two emerging modes of global governance: the recognition of the role of hybrid networks composed of state and non-state actors in the provision of various types of collective goods, and the attribution of a new role to the Government (Delmas and Young 2009).

In decentralised network governance, governance is accomplished through networks of public, semi-public, and private actors associated with international, national and regional institutions. In the past, the role of the Government in the regulation of the networks was mainly restricted to the management of negative externalities, generated by the capture of rents in network industries, for example. The rents and the externalities are still there, but the activities of networks have to be situated increasingly in a complex web of interdependencies with both positive and negative impacts. In this new context, governments have to manage both negative externalities and to facilitate the generation of positive network

effects which contribute to the provision of global collective goods which are cumulative, such as the conservation of biological diversity. As a consequence, governments have been increasingly involved in activities such as the building of adaptive capacities in the governance networks, the stimulation of social learning, support for research into standardisation, and other activities that contribute to the network dynamics.

However, such a mode of governance is clearly insufficient in the case of systemic change. Here, individual networks may take actions that go against the actions of others, because of the direct global interdependencies. For example, in the Montreal Protocol, China would start producing ozone depleting substances such as Chlorofluorocarbons (CFCs) while cooperators try to restrict it. Earth system governance is an answer to the problems raised by functional interdependencies on the global scale (Biermann 2007).

In 2001, four global change programmes — DIVERSITAS, the International Geosphere-Biosphere Programme, the World Climate Research Programme, and the International Human Dimensions Programme on Global Environmental Change — joined forces to intensify cooperation through the establishment of an overarching Earth System Science Partnership. The research communities represented in this partnership contend that the earth system now operates 'well outside the normal state exhibited over the past 500,000 years' and that 'human activity is generating change that extends well beyond natural variability — in some cases, alarmingly so — and at rates that continue to accelerate' (Steffen et al 2004). To cope with this challenge, the four global change research programmes have called 'urgently' for 'an ethical framework for global stewardship and strategies for Earth System management' (Steffen et al 2004).

In the case of earth system governance, global governance arrangements are created which put new constraints on Member States. These can take the form of new independent authorities of last resort, such as intergovernmental organisations or independent dispute resolution authorities. In this context, states become intermediary players between demands and constraints from lower level constituencies on the one hand and constraints from the global order on the other. This leads to a more differentiated global governance system, where collective preferences of states play an increasing role in different forms of common but differentiated responsibilities, as we can see, for example, in the global precautionary regime and the debate over the governance of genetically modified crops.

Global network governance emerged within earth system governance as an important complement to conventional rule-making through intergovernmental arrangements. It shares many of the features of decentralised network governance, such as the hybrid actor networks and the flexible rule-making. It is characterised by the involvement both of intergovernmental entities and international non-state actors and has recourse to interactive rule-making for dealing with highly fragmented communities on the global scale. The main difference with decentralised network governance is the absence of a strong overarching

authority for steering or supporting the network dynamics, such as the national governments or the European Union. The role of accompanying the operation of global networks is typically attributed to international non-governmental organisations, or to commissions and executive agencies of the intergovernmental organisations. A good illustration of this situation is the Forest Stewardship Council, which was established by concerned business groups, social groups and environmental organisations to oversee the operation of a worldwide network of national and regional forest certification bodies. Another example, to which we will turn later in this chapter, is the Commission on Genetic Resources for Food and Agriculture (CGRFA), which is an intergovernmental forum at the Food and Agriculture Organisation that provides policy guidance to the members of the international seed network of the Consultative Group on International Agricultural Research (CGIAR).

Several features of the environmental problems arising today have contributed to the emergence of this new role of networks of non-state actors and governments in the field of environmental governance. In this chapter, we explore:

- (1) the roles of ecological entities whose boundaries do not overlap exactly with federated or global entities;
- (2) the presence of heterogeneous and ill-defined collective preferences regarding abstract goods such as the global gene pool or value laden constitutional principles such as sustainable development; and
- (3) the contribution of institutional diversity to robustness (stability) and resilience (adaptability) of complex socio-ecological systems in face of change.

To assess the potential of decentralised and global network governance to address these problems of environmental governance, we focus in the remainder of this chapter on two challenges: first, the challenge to overcome collective action failures in the context of highly fragmented global communities and dynamic ecological systems and, secondly, the need to foster social learning on the overall normative orientation of the governance networks.

III. THEORETICAL MODELS FOR NETWORK GOVERNANCE AND THE HYPOTHESIS OF REFLEXIVE GOVERNANCE

For the purpose of the analysis of network governance, a more detailed framework is needed that helps to generate hypotheses about possible influences of governance on collective action failures and social learning. In the various models of network governance, a number of approaches to institutions have been distinguished. One of the most important distinctions is that between rational choice institutionalism and social constructivist or sociological institutionalism (Sørensen and Torfing 2007: 30). Drawing on the research findings of these two approaches, the analysis in this chapter distinguishes between two basic types of

network governance, based on external institutional design and disruptive learning respectively, and discusses some mechanisms of disruptive learning as they have been developed in the context of contemporary pragmatism in the work of Charles Sabel on democratic experimentalism (Dorf and Sabel 1998) and the work of Jacques Lenoble and Marc Maeschalck on the genetic approach to governance (Lenoble and Maeschalck 2010: part II chapter 6).

Networks are not a panacea. They are prone to a set of collective action failures (Hertting 2007). Rational choice institutionalism has developed as a set of tools for remediating collective action failures by analysing the network dynamics from the point of view of methodological individualism. A common network failure occurs when network participants free-ride upon the trust of other participants and attempt to improve their own position by providing misleading information on their preferences or by extracting rents from information asymmetries. In some cases, institutional regulation from outside the network will be required to correct such behaviour and produce a form of cooperation under the shadow of hierarchy (Scharpf 1994). In other cases, an appropriate transformation of the game structure, for example by a system of graduated sanctions (Ostrom 1990) or by monetary incentives, might be sufficient to deter free-riding behaviour. In both cases, deliberate institutional design is used to turn the non-cooperative equilibrium into a cooperative outcome.

A second set of network governance failures are due to coordination problems. For example, an agreement for building a common infrastructure with benefits to all, or for removing common barriers, might be hampered by a lack of assurances that all will effectively take part in the implementation of the agreement. Here, the uncertainty on the intention of the other players is a rationale for non-cooperation. A similar problem arises in situations where the generosity of one of the participants is required to select an outcome, among a set of outcomes that all improve upon the current situation, even if it is a less preferred option for his or herself. Solutions to these situations are to be found in devices for providing information on the intentions of the participants, for binding the participants to agreements and in leadership. These and other solutions to the coordination problems have led to a rich literature on establishing cooperative practices through the diffusion of models of innovative practices (Braithwaite and Drahos 2000) and on the building of credible commitment in network cooperation such as in the case of open source biotechnology to which we will turn below (Hope 2008).

Within the rational choice perspective, the potential of governance networks is mainly realised through appropriate institutional design aimed at increasing the stability of the cooperative outcomes and the ability to coordinate action (Mayntz 1993: 15, Scharpf 1994: 41). An important aspect of this game structuring is the deliberate design of institutional conditions which visualise and increase the interdependency structures between specific actors (Kooiman 1993: 251). We find some features of this approach in the case of recourse to governance networks in the field of natural resources management, through examples

such as the recourse to sustainability indicators, common information management tools, and conditional delegation of decision-making to the networks participants 'under the shadow of hierarchy'.

The rational choice perspective mainly focuses on institutions as external constraints on the action of the individuals and organisations in the networks. The influence of the external constraints on the dynamics of the governance networks does not mean, however, that the actors are structurally determined by the institutional context. On the contrary, a set of other factors, such as the development of social identities, adaptive capacities, and the building of reflexive abilities also affect the success of the social learning process in the governance networks. Sociological institutionalism addresses these social and cognitive conditions of the learning processes. Its emphasis is on the actors as normative creatures, whose identity, capacity and aspirations are shaped by the political and social communities to which they belong. From this perspective, actors match the institutionally embedded rules, norms and cognitive paradigms with their own identity and the situation in which they are placed, and they are acting appropriately on the basis of their own constitutive interpretation of the institutionally defined rules (March and Olsen 1995).

Several mechanisms for explaining the success and the failures of the social learning processes have been advanced from a sociological institutionalist perspective. A first mechanism, which is closest to the original intention of the sociological institutionalist position, focuses on the important role of democratic identities and capacities. These can be built in the networks through story-telling, to discourses referring to the network actors as 'responsible citizens' or 'responsive administrators', through the mobilisation and the enhancement of their ability to act individually and collectively, and through ensuring a level of equality in the distribution of the political competences (Sørensen and Torfing 2007: 176–77). The aim of these mechanisms is the formation of a strong sense of communality among the involved actors, and the creation of shared meaning and common visions that facilitate consensus (Sørensen and Torfing 2007: 176).

A second mechanism deepens this first perspective, by focusing on the conditions for changes in beliefs that lead to effective change in behaviour. The need for this deepening is related to the fact that the normative integration of the actors envisioned by the first mechanism does not necessarily lead to new beliefs and strategies that fall outside the existing repertoire of beliefs and strategies of the actors. However, such social learning is required for the transition towards sustainable development, which implies a process leading to long-lasting change in behaviour founded on the changes in knowledge (Siebenhüner 2002: 421). The conditions for reframing beliefs in open-ended situations have been studied in more detail by Charles Sabel (1994), both in the context of firm behaviour and in the context of public policy. In his work, Sabel showed the important role of two specific conditions that are crucial to effective open-ended learning: first, the role of practical incentives for promoting the exploration of disruptive possibilities (Dorf and Sabel 1998: 286), and, secondly, a set of institutional rules that define

the engagement in the cooperative enterprise. An example of a process illustrating the first condition is the recourse to benchmarking. Benchmarking consists in a survey of current or promising products and processes, which identify the products and processes superior to those which a firm presently uses, yet are within its capacity to emulate and eventually surpass. Benchmarking thus allows a comparative evaluation between different groups with possible improvements, and hence provides an incentive to disrupt the current routines and representations of possible outcomes. A second example is the simultaneous engineering by teams in the firm based on the initial benchmarking and on the correction of errors revealed by comparing the results amongst the teams. The second condition points to the importance of defining a set of rules of engagement of the actors in the joint enterprise. Examples of such rules are mutual monitoring of each participant's contribution, information-sharing and the mutual assessment of each participant's reliability in relation to the joint activity.

A second deepening of the understanding of the conditions of possibility of successful social learning is based on the genetic approach to governance, which focuses on the generation of the reflexive abilities which condition the success of the learning operation. Its starting point is the observation that social learning on new beliefs and action strategies can still experience blocking in spite of the building of the democratic identities envisioned in the first mechanism, and the action on the adaptive capacities envisioned in the second mechanism. According to Argyris and Schön, this blocking is due to a deeper level of representations which remain implicit in the learning process and which do not appear through the official story-telling or the explicitly organised experimental process (Argyris and Schön 1996). Their analysis shows the presence of unconscious repetitions of the current position of the actors and the engagement in defensive actor strategies as a tangible effect of these repetitions. This observation points to the need to explicitly build the ability for the actors to critically reflect on their own identities and representations, and to build the ability for the actors to engage with other actors in productive action strategies, without subordinating this joint inquiry to the reproduction of their existing frames or identities. In the genetic perspective, the focus therefore will be on the explicit generation of the reflexive abilities which condition the success of the learning process. Two mechanisms can be identified that play a role in this process (Lenoble and Maesschalck 2010: part II chapter 6). The first mechanism is based on the telling of 'deep stories', in which the implicit representations and identities are made explicit, in order to open the way for further redescription of identities in the process of social learning. The second has recourse to a mechanism of 'terceisation', which refers to the need to be confronted, through a critical experience, to a 'third perspective' on the situation of blocking, as a condition for the destabilisation of the current meanings and identities. For instance, reflexive abilities for social learning can be generated through the explicit confrontation with new user groups, which are not part of the current social learning process and by an engagement in a common process of redefinition of the learning as a result of this destabilisation.

Based on these three mechanisms, geared respectively to normative integration of the actors by building democratic identities, to the social learning of disruptive beliefs and to the generation of the reflexive abilities that condition the success of the learning process, increased productive learning in the governance networks can be expected to occur when the learning process generates both a horizon of reflection on common beliefs and identities, and a destabilisation of the current beliefs and identities through the confrontation to a 'third perspective'.

IV. TWO CASE STUDIES ON GOVERNING SOCIAL LEARNING IN LOCAL AND GLOBAL ENVIRONMENTAL INSTITUTIONS

This section discusses two in-depth case studies which analyse the dynamics of governance networks in a rational choice and a sociological institutionalist perspective. The first is the case of the provision of forest related services in fragmented forest landscapes in Flanders, and the second is the case of global cooperation in the exchange of genetic resources in the seed bank network of the CGIAR. These two case studies are part of a broader set of cases that were analysed in two research networks, the Global Public Services sub-network of the REFGOV integrated project (RTD FP6 CIT3-513420) and the Biodiversity sub-network of the DEMOGOV Interuniversity Attraction Pole (IUAP VI-06).

A. Research Methodology

Two considerations guided the selection and the methodology of analysis of these case studies. First, they were selected on the basis of evidence that showed clearly established limits both of incentive policies and direct regulation, and which established the role of social learning in overcoming these limits in the particular fields. The second consideration is related to the analysis of the conditions of social learning in the genetic approach. Because the focus of the genetic approach is on the way through which the actors explicitly build their ability to critically reflect on their own identities and representations, a methodology of joint inquiry/joint case study design was adopted (Reason and Bradburg 2001). Indeed, what seemed most relevant for this research is the identification of a viewpoint that could act as a mechanism of terceisation from the perspective of the collective actors themselves. Therefore, the collective actors were involved from the outset in the building of the survey methodology, the evaluation of its objectives, and the validation of the results.

In the case of the governance of international seed bank networks, original surveys were conducted in close collaboration with the Policy Research and Support Unit of Bioversity International and the Commission on Genetic Resources for Food and Agriculture of the Food and Agriculture Organisation. In the case of the study of the forest groups in Flanders, the research was based on general published survey data on the forest groups (Serbruyns and Luyseart

2006; Van Gossum and De Maeyer 2006; Verheyen et al 2006), unpublished survey data on the social learning processes within one forest group, and complementary interviews to deepen the understanding of the blocking of the learning process. In both cases, the findings were combined with information coming from internal meeting notes and official reports, and confronted to results from previous studies published in the literature.

B. The Case of the International Seedbank Network of the CGIAR

There are few clear examples of truly global international regimes in the field of environmental governance that have global funding mechanisms and global independent dispute resolution mechanisms. Some illustrative cases of possible global governance systems are the Convention on the Law of the Seas (Wouters 2003) and the ozone regime (Young 2008: 14). Nevertheless, some interesting second-best solutions have been adopted. For instance, some multilateral environmental agreements have created global funding mechanisms to offset the incremental costs that contracting parties incur when implementing a treaty. A clear case is the Global Environment Facility, which operates as a complementary funding mechanism in the implementation of a number of multilateral environmental agreements. Another interesting second-best global governance model, which provides a good illustration of the dynamics of network governance on the international level, is the contribution of the CGIAR network to the international regime for crop genetic resources.

Over the last 40 years, the CGIAR centres have played a leading role in promoting open access to biological resources through the organisation of a network of specialised ex situ conservation facilities throughout the world. The open access policy is clearly reflected in the 2003 CGIAR policy guidelines:

The germplasm [that is the seeds or the parts of a plant that allow reproduction] designated by the Centres is held in trust for the world community in accordance with the agreements signed with the FAO [...]. Based on the conviction that their research will continue to be supported by public funds, the Centres regard the results of their work as international public goods. Hence full disclosure of research results and products in the public domain is the preferred strategy for preventing misappropriation by others (CGIAR 2003).

Being part of the open access network for germplasm produces a network externality: researchers provide access to their own limited resources and information and in turn they gain access to resources and information from all other member organisations. For instance, a quantitative analysis of 15 years of exchange of maize germplasm between the International Maize and Wheat Improvement Centre (CIMMYT) in Mexico and 15 other developing countries shows that the recipient countries received four times as many specimens as they contributed to the international CGIAR repository (Fowler, Smale and Gaiji 2001). However, in spite of these obvious benefits, the collective action failures of

networks that we discussed above could undermine the long-term sustainability of the CGIAR networks. Individual centres can free-ride upon the efforts of the others and extract rents by keeping some of their own materials under conditions of relative secrecy. Alternatively, lack of trust between the network members might deter some participants from engaging in the exchange of materials.

The conservation and sustainable use of plant genetic resources for food and agriculture is regulated by the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), which entered into force on 29 June 2004. The ITPGRFA is an innovative agreement, with a global funding scheme (the multilateral fund) and an independent dispute resolution mechanism (the third party) (Halewood and Nnadozie 2008). The objective of the Treaty is to establish a global commons for a selected list of plant genetic resources that are considered to be essential in the long-term protection of food security. The success of the intergovernmental negotiation processes that led to the Treaty was achieved in part thanks to the knowledge about an already well functioning commons that had been built up in the context of the CGIAR network. The collective learning organised in this network paved the way for the formal legal arrangement in the context of the Treaty. For instance, the CGIAR centres already had a standard Material Transfer Agreement that was used since 1998. The Treaty could further build on this agreement in the development of its own transfer agreements (Halewood 2009). Moreover, the strong normative community built around the CGIAR network continues to play an important role in the implementation of the Treaty, through the elaboration of and experimentation with possible solutions for current implementation problems. For instance, in the field of material transfer agreements, the CGIAR centres have adopted agreements that apply also for materials that are not listed in Annex 1 of the Treaty but that are held by the CGIAR centres. These could possibly serve as a starting point for drafting agreements that go beyond the current Treaty obligations.

A set of design rules, which provide some of the incentives to alleviate the collective action failures, have been identified that play a role in successful 'open source' collaboration in biotechnology (Hope 2008: 183–86). The most important are:

- (1) freedom for recipients of materials to fully exploit the material and distribute it to others;
- (2) the full disclosure of information that is required to use the research material;
- (3) non-discrimination in participation; and
- (4) the demonstration of credible commitment by the provider of the material that he or she can guarantee the protection of the rights of the recipients.

These three design principles go a long way in explaining, from a rational choice perspective, the cooperative dynamics within the CGIAR networks. Credible commitment is provided by the clarification of the ownership rights in various declarations, such as the 1994 In Trust Agreement (Halewood 2009), and has

been strengthened by the adoption in 1998 of the standard material transfer agreement. Full information disclosure is enabled by the common information infrastructure which can be accessed online through the System-wide Information Network for Genetic Resources (SINGER). Finally, the material is available for all recipients in the North and in the South and can be freely distributed as an international public good.

However, this first perspective does not highlight how the learning within the CGIAR network influenced the basic frame conflicts within this policy arena. A major external incentive for triggering the learning process within the CGIAR network was the adoption of the Convention on Biological Diversity in 1993. The Convention reasserted the principle of national sovereignty over biological resources. As a result the ownership status of the centres became highly uncertain. At that time some feared that the World Bank would take control over the centres holdings (as a major donor to the CGIAR) or that countries would make demands for the return of the materials that were originally acquired from them (Halewood 2009). The drafting of the various guidelines and agreements within the CGIAR can be understood as a direct reaction to this external shock, but it did not lead to a major shift in the basic representations within the CGIAR.

A good illustration of the persistence of a basic frame conflict in this policy field is the failed attempt, in 1989, to agree upon the International Undertaking for plant genetic resources, which proclaimed the 'universally accepted principle that plant genetic resources are a heritage of mankind and consequently should be available without restriction' (article 7). Eight countries abstained from adopting the agreement, on the basis that, among other things, it did not provide sufficient guarantees for the intellectual property rights on plant varieties as embodied in plant breeders' rights (Mekouar 2002).² This conflict between the protection of breeders' rights and farmers' rights is part of larger disagreement over the framing of biodiversity resources. On the one hand, biological resources are constructed as a public good, such as reflected in the failed attempt of the International Undertaking, the ITPGRFA Treaty and in the concept of farmers' rights embodied in national legislation such as in India. On the other hand, in international treaties such as the Agreement on Trade-Related Intellectual Property Rights or the Budapest Treaty, biological resource are framed as proprietary resources, to be protected by exclusive use rights such as patents on the intangible components of the biological resources. As a result of this frame conflict, many developing countries abstained from joining some of these Treaties, which is for example the case of the Budapest Treaty which regulates the patenting of microbial genetic resources.

The learning in the CGIAR did not produce any disruptive beliefs or a new strategic consensus among the centres that would allow overcoming the basic frame conflict. The main result of the learning in the CGIAR centres was an

² www.fao.org/Legal/default.html.

adjustment of their rules for exchanging materials and dealing with ownership issues, in order to maintain the self-governance of the network. In this process, the centres maintained a conception that is close to the common heritage doctrine that was already envisioned in the 1989 International Undertaking. Moreover, in spite of some decentralised experimentation by individual CGIAR centres with more specific license agreements with private partners, no systematic benchmarking or mutual monitoring was organised as it would be the case in the recourse to a democratic experimentalist model to the learning process.

In sum, the learning process in the CGIAR can be best characterised as an incremental learning process where the actor strategies were adjusted, as a reaction to the realities of a new policy environment. This incremental learning within the CGIAR has been facilitated by the Commission on Genetic Resources on Food and Agriculture (CGRFA), which provides overall policy guidance to the CGIAR centres. The CGRFA formulated in 1993 four model agreements that could be used for clarifying the ownership issues, which directly inspired the 1994 In Trust agreements between the centres and the FAO (Halewood 2009). This role of the CGRFA appropriately reflects the role of external institutions in the steering of networks, as external facilitators of the network dynamics, which is also recognised as an important aspect of network steering in the rational actor perspective. However, such external steering does not address the deeper laying frame conflicts in this policy field. This latter aspect will be addressed when discussing the genetic approach to social learning in section V.

C. The Case of Small-Scale Forestry in Flanders

Decentralised network governance addresses multilevel governance issues in situations involving cumulative and/or disjointed environmental problems. In the case of environmental goods with low global interdependencies, multilevel governance takes the form of a decentralised network of organisations and communities linked to regional, national, and international institutions. The role of the higher level institutions is to handle coordination functions, to exploit possible economies of scale, and to reduce information asymmetries among actors in the network.

A recent innovation in this field has become known as the 'new environmental governance' (Gunningham 2009). This enterprise recognises the shift taking place in the role of the state and highlights the benefits of a more decentralised and consensual approach, which seeks to coordinate at multiple levels and which is distinctively polycentric (Gunningham 2009: 27). This approach in turn provides greater scope for non-state actors to assume administrative, regulatory, managerial and mediating functions previously handled by the state. Examples of this approach in the United States include the Habitat Conservation Plans developed under the Endangered Species Act, and the Chesapeake Bay and San Francisco Bay Delta Programmes. Within the European Union, the Water Framework

Directive³, an example of the Open Method of Coordination, is sometimes treated as an example of this approach. Other examples are the Resource Management Act in New Zealand, the Flemish Forest Decree in Belgium and Natural Resource Management in Australia.

The new regional emphasis in forest management in Flanders, Belgium, provides a useful example for thinking about the distinctive features of this approach (Dedeurwaerdere 2009). In this ambitious experiment, 19 regional forest groups have been created (*cf* www.bosgroepen.be). These bodies have formal office holders and responsibility for undertaking consultation, planning and priority setting. Provision is made to enable each region to develop its own regional plan and regional investment strategy for addressing management challenges within parameters set nationally.

Why is this innovative scheme successful, in a policy field where the command and control and economic incentive policies that were already in place from 1990 to 1996 were not able to produce the desired outcomes? First, the failure of the transition to sustainable forest management in the past cannot be explained by an insufficient level of economic incentives, such as cost share policies (Serbruyns and Luyssaert 2006). Secondly, from an ecological point of view, the 1990 Forest Decree was already based on a detailed set of criteria and indicators for multi-functional forest use and management, which have been agreed upon in the Pan European Forestry process, where both forest interests and nature movements are represented. It seems therefore that the issue at stake here is not the lack of appropriate legal concepts, which do not integrate the ecological point of view.

The main innovation introduced from 1996 on, through the progressive creation of the forest groups, is the explicit organisation of processes of collective learning amongst the forest owners and stakeholders. The task of the forest group is to assist individual forest owners with the drafting of their individual forest management plans, to organise their approval as part of an overall management plan of the forest group, and to deliver a set of forest management related services to help with the implementation of these management plans.

The learning process within the forest groups has been conceived as a gradual process where (1) management objectives are defined based on the perceptions of opportunities by forest owners, and where (2) the information generated is used to adapt the operational objectives of the forest group. The progress and gaps in the learning process can be analysed by using the available data of the Bosgroep Zuiderkempen (BZK), which is considered a reference case by the Flemish Government. The main sustainability indicators and targets that have been adopted by the BZK forest group concern the social and cultural functions of the forests, and the protection of forest borders and of heath landscapes. Forest management measures for fragile habitats have been planned, and further action

³ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy [2000] OJ L 327 (22/12 2000)

for combating invasive species (especially American bird cherry, *Prunus serotina*) will be pursued in the priority working area. These targets have been set by the forest owners in the general assembly of the forest groups and are the result of building awareness, discussion and negotiation amongst the forest owners.

However, important aspects of sustainable forestry, such as access to private forests in Flanders and biodiversity conservation, still remain under-represented in this learning process and have not been adopted by the forest group. A second mechanism of social learning in the forest groups, based on learning by mutual monitoring between subgroups within the organisation, aims at fostering learning on these issues that still encounter a lot of resistance from the forest owners. The main difference with the previous mechanism is that learning by mutual monitoring is especially appropriate for more experimental forms of learning — the so-called disruptive forms of learning (Sabel 1994). Disruptive learning processes lead to actions that cannot be framed within the current representations of the forest groups. If these experiments lead to successful outcomes, then they provide in turn an incentive for the revision of the current representations.

For example, in 2006, an experiment was organised with the larger forest owners of the forest group. The drafting of the management plan was outsourced to an independent consultant, with the explicit aim to evaluate the contribution of the forest groups to learning on sustainable forestry. This experiment produced a double result. First, a partnership with independent consultants for dealing with large private forest owners was initiated. Secondly, and more importantly, the experiment led to a realisation of the need to have two different approaches to sustainable forest products: the first based on the current standards for certified wood products, which mainly targets the ecological extraction of the timber value of large forest plots, and, the second, based on a new standard to be developed with the small-scale forest owners and which put a greater accent on the social and landscape values of the forests.

A new pilot project will commence in 2009, again with some specific subgroups, in order to develop a specific methodology for integrating forest biodiversity in the management plans of small forest owners (Bosgroep Zuiderkempen 2006). The explicit goal of the pilot project is to reconsider the basic concepts of the management plans with the forest owners and to foster the development of new initiatives that do not directly fall under the current conceptions of sustainable forest management (personal communication, BZK coordinator). These and other experiments illustrate the organisation of open-ended initiatives in subgroups, and attempt to go beyond the insufficiencies of the incremental learning. They question the legitimacy of the current conceptions of sustainable forestry by putting opposing beliefs in practice within the forest groups.

V. BROADENING THE NORMATIVE ORIENTATION OF THE GOVERNANCE NETWORKS

The foregoing section discussed a double improvement of network governance, based on regulated self-regulation and on social learning respectively. The analyses of the case studies showed the contribution of network governance in decentralised and global orders to the provision of collective goods and allowed some hypotheses on the conditions of success and failure of the governance networks to be generated. However, each improvement emphasises only one part of the network dynamics, either the stabilisation of the cooperative outcomes resulting from the mutual adjustments of the various actor strategies, or the social learning on the content of the overall normative orientation of the interaction within the governance networks. Missing from both is a reflection on the articulation between the strategic and normative level of the analysis.

In order to construct a more complete approach, which takes into account both the strategic interactions and the normative orientation of the governance networks, the proposition in this section is to build upon the genetic approach and to consider a different, reflexive articulation between the social learning processes and the adjustment of the actor strategies in the networks. In the genetic approach, the stake is not so much to rely on existing reflexive abilities, whether they are capacities of self-adjustment or of cooperative learning, but to act on the conditions of emergence of reflexive abilities through the mechanism of terceisation. If we take into account this new order of conditionality, we must combine the double improvement proposed in the theories of network governance in a different way.

First, the confrontation, through a critical experience, to a 'third perspective' on the situation of blocking, shifts the attention from the adjustment between various actor strategies to their confrontation with the perspective of other potential beneficiaries of the collective goods. Secondly, the destabilisation of the social learning process, as a result of this confrontation, shifts the attention from learning within the existing networks to the association of new user groups in a process of redefinition of the collective identity. In sum, instead of considering an independent action on either the social learning within a given environment or on the design principles governing the interaction between various communities, a reflexive understanding of this process develops a joint action on the processes of social learning and the association of new actors to the development of the strategies in order to create the conditions for their common transformation.

A. The Building of Reflexive Abilities in the International Seedbank Network

The case of the network of the CGIAR centres is a clear case where common norms and institutional policy in cooperative networks have played a role in

creating a de facto open access regime in genetic resources. A historical reconstruction by key actors that were involved in the building of the open source collaboration shows the importance of strong bonds amongst the scientists and common goals amongst the various organisations and individuals (Byerlee and Dubin 2009). Field training of young scientists in the nurseries of the network and workshops amongst senior scientists played an important role in this. Another key element was the involvement of the recipients in the further use and distribution of the germplasm. Indeed, improved germplasm produced within the CGIAR network is distributed as an international public good, but the strategic decisions on the choice of the plant varieties to be developed as commodities based on this germplasm and distribution to the farmers is organised by the participating countries and organisations.

The in-depth reconstruction of the history of the CGIAR network shows that the main focus of learning process in the development of CGIAR has been on social integration of the plant breeders' community on the global scale. Recently, new challenges, however, showed some of the limits of this social learning process and the need to open up the network to new issues and participants. Examples of these challenges are global infectious diseases affecting food crops, animals and sometimes humans, and the development of crop and non-crop biofuels. These challenges were present in the early stages of the green revolution, but have gained in importance due to the increasing pace of climate change and the recent outbreaks of new variants of bird and pork influenza. As a response to these new challenges, officers at the ITPGRFA attempted to initiate a common workshop with other United Nations agencies on the access to genetic resources related to global infectious diseases, but this attempt failed until today (personal communication, ITPGRFA Treaty Officer).

A more successful attempt to broaden the learning process was undertaken by the CGRFA. The CGRFA is a permanent forum within the Food and Agriculture Organisation where governments discuss and negotiate matters relevant to biodiversity for food and agriculture. At its 11th regular session in 2007, the Commission recommended that FAO and CGRFA contribute to 'further work on access and benefit sharing for genetic resources for food and agriculture in an integrated and interdisciplinary manner', 'in relation to all components of biodiversity for food and agriculture' (CGRFA-11/07/REP). In this context a set of workshops and studies were organised in the field of microorganisms and invertebrates, animal genetic resources, aquatic genetic resources and forest genetic resources. In the field of microorganisms in particular, it appeared that an important goal of ex situ conservation of biological materials is the development and conservation of scientific reference materials for use in cumulative follow-on research or as research and diagnostic tools. The need to develop such 'man-made' reference materials does not appear in the realm of the plant breeders' world and is specifically related to the high level of mutations of microorganisms in situ settings. As a consequence of this broader understanding of the contribution of ex situ biodiversity, new needs were identified, such as the promotion of

global food security through increasing access to microbial research tools, and a process started to develop solutions for collaboration in this new area.

By addressing the broader issues of the contribution of biodiversity to food and agriculture, the CGRFA initiated a process that will require participants in the CGIAR network to look beyond their plant breeding identity. Based on this broader identity, new actors have been associated to the networks, such as in the project to link up microbial holdings of the CGIAR with the international research infrastructure of the World Federation of Culture Collections, in a framework that would guarantee continued access to microbial materials for developing countries. However, for this broadening to succeed, further work on social learning within the extended community will be needed. In particular, there is no agreement yet on the way in which an open source model, based on the CGIAR model, could be developed for the microbial world, and how to overcome the differences in position between governmentally funded collections and private non-profit collections (Dedeurwaerdere et al 2009). Nevertheless, it can be said that, as a result of the confrontation with the new challenges through the initiative of the CGRFA Commission, a reflexive process of redefinition of the identity was initiated. Both the CGRFA and the newly created Bioversity International (1 December 2006) contributed to opening up the learning process in the plant breeding community beyond the current blocking. They also initiated a critical process of evaluation of the existing identity by its confrontation to the broader reality and problems of biodiversity as it contributes to food and agricultural production.

B. The Building of Reflexive Abilities in the Forest Groups

The contribution of the forest groups to forest governance can be modelled as a situation where cooperation is built through a combination of instrumental trust, based on reciprocity and enforced by increased transparency and means of verification, and social trust, based on signs of respect and esteem (Tyler 1998). To build trust with the Government and amongst the forest owners, the forest groups have focused both on instrumental and social trust. Instrumental trust has been built by enhancing verification of reciprocity through the gradual learning on common criteria and indicators. Social identities of the forest owners have been enforced, through generating respect for the owners' ideas and interests, by bringing owners back to their forest and by stimulating a sense of forest stewardship (Bosgroepen 2005).

Within forest groups, the actors are considered and treated from the perspective of forest owners and forest managers. Indeed, that is the common thread in the way in which nature associations and private owners are brought together and the way cooperation is built between active forest managers and passive forest owners. However, in this manner, no new identity is built in the forest groups around the concept of multifunctional management. Instead, the old

identities are simply reproduced within this new framework. Hence, the social learning method based on the criteria and indicators is incapable of achieving a more profound transformation of the identity of the forest groups, which is however needed to address the issues raised by the users of the forest related ecosystems services (such as for recreation and landscape values) and for the building of cooperation with the local communities.

Within the forest groups, there is also a second approach, which takes into account the limits of this first approach and attempts to address the challenge of broadening cooperative learning with the users as a 'third party', without subordinating this cooperation to the current identity of the forest groups. Indications for such a second approach are clearly present in initiatives such as the experiment with the access negotiations in the Bosgroep Zuiderkempen and the integration of the complaints of the local population in the working of the forest groups (Bosgroepen Zuiderkempen 2006). This is also reflected in some position statements by the forest groups, on the cultural and social values of the forests, and the concern frequently expressed about the remaining gap between the interests of the nature associations on the one hand and the inhabitants on the other (Bosgroep Zuiderkempen 2005, Bosgroepen 2006). Hence, instead of the reproduction of the old social identities, within the context of a new cognitive frame, as is the case in the first approach, this second approach points to a more profound transformation that is going on at the same time, which is a more fundamental transformation of the identity of the forest group.

By addressing the reconstruction of the collective identity of the forest groups, through experimenting with the association of forest user groups to their activities, the initiative of BZK attempts to address this failure of the experimentalist approach to social learning. The forest group coordinator has played a key role in opening up the learning process, by confronting the viewpoints and practices of the forest owners to the viewpoint and practices of the various forest user communities. As a result of this broadening of the learning process on sustainable forestry, new initiatives were developed with the user communities. For example, through the negotiation of access plans between the forest group, user representatives and the local authorities, a total area of 342 ha of private forest has been opened up to the various user groups (30 per cent of the working area). If similar results could be accomplished in the other forest groups in Flanders, then an expected total area of around 5000 ha could be opened up for forest users in the near future, which is more than the total area of the largest remaining public forest in Flanders.

However, in many situations of private forest ownership, the learning process is still blocked by the frame conflicts that persist between forest owners and forest users. Further progress would require developing similar initiatives for building reflexive abilities in the other governance networks. Such initiatives would allow sustaining the broadening of the normative orientation of the social learning

process, in a way which is open to its own destabilisation, by a confrontation to the perspectives of various user communities which can benefit from the forest related ecosystem services.

VI. CONCLUSION

The development of global and decentralised network governance has produced a range of innovations regarding governance mechanisms. These innovations are reflected in major evolutions in environmental policy. Examples of these evolutions discussed in this chapter are new environmental governance in Australia, democratic experimentalism in the European Union, and the global crop commons for food security established through the Consultative Group on International Agricultural Research.

This chapter has analysed the epistemological foundations and the practical implications of the models of network governance, by focusing on the question of the role of inferential reflexivity in generating cooperative outcomes on global environmental issues. The chapter defines reflexive governance as a normative process geared to the building of reflexive abilities in the governance networks. The building of reflexive abilities shifts the attention to the development of a joint action on the processes of social learning and the strategic interactions between the actors in order to create the conditions for their common transformation.

Two important examples of experiences with reflexive governance in the field of environmental governance have been studied as an illustration of the theoretical arguments, one in the context of global centralised orders — the international network of seedbanks of the CGIAR — and one in the context of global decentralised orders — the decentralised learning on sustainable management of forest ecosystems. An important lesson to be drawn from this analysis is the complementary role of reflexive governance in non-state organisations and communities on the one hand, and more conventional rule-making in intergovernmental organisations based on the consultation of transnational and national civil society organisations on the other. In particular, global problems need not always be addressed through reflexive learning processes on a global scale. For instance, the analysis showed that sub-politics in intermediary organisations, such as the forest groups, are often more appropriate for building social learning on issues of global concern, in contexts where highly specialised communities use and produce the collective goods.

Ultimately, much of our knowledge about the interaction between decentralised network governance, global network governance, and earth system governance remains highly tentative, contingent and uncertain. However, we hope that this chapter has shown that the epistemological approach of social learning in the networks based on a double conditionality, strategic and normative, while recognising the presence of multiple explanations and the interaction of different

factors, is able to make the problem of multilevel environmental governance more tractable, and provide guidance for evaluating the conditions for organising effective social learning in other specific situations.

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