



# Living Institutions: Sharing and Sanctioning Water among Pastoralists in Namibia

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**Summary.** — Sanctions are often considered an important component of successful resource management. To govern water usage, pastoral communities in Namibia have specific sanctions at their disposal and yet these are almost never applied. Interestingly, this does not lead to a breakdown in water supply. To understand collective action in small communities it is important to take into account that people share multiple resources. Combining ethnography and network analysis we reveal that people cannot separate the sharing of water from the sharing of ancestries, food, and work. This discourages the application of formal sanctions while opening other means of maintaining institutional regimes.

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## 1. INTRODUCTION

Alfons is a respected, elderly man who owns more cattle than anyone else in Elandspuit, a pastoral community in north-western Namibia.<sup>1</sup> One day, when we<sup>2</sup> passed through the community and stopped at Justus’s house, he – the chairperson of the water committee – complained about his uncle Alfons. Again, his uncle had refused to pay the contributions each of them has to give to buy the diesel that is needed to pump the groundwater for their livestock. At the same time, his animals drank the largest share. We asked whether he had recently approached Alfons. He replied that he had, and that we would not believe what his uncle had told him. He said: “I never told my cattle to come to drink at that water point. How can you make me responsible for their behavior, and even ask me to pay for them?” Asked whether they had thought about applying the graduated sanctions the community had agreed upon (e.g., paying a fine) Justus replied: “No, we cannot do that.” This article explores the reasons why. In doing so we examine how the sharing of water is embedded in other social forms and how this can prevent, adjust, and substitute the application of specific enforcement rules.<sup>3</sup>

In his classic theory of “The Tragedy of the Commons,” Hardin (1968) had situations like the above in mind when he argued that the incentives for an individual to contribute to a common good are low, since s/he profits from the benefits no matter whether or not s/he contributed himself/herself. Alfons’ cattle will drink, regardless of whether he contributes to the diesel fuel fund or not. And consequently, “Freedom in a commons brings ruin to all” (Hardin, 1968, p. 1244). Four decades of research have largely debunked Hardin’s assumptions and have shown (1) that freedom does not necessarily lead to collapse (Moritz, Scholte, Hamilton, & Kari, 2013) and (2) that many communities have developed institutions to govern resources successfully over long periods of time (Acheson, 2011; Agrawal, 2001; Araral, 2009, 2013; Dolsak & Ostrom, 2003; Ostrom, 1990; Ostrom *et al.*, 2002; Ratner, Meinzen-Dick, May, & Haglund, 2013; Ruttan, 2006).

In her pioneering work Elinor Ostrom identified eight principles that explain failure and success in shared resource

management. And, although recent research assumes that more than eight variables are necessary for a complete explanation (Agrawal, 2002, 2003; Araral, 2009; Potete, Janssen, & Ostrom, 2010), two of the original eight – graduated sanctioning, and monitoring (principles 4 and 5) – play a crucial role in practically all approaches (Anderies, Janssen, & Ostrom, 2004; Araral, 2011; Cox, Arnold, & Villamayor Tomás, 2010; Gibson, Williams, & Ostrom, 2005; Janssen, 2013; Janssen & Ostrom, 2014; Ostrom, Stern, & Dietz, 2003). Ostrom summarizes that institutions are sustainable if “appropriators who violate operational rules are likely to be assessed graduated sanctions” (1990, p. 90). Ostrom also points out that monitoring and sanctioning involve costs and become public goods themselves, which need to be maintained (1990, p. 43 f).

Fairly recent cross-cultural experiments have shown that people are often willing to pay these costs (Henrich *et al.*, 2006). While some view evolutionary processes as the cause (Henrich *et al.*, 2006), others have pointed out that sanctioning provides an information feedback loop in the social-ecological system that prevents its collapse (Anderies *et al.*, 2004). Although sanctioning behavior is common practice, its likelihood varies between contexts and with the costs involved. The enforcement of rules is easier in groups with shared norms and a certain level of trust, while it is especially difficult in foot-loose populations; e.g., when actors have many exit options

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(Araral, 2009, p. 691, 694, 695). At the same, when costs are low, sanctioning is more likely and vice versa (Anderson & Putterman, 2006, p. 11; Fehr & Fischbacher, 2004, p. 189).

In Elandsputs and other face-to-face communities in north-western Namibia, specific sanctions for breaking the rules of water management exist, yet they are almost never applied. At the same time, this does not result in a breakdown of water supply and the institutional regime. Against this background we ask: (1) Why specific sanctions are not applied, and (2) whether and how other forms of social control substitute specific sanctions to allow the governing of water usage successfully? We argue that social networks and the sharing of multiple resources, experiences, and spaces play a salient role in understanding both phenomena.

## 2. PASTORALISM AND SOCIAL NETWORKS

Many ethnographies have highlighted that among African pastoralists social networks play a key role in the sharing of land and water in a highly stochastic ecological environment (Behnke, Scoones, & Kerven, 1993; Bollig, 2006; Dyson-Hudson & Dyson-Hudson, 1980; McCabe, 2004). Social relations grant access to grazing and open emergency routes when the rains fail to come (Bollig, 2006; Gluckman, 1966, p. 5; McCabe, 1990, 2004; Moritz *et al.*, 2013). While pastures were long held communally by kin-based groups, recent developments including privatization, migration, decentralization and conservation have led to more fragmented, pluralistic and conflict-laden governance regimes (Benjamin, 2008; Fratkin, 1997; Galvin, 2009; Haro, Doyo, & McPeak, 2005; Lesorogol, 2005; Schnegg, Pauli, & Greiner, 2013).

Until some 50 years ago, most pastoralists obtained water through natural springs, surface water, and hand-dug wells (Bollig, 2013; McCabe, 2004; Robinson, 2009). Again, social relationships are salient to securing access. The Nuer, for example, congregate during part of the year around dry-season homes where water is available in dried-up riverbeds. On their way to these seasonal residences, they have to move their cattle through the territories of other groups. Under these constraints, it is essentially necessary for them to maintain friendly terms with neighboring groups (Evans-Pritchard, 1940, 1951; Gluckman, 1966, pp. 5–6).

Since the middle of the 20th century, throughout Africa hundreds of boreholes have been drilled to make pastures available that were only rarely usable in the past. Permanent boreholes reduced the need for migration, and mobility decreased (Bollig, 2013; Picardi & Seifert, 1976; Sobania, 1988). In Namibia, the infrastructure to pump, store, and distribute water was maintained by the South West Africa administration under the jurisdiction of the colonial South African state. After independence, the Namibian state handed the responsibility of these boreholes over to local user association governments (Bollig & Menestrey Schwieger, 2014; Falk, Bock, & Kirk, 2009). Since then, local communities had to cover the costs of water and the administrative responsibility for its distribution. Through this process, water, like land, became a common-pool resource that had to be managed at the community level. It is subtractive (e.g., water consumed by one farmer reduces the amount of water available for others) while at the same time it is hard to exclude anyone from using it.<sup>4</sup> In Namibia, with the localization of water management, the role of networks changed. While social networks guaranteed access to distant resources in the past, they have now become salient for sharing a common good at home.

## 3. SOCIAL NETWORKS AND INSTITUTIONS

Common-pool resource theory typically considers shared norms, trust, communication, and information as beneficial for collective action (Janssen, 2013; Janssen & Ostrom, 2014; Poteete *et al.*, 2010, p. 227). In turn, it is generally assumed that these properties go hand in hand with *small, socially dense connected groups* (Araral, 2009; Beitzl, 2014; Olsson, Folke, & Berkes, 2004; Ostrom, 2005; Pretty, 2003; Pretty & Smith, 2004; Pretty & Ward, 2001).

Early on, Ostrom argued that if people interact *intensely* they can (1) control or obtain information about the actions of others and (2) are also likely to “develop strong norms of acceptable behavior and to convey their mutual expectations to one another in many reinforcing encounters” (Ostrom, 1990, p. 206). Strong norms, again, facilitate collective action as they make social behavior more predictable (Lesorogol, 2005; Moritz *et al.*, 2013; Poteete *et al.*, 2010).<sup>5</sup> In relation to information, Janssen further elaborated that the visibility of actions does not necessarily lead to better performance. However, in combination with communication it does. Communication, typically more intense in small, dense, and connected networks, allows participants to make commitments to cooperation, which in turn can be monitored by gaining sufficient information on the actions of others (Janssen, 2013; Janssen & Ostrom, 2014).

Beyond social cohesion, some authors have pointed out that a certain level of leadership and heterogeneity can be beneficial, as long as the leaders are integrated into the group and trusted (Kurian & Dietz, 2013, p. 1533). Sandström and Rova (2010) found that communities which are both densely knit and centrally integrated do better in managing resources. Heterogeneity is theorized to be supportive, because it integrates different social actors and provides – in the sense of bridging social capital – linkages to different contexts and resources (Sandström & Rova, 2010).

While social cohesion and dense networks are usually regarded as supportive for institutional performance, a few studies indicate that these links may be less clear. Most importantly, Bodin and Crona (2008) find that high levels of social capital (measured by network density and connectivity, among other variables) do not always predict sustainable resource management practices. In this study, although networks were dense and connected, the willingness to report rule-breaking was low (2008, p. 2774). The authors propose that this might have to do with the social costs involved for those about to report (2008, p. 2776) and/or with norms and patterns of behavior which oppose the reporting of rule-breaking (2008, p. 2775). At the same time, they do not present qualitative data to establish this causal relationship in detail. In the same vein, Langfred (2004) and Horne (2001) show experimentally that trust induces reluctance to monitor and to sanction in highly cohesive groups.

In this article we argue that we need to understand the quality and the interpersonal dynamics of social relationships in much greater detail to grasp the complex interrelationship between sanctioning, social networks and the functioning of institutional regimes. This includes looking beyond density and cohesion of social configurations. To explore the properties of social ties we draw on the concept of *multiplexity*, developed in the 1950s by the anthropologist Max Gluckman (Gluckman, 1955, p. 19). A relationship is multiplex if it encompasses many dimensions, including economic, procreative, political, religious, and educational (Gluckman, 1955, p. 19). Gluckman argued that the diversity of relationships is

both an important source of disagreement and the basis for internal cohesion that must be taken into account in order to understand the behavior of the connected actors (Gluckman, 1955, p. 19). More recently, Cleaver and others have argued that in the context of resource management people have multiple social identities that go beyond their economic and productive roles as “pastoralists” or “irrigators” (Cleaver, 2002, p. 17; Meinzen-Dick, 2007; Mosse, 1997; Roth, 2009 and Saunders, 2010). It follows that their actions are not restricted to economic considerations but encompass psychological, moral, and social rationales and domains as well (Cleaver, 2012, p. 15).

Following Gluckman and Cleaver, we show that in small-scale societies, institutions can hardly regulate one affair without reference to others, since people’s interactions involve multiple roles and forms. They not only share water but also food, livestock, ancestries, and other goods and experiences. This multiplicity of sharing restricts the agency of actors who cannot separate sharing water from other past or synchronous interactions. At the same time, it offers distinctive opportunities for monitoring social behavior and controlling resources.

#### 4. DATA

The data analyzed here were collected in northwestern Namibia by a team of six anthropologists during 2010–14 (M. Bollig, M. Schnegg, Th. Kelbert, D. Menestrey, Th. Linke, K. Gradt) as part of the Deutsche Forschungsgemeinschaft (DFG) funded research project LINGS (Local institutions in globalized societies). The two principle investigators, Bollig and Schnegg, have conducted ethnographic fieldwork in the region since 1995 (Bollig) and 2003 (Schnegg) respectively, and are responsible for the overall design and the comparative analysis of the data. They supervise three ethnographers (Menestrey, Linke, Gradt) who stayed for about 15 months during 2010–11 in the southern, central, and northern parts of the research area to gain an in-depth understanding of the process of negotiating and crafting new institutions through daily routines. Bollig and Schnegg meanwhile continued their long-term fieldwork. Since the communities are rather small (between eight and 17 households) we were able to investigate a total of seven communities in detail.

To explore how the sanctioning, the social fabric, and the functioning of institutional regimes are related, different data are required: (1) information on whether and which specific sanctions exist, (2) information on whether they are applied, (3) information about the properties of the social network structure, (4) information on how two and three are linked and (5) information about what effects that has for the functioning of institutional regimes. The required data were gathered in a mixed-method research design through participant observation, qualitative interviews, and surveys.

To understand whether and how specific sanctions were agreed upon we collected documentary evidence. Most communities in the research area have fixed the rules for water governance in management plans and constitutions. For the research area, we were able to collect 21 management plans and constitutions, and will analyze them to show which specific institutions and sanctioning mechanisms communities agreed upon. We further conducted semi-structured interviews on the institutional design, and investigated the difficulties in applying specific sanctions (see below). During the long-term ethnographic fieldwork, we were able to observe the role of sanctions in day-to-day practices. A combination of questioning and observation revealed whether those sanctions were applied or not.

To identify the most important properties of the social structure, we conducted structured interviews about the network relationships with all households in each of the seven communities (Hennig, Brandes, Pfeffer, & Mergel, 2012; Schweizer & White, 1998; Wasserman & Faust, 1994). To allow for comparability, we selected a core of eight relationships that were the subject of elicitation in all communities (see Table 1). All interviews ( $N = 80$ ) were preferably conducted with the household-head (male or female) or, in cases where the head was part of a couple, with his or her spouse, or with both members together. We excluded households that subsist on part-time farming and whose members live and work in the urban centers while a shepherd stays on the farms. Although these households are often related to the households of other farmers, the day-to-day social interactions of their members cannot be compared with those of household members living in one place. For the network survey, all households we approached completed the interview.

The relationships elicited in the network survey are given in Table 1.<sup>6</sup> The questions we posed corresponded to dimensions of support addressed in many international social surveys (e.g., ISSP) and were translated for the regional cultural context. They were intended to capture details of institutional, economic, emotional, and social support (Freeman & Ruan, 1997; Schweizer, Schnegg, & Berzborn, 1996; Wellman & Wortley, 1990). The people interviewed were free to name members of the community and outsiders. The design thus resembled a personal network approach in which the social embedding of individuals takes center stage (Hennig *et al.*, 2012). For the multiplexity analysis we utilized all relationships, both within the communities and with outsiders (Schweizer *et al.*, 1996; Wellman & Wortley, 1990). For the density and connectivity analysis we restricted the sample to the complete network among those interviewed in the seven communities. Both measures are only defined for complete networks and were computed for all communities separately, since they are far apart and do not interlink (Wasserman & Faust, 1994). The data were coded in a MySQL database developed for the project.

Table 1. *Relationships elicited for social network analysis*

Question	
1	If anyone in your household needs to organize a donkey cart for the following day, whom do you ask for it?
2	If you (your house) need sugar or cooking oil, whom do you usually ask to give you some?
3	If you (your house) slaughter a goat, to whom do you send some meat?
4	Who is herding your cattle if you and your sons are absent or sick?
5	Imagine you are sick. To whom do you commit money to bring you some medicine from Fransfontein/Otwani/Opuwo?
6	With whom do you usually visit to have a chat?
7	If you are in urgent need of cash for paying the water fees, whom do you ask to lend you some money?
8	If you notice that the water point (the water infrastructure) has been damaged, whom do you contact first?



To explain the linkage between network structure, sanctioning, and the working of institutions we draw on ethnographic data. Most of the data were collected in the seven communities we studied in depth. The research protocol we developed before starting the fieldwork contained three sections of relevance here. First, rules of water management. Second, the sanctions that existed and how they were applied in daily practices. Third, information about the success of water management, which also included conflicts within and between communities. We interviewed all adult community members, and most interviews were tape-recorded. In addition, field notes were taken after each interview. At the end of the research, for each community a summary report was entered into the data base which contained five large sections and about 100 detailed indicators about the properties of the community and its ways of governing water. Those included social relationships, conflicts, and success. The data stored combines information from the participant observation and interviews and were linked to the individual, the household, and the community as potential units of analysis. The coding of the data was done by the principal investigators in collaboration with the field researchers. During the analysis we went through the relevant indicators (e.g., social relationships, conflicts, and success) and through an inductive process identified the most salient dynamics. The cases studies were selected to represent those dynamics and combine different sources of information, which we triangulated to enhance the validity of the analysis. While we have used a variety of methods to enhance the validity and the reliability of the analysis, the ethnographic enterprise remains more subjective than standardized approaches.

As the analysis reveals, the unwillingness to apply specific sanctions does not vary between communities, but applies to all. Hence, there is no variation between the communities to explain. Our aim is to show why sanctions are not applied, and why this does not lead to a recurrent breakdown of the institutional regime. The three cases presented in detail below were selected from different communities to represent dynamics we observed across all of them. The causal relationships we propose hold true for all communities and do not differentiate between them.

## 5. CASE STUDY

Kunene has a low population density (0.8 people/km<sup>2</sup>) and most people live a rural life. The pastoral livelihood is constrained by the environment, most notably the low and unpredictable precipitation (Bollig, 2006; Schnegg *et al.*, 2013). Most of the rainfall occurs in summer, between November and April. Under these ecological constraints, more than 25–30 ha land are needed to keep one head of cattle (Burke, 2004). Droughts are frequent in the area and regularly lead to significant loss in livestock.

The social organization in Kunene is largely dominated by kinship. As noted above, we collected information about the social networks people maintained in seven communities. Without going into details yet, one number sets the stage: 654 of the social network ties ( $N = 776$ ) we identified were considered to be kin-based. That is almost 85%. The kinship system defines roles through different bio-social phenomena: marriage, generation, seniority within a generation, and gender. Authority and power are typically exercised by men in interactions with women and by older individuals vis-à-vis younger persons.

The economic lives of most people are shaped by their pastoral livelihood. However, livestock are extremely unevenly

distributed in the research area. As our data show, almost half of the households own less than 20 head of cattle, while the most wealthy 8% own more than 200 animals each, and thus a significant portion of the livestock in the area. The uneven distribution of cattle correlates with other economic indicators and results in dependencies between those better off and those who have less. One form of dependency is that those who have more lend cattle to poorer households to herd. The herding households use the milk of these cattle in return for their labor (northern Kunene). Another form is direct economic transfers, including food transactions or informal labor contracts, between rich and poor households (e.g., constructing a cattle-*kraal*, doing washing). Throughout the research area cattle and goats are perceived as a reliable source of income, and are the greatest water consumers.

Naturally occurring water appears in two forms: (1) Springs that are fed by underground water, and (2) precipitation that does not enter the ground but flows into seasonal rivers or naturally occurring dams. These sources support only a relatively low population and livestock density, and are highly unreliable. With the establishment of so-called “homelands” during the Apartheid regime and the politics of segregation the hydrological perforation changed the landscape drastically. During 1960–90 the number of boreholes in the northern region of Kunene increased by a factor of almost ten and altered the use of the landscape (Bollig, 2013, p. 323). Access to groundwater opens up pastures even where previously no open water sources were available.

The technological infrastructure of these boreholes is heterogeneous: diesel engines, wind pumps, hand pumps or electric motors powered by solar panels are installed to pump up groundwater. During colonial times and until the 1990s the entire infrastructure was owned and maintained by the state. Additionally, the South African colonial administration provided diesel for those boreholes that operated with engines. Since the state covered the costs of running and maintaining the infrastructure, little local coordination was required. There was thus no need to establish robust institutions at the community level or to define complex rules of water management. This situation drastically changed in the 1990s with the new water policies.

## 6. RESULTS AND DISCUSSION

### (a) *Specific sanctions*

With the institutional reconfigurations that began in the mid-1990s, the ideas of participation, empowerment, and sustainability through ownership of and engagement with natural resources entered the stage. The decentralization process in Namibia was carried out by extension officers from the regional authorities (Directorate of Rural Water Supply, DRWS) and/or NGOs contracted by the government (Bollig & Menestrey Schwiager, 2014; Falk *et al.*, 2009). During the process of implementing Community-Based Natural Resource Management (CBNRM), both the organizational structure and the institutional arrangements are fixed. At the organizational level, two bodies are established. The larger of the two is the Water Point Association (WPA) that usually includes all adult members of the community. The WPA then appoints a Water Point Committee (WPC), responsible for the daily concerns of water management.

In addition to the organizational structure, the overall principles and rules of water management are fixed in two documents: the “constitution” and the “management plan.” Both

Table 2. *Sanctions defined in the management plans (N = 21)*

Rules	Rule explicitly stated in management plan <i>n</i> , (%)	Sanction explicitly stated in management plan <i>n</i> , (%)
Children are not allowed (to play or waste water) at the WP	13 (61.9)	5 (38.5)
Water point gates must be kept closed when not in use/users must adhere to opening hours	17 (80.9)	11 (64.7)
Taps must be closed after every use	12 (57.1)	8 (66.7)
No one is allowed to wash him- or herself/ swim at the WP/in the trough	17 (80.9)	14 (82.3)
Water point yard should not be used to catch/keep livestock	5 (23.8)	3 (60)
The water point must be cleaned regularly	12 (57.1)	9 (75)
WP may not be used without permission	3 (14.3)	3 (100)
All members must contribute water fees	21 (100)	21 (100)

documents are developed and agreed upon in several community meetings which are supervised by the extension officers. The decentralization process has several steps. By this point, all communities have already entered the “operation and maintenance” phase. Farmers thus have the authority to develop and enforce their own rules (including the possibility of denying households access to water), the responsibility for organizing the payments for diesel, and for maintaining the bulk of the infrastructure above ground.

Table 2 lists the most common rules fixed in the management plans, and whether sanctions ought to be applied if they are broken. The table gives the number of communities that agreed upon the rule in the second column (out of the total of 21 communities for which we have information). The third column shows in what percentage of those cases a sanction is specified within the management plan.

The different regulations and sanctions mentioned in the management plan can roughly be categorized into two subject areas: first, in case community members do not pay their contributions, and second, in case the water point is not handled properly. The latter subject encompasses restrictive rules, including (1) that children should not play at the water point, (2) that washing is not permitted, and (3) that the water tap should be turned off after use. In more than 60% of cases, violations of such handling rules are sanctioned with a fine. Those fines range from 10 NAD for leaving the gates open up to 100 NAD for bathing at the water point, and can sometimes be different for community members and outside users. If community members refuse to pay contributions – a conflictive issue in all of the communities we studied – graduated sanctions are listed in all documents. The starting point is usually the possibility of substituting cash contributions for labor sharing (85.7%) or oral admonishment by the WPC or other local authorities, up to a temporary or permanent exclusion from the water point as a penalty of last resort (71.4%). Some communities state explicitly that they would enforce exclusion with the help of the police.

As Table 2 reveals, the communities have spent considerable effort to come up with norms for regulating water and specific sanctions for violations. However, although the management plans provide detailed guidelines for how to enforce the rules, the application of sanctions is seldom observed in the day-to-day water management of community members. Although rules are broken now and then, during the entire year of fieldwork in seven communities we witnessed only a single case in which a fine was paid for breaking a “handling rule.” Regarding contributions, bending the rules – e.g., failing to pay on time – is in fact a *common practice*. Again, violating the rules was seldom punished and in no case was a user excluded from access to the water point. Since deviations are most obvious with respect to payments, our ethnographic examples will focus on these issues.

### (b) *Social networks*

Our brief ethnographic descriptions have already revealed that communities are small and economically heterogeneous and that people share more than water: They are kith and kin, use the same land for grazing, help each other in everyday life, and thus are related in many different ways. Network analysis allows us to describe the properties of the emergent social structure in the seven communities more precisely. One of the most salient characteristics of networks is their density. *Network density* is defined as the proportion of ties realized in relation to those possible (Hennig *et al.*, 2012; Wasserman and Faust, 1994, p. 118). The networks in the seven communities we studied show a comparably high density value (Schneegg, 2006). On average about 30% of all possible ties along the dimensions we studied are indeed realized.<sup>7</sup>

While density informs us that the communities interact intensely, it does not provide information about the structuring of the ties among members. *Connectivity* is a measure of social cohesion that looks beyond the mere quantity of relationships and takes their patterning into account. Connectivity of a group is given if all members of the group are linked through some path, that is, if they are all connected (Hennig *et al.*, 2012, p. 132; Moody & White, 2003). In five of the seven communities all members are connected and form one social system. In the remaining two, the numbers are still above 80%, and they become fully connected (i.e., 100%) if we take into account two other relationships that were not asked about in all the communities. The analysis reveals that most households can reach one another directly. There are no isolates. This indicates a high degree of connectivity and social cohesion.

So far, the analysis allows us to conclude that the social fabric of all seven communities is dense and that they are well connected. According to the literature, possession of both characteristics should make it easier to build and maintain successful institutions. Connectivity and density allow for communication in day-to-day interactions and a high flow of information. Both help to develop trust and shared norms (Janssen, 2013; Janssen & Ostrom, 2014; Ostrom, 1990, p. 206; Poteete *et al.*, 2010, p. 227).

In our theoretical discussion, we have already indicated that density and cohesion are not sufficient to understand the social dynamics in our cases. We have put strong emphasis on the overlap of different social ties and fields of sharing (multiplexity) and the ways in which this structures institutional developments. Multiplexity can be measured by examining the number of different contexts encompassed within a dyad of two people (Haythornthwaite, 2001; Schweizer *et al.*, 1996; Verbrugge, 1979). If two actors interact in only one way, let us say by helping each other with herding, their social circles overlap little. In this case, the multiplexity of the relationships

Table 3. *Multiplexity of all relationships (N = 776)*

Multiplexity	Number of ties	% of ties	% of ties with multiplexity higher than
Multiplexity 1	61	7.9	92.1
Multiplexity 2	324	41.8	50.3
Multiplexity 3	169	21.8	28.5
Multiplexity 4	89	11.5	17
Multiplexity 5	63	8.1	8.9
Multiplexity 6	50	6.4	2.5
Multiplexity 7	14	1.8	0.7
Multiplexity 8	5	.6	0.1
Multiplexity 9	1	.1	0
Sum	776	100	100

is one. If, however, both are also kin and borrow money from each other, their social circles overlap to a larger degree. Again, we can count the number of different bases for their interactions, and their multiplexity is defined to be three.

Table 3 shows the multiplexity of ties across the seven communities in which we did extensive ethnographic fieldwork. Any of the 776 relationships observed could entail a maximum of nine different transactions<sup>8</sup> and a minimum of one. As we see in Table 3, almost 90% of the relationships contain more than one transaction and are thus multiplex. More than 50% of the relationships contain two or more transactions, indicating the high degree of network multiplexity. This constitutes a specific social structure, and it is highly unlikely that interactions among water-users only take into account rules and sanctions specifically regulating this resource. In contrast, (1) norms and codes of behavior that structure different social relations are likely to be blurred, and (2) further resource-flows that take place within the multiplex social settings are likely to impact conduct with regard to water (Cleaver, 2012).

We have hypothesized that the social structure and the fact that people share a great many resources in dense networks is essential for understanding why formal sanctions are not applied in water management in northwestern Namibia. The social processes that may hinder formal sanctioning are examined next. However, and as we show, networks are double-edged: The same networks not only prevent sanctioning but also offer other ways to exercise social control and enforce norm conformity, and hence regulate behavior.

#### (c) Preventing the implementation of specific sanctions

Density and multiplexity constitute a specific social fabric with far-reaching consequences for building and maintaining institutions. The case study of the wealthy cattle-owner Alfons and his nephew Justus – introduced in the opening paragraph – indicates that people find it very hard to impose the formal sanctions. When we asked Justus why they did not punish his uncle he replied<sup>9</sup>:

JUSTUS: We have tried that also, together with the secretary and the treasurer. (...) But, if you look closely, then it is mostly family on the farm.

MICHAEL: Is it easier to work together in a family or when you are not related?

JUSTUS: When it's just one family, then it is very difficult. It must at least be two different families.

MICHAEL: But why is it more difficult if it's one family?

JUSTUS: Then it is difficult to directly approach the person and tell them their punishment.

MICHAEL: But why can you not go?

JUSTUS: Maybe it's having sympathy for your family that causes the problem, because you cannot face them. Sometimes it is also respect, like with me and my uncle.

Justus makes it clear that the dense kinship network and the kinship relationship he has with his uncle makes it impossible for him to enforce sanctions against Alfons. In the cultural context, kinship, generations, and gender structure social interactions to a large degree. Among all kinship ties, that between a nephew and his uncle (mother's brother) is one of the most salient. A man will inherit property (especially cattle) from his maternal uncle, and is supposed to be subordinate, helpful, and respectful to him. The specific relationship of Alfons and Justus, however, differs, at least formally, in the context of sharing water. Here the management plan defines them as having a horizontal relationship, as co-users of a shared water point, or even one of superiority between Justus as the chairperson and his uncle Alfons as an ordinary community-member. However, the norms associated with their kinship roles overrule the relationships defined on paper for sharing water. As Justus put it: "They (people like Alfons) know exactly that you will never ever face them. Because some people are big, some people are, you see, respected. You cannot go and force someone like Alfons." Restrictive measures, like asking his uncle to do extra work, or imposing a fine on him, or even excluding him from the borehole, are highly inappropriate and would be judged – not only by Alfons, but by the entire community – as an offense hence leading to a severe conflict. The multiplexity of the relationship between the two men is at least three (kinship, sharing water, sharing food) and Justus cannot separate one from the other in any specific social situation. In all cases, however, the most salient relationship is that of kinship and its normative conduct, which dominates and prevents the sanctioning of a respected man by his sister's son.

At the same time Alfons is part of the community and related to many people. His reputation is also based on their valuations, and a person who does not give, even though everyone knows (and can see) that s/he has something to share, is not regarded as wise, and hence will not be respected. In this context, public talk and gossip become one way to muster social pressure. People in Elandsput complained about Alfons on many occasions and put him and his family in the position of having to justify his behavior. On one occasion he defended himself, arguing that even though he did not contribute to buying diesel he had given a larger-than-proportional sum toward the construction of the community *kraal* they had recently built. Alfons has not, and still does not contribute his financial share to the water point. Our case study exemplifies the importance of both social hierarchy and status, which offer an opportunity to avoid complying with certain rules. Even though the community musters social pressure, they are not able to force Alfons to pay his share of the cost of diesel for the water pump. At the same time, there is a certain limit to his hubris, and his defensive justification indicates his sense (apparently at least reluctantly accepted by others) that he has contributed in other social realms sufficiently to maintain his shared community rights.

#### (d) Adjusting specific sanctions

Unlike Alfons, many people in the communities cannot pay at the time payments are due or when diesel is required because they do not have cash at hand. According to the rules, they should be sanctioned. Yet, as with Alfons, this does not happen. Imanuel Amtana, an elderly respected person and headman of the Kleinrivier community, explained why.<sup>10</sup>

THERESA: We would like to talk a bit about the diesel contributions – we heard it is not so easy to collect the diesel?

IMANUEL: Actually it's not a big issue to talk about. People are like this when it comes to money. Some give and some don't. Some do not have anything to give. Then we discuss it. Still some people do not want to contribute. But it is not such a big problem.

THERESA: But if people do not want to contribute you will have to deal with this problem?

IMANUEL: There are rules in case you do not contribute.

THERESA: What rules?

IMANUEL: Your animals do not drink at the waterpoint. . .

THERESA: But did this ever happen?

IMANUEL: No, it never happens. Actually even if you do not pay for several months you are not going to be forced in any way. Because you are going to give! [. . .] The day you will get something you will have to give! [. . .] This is how I feel. If the person does not have, leave him alone! The next day he is going to have.

THERESA: So this is the way it works?

IMANUEL: You are not going to be threatened if you don't have (sufficient resources to pay your share). But you must take care that tomorrow you help the person who helped you before.

THERESA: You must support the ones who supported you?

IMANUEL: Exactly.

When asked about the ways they deal with people who do not contribute, Imanuel underlines that they have never applied formal sanctioning – that is, issued a fine. However, the situation he refers to is different from the one between Alfons and Justus. Here, a person does not have the financial resources to contribute as called upon. Imanuel uses a different strategy to integrate poorer households into the cooperative management of water. Imposing fines on them or even excluding them from the use of water would further exacerbate their economic situation. Instead, Imanuel trusts in long-term cooperation and reciprocity. At some time, even the poorest community members will have a surplus and then they must give. He knows that the close communication and information network of the community will spread the word when one of the households sells a goat or gets access to cash through sporadic wage labor. That day, he will be there to remind them about their outstanding dues. Then, it will be very difficult if not impossible to refuse.

Again, and as in the previous case, the multiplexity of the relationship is high. Imanuel and most of the community members he refers to share food, work, land and experiences. In addition, they expect to share a future. In this situation even if one could impose a fine the social cost would be high. Imanuel knows some households are poor. Fining them would produce conflict and social damage both immediately and in the future, while providing leeway insures later participation.

Both cases reveal vividly that people are aware that they interact in more than one way and that this prevents the imposition of formal sanctions. At the same time both cases also indicate that social networks open other channels of control: Gossip in the case of Alfons, and in the second case, knowledge about the truth of a household's claim to at least temporary impoverishment.

(e) *Substituting specific sanctions*

The inefficacy of institutional sanctioning does not lead to failure of natural resource management, as anticipated by

institutional theory. As we have already indicated, social cohesion and a multiplexity of ties offer other ways to control community members. These go beyond monitoring in the sense of obtaining information about the strategies and behaviors of other community members (Ostrom, 1990, p. 95). As the case of Alfons revealed, social cohesion also implies shared knowledge about social positioning, and public discourse and gossip can challenge reputations associated with valued standing in a community. Alfons has something to lose, and will be sensitive to how far he can go in not cooperating. At the same time he is economically independent and enjoys relative autonomy, which makes it difficult to force him to follow the rules in any particular instance. Furthermore, as in the case of Imanuel, the exchange of information in the community provides knowledge about relative wealth – who has something to give – and thereby allows the behavior of others to be contextualized. This becomes even more effective if multiplexity and dependencies between the parties increase, as the following case reveals.

Karel is a head of household in his forties who returned a few years ago from Windhoek, where he worked as a laborer, to start farming and to take care of his sick father.<sup>11</sup> Soon, economic fortunes turned against him and he was left with no livestock except a few donkeys when we met. During our fieldwork, Karel was pursuing different sorts of casual work to earn money and to support his girlfriend and their two children. During the dry season the community was about to run out of diesel. According to the books, Karel had not provided any diesel for more than a year. Again, he had never been formally sanctioned or fined for not contributing. When this became public in the situation of water scarcity, Albertina, a pensioner who contributes more often and is owner of the largest herd of cattle in the community, became angry.

Given high economic insecurity and the absence of markets, people often lack basic food items. One day there is no maize meal, the next day no tea or, even worse, sugar (one of the most important sources of calories for a large part of the population). When in need, people visit one another and demand a fair share from their neighbors. This is common practice, widely accepted, and the demands are rarely refused. Demand sharing constitutes a salient part of the social order of many rural Namibian communities (Widlok, 2013).

Karel found himself in need of sugar shortly after refusing to pay the contribution for diesel. He went over to Albertina's house, just as he had dozens times before. However, this time things went differently. When he demanded a cup of sugar, Albertina told him straight to his face that this was not how sharing worked. She told him that he knew well about the water shortage and that the time had come to pay for the water he was using. Karel defended himself, pointing out that he possesses neither goats nor cattle, let alone cash to buy diesel. Albertina did not back down, and proposed that his sister, who works as a police officer in Windhoek and has a regular income, could help by enabling him to buy at least 5 L of diesel. She began spreading the admonition in the village and the matter soon became a public debate. Due to her social standing within the community, she was able to show her anger openly and to take a strong negotiating position. In his insecure economic situation, Karel was highly dependent on cooperation and sharing with other households who, like Albertina, now and then helped him with staple food and milk. It was this dependency and the fear of losing his social support network that made him go to Fransfontein the next day. When he returned, he brought 5 L of diesel, purchased with the money his sister had provided.

Unlike Imanuel, who reflected about the ways things are done generally, Albertina did not want to wait in this specific



situation, since Karel had not contributed for more than a year, and she did not envision that he would do so in the near future. The case shows how the publicity of a socially accepted claim and dependency on other relations of sharing allows the community to create pressure and to enforce a rule. Albertina not only knew that Karel had not paid, but also knew that his sister had cash and would help him out. Both pieces of information, spread through dense networks, allowed her to create social pressure. It is the intertwined dependency relations among people in the community that maintains such pressure. Even without sanctioning, the fear and the threat that one may be excluded from the wider field of sharing prompted Karel to comply. Karel regarded his payment as unfair, but nevertheless he could not escape the claim. Although his household was not excluded from water, the potential threat of exclusion from other fields of sharing is equally, if not more, effective.

We began with the case of Justus and his uncle Alfons. Alfons did not follow the rules and his nephew could not sanction him formally. At the same time, the means to create social pressure against a relatively autonomous person are limited. In this case Justus and Alfons navigate between exercising their own power through rule-breaking and conceding to the power of gossip to challenge the social status and standing of a community member. The second discussion, and the further case of Imanuel, reveal a different kind of balance for those without adequate funds to support the water supply. In principle long-term reciprocity prevails. However, with Karel, the case was different. He broke the same rules that others in dire financial straits had broken, and like those others, was not punished for some time. However, at a moment of water-shortage, when he had not paid for more than a year, Albertina wanted him to prove his willingness to share. His social and economic dependency was such that the threat of exclusion from networks of sharing was too severe for him to withstand. Even though not sanctioned specifically within the domain of water supply, the social pressure among his community networks became unbearable and he changed his behavior to comply.

## 7. CONCLUSION

We started this article with the observation that specific sanctions, spelled out in detail in management plans, are almost never applied in northwestern Namibia, and yet this does not lead to a recurrent breakdown of the institutional regime and water supply. In search of an explanation, we pointed to the importance of social networks and the role they play in explaining both phenomena.

A look at the literature reveals that CPR theory largely focuses on the ability of networks to provide information and to facilitate communication in regular face-to-face interactions; this in turn allows low-cost monitoring and sanctioning and reinforces shared rules as well as norms of behavior. Briefly, the more dense and cohesive a social network, the easier it becomes to achieve collective action. While this view is supported by most studies, some have indicated that social capital (measured in terms of social networks at the community level) hinders sanctioning (Bodin & Crona, 2008). While

Bodin and Crona (2008) relate network properties, sanctioning and the functioning of institutions at the aggregate level, they do not provide a detailed account of how such a causal relationship might work.

In this article, we applied a mixed-methods research strategy to do just that. Network analysis and the concepts of connectivity, density, and *multiplexity* allow us to describe the social structure in the pastoral communities we studied. The analysis has revealed that they are both dense and connected, thus displaying social structures favorable to achieving successful resource governance. However, they are also multiplex. This forms a specific social context for establishing and enforcing rules of water management. Here, water becomes just one of many social fields of sharing, and its management is embedded in past, co-occurring, and projected future interactions.

This multiplexity of social configuration has significant consequences for individuals' conduct regarding water, as the qualitative ethnographic analysis reveals. People find it difficult to refer to water as a separate domain, and kinship roles especially circumscribe how people interact with one another in this area, as well as others. While kinship ties lend power to some, they restrict the agency of others. Especially for younger people it is virtually impossible to sanction elder relatives. Even though the networks are dense, this specific configuration, which is likely to be found in many comparable communities, hinders the application of sanctions.

However, and in contrast to the case discussed by Bodin and Crona (2008) the inability to execute formal sanctioning does not lead to recurrent breakdowns in access to water; nor does it result in a complete neglect of the infrastructure. Water shortage due to lack of diesel is rare. While social embeddedness prevents formal sanctioning it enables other modes of social control through processes of adjustment and substitution. Dense and multiplex relations allow a rapid spread of information and provide detailed knowledge about the social and economic situations of community members, which allows others to contextualize their behavior, and their breaking or bending of the rules. Here, communication and information itself become means of social control. In addition, multiplex relations combine different spheres of sharing. For most households the threat of isolation from a larger network or community sphere is more significant than any gain that might result from the violation of a rule. This offers the possibility of using social pressure to encourage cooperation and exploits the fear of exclusion and the withdrawal of support to urge conformity.

In sum, the case studies indicate that social networks hinder formal sanctioning and at the same time adjust and substitute enforcement rules. Since they are substituted, institutions work and water is provided. It is difficult to say whether the causal relationships observed here will also hold true for the management of other common-pool resources, like pastures, forests or fisheries. From what we observe, we would assume that under similarly high levels of density, connectedness and multiplexity it will always be challenging to execute specific sanctions in small face-to-face communities. Whether and when those social networks provide alternative means to govern resources successfully is left to further exploration and debate (Bodin & Crona, 2008).

## NOTES

1. Personal and community names are pseudonyms.

2. This encounter took place during field research conducted by MS in 2014.

3. To grasp the enforcement of rules described here and to distinguish them from other forms of control, we use the term "specific sanctions". Specific sanctions are related to one domain of interaction (e.g., water) and agreed upon between appropriators of a common-pool resource.



4. See Ostrom (1990) for the difference between common-pool-resources and collective goods. Exclusion, in our case, is practically impossible because the animals come to the water point *en masse* and are too strong to be controlled by their owners. In addition, pastures and water points within communal lands are rarely fenced.
5. Furthermore, integration is likely to influence the way an actor perceives the future. Those who have been integrated into a specific place over generations are likely to have more interest in protecting the resources, and thus to value future costs differently than their neighbors who have many external opportunities and are “on the jump.”
6. This analysis takes into account only the relationships that were elicited in all seven communities to make results comparable.
7. The density values vary among communities and correlate with their size. A correlation between density and size is often observed for social networks. It can be explained by the fact that the number of relationships an individual can maintain is limited, and the larger a network gets the more difficult it becomes for each member to maintain ties to, let us say, 80% of the rest.
8. The eight questions asked (Table 1) plus kinship as a ninth tie.
9. Interview MS, 25.03.2014.
10. Interview TL, 20.10.2011.
11. Encounter took place during field research of TL in 2011.

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