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Explaining Multi-Level Environmental Governance

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Explaining Multi-Level Environmental Governance

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Contents

Abstract

Multi-level environmental governance has become a commonplace, yet few attempts have been made to explain in economic terms why it should have emerged. This manuscript argues that there are several possible starting points for economic explanations of multi-level environmental governance and it reviews the most central of them. One new institutional explanation of multi-level governance solutions sees them as instruments for overcoming the collective action challenge of large number of involved actors. Another explanation is that governance functions may have different optimal scales of implementation and that multiple levels may be needed to minimise governance costs. Third, multi-level institutional solutions could be creations of economies of scope, institutional constraints and / or path dependency. Fourthly, multifunctional resource systems may have spatially varying catchments for different benefit streams. Multiple levels may be needed to deal with them and the redistribution of costs and benefits between beneficiaries and those who directly carry the costs of provision. The manuscript suggests that multiple explanations are relevant and that the strength of all explanations is likely to be context-dependent. For example, collective action theories explain the bottom-up emergence of multi-level voluntary or contractual governance solutions, but they shed less light on mandatory solutions or solutions mixing voluntary and mandatory strategies.

Key words: environmental governance, institutions, transaction costs, collective action, ecosystem services

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1 Introduction

Multi-level environmental governance (MLEG) has become a reality as the result of proliferation of multi-lateral environmental agreements (MEAs) (Mitchell, 2003) and the consolidation of the European Union's arsenal of directives on environmental matters (e.g. Jordan, 1999). Multi-level environmental governance solutions have also become a subject of much research, particularly in political science and in international relations (e.g. Biermann and Dingwerth, 2004; Jordan, 1999; Najam et al., 2004; Vogler, 2003). However, in environmental and ecological economics the interest in multi-level environmental governance and in environmental governance in general has been somewhat weaker, and it has been limited mainly to those scholars interested in law and economics, economics and politics and public finance (e.g. Birner and Wittmer, 2004; Costanza et al., 1999; Esty, 1999; Hanna, 1999; Paavola, 2007). This manuscript examines alternative economic explanations for the emergence of multi-level governance solutions for environmental resources in order to start addressing this gap in the literature on environmental and ecological economics.

In this manuscript environmental governance will be understood as the resolution of environmental conflicts through the establishment, reaffirmation and change of institutional arrangements (see e.g. Paavola, 2007). This definition is somewhat broader than the definitions of governance that are common in political science (e.g. Rhodes, 1996; Stoker, 1998). The former encompasses both state-centred solutions and solutions where the state does not play a central role, while the latter definitions frequently understand governance as something apart from the government. In the light of the definition of environmental governance that informs this manuscript, multi-level environmental governance is characterised either by nested levels of jurisdictions or the organisation of governance functions at several spatial scales simultaneously. Governance institutions in multi-level environmental governance thus incorporate multiple jurisdictions and functional levels. The following section of the manuscript will elaborate this definition somewhat to clarify what are the hallmarks of multi-level environmental governance and what types of it exist.

The manuscript argues that there are a number of possible economic explanations for the emergence of multi-level environmental governance solutions. One new institutional explanation sees MLEG solutions as ways to overcome the collective action challenge of a large number of actors. Another explanation is that governance functions may have different optimal scales of implementation. That is, a multi-level structure may be needed for the efficiency of governance solutions in the light of governance / transaction costs. Thirdly, MLEG solutions could arise from economies of scope, institutional constraints and / or path dependency. Further economic explanations would draw attention to the multi-functionality of some environmental resources, their spatially different benefit "catchments", and spatial attributes of user groups. MLEG solutions can broker and institute redistribution between these groups for the optimal provision of a resource.

The manuscript will discuss these alternative explanations in greater detail in the following sections. The manuscript does not seek to discredit any of the explanations but rather to show that any one explanation is partial and that the strength of any explanation is likely to be context-dependent. For example, arguments based on

collective action theories are pertinent to the emergence of multi-level voluntary or contractual governance solutions, but they may not shed much light on the mandatory solutions or solutions mixing voluntary and mandatory strategies. The latter kind of solutions are more likely to arise from multi-functionality and the optimisation of governance costs. In the same vein, an explanation based on multi-functionality or economies of scope does not shed light on the challenges of collective action.

In what follows, the second section will discuss multi-level environmental governance in somewhat more detail to clarify its definition and to characterise different kinds of multi-level environmental governance. The third section will discuss various economic explanations of multi-level environmental governance more closely, and the final section presents conclusions based on the earlier discussion.

2 Multi-level environmental governance

I have argued elsewhere that environmental governance is best understood as the resolution of environmental conflicts through the establishment, reaffirmation or change of institutional arrangements (Paavola, 2007; Paavola and Adger, 2005; for conflict theory of institutional change in general, see Knight, 1992). I favour this conflict-based definition over the typological ones that emphasise the absence of government or its limited role as the hallmark of environmental governance, because the former definition is analytically more encompassing. Descriptive definitions imply a priori that there is a difference between different kinds of environmental governance solutions. The conflict resolution definition suggests comparative institutional analysis of alternative forms of environmental governance which asks why particular kind of solutions are adopted in certain situations, and whether and in which way it matters what kind of environmental governance solutions are adopted.

I also favour a conflict-based definition of environmental governance over a coordination-based one. Coordination is frequently offered as a reason for the existence of institutions (e.g. Taylor, 1987). However, the essence of many "coordination problems" is in fact a conflict. When two or more ways of conducting matters exist, and one of them has to be chosen for all involved agents, this choice typically entails differential costs and benefits to involved actors. Under the different coordination solutions such as A, B, C … N the beneficiaries and losers can and are likely to differ, too. Therefore, even if the choice of one or another coordination solution could enhance the overall social welfare, there remains a conflict over which coordination solution and attendant distribution of costs and benefits to choose. But even more importantly, there are conflicts which do not involve coordination problems: these conflicts are typically purely about distribution or power or, in other words, distributive and procedural justice, respectively. These conflicts are the most important driver of institutional change: they demand institutional responses that settle distributive conflicts one way or another (see Knight, 1992).

I find it useful to use the term "environmental resources" for the object of environmental conflicts. Environmental resources include conventional natural resources such as fisheries and forests, but they also include "newly discovered environmental resources" such biodiversity, the ozone layer, and the global atmospheric sinks for greenhouse gases. The term is also flexible enough to

encompass environmental safety and the quality of environmental media such as water and air (see Paavola, 2007). Many environmental resources are multi-functional and generate streams of ecosystem services that are used by different groups of users in different "ecosystem service catchments" (see Balmford et al., 2002; Turner et al., 2003). In essence, environmental resources are complex resource systems rather than monolithic single-use resources. This means that environmental conflicts can emerge over an individual service stream. For example, there can be a conflict over which of the competing irrigators can divert water from a watercourse to his or her consumptive water use. But environmental conflicts can also emerge as a result of claims to different service streams. For example, claims to consumptive use of water for irrigation and claims to recreational in-stream uses of water can be in conflict with each other.

The conflict-based definition of environmental governance considers all formal and informal institutional solutions from customary common property arrangements to national natural resource and environmental policies to multi-lateral environmental agreements as instances of environmental governance, without omitting formal self-governance and other solutions which do not involve the state as a central player. These environmental governance solutions can have different vertical structures. I have elsewhere (Paavola, 2007) called some environmental governance solutions "uni-planar" – they have a single jurisdiction where the decisions about the use and preservation of pertinent environmental resources are made. Examples of uniplanar environmental governance institutions include customary common property arrangements, local zoning and land use planning solutions, and many national environmental and natural resource use policies. One way of defining multi-level environmental governance would be to simply say that they encompass all other than uniplanar institutional solutions.

Multi-level environmental governance solutions can emerge as a result of different kind of processes. There are instances where federations and over-arching institutions have been created by bottom-up processes, to coordinate the functioning of smaller-scale governance solutions (see Ostrom, 1998). Some of these solutions are informal. For example, Ostrom (1990) discusses federations of irrigator associations as an example of a nested solution. Similar solutions have emerged to coordinate more formally local governance efforts for fisheries and shell fisheries (Berkes 1992; Hanna, 1998). Blomquist (1992) in turn discusses how formal multi-level governance arrangements for groundwater aquifers have emerged in California through bottom up negotiation processes.

Top-down processes create many formal multi-level governance solutions. For example, many federal environmental and natural resource policies provide for or mandate the establishment of state implementation programs in the United States. European Union's Birds and Habitats directives require both national legislation and local solutions for the governance of biodiversity (Paavola, 2004). Similarly, the United Nations Framework Convention for Climate Change (UNFCCC) requires national actions, programs or solutions for the planning, coordination and implementation of internationally agreed upon actions (Paavola, 2005). Indeed, consistently with this logic, the world systems scholars have argued that international environmental agreements have been a key driver of national environmental policy

making, rather than being the logical extension or continuation of the latter (Frank, 1997; Frank et al., 2000).

The top down processes usually generate institutional structures where smaller jurisdictions are nested within larger jurisdiction(s). Hooghe and Marks (2003) call these kinds of multi-level governance solutions as “Type 1”; ones based on permanent, general-purpose jurisdictions with relatively few levels and non-intersecting membership. Examples of Type 1 solution include the federal state and many environmental policies established in federal political systems. Hooghe and Marks (2003) also identify “Type II” multi-level governance solutions which are often based on non-permanent and special-purpose jurisdictions and which can have numerous levels and intersecting memberships. Special districts for the provision of public services are examples of these kinds of multi-level governance solutions (see Blomquist, 1992; Foster, 1997). These kinds of governance solutions are more likely to emerge as the results of bottom up negotiation processes.

The distinction between Type 1 and Type 2 governance solutions proposed by Hooghe and Marks (2003) is linked to the notion of polycentricity originally proposed by Vincent Ostrom and his colleagues (see Ostrom, Tiebout and Warren, 1961; V. Ostrom, 1972). Ostrom proposed the notion of polycentricity to characterise complex metropolitan governance structures that had emerged in the post-war decades for public service delivery in the United States. These new complex structures did not have a single core which characterises conventional monocentric arrangements. The scholarship on polycentric government and governance has sought to establish the rationale of such arrangements.

In essence, Hooghe and Marks (2003) project the notions of monocentric and polycentric government and governance to multi-level governance. Doing so does provide new insights into multilevel environmental governance. However, the key interest of Vincent Ostrom was on the horizontal dispersion of authority to govern and this is also what became imported into the distinction of Hooghe and Marks (2003). Vertical structuring of governance and authority to govern is also involved in the examples Ostrom et al. (1961) and Ostrom (1972) discuss. It is clearly considered an element of polycentricity in these seminal works, but it does not become a central issue of interest in them. Horizontal dispersion of authority was at the time novel and attractive enough phenomenon, one which the established notions of government and governance were not well placed to account for.

While the types of governance suggested by Hooghe and Marks (2003) do indeed capture important aspects of classes of multi-level environmental governance solutions, the reality is probably more complex than their terminology can portray. Casual observation suggests that hybrid forms of governance combining elements from Type 1 and Type 2 governance also exist. For example, many international environmental conventions are explicitly constituted as special purpose jurisdictions vested with limited decision-making and other powers, and they frequently rely on pertinent national and sub-national general jurisdictions at lower levels of governance. Particularly in developing countries but elsewhere as well, public service provision and some governmental functions are occasionally performed by non-governmental organisations at the national or sub-national levels. This is the case with Church of England Schools in the United Kingdom, for example.

In light of the model proposed by Hooghe and Marks (2003), and the arguments of Vincent Ostrom and others about polycentricity, a continuum between monocentric and polycentric multi-level environmental governance could be argued to exist. Another way to approach the phenomenon would be to say that the degree of horizontal dispersion of authority varies in multi-level governance solutions. Other concepts are needed to characterise the vertical features of multi-level governance solutions. I suggest that the concept pair "vertical symmetry" and "vertical differentiation" is helpful for mapping multi-level environmental governance solution across another continuum, one where in one extreme solutions are identical at each level, and in the other extreme there is complete differentiation across levels. The second important attribute of multi-level governance solutions is the way in which they emerge: bottom up as a result of voluntary collective action and bargaining, or as a result of top down mandated processes. Together these two concept pairs help to map multi-level governance solutions as suggested below in Figure 1.

Figure 1. A Mapping of Different Kind of Multi-evel Environmental Governance Solutions

	Vertical symmetry	**Vertical differentiation**
+Top down	Federal states	EU environmental directives
Bottom up	Federations of irrigator associations Federations of fishermen's associations	International environmental regimes

The scheme portrayed by figure 1 suggests that vertically symmetric nested structures can emerge both as a result of bottom up and top down processes. Vertically differentiated structures can also emerge in both ways. In practice, few solutions would be ideal types where vertical symmetry or differentiation would be perfect. In nested symmetric solutions, there is likely to be some difference across the levels. Similarly, it is highly unlikely that perfectly differentiated solutions would emerge: decisions to allocate governance functions to different levels are "lumpy" and there are limits to how many levels of governance can feasibly exist. But importantly, in principle the concepts of monocentricity and polycentricity can characterise solutions in each quadrant of the figure 1.

Whatever the type of a multi-level governance solution, it is likely to have an economic and political rationale. Multilevel solutions are also likely to have economic and political consequences, as do choices between the types of multi-level solutions.

However, my emphasis in the reminder of this manuscript will be on the potential economic explanations for the adoption or emergence of multi-level solutions. Some of these solutions will be discussed in greater detail in the next section.

3 Economic Rationale(s) of MLEG

There are several possible starting points for explaining the economic rationale of multi-level environmental governance solutions. In what follows, I will briefly discuss explanations for the existence of multi-level environmental governance solutions based on collective action, governance costs, economies of scope and path dependency, and multi-functionality. The list of possible starting points is not intended to be exhaustive. Further starting points and explanations are likely to exist, but the range of discussed potential explanations is sufficiently broad to make the case for multiple causation and to discuss its implications.

3.1 Collective action

The collective action explanation for the existence of multi-level environmental governance solutions draws its core insights from the seminal work of Mancur Olson (1971) on collective action. Olson argued that collective action is more likely unsuccessful in large groups where actors deem their impact on collective action outcomes small, and as a consequence have a stronger incentive to free ride. When a large proportion of actors assesses their situation in this way, collective action is undermined in large groups. Olson also saw that there is a difference in the prospects of collective action depending on what kind of goods it seeks to provide, and that collective action can be fostered by modifying individuals' incentives.

The key issue to the rationale of multi-level environmental governance solutions is the plain number of involved agents. Namely, one solution for overcoming the collective action problem characteristic of large groups is to mobilise collective action at a smaller scale. Keeping the primary collective action groups small helps to overcome the incentive to ride free because the impact (and stake) of each individual on collective action outcomes increases. At the same time, the smaller size of groups can potentially increase the homogeneity of actors, possibly along a number of attributes. This is likely to contribute to successful collective action. Relatively homogeneous customary communities that have established common property arrangements are examples of these kinds of small collective action groups (see Ostrom, 1990).

Coordination between several small primary collective action groups can be achieved by establishing larger-scale solutions where primary collective action groups are represented. The introduction of representation reduces the large numbers situation to a situation of small numbers, where the primary collective action groups are treated as individuals. That is, a multi-level environmental governance solution can emerge or be adopted as an instrument which facilitates collective action and overcomes the challenges of collective action in large groups. Federations of irrigators', fishermen's and pasture owners' associations are examples of these kinds of solutions that have emerged through bottom up processes (Ostrom, 1998). But the challenges of collective action can also be recognised through a top down intervention. For example, in Finland the governance of freshwater fisheries and

game is partly based on three tiers of self-governing user organisations but the formation of these organisations is mandated in law and the incorporation statutes also vest the user organisations with their legal powers and responsibilities (Paavola, 2002a: 23).

3.2 Governance costs

Another explanation of multilevel governance starts from the observation that all environmental governance solutions have several generic governance functions which may have different optimal scales of implementation. This starting point suggests that a multi-level governance solution may be needed to ensure the efficiency of governance solutions in the light of transaction or governance costs. To understand this explanation, it is necessary to make a brief detour to governance functions.

There has been a notion of governance functions in the new institutional literature from the outset. For example, when discussing common property arrangements, Schlager and Ostrom (1992) distinguish between “ownership functions” and “management functions” (see also McCay, 1996). A more detailed typology of governance functions can be distilled from the lists of common features of successful governance solutions presented by for example Ostrom (1990: 88-102) and Agrawal (2002). On the basis of these lists, I have suggested (Paavola, 2007) that generic environmental governance functions include:

1) exclusion of unauthorised users;
2) Distribution of benefits of resource use by regulating it;
3) provisioning of rival and non-rival goods and recovering its costs;
4) monitoring of resource users and their compliance with rules;
5) enforcement of the rules of resource use;
6) resolution of conflicts over resource use;
7) collective choice for the modification governance solutions.

In uniplanar governance solutions all of these functions are organised at the same spatial level of action and jurisdiction, although the way in which they are organised may vary. For example, monitoring and enforcement may be based on users monitoring each other and evoking enforcement functions when they observe violation of rules. This was the case with the governance of water quality under common law in the nineteenth century United States (see Paavola, 2002b). Another solution is to appoint “officials” to take the responsibility for monitoring and enforcement functions. Both of these solutions can be and are used in uniplanar environmental governance solutions. But when the involved resources are large, it may be that different governance functions have different economies of scale or different optimal scales of implementation (see Ostrom et al., 1961). This may involve for example making the key collective environmental decisions at a higher level, and organising the provision of the resource at a lower level.

Governance solutions that organise and implement governance functions at different spatial levels are common. For example, co-management of natural resources in developing countries is based on the acknowledgement of relative advantages of undertaking some governance functions such raising funds and making collective

decisions centrally at the national level and others, such as monitoring and provisioning, locally. Multi-level governance of biodiversity in the European Union is also based on differentiation of functions across levels. The provision of biodiversity takes place locally at the Natura 2000 sites (see Paavola, 2004), but within the constraints set forth by the Habitats and Birds Directives, the European level of decision-making in the European Commission, and national legislation implementing the European directives. Multi-level governance of biodiversity is also common in other settings (see Ostrom, 1998).

It is noteworthy that the governance cost based explanation of multi-level environmental governance solutions points to different kind of multi-level solutions than the collective action based explanation. In the light of the collective action explanation, nested governance solutions are like the Russian babushka dolls: they are nested and identical otherwise apart from their different scale. The governance cost based explanation suggests that the levels of governance can be and indeed are likely to be functionally complementary and differentiated. Thus, environmental governance arrangements at different levels do not by any means have to be similar, and there could be sound economic reasons for this.

3.3 Path dependency, increasing returns, and economies of scope

Path dependency, increasing returns and economies of scope offer the third route for explaining the emergence of multi-level environmental governance solutions. Path dependency reasoning suggests that starting points, contingencies and developmental trajectories matter because they can shape the future menu of alternatives and their relative merits. My key contention below is that MLEG solutions can be understood to replicate some of the key features of governmental templates established earlier. That is, once established, multi-level governmental templates structure and shape later solutions such as MLEG solutions by influencing their relative costs (see Pierson, 2000).

Path dependence is typically attributed to increasing returns processes, which may increase the relative benefits of an initial choice or action over time because of large set-up or fixed costs, learning effects, coordination effects or adaptive expectations (see Arthur 1994: 112; Pierson, 2000: 254). Increasing returns processes are unpredictable because random changes in initial conditions can have a large impact on future outcomes – accidental events early in the process do not cancel out (Pierson, 2000; 253). Increasing returns processes make it difficult or costly to change from one developmental path to another one, and may result in “lock-in” to ineffective solutions or outcomes (ibid). While path dependency arguments based on increasing returns originate from the study of technological change, they have also been applied to institutional change (North, 1990; Pierson, 2000).

While Pierson (2000) sees that large set-up costs of institutions are a reason for increasing returns in politics, I would argue that economies of scope also play a role – especially when it comes to explaining the dominant role of the state in political matters. States and sub-national political sub-divisions could be argued to enjoy economies of scope just like a firm producing multiple goods or services. This would mean that the state adoption of new functions could lower the costs of carrying out its already existing functions (Panzar and Willig, 1980; Teece, 1980). Teng (2000)

argues that this kind of complementarity exists between the two core governmental functions of taxation and enforcement of private property rights. Further functions such as defence, the provision of law and order, public service delivery, and the provision of public goods could also involve economies of scope.

I am not making an empirical claim that states and local governments in fact do have economies of scope and that the portfolio of functions that they perform is economically efficient. Rather, I want to propose that the concept of economies of scope offers one way to account for the emergence of multi-level governance structures. If states and local governments do enjoy economies of scope, over time they would become the lowest-cost undertakers of the functions that they perform: stand-alone alternatives would have narrower bundles of functions and thus higher costs.

A similar argument could be based on the work of Coase (1937). Coase argued that firms exist because their internal hierarchies entail lower transaction costs in carrying out certain functions than performing the same functions over the market. In other words, the boundaries of organisations adjust in the light of the relative transaction cost implications of internal organisation and markets. The volume of transactions is likely to influence unit transaction costs because of economies of scale in transacting. However, economies of scope can also prevail in transacting. This would establish the cost-advantage of a portfolio of functions which helps to attain a larger volume of transactions than a single function would entail. Williamson (1999) has also identified other reasons for why governmental organisations could enjoy transaction cost economies.

To summarise, for better or worse, we have established social entities such as states and local governments. Their establishment may have pre-empted or at least increased the relative cost of using other possible institutional solutions. As a consequence, many collective efforts are based on the central role of these collective action templates. In the light of this logic, states are obvious players in discussions and actions on large-scale environmental issues. It is ultimately the states that have to act if any goals are to be achieved, either by acting directly to achieve these goals or by authorising private actors to take responsibility. Local governments occupy a similar when scale is smaller, whilst remaining subsidiaries of the state. The same logic is extended further in federal governmental structures.

In this account, a multi-level governance solution emerges to reproduce the way in which sovereignty and the use of mandatory power have been customarily organised. The customary way could also be cost-effective when economies of scope are involved. This is not to say that other solutions cannot be devised – it is simply to say that there is a default solution that structures the set of alternatives and influences their relative costs and feasibility. For example, a study by Foster (1997) indicates that special districts for public service delivery are costlier than public service delivery by general purpose jurisdictions. Of course, special districts have to offer some advantages to exist at all. Following Ostrom et al. (1961), one such advantage may be to reach a larger scale that includes all affected parties. If the higher level of costs is efficient, then the cost advantage of smaller general purpose jurisdictions would be explained by the presence of negative externalities.

3.4 Multifunctionality

The fourth route to explaining multi-level environmental governance is offered by the multi-functionality of some environmental resources. The idea of multi-funtionality is old and refers to the possibility of multiple use of many natural resources such as forests and watercourses. The term multifunctionality is more recent and was used early on for example in the discussions on the reform of the Common Agricultural Policy (CAP) of the European Union as an argument for the detachment of agricultural subsidies from the output of agricultural production, and their attachment to the provision of other outputs such as environmental benefits in "multifunctional" agriculture (see e.g. Vatn, 2002).

Multifunctionality is also central to the more recent ecosystem service literature. It is this literature that offers perhaps the best route to a multi-functionality based explanation of multi-level environmental governance solutions. The ecosystem service approach has to be seen in contrast to conventional economic treatment of environmental goods and bads. Conventional consumer theory conceptualises the environment as goods (or bads) which are fundamentally similar to the other goods that we consume. It considers utility as the only relevant attribute of environmental goods, and that environmental goods are fully substitutable by other goods. In other words, environmental goods are unproblematic, uni-dimensional goods just like all other goods.

The concept of *ecosystem services* resembles Kelvin Lancaster's (1966) view of goods as having a multitude of attributes which provide consumers with utility separately from each other. Ecosystem services can be defined as "the benefits humans receive, directly or indirectly, from ecosystems" (Costanza et al., 1997: 253; see also Farber et al., 2006: 118) or as "the end products of nature that yield human wellbeing" (Boyd and Banzhaf, 2005: 16). Examples of ecosystem services that benefit humans include the recycling of nutrients, regulation of run-off and river discharge, coastal protection and carbon sequestration (de Groot et al., 2002: 396). Ecosystem services are generated by ecosystem functions, such as regulation, habitat, production and information, which in turn are underpinned by ecosystem structures and processes (ibid, 394; see also Paavola, 2008).

The ecosystem service approach understands ecosystems in a fundamentally multifunctional view, which is illustrated by the large number of benefit streams that are identified in many of the empirical studies (see e.g. Costanza et al., 1997). There is no compelling reason why the "catchments" of different benefit streams would coincide. For example, tropical forests provide timber, charcoal, fuel wood and various non-timber forest products to local users, hydrological, recreational and landscape amenity benefits for a wider user group, and carbon sequestration which provides global benefits. Other resources such as wetlands, the coastal zone and grasslands offer comparable range of benefit streams which have groups of beneficiaries that have different spatial scales.

The ecosystem service approach and its recognition of multi-functionality of resource systems again has some parallels with the discussions on polycentric government. Ostrom et al. (1961) considered that one of the key drivers of polycentricity is the fact that the provision of different public services and goods can have different optimal

scales. A multiplicity of governance arrangements will thus emerge to take advantage of these varied optimal scales of provision. Ecosystem services are not produced in the same sense as public services are, but they do generate benefits to spatially specific groups of beneficiaries, which will differ from ecosystem service to another one. Moreover, the continued existence of these services has to be provided for, and the provisioning involves both direct costs and opportunity costs. These costs are again accrued to spatially specific groups. Just like with the provisioning of public services, the provisioning of a multitude of ecosystem services is best arranged by using a multitude of spatially divergent governance solutions. This is the efficiency-based explanation for the emergence of multi-level environmental governance solutions for multifunctional resource systems.

But it is also possible to formulate am equity and conflict resolution based explanation on the basis of similar reasoning. Multi-level environmental governance solutions can emerge as a response to conflicts of interests between users whose catchments are different in size. For example, in the case of tropical forests, sustained provision of carbon sequestration and hydrological services in the future requires restraint in the harvesting of timber, charcoal and fuel wood now. The opportunity cost of conservation is local and the benefits of conservation are mostly accruing to others than those who bear the costs. As decisions on conservation are often in practice made locally, interests in more widely distributed benefits are not acknowledged. Redistribution is needed to address the situation (Balmford et al, 2002, Turner et al, 2003). This requires decisions on and raising of funding over a larger geographical area, and solutions for channelling funds to cover the opportunity costs of conservation.

That is, the varying spatial scales of benefit catchments may require multiple jurisdictions and solutions to link them together for decision-making and benefit and burden sharing. This is again a different rationale in comparison to the earlier ones. Here the underlying rationale of MLEG solutions is the maximization of total value of ecosystem service benefits, and fair distribution of burdens and benefits of ecosystem service provision as one of its possible preconditions. In contrast, the governance cost model looked at the costs of governance rather than at the benefits it generates, and the collective action explanation only focuses on the costs of collective action.

4 Conclusions

Multilevel environmental governance has become a part of the political reality in the past several decades but there has been relatively little interest in different research strands of economics, including ecological economics, to try and account for the phenomenon. In part this reflects a more general neglect of institutional arrangements in the economic literature on the environment. But somewhat surprisingly, even the more institutionally oriented scholarship in ecological and other strands of economics has not really considered why multi-level environmental governance solutions would emerge.

Explaining the existence of multi-level governance institutions cannot constitute a central activity for the researchers engaged in research on multi-level environmental governance: the arrangements do exist and research questions related to their

effectiveness and impacts can appear more pressing. Nevertheless, the consideration of possible theoretical explanations for the emergence of multi-level environmental governance solutions can make some contributions. This manuscript has demonstrated that there is no shortage of starting points for explaining the emergence of multi-level environmental governance solutions. The manuscript has demonstrated that collective action, governance cost minimisation, path dependency and economies of scope, and multi-functionality offer somewhat distinct starting points for economic explanations of the emergence of multi-level environmental governance solutions. The manuscript has also demonstrated that these theoretical strategies of explanation are complementary rather than competing. Their applicability varies and they also have somewhat different implications to how we ought to understand multi-level environmental governance.

The manuscript has argued that top down and bottom up processes of establishment and vertical symmetry and differentiation are the key factors that distinguish between different kinds of multi-level environmental governance solutions. Collective action and economies of scope explanations both account for symmetrical nested multi-level governance solutions, the first providing the bottom up account and the second one being more pertinent to top down solutions. Governance cost based explanations can highlight why different governance functions can be organised at different levels and it applies to both bottom up and top down solutions. Multi-functionality appears to provide the broadest explanation, having a capacity to encompass all four key types of multi-level environmental governance solutions.

The importance of these differences in explanations is that multi-level governance solutions are likely to have different and multiple rationales, which may vary from context to context. Multi-level solutions can exist to overcome collective action challenges or to minimise governance costs. However, they can also exist merely because they replicate the default tiers of existing governmental organisations. Alternatively, complex resource systems are likely to need complex governance solutions, and the existence of multiple levels of governance is part of that complexity. But multi-levelity alone can hardly constitute the required extent of complexity: it is but one dimension of it. Horizontal complexity such as the degree of polycentricity is likely to be important as well. In this light, institutional analysis of multi-level environmental governance solutions should be informed by the acknowledgement of multiple causation and the acknowledgement of its context-specificity, and a recognition that both vertical and horizontal differentiation are likely to characterise complex governance solutions for complex environmental resources.

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