

## The role of common pool resource institutions in the implementation of Swiss natural resource management policy

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**Abstract:** By analysing Swiss common pool resource (CPR) institutions, this paper aims to contribute to the debate on comanagement while demonstrating how important it is to take into account the structuring role played by public policies in the regulation of natural resource use in western European countries characterized by significant state intervention. The comparative analysis of three detailed case studies dealing with hunting, flood protection, and landscape management policies leads to three main conclusions: (1) CPR institutions strengthen the coherence of natural resource regimes management policies to the extent that they constitute social institutions which can facilitate the “mediation process,” i.e. the transformation of the collective identity, self-perception and, therefore, behaviour of policy target groups in the direction defined by the stated policy objectives; (2) one of the main conditions for the perpetuation of CPR institutions is their capacity to organize their activities around a collective problem defined as such by a policy; (3) the integration of CPR institutions into the political-administrative arrangement contributes to the reinforcement of the functional and territorial coordination between payers, decision makers, and beneficiaries in regional and local institutional regimes.

**Keywords:** Dykes, flood protection, game, hunting, institutional regimes, landscape, natural resource, property rights, public policy, Switzerland

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## 1. Introduction

The theory of the commons has been enhanced by successive developments involving the improved allowance for the complexity of real life institutional arrangements. Starting from relatively simple models based on the study of common pool resource (CPR) institutions in the purest form, operating under the most unadulterated conditions possible (Ostrom 1990), interest has grown in more complex commons, such as global commons (Ostrom et al. 2002; Berkes 2006) involving multiple spatial, temporal, and institutional levels (Cash et al. 2006). The institutions regulating such complex resource use situations have been conceptualized in terms of comanagement (Jentoft 1989; Berkes and Folke 1998), which deals with problems arising from cross-level interaction. By analysing Swiss CPR institutions, this paper aims to contribute to the debate on comanagement while demonstrating how important it is to take into account the structuring role played by policies in the regulation of natural resource use in western european countries, which are characterized by both significant state intervention and the legal codification of most regulations. The approach presented here combines policy analysis with institutional economics of natural resources. We adopt Ostrom's definition of CPR institutions as clearly defined groups of individuals who, while defining a set of rules regulating their use of the resource in accordance with local conditions, create a long-enduring local institutional arrangement capable of monitoring the actions of members vis-à-vis the resource, resolving conflicts, and administering sanctions to offenders (for a detailed discussion of these criteria, see Ostrom 1990, p. 90).

Policy analysts are often victims of the biased view that CPR institutions are a relic of the past condemned to disappear in the context of today's policies. This lack of interest is demonstrated by the dearth of studies on the specific role played by this kind of institution in the policy process. This is due to a presumed loss of functionality by such institutions, which, in the opinion of the analysts who make this presumption, is down to two main reasons. First, appropriators are often less dependent on the local natural resources; dependency being a factor that increases the likelihood of the endurance of CPR institutions (Ostrom 2000; Reynard 2000; Nahrath 2000a). Second, from the 1950s, CPR institutions began to suffer from competition with the welfare state, whose policies have shifted resource management responsibilities to higher decisional levels, resulting in less room to manoeuvre for local property rights holders, in particular CPR institutions.

Recent empirical observations focusing on the regulation processes associated with several natural resources in Switzerland (Knoepfel et al. 2001, 2003; Knoepfel and Gerber 2008; Nahrath 2000b; Thomi 2005; Varone et al. 2002) stressed the importance of CPR institutions, which have survived in many cases, despite the predictions of their inevitable demise. Examples even exist of CPR institutions that have been revitalized or newly created (Knoepfel and Gerber 2008; Reynard 2000). Thus, it would appear that some CPR institutions have managed to adapt to the economic, technological, social, political, and institutional changes that have affected western European societies over the past century.

Based on the various factors outlined above, three questions involving the implementation of natural resource policies in Switzerland are dealt with below: (1) What role do CPR institutions play *within the implementation process* of natural resource management policies? (2) What are the *conditions of the perpetuation* of CPR institutions within western European countries characterized by a high density of policy regulations and an exclusive property rights regime? (3) What are the advantages and disadvantages of political-administrative arrangements involving CPR institutions in the implementation of sustainable resource management policies?

This paper begins by describing the institutional, jurisdictional and political context of the regulation of CPR in Switzerland in brief and conceptual terms. Second, we quickly present the different steps involved in policy analysis and show how it can complement the institutional economics approach to CPR situations. This enables us to formulate three research hypotheses. Following a concise description of the research procedure, the rest of the paper is devoted to the detailed presentation of three case studies (part 3) dealing with hunting, flood protection and landscape management, and to the conclusions drawn which return to the three research questions posed above.

## 2. The institutional context of CPR regulation in Switzerland

Two major changes affected the political regulation of CPR in the twentieth century: the diffusion of the *concept of exclusive property rights* and the implementation of a huge number of *public policies* from the 1950s. The French Revolution thoroughly altered the property rights regime – i.e. the legal definition of property – in most European countries. It marked the decline of the feudal conception of simultaneous and common property (*plura dominia*) and the emergence of the conception of exclusive and private property (Ost 2003). The effects of this profound change in continental Europe were comparable to those provoked by the enclosure movements in England (Polanyi 2001).

This change in the property regime also had profound consequences in Switzerland. In the course of the nineteenth and twentieth centuries, we observe the progressive disappearance of the legal definition of “common” or

“collective” property and the “privatisation” of the commons. Thus, the Federal Swiss Civil Code of 1912 incorporates only a few examples of common or collective property (i.e. one indivisible object with several owners), the main ones being inheritance communities and family-run agricultural enterprises. Moreover, it merely mentions the possible existence of other forms of CPR institution (i.e. corporations), that is they are merely tolerated by the Civil Code. The difficult task of redefining their legal status is assigned to the cantons (federal states). The lack of legal recognition of CPR institutions is accompanied by a change in people’s attitude towards common property, and both factors resulted in the general weakening of the long-established local CPR institutions such as communal pasture and forest tenures and Alpine irrigation communities. Many of these corporations disappeared in the twentieth century and much of the common land was sold to private owners or became the property of local authorities.

The collapse of the regional and local common resource management regimes and the correlated individualization of use rights to resource units resulted in a greater heterogeneity of practices which proved difficult to coordinate at that level of resource systems (e.g. the hydrological cycle, air shed, landscape, ecosystem, biodiversity, climate, endangered plant and animal species, etc.). Because it prevents the definition of use quotas at the resource system level, the uncoordinated attribution of use rights is one of the main causes of overexploitation. It is precisely this kind of situation that led to the development of increased state regulation in the form of environmental policies, in particular from the 1970s onwards. Thus, for three or four decades, the regulation of each of the various CPRs was the outcome of the combination of the accumulation of private law-defining property rights (property rights system), on the one hand, and the accumulation of protection and use policies (public policies), on the other.

The Swiss political regime is characterized by two central institutional rules that have a significant impact on the policy implementation process: i.e. the *principle of subsidiarity* and the principle of *cooperative federalism*. Subsidiarity has two main features: (1) “public intervention and public help should only occur in situations where private means would not suffice to achieve goals” (Linder 1994, p. 56); and (2) the attribution of policy competencies to the lowest possible institutional level. Insofar as it consists in “the completion of federal legislation by the cantons, the implementation of federal programmes by cantonal and local authorities, and extensive finance – and revenue – sharing” cooperative federalism concretizes the principle of subsidiarity (Linder 1994, p. 55).

Thus, both subsidiarity and cooperative federalism grant significant room to manoeuvre the cantons and the municipalities in relation to the definition of the political-administrative implementation arrangement, the choice of the policy instruments implemented and even the interpretation of policy objectives and their prioritization. In this respect, these two political principles undoubtedly

constitute institutional conditions favourable to the perpetuation and even revival of (private) CPR institutions, which are frequently invested with implementation tasks.

### 3. Theory, hypotheses and methods

#### 3.1. Institutional resource regimes

In order to identify the relevant resource regulation mechanisms, the three detailed case studies were analysed using the factors provided by the “institutional resource regimes” framework (Knoepfel et al. 2001, 2003, 2007; Kuks and Bressers 2004; Kissling-Naef and Kuks 2004; Varone et al. 2002). This framework combines an approach based on policy analysis (e.g. Knoepfel et al. 2007), on the one hand, and natural-resource institutional economics (property right theory, e.g. Ostrom 1990; Schlager and Ostrom 1992), on the other. It postulates that the use of natural resources is best understood through the analysis of the practical effect of policies on property and use rights.

The policies that constitute one of the two components of an institutional regime contain all of the substantial and institutional elements relative to the programming and implementation of the different use and protection policies affecting the management of a resource (Knoepfel et al. 2007, p. 113ff.): (1) The (competing or complementary) *definition of the different collective problem to be resolved*. The design of environmental policy is often the product of a historical process involving the accretion of the successive understandings and definitions of the collective problems to be resolved. (2) The *logics of intervention (causal hypotheses)*, which change according to the definition of the problems to be addressed. These logics define the actors (target group) considered responsible for the existence of the problem and the modes of intervention (new legal arrangements, pricing) believed capable of producing the desired changes in the behaviour of the target group(s) (intervention hypotheses). (3) The *policy instruments* (regulatory, economic, persuasive, etc.) implemented in accordance with the different intervention hypotheses. (4) The *political-administrative arrangements* (PAA) created in order to implement the policies. These arrangements usually consist of a configuration of public and sometimes private actors, characterized by a particular portfolio of resources (e.g. personnel, money, law, time, etc.). (5) The actual *outputs* of public policies. These outputs take the form of individual concrete/specific implementation acts in the area of political-administrative legislative programmes (e.g. planning permission, water pumping concessions, banning of chemical substances, etc.).

In contrast with policies, the property rights system is composed of all of the formal property rights, including the rights of disposal and use arising from them, that apply to a resource. The content of these disposal and use rights depends on the definition of ownership adopted within a specific political

entity/territory (e.g. private, collective/communal, etc.) and applicable to a particular resource. An analysis of the property rights regime is equally applicable to the entire resource system and the individual units that provide the various goods and services. While policies may change rapidly, property rights are, by nature, stable over time because their modification involves extensive costs for the state (i.e. compensation costs).

This combination of policies and property rights can be referred to as an institutional resource regime (IRR). An IRR can be characterized using the concept of *coherence* (Knoepfel et al. 2001; Varone et al. 2002). Coherence can refer to the degree of coordination between policies (in particular between use and protection policies), between competing property/use rights (internal coherence), or between the property rights system and public policies (external coherence). The coherence of a given regime depends in particular on the latter, i.e. the correspondence between the policy target groups and the holders of rights to the basis of the property rights system. This correspondence is lacking when policies address target groups that do not have use rights and whose eventual changes in behaviour do not have any real effect on the actual use of the resource (e.g. minimum flow rehabilitation orders aimed at local executives that no longer hold property titles to water because they have conceded them to electricity generating companies). Other such incoherencies consist in the relatively common case whereby policies simply do not have sufficient coercive power to actually restrict the use rights of the resource users. The capacity of land owners to resist the implementation of zoning in the context of land-use planning is a quite recurrent example of this. Empirical research shows that the volume of case law produced by the courts in order to connect the two components of the regime is a good indicator of the external incoherence of an IRR. Like court decisions, informal local arrangements or CPR institutions may re-establish coherence within increasingly complex institutional resource regimes. Incoherent policies and property rights normally produce use regulations that are incompatible with each other and thus lead to the overuse of resources.

### **3.2. Hypotheses**

Three hypotheses corresponding to the three research questions are tested:

#### **3.2.1. H1: Mediation process**

Inasmuch as they constitute social institutions that are able to facilitate the “mediation process” (Jobert and Muller 1987), the transformation of the collective identity, self-perception and, therefore, behaviour of policy target groups in the direction defined by the stated policy objectives, CPR institutions strengthen the coherence of institutional regimes. Thus, CPR institutions smooth the process of the transformation of property/use rights holders into cooperative

policy target groups. In this context, CPR institutions assume a function involving the translation or embedding of the policy objectives and instruments into the logic of the existing property rights system.

### **3.2.2. H2: Integration in the political-administrative arrangement (PAA)**

One of the main conditions of perpetuation of CPR institutions is their enduring integration into the PAA of one or more public policies regulating the use of the resource. This integration itself depends on the existence of a convergence between the policy objectives and the objectives adopted by the CPR institution (i.e. its *raison d'être*).

### **3.2.3. H3: Coordination between payers, decision makers, and beneficiaries**

The integration of CPR institutions into the political-administrative arrangement contributes to the reinforcement of the functional and territorial coordination between payers, decision-makers, and beneficiaries in regional and local institutional regimes. Indeed, in a CPR institution, holders of property and use rights (i.e. the policy beneficiaries) usually pay significantly more for the maintenance of the resource than other tax payers; however, in return, they also benefit from greater decision-making powers regarding the management of the resource system and the possibility of making direct use of the different resource units.

## **3.3. Methods**

The following examples of CPR institutions were analysed in the case studies: a specific hunting management system in northeast Switzerland, “dyke corporations” formed by land owners, and self-organized landscape management structures. Both the legal framework, within which the CPR institutions operate, and the internal functioning of the latter are examined in all cases. This enables us to describe the role played by these institutions in the policy implementation process using the different elements relating to their programming and implementation presented above. The presentation of each case study ends with a brief discussion of the hypotheses.

It is not the aim of this article to present an exhaustive analysis of the role of CPR institutions in all natural resource management policies in Switzerland. Instead, with the help of the qualitative comparison of a few case studies, it aims to identify the mechanisms of causal relations between the two phenomena of the contemporary functioning of CPR institutions, on the one hand, and the implementation of natural resource management policies, on the other. Based on our empirical knowledge of resource management policies in Switzerland, it is possible to state that the three examples presented are typical of the situation in Switzerland.



## 4. Case study I: hunting associations in north-east Switzerland

### 4.1. Hunting regulations in Switzerland

Since the fifteenth or sixteenth century, wildlife has been a CPR regulated by a state-property regime in Switzerland. It constitutes part of a state's regalia.<sup>1</sup> The organization of hunting thus became a matter of the legal competence of the cantons that constituted the old Swiss Confederacy. Throughout this period until the nineteenth century, the cantons regulated and organized hunting practices in a highly varied and uncoordinated way. During the second part of the nineteenth century, the dramatic decrease in wildlife population (*definition of the problem*), a direct consequence of this uncoordinated regulation of hunting practices, led to strong intervention by the new federal state (the Swiss Confederation).

According to the Swiss Federal Constitution of 1874, the Confederation is entitled to legislate on the regulation of hunting and the protection of a number of endangered species and large game animals in the Alpine regions. Thus, the primary *causal hypothesis* of hunting policy is founded on the idea that if the aim is to reverse the dramatic decrease in the game and wildlife populations and guarantee the long-term existence of healthy wildlife stocks and biodiversity, the hunting plan (i.e. the quantity of game that hunters (associations) can kill during a specific period) must be rendered proportional to the reproduction capacity of the wildlife resource. It is interesting to note here that whereas, historically, the implementation of this causal hypothesis involved the significant restriction of the number of game animals killed per hunter (or group), nowadays, it sometimes involves the opposite, i.e. the shooting of a minimum quota of game animals to avoid phenomena associated with local overpopulation.

However, it is important to note that the property rights to game (i.e. hunting regalia) remain the privilege of the cantons and not of the Confederation. This monopoly is fiscal in nature. Thus, the cantons alone are entitled to collect fees resulting from the sale of hunting rights (Petitpierre-Sauvain 1999; Zimmerli 1951). As we can see, contrary to the situation in a number of other European states such as France, Germany, Austria, Belgium and the Netherlands, in Switzerland there is no direct relation between landed property and hunting rights. As in the United States (Buck 1999), game or wildlife is not the property of the landowner (or of the state) and remains a *res nullius* as long as it is alive.

In this resource regime, the Confederation is responsible (intervention hypothesis and instruments) for determining *what* can be hunted (definition of

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<sup>1</sup> The formal (legal) situation concerning property rights is, however, somewhat more complex. Wildlife and game do not belong to anybody (*res nullius*), but the state has a "regalian" right over the appropriation of the resource (state's regalia) and is, therefore, exclusively entitled to collect fees resulting from the exercise of this right. However, once shot, game animals belong to the hunter who killed them.



the protected species), *when* (definition of the shooting season), *where* (definition of the hunting regions and of the preserve hunting reserves) and *how* (definition of permitted hunting methods, types of weapons, and munitions). The Confederation also defines the relevant sanctions. The cantons are responsible for defining *who* is entitled to hunt (organization of the hunting permit examinations), *how much* game can be shot (wild-life monitoring and development of the (annual) hunting plan) and for the selection of the hunting system (licence, rental, or state regulation). The cantons are also free to organize monitoring of compliance with the regulations by game-keepers.

During the first half of the twentieth century, this division of responsibilities (general political-administrative arrangement) between the cantons and the Confederation led to the progressive development of three fundamentally different hunting systems (i.e. policy designs) based on very different intervention hypothesis and cantonal political-administrative arrangements:

1. The *state regulation system* in the canton of Geneva is characterized by the fact that hunting is completely prohibited and that the environmental administration has been assigned the task of monitoring and regulating wildlife and its habitats.
2. The *licence-based system* exists in 16 cantons of central and western Switzerland. The basic principle of this system consists in the possibility for any hunters who have passed the relevant examination to hunt a certain quota of game animals (defined by an administrative and political decision) on most of the canton's territory (with the exception of the federal hunting reserve) during precisely defined periods of the year. In the late nineteenth century and the first half of the twentieth century, the licence system was considered as giving rise to greater "game consumption" (overexploitation) than the rental one. As opposed to this, recent research has shown that, nowadays, this system gives rise to instances of local overpopulation due to the greater (political) difficulty in adapting the definition of hunting quotas (hunters' "path dependency") and the number of hunters to the evolution of wildlife populations (Nahrath 2000b).
3. The *rental-based system* exists in nine cantons in the northeast part of the country. The rental system is based on a significantly different principle than the licence-based one. The former consists in the idea that the basic unit of a hunting system is not the individual hunter, but the local hunting association (CPR institution). The hunting association is accountable to the canton and the municipality for the implementation of the hunting and the wildlife regulation policy within the hunting territory it rents. More specifically, the association is responsible for monitoring the resources (statistics, qualitative state), the (self) monitoring of the hunters (behaviour, type of weapons used, compliance with quotas, distribution and accomplishment of shared tasks) and the territorial protection of wildlife. Finally, the hunting association must bear half of the cost of the damage caused by fauna to agriculture and forestry.

#### **4.2. Local hunting associations as characteristic of the rental-based system**

The rental contract between the canton, the municipality (or municipalities) and the hunting association is based on a duration of six to eight years. At the end of this period, the contracts are reassigned by the municipality, usually through an auction system. Admission or exclusion is subject to the approval of all members of the hunting association. As the number of territories available for rent is limited, the number of local associations and, consequently, hunters is also limited, contrary to situation that prevails under the licence system.

This delegation of responsibility has some advantages for the members of the association: They have the fundamental right to accept or exclude non-members from access to the resource, the hunting periods are significantly longer than those that apply under the licence system, cantonal control of the club members' behaviour is not tight, and the clubs enjoy considerable freedom in relation to the organization of hunting activities within the rented territory (for example the possibility of creating teams or groups and of defining the way in which the quotas are reallocated). A consequence of these shared responsibilities is that the members of such associations are strongly incentivized to collaborate in the good management of both the rented territory and the resource.

As we have seen, however, although the rental system is characterized by a strong component of self-organization and self-monitoring, the state has still prerogatives concerning the management of the resource. In fact, the cantonal administration defines both the planning objectives and the quotas assigned to the different rented territories through consultation processes within a hunting commission composed of representatives of the various actors involved,<sup>2</sup> who develop the hunting plans jointly.

In fact, this co-managed system (Berkes 2006; Cash et al. 2006; Young 2006) also shares some of the characteristics of a nested enterprise (Ostrom 1990, p. 90), except for the fact that, in this case, the canton remains the central actor of the governance structure. Thus, within this system, appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities occur at different organizational levels. Moreover, the local hunting associations are grouped in a peak association organized at canton level. This association is responsible for both the supply of game and the hunting statistics. Both sets of data are created by collating information provided by the different local hunting associations and the official game-keepers (where they exist). The association also defends the interests of the local associations vis-à-vis the cantonal authorities and other interest groups of rival users (e.g. farmers, tourists, members of nature conservation organizations, hikers, cyclists, etc.).

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<sup>2</sup> The commission encompasses representatives of the local hunters' associations, foresters, representatives from the agricultural sector, the municipalities, and the nature conservation associations.

### 4.3. Compared outputs and outcomes of the licence-based and rental-based systems

A (very simple) statistical analysis of the available national hunting and wildlife data over a period of 30 years (1968–1998) reveals some interesting tendencies in relation to hunting management practices under the different systems and their effects on the fauna (Nahrath 2000b). For example, a comparison of the relation between the total number of live-stock and the total number of game animals shot over a period of 30 years for different species (red-deer and roe) tends to demonstrate a closer relation between variations in the total live-stock numbers and the bag in the rental system than in the licence system (Figure 1).

Thus, this statistical analysis of hunting data shows that in the rental system, management is more sensitive to changes occurring at (micro) local level and tends to adapt to them more accurately and rapidly. This remains true even if this adaptation is the result of the sum of different local, independent and loosely coordinated processes. It would appear that processes of adaptation between livestock evolution and the definition of hunting plans are easier to implement in a rental system than a licence-based one. This is probably due to

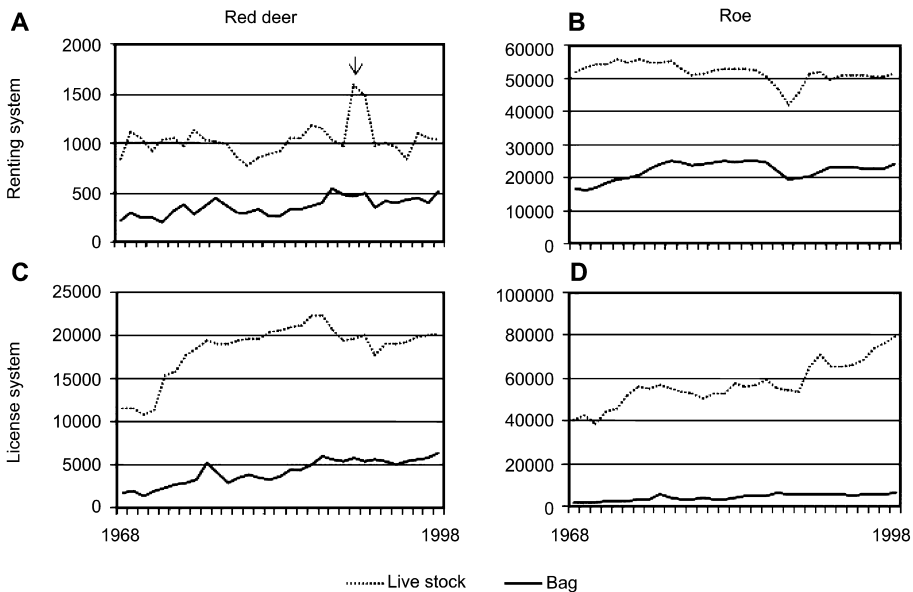


Figure 1: Relation between total live-stock numbers and the bag under the rental system (red-deer [A] and roe [B]) and the licence system (red-deer [C] and roe [D]). The arrow in graph A indicates a temporary change in the counting method used.

the fact that the decision-making process is more directly linked to the local empirical situation – hunting quotas are co-defined by the hunters and are thus more easily understood and accepted by them. In fact, whereas in the licence-based system, the modification of the annual hunting plan affects all of a canton's hunters simultaneously and in the same way, modifications in the rental system have highly segmented territorially differentiated impacts. Thus, significant modifications are much more easily implemented in the latter system due to the fact that: (1) hunters are more familiar with such changes; (2) the changes are not the same for all the appropriators at the same time, and are less susceptible to leading to collective opposition; and (3) as the consequences of the changes for the hunters are more fragmented and more directly linked to local conditions, they tend to be more easily understood and accepted. Complementary qualitative analysis (interviews, hunting journals) has confirmed these interpretations (Nahrath 2000a,b).

A second clear advantage of the rental-based system concerns its efficiency. Comparison has shown that it produces better outcomes in term of fauna management (Figure 1) at a significantly lower cost for the state. For example, the ratio between game keepers and hunters is over ten times greater in the license-based system than in the renting-based ones (Nahrath 2000a, p. 141).<sup>3</sup>

The case of Swiss hunting policy constitutes a good example of the role that CPR institutions can play in the implementation of contemporary natural resource management policies. More precisely, it highlights their potential to mobilize the existing property rights of the hunting associations in order to reinforce the hunting policy implementation process. The comparison of some of the outcomes produced by the different hunting systems tends to confirm the high level of efficiency of arrangements based on CPR institutions. Finally, the adaptability of CPR institutions to major policy change confirms their high level of potential with regard to the implementation of state-steered public policies. These conclusions are discussed in more detail in the next section.

#### **4.4. Discussion of the hypotheses**

##### **4.4.1. H1: Mediation process**

This hypothesis is widely confirmed. The integration of the hunting associations in the cantonal political-administrative arrangement of the rental-based system has clearly improved its implementation capacities. It has clearly facilitated the transformation of reluctant (individual) use rights holders (the hunters) into cooperative target groups. This example shows that CPR institutions can play the role of an intermediary institution which is able to articulate restrictive

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<sup>3</sup> Licence-based system: one game keeper for 120 hunters. Rental-based system: one game keeper for 1326 hunters. Moreover, six of the nine cantons that have implemented a rental-based system do not have any permanent game keeper.

policy outputs and the individual interests of the target group members. More precisely, the contribution of hunting associations to the strengthening of the coherence of the resource regime consists in their capacity to provide a social engineering structure that enables the self-organized and negotiated process of rights redistribution. The latter is facilitated by the re-invention of a *de facto* common property resource regime within the CPR institution and by its capacity to provide a shared conception of the collective interest of the members.

#### **4.4.2. H2: Integration in the political-administrative arrangement (PAA)**

This second hypothesis is also largely confirmed. The comparison between licence-based and rental-based cantons clearly shows that the survival of CPR institutions depends on their integration and empowerment within the (decisional and) implementation process of one or more policies. Although they also exist there, the hunting associations in the licence-based cantons play nothing akin to the same role as that played by the CPR institutions in the rental-based cantons. Hunting associations in the licence-based cantons tend to behave like hunters lobbies and have developed far more limited interests, conceptions, and competencies regarding the role of hunters in the sustainable management of wildlife and its ecosystems. There is no doubt that the convergence that exists between the values and interests of the CPR institutions, on the one hand, and the hunting and wildlife management policy objectives, on the other, constitutes an important condition for the integration of the hunting associations into the latter's political-administrative arrangement. It is also possible to go one step further here. Historical research (Zimmerli 1951) shows that the presence of well organized CPR institutions constituted an important explanatory factor for the choice of rental-based system in certain cantons.

#### **4.4.3. H3: Coordination between payers, decision makers and beneficiaries**

Like the other two, this third hypothesis is also fully confirmed. The implementation of hunting and wildlife management policy by the hunting associations in the rental-based system leads to a relative convergence of the payer, decision-maker and beneficiary groups within the resource system. In fact, the hunters (i.e. the members of the CPR) simultaneously pay for, decide on, and benefit from the jointly managed resource. Such a convergence clearly contributes to the reinforcement of the functional and territorial management of the resource by establishing coordinated use-rights allocation mechanisms between the main users within the different regional perimeters. Of course, healthy wildlife populations also benefit a large number of other actors or social groups, such as forest owners, foresters, nature conservation associations, (mainly) urban walkers, wildlife observers/lovers, etc. However, to some extent, these groups also contribute financially to (through taxation), and decide on (through hunting commission), the management of the resource.

## 5. Case study 2: the dyke corporations in the canton of Berne

Dyke corporations are an example of CPR institutions that unite local noninstitutional actors, mainly the owners of land and buildings, to take action against hydrological risks. The service to the community provided by this kind of CPR institution is protection against potential future flood events.

Dyke corporations still exist today in some of the Alpine areas of Switzerland. This case study concentrates on dyke corporations in the Alpine area of the canton of Berne (west-central Switzerland) where dyke corporations exist in numerous municipalities.

### 5.1. Swiss flood protection policy

Flood protection is hugely important in Switzerland. Since 1990, floods have caused damage exceeding EUR 4 billion (PLANAT 2004; FOWG 2005). Each year, around EUR 500 million is invested in flood protection measures (PLANAT 2005). Although the Federal Law of 1991 on Hydraulic Engineering attributes the responsibility for flood protection to the cantons, it is the federal authorities that develop the concepts, strategies and priorities of the measures to be taken. The implicit *causal hypothesis*, on which Swiss flood protection policy is based, refrains from attributing responsibility to specific actors for the potentially inadequate flood protection provided, i.e. the policy does not explicitly identify a target group.

Based on the observation that natural hazard processes are the originators of flood damage (problem definition), flood protection policy proposes two families of measures. The first causal hypothesis assumes that knowledge of water courses must be improved to enable the adequate protection of human life and material assets against floods. The second considers structural flood protection measures and spatial planning as appropriate measures for reducing the risk of flooding. Whereas federal flood protection policy assigns the task of collecting information about flood risks to the federal state, the cantons – and in some regions also the municipalities – are given the responsibility for implementing flood-protection policy, in particular for defining the modalities of the implementation of appropriate flood-protection measures (political-administrative arrangement).

Although the flood protection policy does not define specific target groups *sensu stricto*, these are defined in the cantonal laws on hydraulic engineering. However, the causal hypothesis remains the same. Thus, target groups are committed to the coordination, financing, and implementation of flood protection measures, even though they are not regarded as being responsible for the protection deficit. Since every canton has its own law on hydraulic engineering, a large number of public and private actors may potentially belong to the target group (Thomi 2005; Zaugg 2002). The actors mainly involved are the canton itself, the municipalities, the concession holders, the hydraulic engineering associations, the dyke corporations, and the owners of land bordering river

banks (Zaugg 2002). The beneficiary groups consist of every natural and legal person who could be affected directly or indirectly by a potential flood.

## 5.2. The dyke corporations

According to the Bernese Cantonal Law on River Maintenance and Hydraulic Engineering of 1989, the hydraulic engineering management of rivers is incumbent on the municipalities. This duty may either be assumed by the municipality itself or be delegated to an association of municipalities (comprising several municipalities or dyke corporations) or a dyke corporation. The cantonal legislation grants the corporation the right to levy financial contributions. However, hydraulic engineering tasks can only be delegated to a corporation with its agreement. The tasks assigned to the latter are defined in a regulation act and may encompass the planning, implementation, and financing of hydraulic engineering projects and of river maintenance measures on specific or all rivers within the territory of the municipality (intervention hypothesis) (Kunz and Walther 1989).

The organization and operational mode of each dyke corporation is defined in its statutes. In most cases, the perimeter of the corporation coincides with the territory of the municipality. Everyone who owns land or buildings within the corporation's perimeter automatically becomes a member of the corporation. Holders of right of passage (i.e. for cables, pipes, roads, and railway-lines) may also be considered as members. Each member of the dyke corporation must pay an annual contribution for flood protection measures (intervention hypothesis). The contribution is calculated on the basis of the value of the member's land and buildings.

Dyke corporations are often characterized by the enthusiasm and motivation of their president and other members of the executive committee. Corporations profit from their in-depth knowledge of local water bodies and their long-standing experience in the area of hydraulic engineering. However, apart from the committee, the majority of corporation members often show little interest in active participation, for example in the membership assembly (Thomi 2005).

Despite the important role they play in flood-protection policy implementation, dyke corporations played only a marginal role in the development of the new cantonal law on hydraulic engineering which entered into force in 1989. Indeed, with the allocation of the responsibility for the implementation of river engineering projects to the municipalities instead of the landowners, dyke corporations relinquished their very *raison d'être*. However, having proven an appropriate institution for the implementation of the necessary hydraulic engineering measures, the system of dyke corporations was not abandoned and was integrated into the new law. Despite various modifications at the organizational level (in general, responsibility was extended from a specific river to all rivers of the municipality), numerous dyke corporations have survived.

The coexistence of two different systems at the local level – i.e. the implementation of the federal legislation on flood protection with and without



a dyke corporation – enables the comparison of the performance of the institutions involved. One of the most important advantages of corporations is their financial independence. Dyke corporations can levy annual contributions on landed property, buildings, and right of passage regardless of the fact that the owner is a permanent resident. This may be of particular interest in tourist regions, where second residences are widespread. Since the financial resources of the municipalities are limited, various causes compete for spending; hydraulic engineering and river maintenance projects are just one task among many others. In contrast, not only is a dyke corporation's budget independent of the municipality's budget, its allocation is strictly limited to river maintenance projects.

Dyke corporations also have some disadvantages vis-à-vis the municipalities, mainly in relation to administrative issues and implementation of modern flood-protection policies. The protagonists of dyke corporations are often unfamiliar with administrative procedures. Since hydraulic engineering projects involve formal approval procedures, they could infringe on the corporation's autonomy (Thomi 2005). Moreover, modern flood protection policy gives priority to spatial planning measures (ARE, OFEG, and OFEFP 2005), which are the responsibility of the municipalities.

Irrespective of whether a dyke corporation or the municipality is responsible for the implementation of flood protection policy at local level, the beneficiary group remains the same. Thus, access to flood protection is open to every natural and legal person affected by a potential flood. However, only some of the beneficiaries have the right and obligation to belong to the group of decision makers and payers. In the case of a dyke corporation, all land owners within its perimeter must pay the contribution. Being a member of the corporation they also have the option of being involved in decision-making relating to hydraulic engineering projects and to vote for the executive committee. The situation is different when the municipality is in charge of hydraulic engineering projects. In this case, each inhabitant of the municipality contributes indirectly to the cost through their local taxes. At the same time, citizens may exert an influence by using their political rights. However, in this situation land owners whose primary residence is outside the municipality benefit from the flood protection measures, but do not pay local taxes.

### **5.3. Discussion of the hypotheses**

#### **5.3.1. H1: Mediation process**

The implementation of hydraulic engineering projects – and flood protection in general – today is more than a technical task. It is a process of social and political negotiation aimed at finding an acceptable solution in terms of safety, cost, and the design of the measures adopted. In terms of the different actor groups involved, it is particularly important – but also difficult – to integrate noninstitutional actors like landowners. A dyke corporation can make the link

between the public authorities and local people. The interests, knowledge, and expectations of local people may be reformulated by the corporation and then defended in front of public authorities. Conversely, the latter can also negotiate with local people via the corporation. As they often have more experience in working with institutional actors than noninstitutional ones, this could facilitate the negotiation process. This hypothesis is thus largely validated.

### **5.3.2. H2: Integration into the political-administrative arrangement (PAA)**

Predecessors of the current dyke corporations existed long before the first policy on flood protection came into force in the nineteenth century. Dyke corporations have been integrated into the implementation of federal policy on flood protection at the cantonal level since the outset. They have always been an explicit part of the political-administrative arrangement. Thus, the objectives of dyke corporations are very similar to those of flood-protection policies. This early integration of the dyke corporations into the PAA of the successive flood-protection policies certainly goes a long way in explaining the survival of these institutions in regulatory contexts dominated by state intervention. This hypothesis is entirely validated.

### **5.3.3. H3: Coordination between payers, decision makers and beneficiaries**

The payer, decision-maker, and beneficiary groups are for the most part congruent in a dyke corporation. Indeed, people who own land or buildings within the perimeter of the corporation can participate in the decision-making on hydraulic engineering measures, contribute to their financing, and ultimately benefit from the flood protection they provide. Unlike the situation with a municipality, it does not matter whether these people have their permanent residence within the corporation perimeter or not. The crucial point is that they have a formal property right to real estate within its borders. The third hypothesis is also validated.

## **6. Case study 3: Alpine landscape management organizations**

The European Landscape Convention defines landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” (Council of Europe 2000). This definition of landscape as a cultural and immaterial resource makes a clear distinction between the landscape and its material basis which is composed of a spatial combination of elements of the environment (such as natural elements, buildings, etc.) (Knoepfel and Gerber 2008). Unlike the other resources that have been analysed above, the landscape is not regulated by formal property rights. However, like any other resource, appropriation strategies can be identified in the case of landscape that constitutes a basis for use rights. The appropriation of landscape takes place indirectly through property rights to other resources (in particular the soil), through intellectual property, which allows the associa-

tion of the representation of a particular landscape with a specific commercial product, or through policies that create indirect use rights (e.g. access rights).

### **6.1. Swiss landscape conservation policy**

The protection of the landscape in Switzerland is regulated by the Federal Law on the Conservation of Nature and Landscapes of 1966 which assigns the responsibility for the conservation of the characteristics of traditional landscapes to the federal authorities. The law relies on two main causal hypotheses: the federal state threatens landscapes in the implementation of its tasks (in particular through building activities, the granting of licences and concessions, and allocation of subsidies). Thus it must take better consideration of the landscape in the implementation of such tasks. Without going into further detail, the federal law also mentions that human activities in general represent a threat to the quality of landscapes. This paves the way for the financial compensation of those actors who take action to protect the landscape.

Building on the causal hypotheses, the intervention hypotheses rely on the introduction of federal inventories, which define objects of national importance (leading to land-use planning and building restrictions) on the one hand, and on the support of the federal state in terms of financial subsidies for landscape conservation and the better representation of landscape interests through the creation of mainly consultative *ad hoc* federal commissions, on the other.

The implicit target group defined by the law is as vague as human activity (building activities in particular) is held responsible for the loss of landscape quality. The law mainly concentrates on the role played by the federal state itself. The *beneficiary groups* are the population, in general, and landscape protection organizations, in particular.

### **6.2. Landscape CPR institutions**

A transitory phase in landscape protection policies could be observed in the 1990s. While existing instruments, such as inventories, proved insufficient to curb the degradation of landscapes (OPCA 2005), the concept of the sustainable use of the entire national territory (including inhabited areas) gained wider acceptance. In this context, a new instrument has been introduced in the Swiss legislation in 2006 – regional nature parks – which binds local communities willing to coordinate their actions in terms of landscape/environmental conservation and economic promotion (tourism).

However, several initiatives comparable to regional nature parks had already been initiated locally without the unifying legislation at the federal level. These initiatives correspond to the creation and implementation of landscape management organizations on a given territory, which ceases to be a mere area and becomes an institutional territory that enjoys specific responsibilities at an intermediary level between communal authorities and cantons.

In this case study, we concentrated on two particular examples, i.e. the Baltschieder Valley Commission and the Jungfrau–Aletsch–Bietschhorn World Heritage Site Society (WHS-Society), which can be considered as the precursors of the regional nature parks. Both share many similarities with CPR institutions dedicated to the management of the resource landscape. The Baltschieder-Commission brings together the mayors of four local administrative communities along with representatives of nature protection organizations and the canton. The area managed by the Commission since 1986 totals 42.7 km<sup>2</sup>. The Baltschieder valley has also been part of the larger Jungfrau–Aletsch–Bietschhorn WHS which covers an area of 824 km<sup>2</sup> since 2001. The WHS straddles the border of the two Swiss cantons of Berne and Valais and includes parts of the territories of 26 municipal authorities, which have representatives in the bodies of the WHS Society (delegate assembly and executive committee) together with representatives of the tourism industry, agricultural sector, cable-car operators, and nature protection organizations. The WHS Society is willing to encourage the participation of the local population through the organization of discussion forums for the definition of the priorities to be adopted in the future (Wiesmann, Liechti, and Rist 2005). It remains open, however, whether such forums will be continued now that the management plan has been delivered. The landscape managed by the Baltschieder Valley Commission and the WHS Society is not permanently inhabited. It mainly comprises unproductive Alpine land and some mountain pastures; however it is under too much pressure from visitor flows.

In the high Alpine valleys, nature conservation interest frequently opposes those of tourism promotion and vice versa; different actors characterized by different perceptions are responsible for these domains (e.g. private nature conservation organization versus tourist offices supported by local authorities), which results in contradictory measures. Advertising attracts visitor flows which are difficult to manage on the local scale. In short, a balance between economic and conservation interests is particularly difficult to achieve. Moreover, the fact that all human activities with a spatial impact also affect landscapes making this resource particularly difficult to manage.

Given that the Baltschieder Valley Commission and the WHS Society bring (local) administrative authorities together with representatives of landscape users (tourism, nature conservation, farming), but no individual users, they do not entirely meet the definition of an enduring CPR institution. However, they do unite actors who are willing to improve the management of the resource landscape so as to promote its image towards external users (tourism) while also guaranteeing its conservation sustainable use. These landscape CPR institutions are responsible for their specific organization, as well as for the tasks being carried out. Moreover, the preservation of the resource landscape is of vital importance for the participants, because tourism is very often the main source of income in peripheral regions.

### **6.3. Discussion of the hypotheses**

#### **6.3.1. H1: Mediation process**

The mere existence of structures such as the Baltschieder Valley Commission and the WHS Society demonstrates that actors who were fundamentally opposed to each other in the past have become increasingly aware of their rival positions to the extent that they agreed to come together in one and the same structure. The long process of the establishment and “fine-tuning” of such landscape CPR institutions enabled mentalities to change. Despite the difficulty that arises in evaluating their results due to their relatively short period of existence, it may be observed that these structures have attained some legitimacy which only arises because they unite opposing actors, they improve the coordination of the involved actors, and they enable the identification of universally beneficial development strategies, i.e. because they contribute to the transformation of the collective identity of a group who accept that they must accommodate the claims of others. They allow landscape issues to be better integrated in development projects, which is a condition for its better management.

The strength of CPR landscape institutions lies in the mediation process they can engage on a larger scale among heterogeneous groups of actors, thus, theoretically, their capacity for establishing more coherent regulation. However, in the current situation, the advantage of a more extensive regulation capacity has been overshadowed by their lack of power to impose stricter regulations. This hypothesis is only partly validated.

#### **6.3.2. H2: Integration in the political-administrative arrangement (PAA)**

The federal legal basis for the institution of CPR landscape institutions (regional nature parks) arrived after the creation of different pilot projects in the regions which have played a pioneering role and inspired this legal amendment (the example of neighbouring countries, such as France, which introduced regional nature parks into their legislation a long time ago should not be overlooked here). The update of the Federal Law on the Conservation of Nature and Landscape now acknowledges the central role played by these institutions in the management of landscapes and integrates them into the PAA given that no policies had provided instruments that enabled this previously. This hypothesis is fully validated.

#### **6.3.3. H3: Coordination between payers, decision makers, and beneficiaries**

Because of their significant organizational flexibility, landscape CPR institutions can bring together actors who would not otherwise meet, either because of their different nature (representatives of the state, local authorities, NGOs, civil society, etc.) or because they are active at different levels (local, regional, cantonal, national, and even international in the case of UNESCO). In particular, they assemble the local authorities and different regional tourism actors (who

are the main payers in this context), the decision-makers at regional level, and the economic beneficiaries of the local development aspect of this policy. However, the main beneficiary, the population in general, is not fully represented: CPR landscape institutions should include a larger number of landscape users, in particular nationwide nature conservation organizations which represent the interests of non-local inhabitants who are users of the landscape with partly different expectations to locals. Non-local tourism companies should also be included because they “sell” the landscape resources (generating visitor flows) without contributing to its maintenance. This hypothesis is only partly validated.

## 7. Discussion and conclusions

Contrary to the hypothesis of the progressive but unavoidable demise of CPR institutions, the examples presented in this paper would suggest that the adaptation and even creation of new CPR institutions are possible in the *a priori* unfavourable institutional contexts constituted by the current (welfare) state-oriented political regime. In fact, despite the implementation of a property rights system which abolished common property regimes and the emergence since World War II of a very complex legal setting arising from the increasing number of public policies, CPR institutions continue to play an important role in the implementation of some (natural resource management) policies, at least at local and regional levels.

In response to question one, we demonstrated that, in all three cases, the CPR institutions clearly contribute to the reinforcement of the coherence of the institutional regime, to the extent that they constitute a kind of “operator” of the mediation process between the interests, values, and world visions (*Weltanschauungen*) of property and use-rights holders, on the one hand, and the policy causal and intervention hypotheses, on the other. This contribution made by the CPR institutions to the process of mediation manifests itself in particular in the capacity of the CPR institutions to influence the (re) definition of the collective identity and value system of the property and use-rights holders. Thus, the different CPR institutions clearly contribute to make hunters, land-owners, and tourism development actors aware of their responsibilities (even toward the environment) and to influence their belief systems and behaviours within policy processes, of which they are the target groups. To be more specific, the CPR institutions contribute to this mediation by translating the more or less “technocratic” policy action plans and outputs into the logic of the property and use-rights holders (translation of hunting plans into individual quotas in the local hunting associations, translation of the obligations to finance and maintain dykes into the payment of contributions and implementation of specific tasks by land-owners, and translation of the restrictions associated with landscape protection into the restructuring of tourism development projects). Thus, in this sense, it may be stated that CPR institutions assume a function involving

the translation or embedding of the policy causal and intervention hypotheses into the logic of the existing property rights system.

In response to question two, we demonstrated that the integration of CPR institutions into the PAAs of public policies constitutes a central condition of their very existence. In effect, we did not locate in our three resource regimes the existence of enduring CPR institutions which are significantly active in the management of a resource system outside of the PAA of the relevant public policy. However, the comparison of the three case studies enables the identification of two different modalities of integration of the CPR institutions, depending on whether they predate (hunting associations, dyke corporations), accompany, or conversely, result from the implementation of the policy within the relevant institutional regime (landscape organizations). In effect, the historical analyses quoted in the case studies would appear to suggest that in the cases of hunting and dikes, the presence of well organized CPR institutions on the ground which were actively involved in the management of the resource clearly influence the choices made by the cantons in the context of the implementation of policies within the regime. In contrast, the case of the landscape organizations involves the recent establishment of CPR institutions, whereby the latter are intended as a form of prefiguration of future regional nature parks which constitute the key instrument currently being incorporated into the law on the Conservation of Nature and Landscapes of 1966. Irrespective of the trajectory of their integration, the essential condition of the survival or existence of the CPR institutions consists, therefore, in its capacity to reserve itself a central place in the PAA of the policy in question.

It should be noted here that one of the central conditions for this integration consists in the fact that the CPR institutions brings together – directly or through its members – a significant number of property and use rights to the resource system in question and therefore constitutes an actor that cannot be ignored within the regime and the only actor capable of guaranteeing the (reestablishment of the) coherence of the regime through the linking of the property and use rights of the target groups within the policy objectives and action logic.

Finally, contrary to the point of view championed by Ostrom (2000), according to which the perpetuation of CPR institutions primarily depends on the “vital” dependence of its members with respect to the resource system regulated by the institution, our case studies show that not only is this condition not indispensable, but a more important one exists concerning the behaviour of the state towards them. It may also be considered that Ostrom’s hypothesis would be more plausible if she did not restrict her conception of dependency to economically apprehendable material goods, but would extend to symbolic and immaterial goods and services. For example, in addition to economic advantages, the work of CPR institutions may provide opportunities at social and ecological levels. This shift toward symbolic dependency is well illustrated by the hunting associations in north-east Switzerland. Even if the members are



no longer dependant on the hunting grounds, they continue to manage them for symbolic, social, and ecological reasons (e.g. hunting as a social and cultural event as well as a sporting activity, the management of fauna, etc.). However, it is important to note that, despite the transformation from material to immaterial values, some CPR institutions still offer important economic services. They can tap alternative sources of income (dyke corporations) or function as a recipient of public subsidies, which the members would not be able to access as individuals (landscape management organizations).

In response to question three, our case studies empirically confirmed the majority of advantages and disadvantages of CPR institutions which were already known for the most part and debated. On the one hand, because of their low cost to the national community, their relative independence of institutional boundaries, their legitimacy, and their in-depth knowledge of local conditions, they are efficient. However, on the other hand, they only deal with a very limited number of local uses of the resource system (and in many cases just one) and only benefit from a local view of the situation. Because of the frequent lack of coordination with other CPR institutions or other institutions in charge of similar tasks, these characteristics make integrated management at the level of the resource system very difficult.

We did not focus on the advantages of CPR institutions as such in this paper, but on their power from the perspective of the resource regime in force (public policy and property rights system). Thus, hypothesis 3 is well confirmed, with a reservation in the case of landscape. Despite the fact that these CPR institutions are integrated into the PAA, the payers, decision-makers, and policy beneficiaries do not completely overlap. This is only half-surprising. Considering the complexity of the task involved in the management of this resource (multiple and competing uses, local and external users), it would appear to be very difficult to integrate all of the actors involved. The case of the landscape demonstrates, however, that new CPR institutions, which are well integrated into policies, are capable of dealing with multiple uses of the resource, unlike the old CPR institutions which concentrate first and foremost on a single use.

Seen from this perspective, the challenge facing the conception of new resource management strategies would be to combine the advantages of CPR institutions with a policy approach that would accommodate nationwide planning, better coordination between adjacent local spaces, and, hence, the better synchronization of the different CPR institutions with each other and with other institutions. Considering the potential of CPR institutions in the area of sustainable resource management and their difficulties when it comes to the management of joint uses situations, a practical recommendation would be to provide recourse to resource management policies which deliberately pave the way for the creation of new more general CPR institutions, like landscape CPR institutions, in order to resolve at local levels the lack of coherence between competing public policies.

## Literature cited

- ARE, OFEG and OFEFP. 2005. Aménagement du territoire et dangers naturels. Recommandation. Berne: Office fédéral du développement territorial (ARE), Office fédéral des eaux et de la géologie (OFEG), Office fédéral de l'environnement, des forêts et du paysage (OFEFP).
- Berkes, F. 2006. From community-based resource management to complex systems. *Ecology and Society* 11(1):45. <http://www.ecologyandsociety.org/vol11/iss1/art45/> (accessed March 19, 2007).
- Berkes, F. and C. Folke, eds. 1998. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge UK: Cambridge University Press.
- Kuks, S. and H. Bressers, eds. 2004. *Integrated Governance and Water Basin Management. Conditions for Regime Change and Sustainability*. Dordrecht: Kluwer Academic Publishers.
- Buck, S. J. 1999. Contextual Factors in the Development of State. Wildlife Management Regimes in the United States of America. *Journal of Environmental Policy & Planning* 1:247–259.
- Cash, D. W., W. Adger, F. Berkes, P. Garden, L. Lebel, P. Olsson, L. Pritchard, and O. Young. 2006. Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecology and Society* 11(2):8. <http://www.ecologyandsociety.org/vol11/iss2/art8/> (accessed March 19, 2007).
- Council of Europe. 2000. European Landscape Convention. Strasbourg: Council of Europe.
- FOWG. 2005. Bericht über die Hochwasserereignisse 2005. Bern: Federal Office for Water and Geology (FOWG).
- Jentoft, S. 1989. Fisheries co-management. *Marine Policy* 13:137–154.
- Jobert, B. and P. Muller. 1987. *L'État en action. Politiques publiques et corporatismes*. Paris: PUF.
- Kissling-Näef, I. and S. Kuks, eds. 2004. *The Evolution of National Water Regimes in Europe. Transitions in Water Rights and Water Policies*. Dordrecht: Kluwer Academic Publishers.
- Knoepfel, P. and J. -D. Gerber. 2008. *Institutional Landscape Regimes – An Approach to the Resolution of Landscape Conflicts*. Zurich: vdf.
- Knoepfel, P., C. Larrue, F. Varone, and M. Hill. 2007. *Public Policy Analysis*. Bristol: The Policy Press.
- Knoepfel, P., I. Kissling-Näf, and F. Varone, eds. 2001. *Institutionelle Regime für natürliche Ressourcen: Boden, Wasser und Wald im Vergleich*. Basel/Geneva/Munich: Helbing & Lichtenhahn.
- Knoepfel, P., I. Kissling-Näf, and F. Varone, eds. 2003. *Institutionelle Regime natürlicher Ressourcen in Aktion*. Basel/Geneva/Munich: Helbing & Lichtenhahn.
- Knoepfel, P., S. Nahrath, and F. Varone. 2007. Institutional Regimes for Natural Resources: An Innovative Theoretical Framework for Sustainability. In *Envi-*

- ronmental Policy Analysis*, ed. Peter Knoepfel, 455–506. Berlin/Heidelberg. Springer.
- Kunz, U. and H. Walther. 1989. Loi sur l'entretien et sur l'aménagement des eaux du 14 février 1989. Commentaire. Berne: Direction des travaux publics du canton de Berne.
- Linder, W. 1994. *Swiss Democracy. Possible Solutions to Conflict in Multicultural Societies*. Houndmills: MacMillan Press.
- Nahrath, S. 2000a. "Governing Wildlife Resources?" L'organisation de la chasse en Suisse comme exemple de régimes institutionnels de gestion d'une ressource naturelle. *Swiss Political Science Review* 6:123–158.
- Nahrath, S. 2000b. "Governing Wildlife Commons?" A Comparative Analysis of Switzerland's Three Hunting Systems. Paper presented at the 8<sup>th</sup> Biennial Conference of the International Association for the Study of Common Property (IASCP) "Crafting Sustainable Commons in the New Millenium" in Bloomington, Indiana, May 31–June 4, 2000.
- OPCA. 2005. Évaluation de l'Inventaire fédéral des paysages, sites et monuments naturels d'importance nationale (IFP): rapport à l'attention de la Commission de gestion du Conseil national. Berne: Organe parlementaire de contrôle de l'administration (OPCA).
- Ost, F. 2003 (1995). *La nature hors la loi. L'écologie à l'épreuve du droit*. Paris: La Découverte.
- Ostrom, E. 1990. *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- Ostrom, E. 2000. Reformulating the Commons. *Swiss Political Science Review* 6:29–52.
- Ostrom, E., T. Dietz, N. Dolsak, P. C. Stern, S. Stonich, and E. U. Weber, eds. 2002. *The drama of the commons*. Washington, DC: National Academy Press.
- Petitpierre-Sauvain, A. 1999. La chasse en Suisse. In *La chasse en droit comparé*, ed. Société Française pour le Droit de l'Environnement, 337–357. Paris: L'Harmattan.
- PLANAT. 2004. Sécurité contre les dangers naturels. Concept et stratégie. Série PLANAT 2/2004. Bienne: National Platform for Natural Hazards (PLANAT).
- PLANAT. 2005. Strategie Naturgefahren Schweiz. Synthesebericht in Erfüllung des Auftrages des Bundesrates vom 20. August 2003. Bienne: National Platform for Natural Hazards (PLANAT).
- Polanyi, K. 2001 (1944). *The Great Transformation: The Political and Economic Origins of Our Time*. Boston: Beacon Press.
- Reynard, E. 2000. Cadre institutionnel et gestion des ressources en eau dans les Alpes: deux études de cas dans des stations touristiques valaisannes. *Swiss Political Sciences Review* 6:53–85.
- Schlager, E. and E. Ostrom. 1992. Property-rights regimes and natural resources. A conceptual analysis. *Land Economics* 68:249–262.
- Thomi, L. 2005. La gestion de l'aménagement des cours d'eau dans les cantons suisses de Glaris, de Berne et du Valais. *Geographica Helvetica* 60:35–43.

- Varone, F., E. Reynard, I. Kissling-Näf, and C. Mauch. 2002. Institutional Resource Regimes. The case of water in Switzerland. *Integrated Assessment* 3:78–94.
- Wiesmann, U., K. Liechti, and S. Rist. 2005. Between conservation and development – Concretizing the first world natural heritage site in the Alps through participatory processes. *Mountain Research and Development* 25:128–138.
- Young, O. 2006. Vertical interplay among scale-dependent environmental and resource regimes. *Ecology and Society* 11, no. 1:27. <http://www.ecologyandsociety.org/vol11/iss1/art27/> (accessed March 19, 2007).
- Zaugg, M. 2002. More space for running waters: Negotiating Institutional change in the Swiss flood protection system. *GeoJournal* 58:275–284.
- Zimmerli, G. 1951. La chasse et la loi en Suisse. In *La chasse en Suisse*, ed. Collective, *La chasse en Suisse*, 235–244. Genève: Editions René Kister.