RESEARCH ARTICLE

Non-owners' success: confrontations of rules in rivalries between water users in Belgium and Switzerland

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Water scarcity increases with the multiplication of human pressure and threatens coexistence between heterogeneous users. The aim of this article is to understand how users solve their rivalries within a complex regulatory environment. The article proposes an analytical distinction between property rules and public policies. This distinction sheds light on the involvement of non-owners in resource rivalries and contrasts with the common view, associated with new institutional economics, whereby only owners matter. Although property is powerful and costly to change, the article argues that public policies can have redistributive effects in favour of non-owners. The qualitative analysis of four cases of water rivalries reveals that non-owners can succeed against owners when they successfully activate public policies.

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Water scarcity increases with the multiplication of human pressure. All along a river, or within a watershed, different users compete in order to produce various processes and goods, e.g. hydro-power, drinking water, industrial cooling, and their behaviour must be regulated in order to maintain their coexistence. For example, if a manager of a dam decides to retain too much water, the industry located downstream cannot cool its machinery properly. If this industry dumps pollution in the river, the leisure centre loses its bathing area and the fishermen lose their livelihood. Thus, coexistence between heterogeneous users cannot be taken for granted, notably when resource scarcity increases.

New institutional economics and public choice provide a straightforward answer to these rivalries. They assume that they can be tackled or avoided with the assignment of clearly defined property rights to the users (Coase 1960, Ostrom 1990). Property offers the most efficient distribution of resource access and use. However, the transposition of this prediction to the real world is problematic: Many users do not have property rights on the resource they use and consequently fall outside the scope of the analysis. Excluding them is not an option, neither for resource managers who promote sustainability and resolve rivalries nor for social scientists who root their predictions in actual experience. In this article, I show that non-owners must be considered, simply because they belong to the scene. In addition, they are active participants who use the tools at their disposal to get the upper hand over owners, as this article shows.

The behaviour of non-owners can be approached with policy analysis. The combination of this literature with new institutional economics provides a distinction between property rights and public policies. Property grants absolute rights to individuals or groups on a resource with a guarantee from the state. A public policy is a coercive command from public authorities targeting groups in order to make them change their behaviour. While many economists consider

than any use right is a property right, I defend the relevance of a distinction between property and public policies. Public policies provide and secure non-owners access to the natural resources, without necessarily threatening sustainability and causing 'tragedies of the commons'.

The aim of this article is to understand how heterogeneous water users solve their rivalries within a complex regulatory environment. In order to find a solution, they activate rules, and confront them to reach a local arrangement. I claim that although property is powerful and costly to change, public policies can have redistributive effects, notably in favour of non-owners. First, the analytical framework establishes the relationships between the resource, the users, the rules, and the resolution of rivalries. The hypotheses are tested with a comparison of four cases of rivalries, identified in the watersheds of the Vesdre in Belgium and Val de Bagnes in Switzerland, and the results discussed. Resolutions of rivalries sometimes benefit non-owners, when they successfully activate public policies that defend their use against owners' claims.

Resolutions of rivalries in complex regulatory environments

In *Governing the commons*, E. Ostrom stressed the importance of rules in the capacity of resource users to overcome collective action dilemmas (Ostrom 1990, 2005). By rules, she means legal prescriptions backed by a coercive apparatus that 'define what actions are required, prohibited, or permitted and the sanctions authorised if the rules are not followed' (Ostrom et al. 1994, p. 38). Rules are imposed on actors and condition their behaviour. In rivalries, I consider that users activate existing rules in order to get a resolution. The analytic framework proposed emphasises rules to explain the outcome of confrontation between rival users. It stresses that the type of local arrangement reached by rival users depends on the configuration of the rules activated.

A multi-level regulatory framework

The behaviour of competing resource users is regulated by a great variety of rules that can best be apprehended with the concept of institutional resource regime (Kissling-Näf and Varone 2000, Gerber et al. 2008), defined as: 'an institutional framework which combines the prominent program elements of a resource-specific protection and/or use policy (= policy design) with a specific arrangement of the formal ownership, disposition and usage rights for the goods and services provided by a natural resource (= water rights system)' (Varone et al. 2002, p. 83). Both public policies and property constitute the regulatory environment within which users behave.

A public policy is defined as a series of intentionally coherent decisions or activities taken or carried out by different public actors with a view to resolving a problem that is politically defined as collective in nature. These decisions and activities give rise to formalised actions or outputs aimed at modifying the behaviour of target groups (e.g. polluting industries) presumed to be at the root of the collective problem to be resolved in the interest of the final beneficiaries, i.e. the social groups (e.g. consumers of drinking water) or the environment that suffer from the negative effects of the problem in question. The policy attempts to modify the behaviour of target groups in order to improve the social situation to the benefit of the final beneficiaries. Thus, the public policy designates target groups and final beneficiaries among the users, while property distinguishes between owners and non-owners.

Property grants ownership on goods to owners, as well as the legal capacity to benefit from the good owned. '[Property] is not an object such as land, but rather a right to a benefit stream that is only as secure as the duty of all others to respect the conditions that protect that stream' (Bromley 1991, p. 22). Accordingly, the first virtue of property is to exclude non-owners and

rival appropriators from the use of goods and services derived from the natural resource. Property rights deriving from property are usually distinguished between formal property, disposition and usage rights. Usage rights specifically determine who can or cannot use the resource with the purpose of producing particular goods and services. Disposition rights determine under which conditions an owner can appropriate (or not) the resource, or part of the resource, or transfer it to another appropriator, either by selling it, giving it or putting it under a concession. Formal ownership rights give absolute control over the resource to the formal owner, i.e. the person who owns the formal title of property. It encompasses the disposition and usage rights that are directly exerted on the resource or conceded to other users. Thus, property is a bundle of exclusive rights on the resource owned that derive from a formal title.

Reaching a local arrangement

In order to find a solution to their rivalry, competing users activate rules and confront them to arrive at a local arrangement. The local arrangement is a set of decisions and actions taken with the intention to solve the rivalry. It implements an adjustment in the distribution of the resource, and consequently announces a change in the users' behaviour with the aim of solving the rivalry. The problem is not necessarily solved, in objective terms, but the users are satisfied with the arrangement or at least accept that they have to conform to it.

Even though the local arrangement can take various tangible forms (e.g. a convention on water releases from a dam, a court decision that condemns one user for failure to respect a discharge permit, a voluntary agreement for the preservation of an aquatic ecosystem, or the acquisition of a protection perimeter around a water catchment), I have limited my typology of the characteristics of local arrangements to two attributes: the degree of coercion of the

agreement and the distribution of costs between users. The degree of coercion reveals whether the users have succeeded in negotiating the arrangement between themselves, or rather if this arrangement has been necessarily imposed from outside, most frequently by the state. The distribution of costs informs about the way users bear the net costs of the arrangement.

The choice of attributes that characterise the local arrangement is influenced by the idea that actors are moved by both the institutions and their interests (Scharpf 1997). I represent the weight of the institutions by the degree of coercion exerted on the users (Lowi 1972, p. 299). The degree of coercion corresponds to the obligation or not to accept the local arrangement. A coercive arrangement is imposed by the state by force or persuasion. State coercion can take direct forms, e.g. a court or a state decision, or more indirect ones, e.g. the guarantee of property. By contrast, voluntary agreements are related to negotiations and private arrangements. The user is free to accept the arrangement, no matter if it is satisfying or not. As such, a voluntary agreement is consented by both users and takes the form of conventions or transfers of titles.

The second attribute of the local arrangement is the distribution of costs. Costs represent either a limitation of the 'benefit stream' related to the property title for an owner, or a financial burden. In order to determine who wins and who loses, only net costs are considered, i.e. the difference, for each user, between the marginal costs and benefits of the local arrangement. This balance of net costs between users is derived from the idea that: '[politics] is in large measure a process of raising and settling disputes over who will benefit or pay for a program and who ought to benefit or pay' (Wilson 1986, p. 429). The determination of individual strategies in an institutional arrangement is influenced by the importance of expected costs and benefits. The arrangement must provide gains to the users when change is implemented (Ostrom 1990, p. 142). The distribution of costs is either equal or redistributive. With equal costs, costs are not

distributed but equally shared between users. In case of redistributive costs, one user assumes the burden of the arrangement by himself (e.g. a farmer must stop drainage in compliance to a law on the protection of wetlands and loses the parcel for crop production to the benefits of the environmentalists).

The combination of these two attributes leads to four ideal-typical forms of local arrangement (table 1). The transactional arrangement corresponds to equal costs and a voluntary agreement. Users negotiate and share the costs of the arrangement (e.g. the transfer of property titles or a convention). Users have not much difficulty in reaching the agreement as the distribution of costs is considered to be equitable. When a voluntary agreement implies a redistribution of costs, I call it a conceded arrangement. In this case, the user consents to bearing much of the costs of the arrangement, in other words, being a loser. This kind of outcome is possible when users are in such a weak bargaining position that they have no alternative but this agreement. I presuppose, however, that the loser makes a relative gain in regard to the status quo situation of rivalry.

Table 1. Ideal-typical forms of a local arrangement

	Equal costs	Redistribution of costs
Coercive	*Compensatory Arrangement*	*Arbitration Arrangement*
Voluntary	*Transactional Arrangement*	*Conceded Arrangement*

When users do not reach an agreement, they turn to the state and expect a coercive decision to settle the litigation. When costs are equally distributed between users, the arrangement is

compensatory. This means that the state intervention compensates the user that suffers a loss or finances technical measures that overcome the rivalry. When a coercive decision of the state is not accompanied by a financial compensation, I talk about an arbitration arrangement. The state settles the litigation with a decision of authority. In condemning the attitude of one of the users, the state provokes a redistribution of costs between the parties. Being affected by the coercive decision, one of the users is compelled to conform to the decision, whatever the costs born.

Confrontation of rules: Two hypotheses

The assumption is made that the type of local arrangement necessary to solve the rivalry depends on the power that rules confer to the respective users. Users activate either property or public policies and confront these rules. I retain two possible actor confrontations involving owners, i.e. between two owners and between an owner and the final beneficiary of a public policy. The first configuration refers to the classical Coasean situation, while the second introduces the idea of competition between two kinds of rules that are usually mixed in the literature (see Varone et al. 2008, p. 6).

The focus is put on the confrontation of rules and thus activation remains at the stage of formulating postulates. Users are supposed to activate the rule that defends them best, i.e. the rule that protects and legitimises the use they have of the resource. In other words, users activate rules that legitimise their use and that respectively stigmatise or condemn the use of the competitor. The owner activates property (e.g. farmers activate their property title on their field and accordingly claim the free disposition of this field in order to maintain its current use). Correspondingly, the other user is shunted to the category of the third-parties, which makes them excludable from the resource access. The same goes for public policies. The user activates the

public policies that benefit them (e.g. an environmental association claims the prohibition to drain wetlands in protected areas against farmers). Once the public policy has been activated, the user is recognised positively as a final beneficiary of the policy. As such, they are in a position to claim that competing users, considered target groups, must change their behaviour in a way that respects the prescriptions of the public policy. I assume that users, in the activation process, make a selection between rules in favour of property that recognises them as an owner (and respectively their competitor as an excluded third party), or public policies that identify them as a final beneficiary (and respectively her competitor as a target group).

In a rivalry, resource users confront one another with competing rules. The result of this activation leads to three configurations of users' confrontations, i.e. property versus property, property versus public policy and public policy versus public policy. I will not consider the last configuration, as my focus is clearly on situations that explicitly deal with property[1]. In a configuration of property versus property, two owners confront one another in a situation similar to a neighbours' dispute (Coase 1960). This configuration also encompasses situations where a new entrant or (potential) owner wants to purchase a property right. The second configuration of confrontation is property versus public policy. It corresponds to situations where the final beneficiary of a public policy has difficulties in obtaining recognition of their use against a recalcitrant owner (e.g. an ornithological association claims the respect of a law about the preservation of wild birds' habitats towards a landowner who intends to drain a wetland on his field). In this case, the effective implementation of the public policy is challenged by the guarantees given to the owner by their property.

The local arrangement should differ given the initial configuration of confrontation. In the configuration of property versus property, I postulate that two owners should always be able to

find some common ground insofar as owners do not want to bear the costs of a resolution alone. Competing owners either share the burden of the local arrangement equally, or avoid these costs, which brings us to the first hypothesis: If two owners confront, then the rivalry is solved through a transactional arrangement. A confrontation between two owners does not necessitate direct state intervention. The legal guarantee of the property is sufficiently strong to produce effects without the backing of an authority. The two owners tend to negotiate and look for common ground. The agreement organises an exchange of rights and specifies the financial conditions of the exchange. The costs of the arrangement should be equally distributed between the users.

In the second configuration of confrontation, one user has activated a property and the other a public policy. The owner defends his rights on the resource with his property titles against the other user who claims a usage right endorsed in a public policy. The implementation of the public policy questions the validity of the property title, or at least, the extent of the bundle of rights associated with this property title. Once again, the assumption is that an owner never bears the costs of the resolution of a rivalry. Given the protection of property at the constitutional level and the strict conditions of expropriation, a financial indemnity from the state to the owner is necessary to effectively apply a competing public policy, and consequently solve the rivalry. I formulate the hypothesis that owners cannot modify their resource use without being compensated: If an owner confronts a final beneficiary of a public policy, then the state must provide a financial compensation to the owner for the loss of property. As such, this configuration of confrontation leads to a resolution of the rivalry only if the owner does not bear the costs of the arrangement. The state is compelled to intervene in order to implement the policy to benefit the final beneficiary.

My analytical framework purports to explain how (heterogeneous) resource users succeed in solving rivalries. In order to proceed to an empirical verification of the framework, I have restricted the spatial scales of the case studies, limiting them to functional perimeters inside watersheds. Rivalries do not necessarily occur in the same place, but rival users are functionally dependent on the same resource, as is the case when a user located upstream, even kilometres away, disrupts the use of another user downstream. The test of the hypotheses is made according to the comparative method, with cases selected according to the most dissimilar system design, even if the variance between cases remains limited (Przeworski and Teune 1970). I have selected two kinds of rivalries (water supply and dam management) in two different institutional regimes. The four case studies, located in the Vesdre watershed in Belgium and the Val de Bagnes in Switzerland, are the product of qualitative research conducted between 2001 and 2005. Data collection on the specific rivalries was made with a common analytic grid, initially based on primary and secondary documents and completed with semi-structured interviews with the key actors involved in the water rivalries.

Resolutions of rivalries in the Vesdre watershed

The Vesdre watershed (710 km²) is located near Liège in the Eastern part of Belgium. The relief inside the watershed is mountainous and the water flow is mainly influenced by rainfall (10.5 m³/s. on average, with peaks at 165 m³/s.). Nearly half the territory is covered by forests; housing and industry are concentrated along the river. In federalist Belgium, water management is under the responsibility of the Regions, but property is still defined at the federal level in the Civil Code. Surface water is under the public domain but parts of it can be privately appropriated (when withdrawn, for instance). In fact, water ownership is tied to land ownership in most settings (e.g. groundwater or springs). In terms of public policies, many regulations have been

adopted regarding surface water quality (e.g. discharge permits and taxes), the protection of aquifers (e.g. withdrawal licenses) or the practices of recreational activities. However, the management of dams and flood control is not regulated. The rivalries in the Vesdre watershed were primarily concerned with lead-poisoning in Verviers and floods in Chaudfontaine.

Lead-poisoning in Verviers

In the town of Verviers, a rivalry between the distribution of drinking water and industrial water gave rise to a conflict in the mid-1980s. Citizens of Verviers opposed the municipality (as the main water supplier), claiming that lead concentration in tap water exceeded the national standards and caused disease within the population. Raw water comes from the dam of the Gileppe and is not treated. Moreover, this water is naturally acidic, which attacks the lead water pipes. The same water source supplies industrial concerns which find the cleansing properties of the acid water beneficial to their processes (e.g. for washing pipes or wool). They did not want to lose this specific quality of the water. As a result, water consumption in Verviers has led to lead-poisoning for more than a century.

The conflict between the municipality and an association of local citizens emerged at the beginning of the 1980s. The citizens were concerned by the poor quality of the water. They decided to sue the municipality in 1984 basing their action on the national decrees of 1965 and 1966 that set the first standards on drinking water. The association won the case on appeal in 1987. The association simultaneously referred the matter to the European Commission, which resulted in a condemnation by the EU Court of Justice in 1990 for the failure of Belgium to implement the 1980 European Directive on the quality of drinking water[2]. As a result of the case-laws, the Walloon Region compensated the inaction of the municipality and pushed the

negotiations ahead with the Federal State about the construction of a drinking water treatment plant, a project that had been underway for years. The treatment plant finally came into operation in 1992. In the meantime, the Region provided a temporary solution that consisted in connecting some of Verviers' drinking water mains to the Eupen dam[3]. With regard to the complaint of the industrialists, a technical arrangement safeguarded their supply of raw (and acid) water.

Ultimately, the public health concern was taken into account without requiring any redistribution to the detriment of industrial uses. In the rivalry, the drinking water consumers activated a public policy that prescribed drinking water standards. The consumers are the final beneficiaries of the policy and the drinking water suppliers are the target groups who must conform to the standards, whatever the cost. However, the industrial groups used the argument of a historical usage right on the water mains. The configuration of the confrontation thus is a confrontation between property against public policies. This configuration led to a compensatory arrangement, in which the state was not only in charge of the construction of the treatment plant, but also provided a technical solution that kept the quality of industrial water unchanged. The resolution of the rivalry was possible as soon as this technical solution had been found.

Water floods in Chaudfontaine

Water floods in the lower part of the Vesdre created a rivalry between drinking water production and protection against floods. The rivalry was caused by the Eupen dam, which retains water upstream in the watershed. The dam was built to meet a growing need for industrial and drinking water. The *Ministère de l'Equipement et des Transports* (MET), the manager of the dam, was confronted with a dilemma. On the one hand, they must maintain sufficient water reserves in order to guarantee a drinking water supply. On the other hand, they must protect the population

downstream from water floods. When there is heavy rainfall, the dam reservoirs reach their maximum capacity and it becomes dangerous to store more water. People and municipalities downstream, notably Chaudfontaine, were regularly flooded and systematically complained to the MET.

The MET found a technical solution to the problem in 1985. They recalculated the mathematical model that helped manage the filling of the dam reservoir taking all the potential users into account. In order to do so, the MET went to the ERPE, i.e. the water supplier and main user of the dam reservoir, and asked if they would be ready to face possible shortages in years of exceptional drought. As the ERPE was observing a stabilisation in the levels of consumption, they conceded to the recalculation of the model. As a result, the two actors assumed the risk of water shortages in drought periods, to the advantage of the population downstream who suffered from the effects of the regular flooding. The MET reduced the maximum filling level and created a reserve of two million cubic meters in case of major rainfall. The dams no longer threatened the downstream part of the Vesdre. In this case, surprisingly, we observe that collaboration resolved the problems in the watershed, despite the absence of a regulation of dam management and flood control. The arrangement was supported by the consent of the manager of the dams, who has the full capacity to influence the disposition rights to water stored in the reservoir.

The resolution of the rivalry involved the redistribution of the water resource between the different uses of the resource. The main users in the rivalry were the municipality of Chaudfontaine and the drinking water producer, the ERPE. The inhabitants of Chaudfontaine are riparian landowners along the Vesdre, who had suffered a blow to their property because of the regular flooding. The ERPE has a disposition right on the dam reservoir. It is not directly responsible for the water release, but has an interest in the levels of the reservoir. The

configuration of confrontation was property versus property. The solution to the rivalry in this case was a conceded arrangement. The ERPE accepted to take a risk without any compensation, except for the tacit guarantee from the MET that the filling curve would be revised in case of shortages in water supply. In this case, the MET played the policy broker between the two users involved.

Resolutions of rivalries in the Val de Bagnes

The Val de Bagnes (300 km²) is located in the canton of Valais in Switzerland. The Dranse, its main river, is 30 km long and flows among some of the larger glaciers and highest peaks of the Alps (e.g. the Grand Combin, alt. 4314 m). Its flow (2.32 m³/s on average) was reduced to one quarter of its previous level with the construction of the Mauvoisin dam in the upper valley (capacity of 210 mio m³); the flow is greatly influenced by hydro-power activities. Most of the upper valley is permanently under ice and uninhabited. The population is located in the lower valley in the two villages of Bagnes and Vollèges. The main economic activities are tourism, farming and hydro-power production, which consumes three-fourths of the natural water input and discharges the flow directly into the Rhône river, outside the valley. Despite an apparent abundance of water, the drinking water supply has long been a preoccupation of the locals, and, more recently, the conservation of nature and landscape have also become a growing concern. Thus, the rivalries in this case primarily concern the drinking water supply in Vollèges and the heightening of the Mauvoisin dam. The institutional regime in the Val de Bagnes differs from the one in the Vesdre watershed. Switzerland is a federal state and responsibilities for water management are shared between the Confederation and the cantons, even if local autonomy remains important. Public policies regulate most potential water uses, including dam

management and the ecological protection of rivers. In terms of water rights, the municipalities own the rivers and can concede the water to appropriators.

Drinking water supply in Vollèges

Drinking water supply came into rivalry with hydro-power production. While this rivalry occurred at the moment of the construction of the dam of Mauvoisin, it only revealed its importance in the 1960s, when drinking water demand increased. The municipality of Vollèges negotiated the concessions for hydro-power production to Albert Maret and the *Forces Motrices de Mauvoisin* (FMM) in view of obtaining a drinking water main for local supply. Its bargaining position against the FMM was based on secular and perpetual rights on the torrent of *La Chaux*. Water supply had always been a preoccupation for Vollèges, which lacks springs. As such, the municipality has always sought water resources abroad. Upon obtaining its usage rights on the torrent of *La Chaux*, located in the municipality of Bagnes, it constructed a small canal, the *bisse du Levron*, which conveyed water to the upper part of Vollèges. This *bisse* regularly broke down at one end because of soil instability.

The hydro-power plant project raised hopes in Vollèges. The municipality sought a connection to the water mains of the hydro-power plant that could supply water to the village. It activated its perpetual rights on the torrent of *La Chaux* and asked for this connection in compensation for the concession of its rights during negotiations. The FMM accepted the claim and the resulting agreement foresaw a connection to the mains of Mauvoisin-Riddes at 1650 m, conveying 150 l/s of irrigation water during 90 days/year for free to Vollèges and 12 l/s of drinking water all year long. In fact, the issue at stake was not the preservation of the flow in the

torrent of *La Chaux* — the dam collection system does not even pump into it — but the consent of the municipality of Vollèges for their portion of the Dranse.

The connection to Vollèges was not immediately carried out for technical reasons. In fact, the FMM was forced to modify its plans and make a half-landing with a first set of turbines in Fionnay, before sending water to the Rhône river. As a consequence, the mains were too low to enable a gravitational flow to Vollèges. In order to honour their commitment, the FMM offered its financial participation in the building of a new main pipe, supplied by a small dam with a reservoir capacity of 370,000 m³, and convened by convention between the municipalities of Bagnes and Vollèges in 1960. The aqueduct of Louvie, inaugurated in 1967, supplied 540 l/s to Bagnes and 220 l/s to Vollèges during low water periods, and became crucial to Bagnes, the second municipality of the valley, as tourism was booming in the ski resort of Verbier. As such, beyond the initial agreement, the rivalry was effectively solved thanks to a change in the nature of the problem and an extension of the group of users involved.

The initial rivalry led to a significant redistribution of water uses in the *Val de Bagnes*. Initially, Vollèges activated a disposition right on the small torrent of *La Chaux* in order to get compensation for the construction of the Mauvoisin dam. On its side, the FMM were not in a strong bargaining position, as they were seeking an acquisition of the disposition rights on the Dranse to Vollèges. The final local arrangement was a transactional one. The state did not intervene and the arrangement was voluntary. In terms of costs, the FMM consented to a minor investment in order to obtain the rights to exploit a dam on the Dranse. The arrangement did not add significant costs, given the extent of the overall project.

Heightening of the Mauvoisin dam and the question of minimum flows

More recently, a second rivalry occurred over the release of a minimum flow downstream from the dam. When the FMM decided to heighten the dam in 1986, an environmental group, the World Wide Fund for Nature (WWF), opposed the project and claimed the implementation of minimal flows. The WWF had long claimed minimal flows in Switzerland and wanted to create a precedent. The case of the Dranse was particularly striking because the river no longer flows immediately downstream from the dam. This absence of input from the Dranse has consequences on the eco-systems all along the valley.

The question of minimum flows was not an issue when the Mauvoisin dam was inaugurated in 1945. The initial concession from the municipality of Bagnes allowed the FMM to restrict all of the water for hydro-electric production and foresaw absolutely no minimum flows. The formal owners of rivers in Switzerland are the municipalities. They decide by whom and how the resources are exploited. In the case of the Mauvoisin dam, the concession was signed between the FMM and the municipality of Bagnes in 1945, for a period of 80 years. When the FMM decided to heighten the dam by 13.5 m in 1986, they did not need to re-negotiate the concession, as they were not restricting the flow of more water. However, as with any construction work, the project was submitted to an impact enquiry open to all persons concerned[4].

During the impact enquiry that opened in August 1986, the WWF announced its opposition to the project. The WWF argued that, as for any new dam construction, this project required a minimum flow of water back to the river, according to the Federal Environmental Protection Law of 1983. The opposition by an environmental group was based on the activation of the

Federal Nature Protection Law of 1966, which grants legal appeal to environmental associations. Transactional negotiations were set up between the WWF and the FMM. The FMM was thus put under pressure to consider the position of WWF, as the environmental association lodged a further appeal to the Federal Court. The FMM wanted to move forward quickly with its project and preferred to negotiate rather than lose time and money in a trial. The negotiations ended with a convention signed on 5 October 1988. The FMM agreed to convert a 3-hectare plot of land into a hydro-biological site and to leave a minimum flow of 50 l/s downstream from the dam of Mauvoisin.

The solution was obviously symbolic when compared to the flow of the Dranse (2500 l/s), but it still satisfied the WWF, which had obtained the precedent it desired and the guarantee that the question of minimum flows will not be excluded from the upcoming concession renewals. From the perspective of the FMM, the solution required no technical change to the dam, as the minimum flow would come from a diverted torrent, and thus it was able to start the project of heightening the dam without significant delays. Even if the outcome was voluntary and did not imply huge costs for the FMM, the rivalry was solved to their detriment. The arrangement was, however, consented to by both parties. The users reached the agreement by activating, on the side of FMM, a disposition right on the resource through the concessions, and, on the side of WWF, a public policy that grants a right of appeal to environmental associations in case of an impact enquiry. Both parties were satisfied with the arrangement, at little cost for the owner.

The success of non-owners in water rivalries

The analytical framework developed in this paper suggests that resource users who want to solve a rivalry activate rules and confront them in order to get a local arrangement. I have presented a

categorisation of local arrangements according to the degree of coercion and the distribution of costs. The four cases cover the two configurations of confrontation that involve an activation of property: property versus property and property versus public policy. The outcomes of the cases were one transactional arrangement (Louvie), one compensatory arrangement (Verviers) and two conceded arrangements (Chaudfontaine and Mauvoisin).

Two hypotheses were tested on the basis of the data collected, both articulated around the idea that the configuration of rules activated in a rivalry determines the form of the resolution. As a reminder, the first proposed that if two owners confront one another, then they reach a transactional arrangement and the second asserted that if an owner and a final beneficiary confront, then the arrangement is compensatory. Between owners, an agreement is thus necessary for the rivalry to be solved, while between an owner and the final beneficiary of a public policy, there is no chance that the owner modifies their behaviour without government intervention. As summarised in table 2, the hypotheses are met in two of the four cases.

Table 2. Test of Hypotheses

Cases	Local Arrangement	If two owners confront, they reach a transactional arrangement	If an owner and a final beneficiary confront, then the arrangement is compensatory
Verviers	Compensatory Arrangement		Yes
Chaudfontaine	Conceded Arrangement	No	
Louvie	Transactional Arrangement	Yes	
Mauvoisin	Conceded Arrangement		No

In the Louvie case, the confrontation between property rights led to a transactional arrangement, as expected in the first hypothesis. The users involved in the confrontation activated property in order to reconcile their positions. They mutually agreed to an arrangement and voluntarily shared the burden of the costs. They resolved the dispute with an exchange of property titles, an outcome in line with the predictions of Coase's theorem (Coase 1960). However, in Chaudfontaine, the ERPE did not claim any compensation for the partial loss of their water rights, i.e. the risk of water shortages, and voluntary consented to the arrangement proposed by the MET in the name of common interest. In actual fact, the consent of the ERPE did not entail any costs.

Concerning Verviers, the case fulfils the second hypothesis. The citizen group succeeded in being recognised by a court decision as the final beneficiary of the policy prescribing drinking water standards. The competing owner, the municipality of Verviers, was condemned to conform to the requirements set in public policy, but it declared itself unable to meet the cost of the corrective measures and invoked the state. Finally, the public budget financed the construction of the drinking water treatment plant as well as the technical adaptation of the water mains that allowed a constant acidity of water for the local industrialists. In this case, even users holding the *de facto* usage rights (i.e. the right to receive acid water) did not bear the costs of the arrangement.

By contrast, the Mauvoisin case deviates from my expectations. Instead of getting public compensation for the loss of property, the FMM voluntarily conceded a minimum flow without any compensation. In fact, they accepted an unfavourable arrangement instead of enduring an expensive and time-consuming trial. In the case of a disagreement during the negotiations, the WWF had the right to refer to the Federal Court according to the Nature Protection Law of 1966.

As such, the FMM decided to accept a quick but unfavourable agreement, rather than a slow and unpredictable court decision. This attitude is best understood with a calculation of the costs and benefits of the arrangement. From the perspective of the FMM, its construction projects were postponed to an undetermined date and also faced a context of increased competition in the Swiss energy market. The millions lost were balanced against the costs of the measures claimed by the WWF. The FMM preferred to concede a minimum flow in order to execute the project as soon as possible. In this case, the WWF had a strong alternative to the negotiation process (see Holzinger 2001), by the threat of a long and uncertain trial. Consent occurred, but under the threat of legal prosecution.

This is precisely the main lesson that the partial invalidation of the hypotheses points to. Conceded arrangements take place in the real world, i.e. arrangements in which an owner, deprived of a part of their rights on the resource, voluntarily consented to a loss of property to the benefit of the final beneficiary of a public policy. An owner accepts to concede a part of their rights without any compensation, in case the claimant holds a credible threat as an alternative to the negotiation, if the owner is not severely affected in their use and the net costs are negligible to them. The difference in nets costs between the local arrangements of Verviers and Mauvoisin suggests that state intervention is only relevant when the costs are too high to be carried between the parties in a voluntary agreement. In sum, the conceded arrangement seems possible only if the 'loser' is not affected in their use and if the nets costs that they bear remain very low, at least lower than those resulting from a non-negotiated alternative.

Indeed, conceded arrangements are possible and seem to be quite frequent. Public policies can force the consent of owners to change their behaviour when they address the concerns of the social groups who suffer from the externalities of the owners' behaviour. They can be

particularly effective when they combine rules that constrain the behaviour of owners (e.g. imposing minimum flows or setting quality standards) with procedures that empower interested third parties to denounce the violation of the substantial rules and claim the enforcement and sanctions (e.g. the right of appeal for environmental associations). Considered more broadly, such a finding provides an alternative to costly expropriation (Cole 2002) and shows that public regulations do not necessarily need voluntary cooperation between owners to be enforced, even if it proved useful in the implementation phase (Raymond 2006).

Conclusion

In a context of increasing resource scarcity, rivalries between heterogeneous users of natural resources are common. In industrialised countries at least, where rules are all guaranteed by the state and constitute complex regulatory regimes, their resolution follows a process of confrontation between rival users on the basis of activated rules. Although the idea that the type of local arrangement necessary to the resolution depends on the activated rules is partially invalidated, the empirical observation of several cases of conceded arrangements, where an owner voluntarily agrees to a loss in their property, reveals that public policies can incrementally alter the scope of property. These results confirm the analytic interest in making a distinction between property and public policy.

Users do not only devise new institutions, but also build local arrangements on the basis of a confrontation between existing rules. On the one hand, users do not require the adoption of a new and specific public policy to resolve the rivalry, nor even direct state intervention. On the other hand, they rely heavily on existing rules to defend their respective positions and build up arrangements. Of course, this process is only possible with the existence of formal rules at a

higher level and solid state guarantees on the enforcement of these rules, be they property or public policies. Thus, the validity of the findings is limited in its scope to societies governed by the 'rule-of-law'.

Within complex regulatory environments, where the positions that the rules grant to each one are considered legitimate and respected, the resolution of rivalries between heterogeneous users are not only frequent, but usual. The respective positions of users are well delineated by the rules they activate and the rivals share a common understanding of the regulatory framework. The institutional resource regime has the potential to distribute and legitimise the positions of all users. Users are able to reach agreements because they accept the recognition that the regime gives to the different uses. Once activated, institutions confer a relative position of power to the users mobilised in the confrontation. Hence, the problem of heterogeneity is overcome by the presence of a complex resource regime and the assurance that all the rules are enforced.

The empirical results show successful arrangements involving both owners and non-owners. Both public policies and property matter in environmental policy analysis, but in practice, property takes precedence. It is a privilege that remains costly to change, even in favour of the public interest. It provides strong guarantees to the users on the continuity of their use, particularly in a context of change. The state has great difficulty in undermining property, even in the legitimate conduct of a public policy. The strength of the guarantees of property limits the possibilities of government intervention that lead to redistributive arrangements in favour of more sustainable resource uses (see Glennon 2002). In contrast, public policies are the only means of granting access to natural resources to excluded third parties. They play an important role in introducing new uses, particularly when these uses are non-commercial activities (e.g. the protection of ecosystems). Thanks to public policies, users are granted some use rights without

being appropriators, i.e. without holding a property title. Public policies are rules that need to be considered in resource rivalries in order to bring non-owners back in the analysis of natural resource management.

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Notes

[1] Furthermore, this public policy versus public policy configuration of confrontation has already been covered in depth by policy analysis.

[2] Council directive 80/778/EEC of 15 July 1980 relating to the quality of water intended for human consumption. Case law C-42/89 of 5 July 1990.

[3] However, this arrangement only covered 80% of the population. The situation was left unchanged for 10,000 people in the poorest part of the town, until the necessary drinking water treatment plant entered into operation.

[4] The raising of the reservoir's capacity was decided on in order to retain water longer and produce an additional 100mio kWh in peak periods in winter.

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