

Paavola, Jouni

**Working Paper**

## Environmental conflicts and institutions as conceptual cornerstones of environmental governance research

CSERGE Working Paper EDM, No. 05-01

**Provided in Cooperation with:**

The Centre for Social and Economic Research on the Global Environment (CSERGE), University of East Anglia

*Suggested Citation:* Paavola, Jouni (2005) : Environmental conflicts and institutions as conceptual cornerstones of environmental governance research, CSERGE Working Paper EDM, No. 05-01, University of East Anglia, The Centre for Social and Economic Research on the Global Environment (CSERGE), Norwich

This Version is available at:

<https://hdl.handle.net/10419/80277>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

**Environmental Conflicts and Institutions as  
Conceptual Cornerstones of Environmental  
Governance Research**

**by**

**Jouni Paavola**

**CSERGE Working Paper EDM 05-01**

**Environmental Conflicts and Institutions as Conceptual Cornerstones of  
Environmental Governance Research**

**by**

**Jouni Paavola**

**Centre for Social and Economic Research on the Global Environment,  
University of East Anglia, Norwich NR4 7TJ, UK**

**Contact details:**

**Email: [j.paavola@uea.ac.uk](mailto:j.paavola@uea.ac.uk)**

**Tel: +44 (0)1603 593116**

**Fax: +44 (0)1603 593739**

**Acknowledgements**

The support of the Economic and Social Research Council (ESRC) is gratefully acknowledged. This work was part of the interdisciplinary research programme of the ESRC Research Centre for Social and Economic Research on the Global Environment (CSERGE).

I thank Sergio Rosendo and Esteve Corbera-Elizalde for their comments and suggestions on an earlier version. As usual, all shortcomings remain my own responsibility.

**ISSN 0967-8875**

## **Abstract**

This article examines the conceptual revisions needed to extend the new institutional approach to environmental governance from its current local and international domains to new areas of application, such as national environmental and natural resource use policies. The article argues that environmental governance is best understood as the resolution of environmental conflicts through the establishment, reaffirmation or change of environmental governance institutions. This understanding suggests that the choice of environmental governance institutions is a matter of social justice rather than economic efficiency, demanding greater emphasis on public participation as the foundation of their political legitimacy. The article also suggests a more encompassing way to understand environmental governance institutions to make space for state-centred governance solutions as types of formal collective ownership not unlike common property. The article demonstrates how institutional analysis can benefit from looking more closely at the three-tier structure, organization of generic governance functions and formulation of institutional rules as key aspects of the institutional design of governance solutions.

**Keywords:** New institutional economics, environmental governance, interdependence, property rights, environmental justice

## 1. INTRODUCTION

New institutional economics has informed a significant body of research on local common property arrangements and international environmental conventions (see Acheson, 2003; Baland and Platteau, 1996; Berge and Stenseth, 1999; Berkes, 1989; Bromley, 1992a; Buck, 1998; Dahlman 1980; Dolšák and Ostrom, 2003; Hanna, Folke and Mäler, 1996; Keohane and Ostrom, 1995; Loehman and Kilgour, 1998; McCay and Acheson, 1987; Ostrom, 1990; Ostrom et al., 1994; Ostrom et al., 2002; Young, 1994, 1997, 2002). This interdisciplinary research encompassing economics, political science, sociology and anthropology has focused on understanding under which conditions voluntary collective action can achieve sustainable governance and use of environmental resources. It has also identified a number of design principles that characterize successful governance institutions and has demonstrated under what circumstances they are likely to be effective.

This article argues that the new institutional approach to environmental governance has significant growth potential and it outlines the key conceptual revisions needed for its realization. To date, the new institutional research has focused on local and international levels of environmental governance. The first of these strands has investigated informal governance solutions such as common property arrangements and the latter strand has examined international environmental conventions. The common denominator for these strands of research is that they have focused on voluntary cooperation on the governance of environmental resources. There is less research on other formal governance solutions such as national environmental and natural resource policies or on formal sub-national solutions based either on governmental authority or on voluntary contracts (but see Blomquist 1992). Moreover, multi-level governance solutions and the interactions between the levels and regimes of governance have only recently been recognized as important areas for research and governance practice (Young, 2002).

The greatest obstacle for the extension of the new institutional approach to these new areas of research lies in its (mostly implicit) definition of “governance”. The literature has considered the absence of coercive state power as the hallmark of “governance”, making a distinction between “governance” and “government”. Yet governance is what governments do. Sometimes – as when resource users govern themselves under customary institutions – environmental governance does not involve the state. Yet customary resource users perform the governmental functions of legislation, administration and adjudication and the government is present as the term “self-government” conveys. Rather than an external actor, the state should be understood as an arena of collective action which is often pertinent to environmental governance. For example, national environmental and natural resource use policies perform many of the same functions and rely on many of the same basic institutional solutions as customary common property arrangements but have larger jurisdictions and rely on the mandatory powers of the state in implementation and enforcement.

This article suggests a broader definition of environmental governance, arguing that it is best understood as the resolution of environmental conflicts by establishing, reaffirming or changing environmental governance institutions (Adger et al., 2003; Bromley, 1989, 1991; Paterson et al., 2003; Young, 1994, p. 15). Environmental conflicts are here understood as situations where different parties have conflicting interests in the use (and preservation) of environmental resources because of interdependence created by resource attributes or the attributes of resource users. This definition is applicable to the governance of all environmental resources, including conventional renewable and non-renewable natural resources such as forests, groundwater and minerals; recently recognized environmental resources such as biodiversity, the ozone layer, and atmospheric sinks; and environmental safety and the quality of environmental media such as air and water. The definition does not limit the scale, range or type of environmental governance solutions that can be examined. The conceptualisation of environmental governance as resolution of environmental conflicts

also gives a more central role for social justice in environmental decisions and it places more emphasis on procedural justice issues such as recognition, participation and legitimate distribution of power in choices over governance solutions.

The expansion of new institutional analysis to new areas of application also requires revisions to the way in which governance institutions are understood. The traditional distinction between *res nullius*, state property, common property and private property as alternative rights systems for governing the use of natural resources does not accommodate many common formal governance solutions. The paper suggests that “state property” should be abandoned as a redundant category and that “common property” should be replaced with a more inclusive category of “collective ownership” which encompasses rights and governance systems created by national environmental and resource policies and international environmental conventions. The article also demonstrates how observations regarding the design principles of successful governance solutions can be transformed to a model of governance functions which gives more resolution to institutional analysis.

In what follows, the second section discusses how the concept of interdependence sheds light on environmental conflicts. The third section discusses the implications of plural motivations for the resolution of environmental conflicts and environmental governance. The fourth section expands the typology of governance institutions so as to include all institutional solutions that can be used for resolving environmental conflicts. The fifth section suggests a functional model of governance solutions for institutional analysis.

## 2. GOVERNING INTERDEPENDENCE AND ENVIRONMENTAL CONFLICTS

Contemporary research on the management of natural resources under customary common property institutions (Baland and Platteau, 1996; Berkes, 1989; Bromley, 1992a; Dahlman 1980; Dolšák and Ostrom, 2003; Hanna, Folke and Mäler, 1996; Loehman and Kilgour, 1998; McCay and Acheson, 1987; Ostrom, 1990; Ostrom et al., 1994; Ostrom et al., 2002) and research on international environmental governance (Berge and Stenseth, 1999; Buck, 1998; Keohane and Ostrom, 1995; Young, 1994, 1997, 2002) are the strongest strands of environmental research informed by new institutional economics. This body of research forms the starting point for my discussion below.

However, in order to fully understand the conceptual foundations of the environmental governance research, it is also necessary to examine some of the founding literature in new institutional economics, as well as some of its criticisms. New institutional economics has evolved in part as a response to (and critique of) mainstream economics, particularly of welfare economics and environmental economics. Already in the 1930s, Coase (1937) developed the concept of transaction costs when trying to explain why firms exist. His (Coase, 1960) critical response to Pigou's (1920) conception of externalities – which forms the core of conventional environmental economics – established new institutional economics as an intellectual program. New institutional economists also addressed other cornerstones of environmental economics early on. For example, Coase (1974) revised the theory of public goods and Calabresi (1961) developed a new institutional approach to risks.

New institutional economics differs from conventional welfare economics and environmental economics in two central ways. First, new institutional economics acknowledges that transaction costs exist and influence economic and environmental outcomes (Coase, 1960; Barzel, 1985; Dahlman, 1979). While the concept of transaction costs has not played a prominent role in environmental governance research, it helps to shed light on the implications of institutional designs for governance outcomes as will be indicated in the last section of this article (see also Paavola, 2002a; Paavola and Adger, 2005). Secondly, new institutional analysis of environmental problems is based on the concept of interdependence rather than that of externality (see Ostrom, 1990; Keohane and Ostrom, 1995), which is the key for the redefinition of environmental governance in this article.

Interdependence exists when a choice of one agent influences that of another. Game theory is the clearest source of interdependence reasoning in the environmental governance research but its institutional roots also merit attention. The best starting point here is the way in which environmental problems are conceptualized in welfare economics and environmental economics. Following Pigou (1920), environmental problems are examined as externalities or physical effects between agents, for which no price is paid and no compensation is received (Mishan, 1971). Partial equilibrium analysis indicates that efficient allocation of resources is not achieved when externalities prevail. Pigou's suggestion was to impose a tax on the generators of negative externalities and to subsidize the generators of positive externalities in order to reach the efficient allocation of resources and to maximize social welfare.

Economists following the Pigovian approach have typically failed to recognize “externalities” as instances of interdependence. Yet interdependence is obvious in the classic externality examples. Factories belching smoke limit the ways in which laundries can dry their linen, and if the options of laundries are kept open, the options of factories must be limited. Similarly, steam locomotives generate sparks and expose trackside farmers to the risk of fires, but the elimination of these risks by regulating the use of locomotives would limit the freedom of their owners. Hardin's (1968) analysis of the “tragedy of the commons” in the use of rangelands and fisheries highlights interdependence as the source of natural resource use problems. The use of these resources by one agent precludes it by another. This can

potentially instigate a race for the appropriation of resource units, which maybe individually rational but which can lead to the over-exploitation of the resource.

Coase (1960) acknowledged that interdependence underlies what Pigou regarded as externalities but he did not pursue this analysis to its conclusions. He demonstrated that under Pigou's own assumption of costless transactions, assignment of private property rights to one of the parties is all that is needed: they can reach the efficient allocation of resources through private bargaining after initial endowments are defined. This is the essence of the Coase Theorem as it is usually understood (see Paavola, 2006). However, it also amounts to a recognition that it is necessary to choose whose interests are to be protected when an externality exists. Coase demonstrated that when transaction costs are introduced, the initial assignment of rights influences and can determine the allocation of resources. He also argued that environmental regulations can entail lower transaction costs than private property rights and markets as a way of establishing initial endowments (Coase 1960, pp. 17-18).

Institutionalist and other critics have argued that Pigovian reasoning on welfare-enhancing policy interventions is illegitimate because it makes a false distinction between allocative and distributive decisions – Pigovian taxes and subsidies alter initial endowments, redistribute wealth and income, and result in different equilibria which cannot be compared in Paretian terms (Calabresi, 1991; Dragun and O'Connor, 1993; Vatn and Bromley, 1994). Interdependence thus creates conflicts over who gets to consume or use particular goods or resources which have to be resolved in one way or another (see Schmid, 1987; 2002). This – and not the economization on transaction costs – is the reason for establishing institutions: they are needed to resolve conflicts whether or not transaction costs are acknowledged.

Institutions are often understood simply as the “rules of the game” (North, 1990: 3) but they also create entitlements by defining the rights, duties, liabilities and powers of involved agents (Bromley, 1989: 43-46; Schmid, 2004: 6). Governance institutions resolve environmental conflicts by striking a particular balance between conflicting interests by either establishing, reaffirming or redefining entitlements (see Adger et al, 2003; Bromley, 1991, 2004). For example, fisheries management arrangements establish and distribute entitlements to fish and comparable entitlements are being considered for the use of atmospheric sinks for carbon dioxide. The establishment and change of governance institutions have both allocative and distributive consequences. Coase has shown that allocative efficiency will be reached after the initial endowments are (re)defined and that governance outcomes may vary in the context of positive transaction costs depending on how entitlements are assigned. Therefore, distributive and governance outcomes are the key variables in collective environmental decisions (Calabresi, 1991). As Coase (1960, p. 43) argued: “the choice among different social arrangements ... must ultimately dissolve into a study of aesthetics and morals.” In what follows, social justice aspects of environmental governance will be discussed in somewhat greater detail.



### **3. PLURALISM AND SOCIAL JUSTICE IN THE CHOICE OF GOVERNANCE SOLUTIONS**

The conceptualization of environmental problems as conflicts between different groups interested in environmental resources emphasizes that the choice of governance institutions is a matter of social justice rather than efficiency. But the choice of governance institutions does not reduce to the question who are (to be) the economic winners and losers. For example, motivations and preferences of involved agents influence what can be considered just in a particular institutional choice. For this reason, it is important how motivations and preferences are treated in analysis. Environmental governance research has sometimes acknowledged alternative motivations such as “environmental stewardship” but most often it has shared the conventional economic assumptions according to which agents seek to improve their personal welfare or utility (but see North, 1990, pp. 17-26). A more nuanced treatment of human motivations is needed to understand environmental conflicts and collective institutional choices required by them.

One reasonable starting point for the treatment of motivations is the acknowledgement of pluralism. It is common to argue that peoples’ values – which underlie motivations – differ. I am making a particular argument for the acknowledgement of “radical pluralism” – the co-existence of incommensurable ethical premises of behaviour which can be informed by utilitarian, non-utilitarian consequential or deontological ethics (Paavola, 2005). That is, there are different reasons to pursue or to oppose environmental governance solutions. Some pursue a particular environmental governance solution because of its presumed positive welfare consequences. Others may in turn consider some of its consequences inherently good so that they are worth pursuing even if that would require welfare sacrifices, or that involved rights and duties override any consequentialist reasoning (Paavola, 2002a; Sagoff, 1988; 2004). Those who oppose particular environmental governance solutions also do so on a number of grounds – not only because it is in their narrow economic self-interest. For example, they may consider private property rights inviolable and defend them even if doing so would require welfare sacrifices.

Value premises that underlie motivations influence what resolutions of environmental conflicts are considered just among the involved agents, and there are also other reasons why social justice in environmental governance is a more complex issue than just that of economic winners and losers. For example, even the certainty of positive welfare consequences might not justify the adoption of an international emission trading scheme for greenhouse gases to some of its opponents. They could argue that historical responsibility and the right to be free from involuntary exposure to climatic risks should be the primary concerns informing international and national climate change policies. Any acceptable justification ought to provide reasons for why, under the prevailing circumstances, would it be better to adopt a trading scheme rather than some other solution to pursue and allocate emission reductions (see Bromley, 2004; Bromley and Paavola, 2002). These reasons must explain why social welfare could and should be considered decisive and why other considerations, such as those for the involuntary exposure of people to risks and harms to which they have not contributed, are secondary or can be omitted completely.

Sufficient reasons for environmental decisions relate to both distributive and procedural justice. Decisions on governance institutions resolve whose interests in environmental resources are realized and what the incidence of beneficial and adverse consequences of decisions will be. These decisions can be informed by the traditional rules of distributive justice such as Aristotle’s just deserts, Bentham’s greatest happiness for the greatest numbers, Rawls’ maximin or “no envy” or “equality” (see H. P. Young, 1994). The problem with these rules is that they are often applied as if the distribution of some overarching good such as “utility” or “welfare” could resolve all dilemmas of distributive justice. This requires commensuration of goods and bads and allows compensating one bad with another kind of

good. For example, adequate compensation could be considered to fully resolve justice dilemmas related to unequal incidence of environmental degradation and hazards. However, it is not at all obvious that this line of reasoning should be accepted.

Non-commensurated aspects of justice such as the various rights contained in the notion of human rights can be supported by cosmopolitan theories. Other social justice theorists have argued that justice is specific to particular communities and that rules of justice are tentative and likely to vary across issues and contexts (Bell, 1993; Radin, 1996). Walzer's (1983) notion of complex equality in turn requires the absence of domination by one group of people across "spheres of justice" in which justice is defined in different terms. For example, questions of income inequality and environmental justice would need to be resolved separately (but not necessarily independently). Groups disadvantaged in income terms should not be disadvantaged in other spheres of justice. Vital interests in health and safety ought to be considered as distinct from those related to levels of income and to occupy their own sphere. Justice demands the protection of these interests to avoid repeating the injustice of income and wealth distribution.

The existence of several spheres of justice does not necessarily reduce the degree of pluralism in any of the spheres, however. It would still be difficult to agree on the rules of justice in each of them. This means that the legitimacy of environmental decisions must rest in part on procedural justice (Paavola, 2005). Procedural justice can assure those whose interests are not endorsed by a particular environmental decision that their interests can count in other decisions. Procedural justice also enables affected parties to express their dissent or consent and to maintain their dignity (Schlosberg 1999: 12-13, 90; Soyinka 2004). The core concerns of procedural justice can be best represented by the following three questions (see e.g. Lind and Tyler, 1988; Fraser, 2001; Schlosberg, 1999; Shrader-Frechette, 2002):

- 1) Which parties and whose interests are recognized, and how, in the processes of environmental planning, decision-making and governance?
- 2) Which parties can participate in environmental planning, decision-making and governance, and how?
- 3) What is the effective distribution of power in environmental planning, decision-making and governance?

These questions are related to but do not reduce to each other. *Recognition* is the foundation of procedural justice (see Fraser, 2001) but it can take many forms which do not necessarily involve participation. For example, President Clinton's Executive Order 12898 required federal agencies to identify and address the consequences of their programs, policies and actions to minority and low-income populations (see Paavola, 2005). This kind of guidelines for planning and decision-making can make the consideration of a group's interests an integral part of the process. *Participation* requires recognition but it can again take many forms which range from simply informing or hearing affected parties to giving them effective power in decision-making and rights to contest decisions and actions (see Fitzmaurice, 2003: 339). The solutions for participation, together with political-economic factors of predominantly distributive nature, generate a particular *distribution of power*. The relative power of involved parties determines to which extent they can make their interests to count in environmental planning, decision-making and governance.

Distributive and procedural justice are tied together despite being separate fields of justice. Distributive outcomes influence but do not necessarily determine recognition, participation and power in different spheres of action. This is because institutions constitute actors such as consumers, citizens, organizations and firms in particular ways and structure their interactions to an extent independently of distributive factors. Arguments for maintaining a distinction between markets and politics are based on this reasoning, and on a recognition that the procedures of the two realms will generate different power structures and help to

diffuse power in the society. Recognition, participation and distribution of power in turn influence plans and decisions, including their distributive implications.

Legitimate environmental decisions thus have to reflect both distributive and procedural justice concerns. This is especially so when people have broader concerns than their narrowly construed economic welfare. In the context of pluralism, distributive justice matters in a broad sense of whose interests and values will be realized by the establishment, change or affirmation of environmental governance institutions. Often governance solutions seek to realize multiple goals simultaneously and this may require different governance solutions for the achievement of different goals. Yet dilemmas of distributive justice will remain difficult to resolve to everybody's satisfaction. Therefore, procedural justice plays an important role in justifying decisions to those who have to accept that their interests and values are sacrificed to realize some other interests and values. This means that governance solutions are much more than simply ownership arrangements: they provide for participation in collective environmental decisions and make conflict resolution available for involved actors (see Ostrom, 1990). In the remainder of the article, I will present a way to look at governance institutions which is more inclusive and explanatory than the existing accounts.

#### 4. TOWARDS AN INCLUSIVE VIEW OF GOVERNANCE SOLUTIONS

The emergence of environmental governance research has been accompanied with a gradual widening of the perceived range of governance solutions. For two decades since Hardin's (1968) damning analysis of the commons, there seemed to be only two alternatives for resource tenure: the nationalization or privatization of natural resources. In the 1980s economists working on common property arrangements (Bromley and Cernea, 1989; Runge, 1986; Wade 1987) made counter-arguments to Hardin's analysis which, together with the accumulating empirical evidence (Ostrom, 1990; Wade, 1988), legitimated common property as a viable form of resource tenure. The established view became that four property rights regimes can be used for governing the use of natural resources: open access or *res nullius*, common property, state property and private property (see Bromley and Cernea, 1989; Bromley, 1992b; Hanna, Folke and Mäler, 1996). At this juncture, *res nullius* and ineffective state property regimes became considered the culprits for resource degradation and depletion. Of course, all property rights regimes can be ineffective if they are designed so (or face such daunting challenges) that formal rights cannot be made effective.

This contemporary typology of governance regimes still has shortcomings in it. For example, state property is a category which does not have a clear meaning. Moreover, many common environmental governance solutions such as national environmental and natural resource policies do not fit conveniently to any of the categories. These shortcomings can be mended without great difficulty. On one hand, the state owns some resources such as national forests outright. On the other hand, the state manages certain resources such as watercourses and air basins on behalf of its people. In the first case the state simply holds ordinary private property rights to resources such as forests. In the latter case the state does not have an authority to alienate the resource in question and manages it as if holding it in public trust (Sax, 1970; Rose; 2003). This is an example of collective ownership not unlike common property. Thus "state property" is a redundant category and should be abandoned. The category of "common property" should in turn be defined broadly so as to include all forms of collective ownership, such as those governance regimes constituted by national environmental and natural resource policies and international environmental conventions.

The elimination of state property from the typology does not mean that the state would not be important in environmental governance – it means that the type of owner does not change the fundamental nature of ownership. State can be a private owner or it can be a participant in common ownership arrangement, just like individuals and their various organizations. No matter what the ownership arrangements are, state behaviour depends issues such as transparency, accountability, rule of law and social capital. For example, the state may let customary users to continue having access to forests which it owns as private holdings, but, as has frequently happened, it may equally well exclude them and lease or transfer rights to forest use to commercial operators. Alternatively, the state may act on behalf of its people when managing a commons in public trust or it may enclose the commons.

Another problem with the typology is the equation of *res nullius* with open access. Yet the two are not the same thing. Open access prevails when access to a resource is not limited by exclusive access rights (see Schlager and Ostrom, 1992). *Res nullius* should in turn be understood more narrowly as "nobody's property", a situation where nobody has legitimate authority to exclude others from a resource. Open access may prevail because of the absence of ownership arrangements but there are also other reasons for it. For example, there are many effectively owned resources to which open access is intentionally maintained. University campuses, public parks and public beaches are common examples. Here widely shared access rights do not imply unregulated use – although they do have open access, users of public parks have to observe the pertinent rules of use.

Thus a typology of governance regimes should distinguish between *res nullius*, collective ownership and private ownership. Private ownership vests comprehensive decision-making authority with regard to a resource to its individual or collective owner and entitles them to alienate the resource in question on the market which allocates them to their most valuable uses (see Cole, 2002). Forms of collective ownership – of which “common property” represents a special case where governance institutions are customary and informal – do not usually vest any one agent with the right to alienate the resource. Collective ownership often creates inalienable collective rights but rights can also be held individually and be transferable. Agricultural land has been frequently held under usufruct rights which can be bequeathed across generations or rented out within the community. Sometimes rights, such as Spanish water rights under the *Huerta* arrangements described by Ostrom (1990: 69-82), can also be transferable within the community. In practice, decision-making authority is often shared between the collective and the individuals in collective ownership arrangements.

Many contemporary environmental and natural resource policies are best understood as forms of collective ownership. For example, water and air pollution control regulations determine to what extent polluters can use air basins and watercourses as sinks for depositing wastes. At the same time, they define the entitlements of other users to be free from any greater amounts or concentrations of polluting substances. These entitlements resemble the usufruct rights created by common property arrangements in that both are qualified and non-transferable. Environmental taxes and charges constitute collective ownership where administrative prices are used to allocate scarce environmental resources. Trading systems, such as the one established in the United States to govern SO<sub>2</sub> emissions under the Clean Air Act, constitute a form of collective ownership (see Rose, 2002; Tietenberg, 2002) which is not fundamentally different (apart from obvious differences in scale and formality) from trading irrigation water within common property arrangements (see Ostrom, 1990).

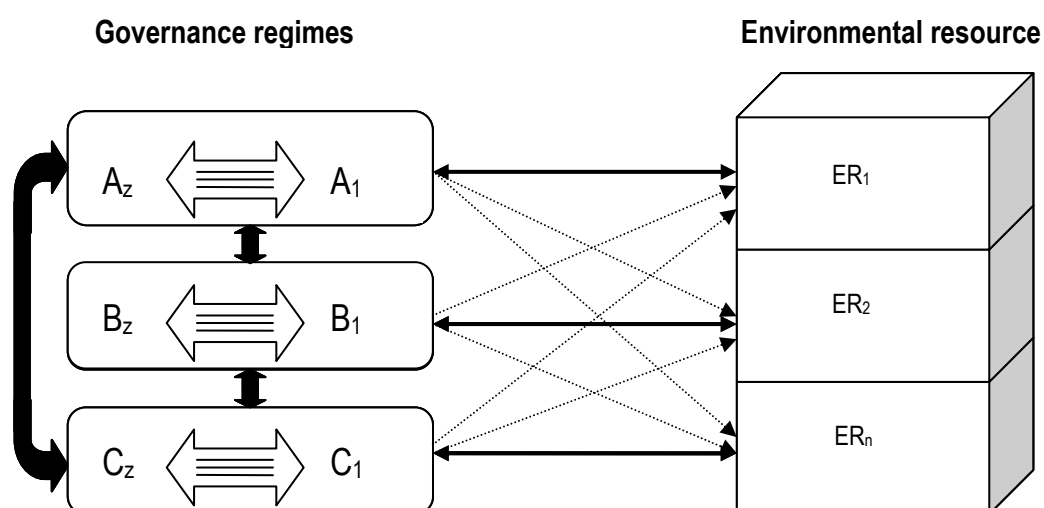
But not all environmental policies are manifestations of collective ownership: private ownership also plays an important role in environmental governance. For example, different kinds of payments for ecosystem and conservation services confirm private (and collective) ownership of environmental resources that generate sought-after benefit streams. It is important to underline that these payments are not subsidies: they constitute the use of markets and prices for the provisioning of environmental goods and services. Other policies, such as those requiring insurance coverage for oil spills and other environmental hazards, in turn confirm these risks as private property and create a market for pricing and exchanging them. Many new informational and voluntary policy instruments such as eco-labels and certified management systems (see Dietz and Stern, 2002; OECD, 2003) in turn seek to constitute good environmental performance as intangible private property.

The revised typology of governance solutions still fails to capture the full complexity of environmental governance solutions. One reason for this is that it portrays property rights as bundles of rights held by the owner(s) vis-à-vis other agents. This viewpoint is useful and appropriate for understanding how institutions constrain and facilitate the behaviour of economic agents but it is not best suited for characterizing institutional solutions that govern the use of physical environmental resources. The key issue here is that many physical environmental resources such as bodies of water or air basins can support multiple uses. Resource users often draw a benefit stream from different aspects or dimensions of a resource – think of, for example, consumptive use of water and the use of water for navigation, power generation and recreation. Different dimensions of the same physical resource could each be considered a distinct asset governed by their own governance institutions.

Looking at the “bundle of sticks” notion of property rights from the viewpoint of a physical environmental resource sheds more light on governance institutions (see Figure 1). A variety

of agents can hold different kinds of entitlements to different aspects of the same resource simultaneously (see Figure 1). For example, in India a complex system of land rights distinguished the rights of farmers to cultivate land during the growing season from the rights of transhumant pastoralists to grazing on the residues after the growing season (see Chakravarty-Kaul, 1998). The same applies to many contemporary governance solutions for environmental resources. For example, the use of land is partly governed by private ownership and markets in market economies. In figure 1, this is represented by the regime A which resolves conflicts between competing users  $A_1$  and  $A_z$  by creating private property rights. However, forest policies define some aspects of forested land as a distinct resource and establish a layer of institutional rules which qualify the authority of private owner over it. In figure 1, this is represented by regime B which resolves conflicts over forests between the involved parties. Game and wildlife policies establish another layer of governance institutions (C) that define game and wildlife a distinct resource and establish rules for its governance. Still further layers of institutions exist for the governance of sub-soil minerals, ground water, historical heritage, landscape amenities and biodiversity, for example. Water resources, the coastal zone, air basins and atmospheric sinks are similarly governed by a conglomerate of different governance institutions.

**Figure 1: Governance regimes and environmental resources**



This kaleidoscopic picture of governance arrangements and resource rights may not appeal to those who promote exclusive and non-attenuated ownership of environmental resources. Their argument has been that private property rights maximize the value of resources and ensure that they are allocated to their most highly valued uses (e.g. Posner, 1992). However, property rights and governance systems are costly to establish and maintain and thus the value of a resource sets limits to how complex its governance solutions can be (Bromley, 1989: 15-18; see also Dahlman, 1980). This line of reasoning suggests that some resources remain ungoverned because they generate too low benefits or entail too high governance costs. When resources offer greater benefits or entail lower governance costs, they may support a common property regime. When benefits increase or governance costs decrease still further, resources can support even private property rights.

However, private property rights are not necessarily the pinnacle in the evolution of governance institutions. The theory merely says that when a resource becomes more valuable, it becomes affordable to define rights to it in a greater detail. Private property rights vest the private owner with the authority to define and, if he or she so prefers, to alienate

rights to aspects or dimensions of the resource. But this is only one way to specify resource rights in greater detail, one not particularly attractive when transaction costs are high and prevent the emergence of markets for aspects of the resource. An alternative is to define increasingly detailed layers of collective ownership. Thus, far from being a result of misguided political interference or whims, complex governance systems with overlapping institutions of collective ownership can have a solid economic explanation. Of course, these different layers of environmental governance remain interdependent – entitlements of one regime are affected by those of another one and the degree to which they are implemented (Young, 2002).

The complexity of contemporary governance solutions thus partly reflects the value and complexity of governed environmental resources. However, there are also other reasons for the complexity of governance solutions. The nature of environmental governance as conflict resolution means that governance solutions have to strike a legitimate balance between diverse and conflicting interests in environmental resources. Private property rights would vest comprehensive ownership of environmental resources in the individual or collective owner which would not be legitimate in all circumstances. The use of collective ownership arrangements and their greater variety of attenuated entitlement types can disperse entitlements more widely in the society, protecting particular interests in environmental resources such as those related to environmental safety or public health, to the extent that they are enforceable and actually enforced.

However, despite clarifying some important conceptual issues, the distinctions between *res nullius*, collective property and private property are not sufficiently detailed to make concrete claims about the institutional design of governance solutions and their likely outcomes and performance. In what follows, I will indicate how the institutional design of governance institutions can be analyzed in greater detail.

## 5. INSTITUTIONAL DESIGN OF GOVERNANCE SOLUTIONS

I propose that the institutional design of governance solutions has three core aspects which include 1) functional tiers; 2) organization of governance functions, and 3) formulation of particular institutional rules. In what follows, I will discuss each aspect in greater detail.

### 5.1 The Three-tier Model of Institutions

The above discussed typology of governance solutions distinguishes between *res nullius*, collective property and private property “horizontally”. But governance solutions have also a “vertical” dimension. For example, Kiser and Ostrom (1980: 208-215) and Ciriacy-Wantrup (1971: 44-46) discuss the “three worlds of action” and the “three-level hierarchy of decision-systems” which are governed by corresponding institutional rules. At the “operational level”, individuals make choices within the constraints of “operational” rules which define their choice sets. A decision to catch fish within the constraints set by regulations regarding approved gear or catch is an example. At the “collective choice” level, authorized individuals and organizations make collective choices such as whether to take an enforcement action against a fisherman who has been detected using disallowed gear. These decisions are based on “institutional” rules. Finally, decisions regarding the authority of collective actors and the procedures they are supposed to follow form the “constitutional” level of action. Accordingly, these decisions are governed by “constitutional rules”.

This notion of operational, institutional and constitutional levels of rules refers to the *functions* of institutional rules rather than describes the actual vertical structure of institutional arrangements. Functional and structural levels of governance solutions can be linked but they are still distinct. For example, a national policy, such as the U.S. Clean Water Act, is enacted within a set of federal rules of procedure that are “constitutional” for federal water pollution policy. The Clean Water Act provides for the establishment of state-administered permit programs. The federal legislation, together with the pertinent state rules of procedure, form the constitutional rules for the state permit program. Federal and state legislation together form the institutional level rules for state authorities implementing the permit program. State legislation and programs, together with the applicable federal rules, in turn generate the operational rules that define what individual agents must, can or cannot do.

It is important to distinguish the functional view of three-tier institutions from the existence of multi-level governance solutions. Multi-level governance solutions involve a hierarchy of governance institutions where governance solutions with smaller jurisdiction are nested within solutions with a larger jurisdiction. Environmental governance research has recorded instances where actors of local governance solutions have formed federations and over-arching institutions to coordinate their actions (see Ostrom, 1990; Sengupta, 2004). In these examples, larger-scale governance solutions have been created as a result of bottom-up processes. The opposite, top-down process creates many formal multi-level governance solutions. This is a feature of many federal environmental and natural resource policies in the United States which provide for or mandate the establishment of state programs. The European Union’s directives also require the transposition of European policies into national legislation for their implementation (Paavola, 2004b). International environmental conventions such as the United Nations Framework Convention for Climate Change (UNFCCC) similarly require national actions, programs or solutions for the purposes of planning, coordination and implementation. For example, Least Developing Countries are currently preparing National Adaptation Programs of Action (NAPAs) under the United Nations Framework Convention for Climate Change (UNFCCC). NAPAs are expected to generate national priorities for adaptive measures and thus help to focus adaptation assistance for the least developing countries (see Paavola and Adger, 2005b).



Higher level governance solutions seldom limit the range of functions at the lower levels to the extent that they would not have the three-tier functional structure. At lower levels, the surrounding institutional framework has an impact on what are the effective institutional and operational rules. Therefore, there are always “degrees of freedom” between levels of governance in multi-level solutions. But the way in which operational, institutional and constitutional choices can be made and the authority and responsibilities the respective rules confer to involved actors still vary according to adopted institutional solutions. This has important implications for general issues such as transparency and accountability as well as to procedural and distributive justice among involved and affected agents.

## **5.2 Governance Functions**

From a slightly different viewpoint, all environmental governance institutions perform certain generic governance functions which are necessary for environmental governance institutions to be able to resolve conflicts over the use of environmental resources. For example, Schlager and Ostrom (1992) distinguish between “ownership functions” and “management functions” of common property arrangements (see also McCay, 1996). A more detailed and useful typology of generic environmental governance functions can be distilled from the lists of common features of successful governance solutions presented by Ostrom (1990: 88-102) and Agrawal (2002), for example. On the basis of these lists, I suggest that the generic environmental governance functions should include at least the following:

- 1) exclusion of unauthorized users;
- 2) creation of entitlements to regulate authorized resource use;
- 3) provisioning of joint-impact or non-rival goods;
- 4) sharing the benefits of resource use and the costs of its provisioning;
- 5) monitoring of resource users;
- 6) enforcement of the rules of resource use;
- 7) resolution of conflicts over resource use;
- 8) collective choice for the modification of governance solutions.

Different governance solutions organize these governance functions differently. In a small, customary common property regime, resource users are often members of a community such as a village or a fishermen’s association which makes, enforces and adjudicates the rules of resource use. In essence, the community performs all governmental functions without separation of powers and the resource users have a possibility for direct participation in environmental decision-making affecting them. Resource users may also themselves perform some governance functions such as exclusion of unauthorized resource users and monitoring of the compliance with rules of authorized resource use.

In contrast, formal national policies have a deeper division of labour between governmental organizations and they offer less direct participation for users in environmental decisions. General-purpose legislatures make some of the collective choices at the local, state or federal levels while delegating others to be made in specialized agencies which may involve interested and affected parties directly and/or through representation. Specialized agencies also frequently monitor and enforce the rules of the governance regime while conflict resolution is often split between these agencies and general-purpose courts. Most contemporary environmental policies also require the resource users to practice self-monitoring and reporting. International environmental conventions in turn are “constitutions” for special-purpose jurisdictions which typically have their own specific decision-making, monitoring and implementation bodies and designate conflict resolution processes. Private property regimes also rely on greater differentiation of governance functions than customary common property arrangements: while decision-making authority and monitoring responsibility is vested in the private owner, the state participates in exclusion, enforcement and conflict resolution through its executive and judicial branches.

Governance solutions thus perform broadly similar functions but organize them in different ways. The nature and scale of the governance problem and the institutional underpinnings of governance solutions influence the choice and performance of governance solutions. For example, community-based solutions can work when the scale of the governance problem is limited and homogeneity and social capital reduce transaction costs and foster collective action among the affected and involved actors. Ways to organize exclusion and regulation functions have different transaction cost and social justice implications and influence what de facto entitlements and governance outcomes will be. The same applies to other governance functions.

### 5.3 Institutional Rules

Institutional analysis should also involve the examination of specific institutional rules that are central to the above discussed generic governance functions. I will discuss below those rules that provide for the exclusion of unauthorized users from the resource, create entitlements to and regulate authorized resource use, provide for monitoring of resource use and structure participation and decision-making in environmental governance.

*Rules of exclusion* influence how effectively unauthorized users can be excluded. For example, early state water pollution control programs in the United States often prohibited “the creation of public nuisances” or “harmful pollution of water” (see Paavola, 2004a). The purpose of these rules was to exclude certain uses and users from the watercourses. However, it was difficult to monitor compliance with and to enforce this kind of rules – it required expensive litigation to find out whether a public nuisance had been created. Frequently this kind of exclusion rules resulted in lax (if any) enforcement, making the regimes nominal rather than effective. In contrast, contemporary water and air pollution policies typically contain a blanket prohibition of *unlicensed* discharges which provides a better basis for the exclusion of unauthorized users and for the regulation authorized use.

*Entitlement rules* are the key rules in any governance regime as they are the instruments with which a conflict is resolved by striking a particular balance between the involved interests. Entitlement rules regulating authorized resource use include property rules, liability rules and inalienability rules (see Calabresi and Melamed, 1972; Bromley 1991). Contemporary environmental policies use these rules in different ways. Trading systems use property rules to create alienable and exchangeable entitlements which can be either grandfathered or auctioned, depending on the sought-after initial assignment. Environmental charges use a liability rule to protect the interests of the public whom the polluter has to compensate for adverse resource use. Subsidies recognize the polluter’s private property rights and provide compensation for its attenuation. Inalienable rights underpin environmental regulations and define non-transferable entitlement to the use or enjoyment of environmental resources. For example, an effluent limit determines a polluter’s right to use a watercourse as a waste sink. At the same time, it defines the upper limit to the amount of effluents which others have to tolerate and by implication what they have a right to be free from.

The way in which entitlement rules are defined has significant implications for governance outcomes – water pollution control regulations prescribing maximum pollutant concentrations but enabling dilution provide an example. But entitlement rules have also other dimensions. For example, riparian law – which establishes common rights of riparians to the use of water in a watercourse abutted by their land – underwent several changes in the 19th century (see Paavola, 2002b). Early in the 19th century, the doctrine of natural flow entitled riparians to undiminished quantity and quality of water. Industrialization put pressure on the use of water resources in the following decades. The adoption of the rule of reasonable use in the late 1820s enabled proprietors to cause some change in the quantity or quality of water available for others without legal liability for damages. In the mid-19<sup>th</sup> century, the rule of reasonable

use was transformed into a balancing test, which confirmed the more valuable water use as the reasonable one and enabled the riparian making a more valuable water use to extinguish the less valuable rights without compensation – this was a part of what Morton Horwitz (1977) has called the capital subsidy for the nascent industry in the 19th century United States. That is, the formulation of entitlement rules has significant distributive implications which will also be translated to specific governance outcomes.

*Monitoring rules* determine what is being monitored and by whom. For example, the 19th century common law of water rights required water users to monitor each others' water use and to actively seek the protection of their own interests when they were harmed. This was relatively straightforward as most discharges contained solids that caused obvious damages such as the clogging of waterwheels of downstream mills (see Paavola, 2002b). Water pollution that endangered public health was not as obvious to the naked eye which brought about water quality monitoring by government agencies. Today monitoring of compliance with federal water pollution control legislation consists of a complex mix of state and federal inspections and water quality monitoring as well as self-monitoring and reporting by the polluters (e.g. Magat et al., 1986).

*Decision-making rules* determine whose interests are recognized and who can participate in environmental decisions, and what are the rules and procedures that have to be observed when making decisions. These rules largely determine the procedural justice implications of governance solutions. Decision rules influence distributive outcomes as well. For example, the governance of water quality under the common law in the 19th century United States was organized so that decisions were made in the courts as a result of private litigation (see Paavola, 2002b). This granted participation in decision-making according to the ability and willingness of plaintiffs to pay for litigation. This was the primary reason for the gradual relaxation of rules of water use discussed above.

Decision rules have important implications for contemporary environmental governance solutions as well. For example, implementation, effectiveness and legitimacy of the European Union's Habitats Directive suffered significant blows when stakeholder groups angered by the lack of opportunity to participate and to voice their concerns over the designation of habitat preservation sites staged protests across the member states (Paavola, 2004b). In many other instances, nominal right to participate is granted without any real chance of influencing decisions and thus gaining power in decision-making processes. In the climate change regime, negotiators representing developing countries in turn feel that they do not have equal opportunity to participate in decision-making under the convention (see Gupta, 2002). Formally equal treatment of sovereign states ignores the fact that developing countries have only small delegations which are not backed by cadres of legal and scientific experts. It is simply impossible for the one or two person country teams to be present in the numerous simultaneous meetings of various working groups. Language can also form barriers for participation in the less formal meetings where much of the preparation work takes place. These inequities contribute to the unwillingness of developing countries to cooperate in the agenda of developed country parties to the climate change convention.

To summarise, the formulation of particular institutional rules within governance solutions has transaction cost implications and it also has ramifications for distributive and procedural justice. Therefore, it affects the performance and legitimacy of governance solutions as well as governance outcomes. The identification and characterization of key institutional rules associated with generic governance functions also fosters institutional analysis because it helps to bring transaction cost reasoning to bear on institutional design. These observations are also applicable to the two other aspects of institutional design – tier structure and the organization of governance functions - discussed earlier in this section.

## 6. CONCLUSION

This article has sought to extend the new institutional research on local and international environmental governance to all instances of environmental governance, outlining the needed conceptual revisions. The article argued that environmental governance is best understood as the resolution of environmental conflicts which have their origin in the interdependence of involved actors. This conceptualization of environmental problems makes the new institutional approach applicable to the governance of natural resources and environmental quality at the local, national, international as well as intermediate and multiple levels.

Interdependence reasoning suggests that the choice of governance solutions is a matter of social justice rather than of economic optimization. The paper demonstrates how this demands emphasis on distributive and procedural justice in environmental decisions. Acknowledgement of pluralism also broadens distributive concerns outside the conventional economic domain so as to include the distribution of ecological and health impacts as well as impacts on self-determination and capacity. These concerns are not likely to replace traditional distributive considerations but they should not be ignored either: they have to be addressed either within integrated governance solutions or the legitimacy of multiple solutions has to be admitted. Pluralism also gives an important role for procedural justice as the underpinning of legitimacy: recognition of interests, fair participation and legitimate distribution of power are important for governance solutions. Legitimacy is also instrumentally important as it is tied to voluntary compliance and ultimately effectiveness of governance solutions. The demands of procedural justice form governance functions of their own which complement those related to control and regulation of resource use.

The paper also argued that the extension of this new institutional approach to new areas requires a revised conception of governance institutions. The established typology of four property regimes must be replaced by a scheme which identifies private ownership, collective ownership and *res nullius* as the main types of governance solutions. This typology can accommodate formal governance solutions such as national environmental and natural resource policies as particular forms of collective ownership. These and many other governance solutions did not fit conveniently to the earlier typology. The paper also suggested that many environmental resources are governed by overlapping governance regimes. This is consistent with theories suggesting that entitlements will become more detailed when the value of resources increases.

While the revised typology of governance solutions improves the conceptual clarity in analysis of governance institutions, it is too crude to be useful for institutional analysis. The article suggests that a model of institutions drawing attention to their tier structure, organization of generic governance functions and formulation of particular institutional rules would add resolution to institutional analysis. What is more, this analytical lens helps to determine social justice implications of environmental governance solutions as well as to bring transaction cost reasoning to bear on institutional analysis in order to explain and predict the outcomes of suggested or adopted governance solutions.

## References

- Acheson, J. 2003. *Capturing the Commons: Devising Institutions to Manage the Maine Lobster Industry*. Hanover, NJ, University Press of New England.
- Adger, W. N., K. Brown, J. Fairbrass, A. Jordan, J. Paavola, S. Rosendo, and G. Seyfang. 2003. "Towards a thick analysis of environmental decisions." *Environment and Planning A* 35:1095-1110.
- Agrawal, A. 2002. "Common Resources and Institutional Sustainability." In *The Drama of The Commons*, ed. E. Ostrom, T. Dietz, N. Dolšak, P.C. Stern, S. Stonich, and E.U. Weber. Washington, D.C., National Academy Press.
- Baland, J.-M. and J.-P. Platteau. 1996. *Halting Degradation of Natural Resources: Is There a Role for Rural Communities?* Oxford, Clarendon Press.
- Barzel, Y. 1985. "Transaction costs: are they just costs?." *Journal of Institutional and Theoretical Economics* 141: 4-16.
- Bell, D.A. 1993. *Communitarianism and its Critics*. Oxford: Clarendon Press.
- Berge, E., and N.C. Stenseth, eds. 1999, *Law and the Governance of Natural Resources: Studies from Northern Europe and Africa*. San Francisco: The ICS Press.
- Berkes, F., ed. 1989. *Common Property Resources, Ecology and Community-Based Sustainable Development*. London, UK: Belhaven.
- Blomquist, W. 1992. *Dividing the Waters: Governing Groundwater in Southern California*. San Francisco: The ICS Press.
- Bromley, D.W. 2004. "Reconsidering Environmental Policy: Prescriptive Consequentialism and Volitional Pragmatism." *Environmental and Resource Economics* 28: 73-99.
- Bromley, D.W. 1989. *Economic Interests and Institutions: The Conceptual Foundations of Public Policy*. Oxford, UK: Blackwell.
- Bromley, D.W. 1991. *Environment and Economy: Property Rights and Public Policy*. Cambridge, MA: Blackwell.
- Bromley, D.W., ed. 1992a. *Making the Commons Work: Theory, Practice, and Policy*. San Francisco: The ICS Press.
- Bromley, D.W. 1992b. "The Commons, Common Property and Environmental Policy." *Environmental and Resource Economics* 2: 1-17.
- Bromley, D.W., and M.M. Cernea. 1989. *The Management of Common Property Natural Resources: Some Conceptual and Operational Fallacies*. Washington, DC: World Bank Discussion Paper 57.
- Bromley, D.W. and J. Paavola. 2002. "Economics, ethics and environmental policy." In *Economics, Ethics, and Environmental Policy: Contested Choices*, ed. D. W. Bromley and J. Paavola. Malden, MA: Blackwell.
- Buck, S. 1998. *The Global Commons: An Introduction*. Washington DC, Island Press.

- Calabresi, G. 1961. "Some thoughts on risk distribution and the law of torts." *Yale Law Journal* 70: 499-553.
- Calabresi, G. 1991. "The pointlessness of Pareto: carrying Coase further." *Yale Law Journal* 100: 1211-37.
- Calabresi, G., and D. A. Melamed. 1972. "Property Rules, Liability Rules, and Inalienability: One View of the Cathedral." *Harvard Law Review* 85: 1089-1128.
- Chakravarty-Kaul, M. 1998. "Transhumance and Customary Pastoral Rights in Himachal Pradesh: Claiming the High Pastures for Gaddis." *Mountain Research and Development* 18: 5-17.
- Ciriacy-Wantrup, S.V. 1971. "The Economics of Environmental Policy." *Land Economics* 47: 41-42.
- Coase, R.H. 1937. "The theory of the firm". *Economica* 4: 386-405.
- Coase, R.H. 1960. "The problem of social cost." *Journal of Law and Economics* 3: 1-44.
- Coase, R. H. 1974. "The lighthouse in economics." *Journal of Law and Economics* 17: 357-376.
- Cole, D.H. 2002. *Pollution and Property: Comparing Ownership Arrangements for Environmental Protection*. Cambridge: Cambridge University Press.
- Dahlman, C.J. 1980. *The Open Field System and Beyond: A Property Rights Analysis of an Economic Institution*. Cambridge, UK: Cambridge University Press.
- Dahlman, C. 1979. "Problem of externality." *Journal of Law and Economics* 22: 141-162.
- Dietz, T. and P.C. Stern, eds. 2002. *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*. Washington DC: National Academy Press.
- Dolšák, N. and E. Ostrom, eds. 2003. *The Commons in the New Millennium*. Cambridge, MA: The MIT Press.
- Dragun, A.K. and M. P O'Connor. 1993. "Property rights, public choice, and Pigouvianism." *Journal of Post Keynesian Economics* 16: 127-152.
- Fitzmaurice, M. 2003. "Public Participation in the North American Agreement on Environmental Cooperation." *International and Comparative Law Quarterly* 52: 333-368.
- Fraser, N. 2001. "Recognition without Ethics?." *Theory, Culture and Society* 18(2-3): 21-42.
- Gupta, J. 2002 The climate change regime: can a divided world unite? In: Briden, J. C. and Downing, T.E. (Eds.), *Managing the Earth: The Linacre Lectures*. Oxford: Oxford University Press, pp. 129-155
- Hanna, S.S., C. Folke, and K.-G. Mäler, eds. 1996. *Rights to Nature: Ecological, Economic, Cultural and Political Principles of Institutions for the Environment*. Washington, DC: Island Press.
- Hardin, G. 1968. "The tragedy of the commons." *Science* 162: 1241-1248.

- Horwitz, M. J. 1977. *The Transformation of American Law, 1780-1860*. Cambridge: Harvard University Press.
- Keohane, R.O. and E. Ostrom, eds. 1995. *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*. London: Sage.
- Kiser, L.L., and E. Ostrom. 1980. "The Three Worlds of Action: a Meta-theoretical Synthesis of Institutional Approaches." In *Strategies of Political Inquiry*, ed. E. Ostrom. Beverly Hills, CA: Sage Publications.
- Lind, E. A. and T. Tyler. 1988. *The Social Psychology of Procedural Justice*. New York: Plenum Press.
- Loehman, E.T., and D. M. Kilgour, eds. 1998. *Designing Institutions for Environmental and Resource Management*. Cheltenham, UK: Edward Elgar.
- Magat, W., A.J. Krupnick, and W. Harrington. 1986. *Rules in the Making: A Statistical Analysis of Regulatory Agency Behaviour*. Washington: Resources for the Future.
- McCay, B.J. 1996. "Common and Private Concerns." In *Rights to Nature: Ecological, Economic, Cultural and Political Principles of Institutions for the Environment*, Ed. S.S. Hanna, C. Folke, and K.-G. Mäler. Washington, D.C., Island Press.
- McCay, B.J., and J. M. Acheson, eds. 1987. *The Question of the Commons: The Culture and Ecology of Communal Resources*. Tucson, AZ, University of Arizona Press.
- Mishan, E.J. 1971. "The postwar literature on externalities: an interpretative article." *Journal of Economic Literature* 9: 1-28.
- North, D.C. 1990. *Institutions, Institutional Change, and Economic Performance*. Cambridge: Cambridge University Press.
- OECD. 2003. *Voluntary Approaches for Environmental Policy*. Paris: OECD.
- Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- Ostrom, E.; T. Dietz, N. Dolšák, P. C. Stern, S. Stonich, and E. U. Weber, eds. 2002. *The Drama of The Commons*. Washington DC: National Academy Press.
- Ostrom, E., R. Gardner and J. Walker. 1994. *Rules, Games and Common-Pool Resources*. Ann Arbor: University of Michigan Press.
- Paavola, J. 2006. "Externalities, public goods, and governance." In *International Encyclopedia of Public Policy: Governance in a Global Age*, ed. P. O'Hara. London: Routledge, forthcoming.
- Paavola, J. 2005. "Interdependence, pluralism and globalisation: implications for environmental governance." in *Environmental Values in a Globalising World: Nature, Justice and Governance*, ed. J. Paavola and I. Lowe. London: Routledge.
- Paavola, J. 2004a. "Law – Water and Air Pollution." In *The Encyclopedia of World Environmental History* Vol. 2, ed. S. Krech III, J. R. McNeill and C. Merchant. London, UK and New York, N.Y, Routledge.

- Paavola, J. 2004b. "Protected Areas Governance and Justice: Theory and the European Union's Habitats Directive." *Environmental Sciences* 1: 59-77.
- Paavola, J. 2002a. "Rethinking the choice and performance of environmental policies." In *Economics, Ethics, and Environmental Policy: Contested Choices*, ed. D. W. Bromley and J. Paavola. Malden, MA: Blackwell.
- Paavola, J. 2002b. "Water Quality as Property: Industrial Water Pollution and Common Law in the Nineteenth Century United States." *Environment and History* 8: 295-318.
- Paavola, J. and W. N. Adger. 2005a. "Institutional Ecological Economics." *Ecological Economics*, in press.
- Paavola, J. and Adger, W. N. 2005b. "Fair Adaptation to Climate Change." *Ecological Economics*, in press.
- Paterson, M., D. Humphreys and L. Pettiford. 2003. "Conceptualizing environmental governance: from interstate regimes to counter-hegemonic struggles." *Global Environmental Politics* 3(2): 1-10.
- Pigou, A.C. 1920. *Economics of Welfare*. London: Macmillan and Co.
- Posner, R. A. 1992. *Economic Analysis of Law*, 4th ed. Boston: Little & Brown.
- Radin, M.J. 1996. *Contested Commodities*. Cambridge, MA: Harvard University Press.
- Rose, C.M. 2002. "Common Property, Regulatory Property, and Environmental Protection: Comparing Community-Based Management to Tradable Environmental Allowances." In *The Drama of The Commons*, ed. E. Ostrom, T. Dietz, N. Dolšák, P. C. Stern, S. Stonich, and E. U. Weber. Washington DC, National Academy Press.
- Rose, C.M. 2003. "Joseph Sax and the Idea of the Public Trust." *Issues in Legal Scholarship* 8, October 2003: 1-8.
- Runge, C.F. 1986. "Common Property and Collective Action in Economic Development." *World Development* 14: 623-35.
- Sagoff, M. 1988. *The Economy of the Earth: Philosophy, Law and the Environment*. Cambridge: Cambridge University Press.
- Sagoff, M. 2004. *Price, Principle and the Environment*. Cambridge: Cambridge University Press.
- Sax, J. 1970. "Public Trust Doctrine in Natural Resources Law: Effective Judicial Intervention." *Michigan Law Review* 68: 471-566.
- Schlager, E., and E. Ostrom. 1992. "Property-rights regimes and natural resources: a conceptual analysis." *Land Economics* 68: 249-262.
- Schlosberg, D. 1999. *Environmental Justice and the New Pluralism: The Challenge of Difference for Environmentalism*. Oxford: Oxford University Press.
- Schmid, A.A. 1987. *Property, Power, and Public Choice: An Inquiry into Law and Economics*, 2nd ed. New York: Praeger.



- Schmid, A. A. 2002. "All policy instruments require a moral choice as to whose interests count." In *Economics, Ethics, and Environmental Policy: Contested Choices*, ed. D. W. Bromley and J. Paavola. Malden, MA: Blackwell.
- Schmid, A. A. 2004. *Conflict and Cooperation: Institutional and Behavioral Economics*. Malden, MA: Blackwell Publishing.
- Sengupta, N. 2004. *Common Mistakes about Common Property*. A paper presented at the Tenth Biennial Conference of the International Society for the Study of Common Property in Oaxaca, Mexico, 9-13 August 2004.
- Shrader-Frechette, K. 2002. *Environmental Justice: Creating Equality, Reclaiming Democracy*. Oxford: Oxford University Press.
- Soyinka, W. 2004. *A Quest for Dignity*. Fourth Reith Lecture on Climate of Fear, University of Leeds, broadcast on BBC4 24 April, 2004, 8 pm. Available online at <http://www.bbc.co.uk/radio4/reith2004/schedule.shtml> (Accessed 29 April 2004).
- Tietenberg, T. 2002. "The Tradable Permits Approach to Protecting the Commons: What Have We Learned?" In *The Drama of The Commons*, ed. E. Ostrom, T. Dietz, N. Dolšák, P.C. Stern, S. Stonich and E.U. Weber. Washington DC, National Academy Press.
- Vatn, A. and D. W. Bromley. 1994. "Choices without prices without apologies." *Journal of Environmental Economics and Management* 26: 129-48.
- Wade, R. 1988. *Village Republics: Economic Conditions for Collective Action in South India*. Cambridge: Cambridge University Press.
- Wade, R. 1987. "The Management of Common Property Resources: Collective Action as an Alternative to Privatisation or State Regulation." *Cambridge Journal of Economics* 11: 95-106.
- Walzer, M. 1983. *Spheres of Justice: A Defence of Pluralism and Equality*. Oxford: Blackwell.
- Young, H.P. 1994. *Equity: In Theory and Practice*. Princeton, NJ: Princeton University Press.
- Young, O.R. 2002. *The Institutional Dimensions of Environmental Change: Fit, Interplay and Change*. Cambridge, MA: The MIT Press.
- Young, O.R., ed. 1997. *Global Governance: Drawing Insights from the Environmental Experience*. Cambridge, MA: The MIT Press.
- Young, O.R. 1994. *International Governance: Protecting the Environment in Stateless Society*. Ithaca, NY: Cornell University Press.

