

IRRIGATION SYSTEMS AND VALUES: UNDERSTANDING THE PROCESS OF SELF-GOVERNING WATER RESOURCES IN NORTHERN ITALY

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Common-pool resources (CPRs) are natural or man-made resources shared among different users, a condition that produces a competition for their utilization leading often (although not necessarily) to their degradation or even to their destruction (Hardin G. 1968). A vast number of valuable natural resources falls in this category and today shows chronic problems of overuse. Examples are the world forests, fisheries, water basins, biodiversity, and even the atmosphere.

As broad bodies of literature and empirical evidence (Ostrom 1990, 1998, 1999, 2005; Agrawal and Clark 2001; Cardenas 2000) have demonstrated, management of common pool resources implies an institutional construction that would be able to take into account not only physical attributes of the resources, but also attributes of the communities called to protect them. According to Ostrom (1992, 2005; Ostrom and Ahn 2008) among these attributes generally accepted by the community, there are values of behaviour, vehicle of shared learning and explanations about foundations of social order (Ostrom V. 1980), crucial variables of relevance for institutional analysis. After a brief review of related literature, I am going to analyze how internal and shared values can affect institutional evolution in farming irrigation systems. The discussed hypothesis maintains that in small farm communities individual values can interact in the course of time with the process of water management, leading to an institutional evolution that translates these individual demands for changes in the rules in use applied by the groups. Such a topic has been addressed analyzing two small self-organized farm communities in northern Italy, having as support a qualitative methodology of investigation based on in-depth interviews. This

allowed focus on the internal values of the appropriators of the resource, key variables for the explanation. As a result, the research found the existence of a common set of values is extremely useful in increasing the institutional performance and in controlling opportunistic behaviours. It is also important to recognize genuine trustworthiness appeared as an independent and non-reducible reason for explaining how communities achieve collective action compliance.

The results also support Ostrom's (1998, 1999) idea of a core relationship existing among trust, reputation, and reciprocity. It has been found indeed these variables are dependent on the community's past experiences and on the capacity of its members to recognize a major common interest in preserving resources. Once in place, those factors enhance the capacity of a community to govern its commons and, particularly, to foster the process of institutional adaptation that is necessary for a long term management of water resources.

Theoretical background

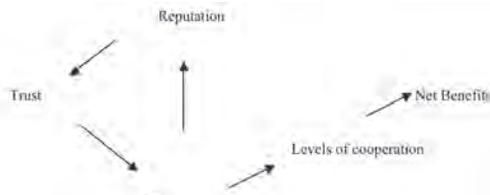
According to Ostrom (1998), elaborating conditions where governing and solving social dilemmas (including common pool resources) successfully happen, it is possible to identify individual attributes at the core of human behaviours as the following (Ostrom 1998, 1999):

- the individual expectations regarding other people's behaviour (trust);
- the norms that individuals learn from socialization and past experiences (reciprocity);

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- the identities that individuals intentionally create through their own behaviour and internalisation of norms (reputation).

Trust, reciprocity, and reputation are relationship constructions that fill a gap of indeterminateness of the objective social foundation (Cella 1994). According to Ostrom (1998) the existence of a mutual reinforcement among these variables, considered to be at the core of the general behavioural explanation, can be dynamically illustrated as follows:



Source: Ostrom (1998)

Reputation, trust, and reciprocity act through a positive retroaction circle. Therefore, it seems impossible to individualize them among dependent and independent elements. Every variation on a single variable strikes again into the chain on the others, amplifying the initial effect, that could be both positive and negative.

The reinforcement among these individual attributes depends on structural variables, such as existence of small communities, their past experiences, possibilities for a direct communication, and the existence of symmetrical affairs on the resource. All such factors engrave on the cost of internal and social agreements, from which it derives the cooperation level, initially reached through individuals' ability to set aside selfishness.

Jon Elster's contribution provides support of this perspective (1993, 1995). He analyzes altruistic motivations by identifying different actors' groups according to different levels of propensity to cooperation. The group that appears to be more relevant in terms of accomplishing communal argument is formed by those people who act according to the categorical imperative of Kant, that answers to the following question: "What happens if all of us would act so?" This powerful person's appeal does not deal with the real results or private purposes because it is connected to what could be verified if everyone abstains from the cooperation. Such motivation would forbid the egoistic behaviour, bringing the community exactly to an opposite outcome respect to the utilitarianism. For this reason, these results could be extremely important for understanding individual contributions in matters of commons management.

Rationality and values

Since informal ties are broadly diffused as a structural base for social relationships, the self-interest point of view does not occupy a core position in the current relational environment. According to Hirsch (1976), the main question is not concerned with whether individuals are sociable or altruistic in their objectives, but rather is focused on the possibilities of realizing the prevailing objectives of sociality and altruism in the community. For the author, constraints of the scarcity and demands of social morality constitute the two social limits to growth. For this work, they can be helpfully interpreted as consequential bonds derived from the missed solution of the social action dilemmas, like the ones we observe in governing common pool resources and as a consequence in water management. Limitation to individual selfish behaviour, imposed in the collective interest, could be more effectively respected if the sense of obligation would come interiorized. Already in the mid 1970s, Hirsch made emerge an interpretative urgency for the generality of the goods that will then be developed by Ostrom for common pool resources in the mid 1980s:

"The public perception of society's costs in its complex will contribute to encourage the social morality, but it will not be enough to assure it until the individualistic behaviour will preserve its own legitimacy in comparison to the broad sphere of the collective action. Once more, the individualistic behaviour can be an obstacle to the satisfaction of the individual preference". (Hirsch 1976)

Such overcoming, if it points out a predisposition to shared collective beliefs and to be open to a comprehensive vision of cooperative ethic (Sugden 1986), does not require the abandonment of rationality. In fact, according to the sociological tradition (Boudon 1997, 2000, 2003), actions which are apparently not referable to some consequential explanation nor analyzable as effects of instrumental reasons, do not have to be viewed as completely detached from every rational logic. In these cases, actors follow principles founded upon reasons to which they simply feel obliged to conform to. This is the case of a collective belief genesis, whose content becomes an object of voluntary adhesion by the individuals. Boudon referred to his work as an axiological perspective and quoted Weber's value rationality (*Wertrationalität*) as a fundamental contribution to contemporary studies focused on moral feelings. For the present research, what is more interesting is distinguishing between the axiological rationality and the instrumental one of economic kind. In this manner, one of the limits of the utilitarian model emerges with greater clarity: not knowing how to explain attribution of values phenomena. Instead, axiological rationality expressly foresees cases in which the subject does not choose to maximize immediate benefits, but chooses to follow "correct" principles not guided by personal will.

According to Weber, a collective belief is formed when its content becomes an object of adhesion by individuals (Boudon 1997); this occurs only if valid reasons for accepting it do exist (*deutend Verstehen*). The theory of collective beliefs can be interpreted in a manner that has to be concerned with rationality because these beliefs are felt as strong by social actors. According to Boudon (2000), a theory is rational in a cognitive sense when it leans on reasons of theoretical character the actor believes are strong in that particular context (values rationality, according to Weber). The advantage of this vision in comparison with the irrational one is it easily explains essential phenomenological data: the actors have a sense of conviction, not internalisation or constraint. The implicit or not directly observable character of the reasons, both at the individual and the collective levels, does not jeopardize the scientific quality of an analysis based on them. Such issue has given support to the present research, since it stresses the fact that when an interaction system has an interest for all the participants, the operation rules derived from it obtain a positive value. The exploitation process linked with governing a common pool resource allows a group of users to give a content to the concept of axiological rationality.

Hypothesis and method of investigation

The hypothesis suggests individual values are the determining variables in social networking and in the institutional crafting of governing natural resources. In particular, Ostrom's model explains decisions at the micro level of the interaction substantially affecting the management and the evolution of small self-governing irrigation systems over time. Individual requests can bring the institutions, under certain conditions, to substitute the search for collective benefits derived from the resolution of common dilemmas with the pursuit of individual demands. This leads to an erosion of the collective meaning of the institution itself, nullifying the realization of more broad community outcomes. In contrast, under different conditions, internal values (i.e. Boudon's axiological rationality) can be extremely useful in increasing the institutional performance and in controlling opportunistic behaviours. According to such a hypothesis, the levels of trust and trustworthiness among community members are important explanative variables because they further the learning process enabling it to generate availability of mutual social interactions. For the achievement of a sustainable institutional arrangement governing water resources, the existence of the feedback loop among trust, reputation, and reciprocity is highly desirable.

I explored this issue investigating how two small farm communities in northern Italy have managed water over time, focusing on the values they applied in this self-governance process. I selected these two groups because they share the same physical attributes of the

resources in use and the same institutional structure, but show different outcomes in terms of sustainable management of natural irrigation streams.

The theoretical purpose is achieved with a qualitative method of investigation to focus on internal values and emotional feelings among the actors involved in the resource management. For collecting the data, in-depth semi-structured interviews were conducted with half of the members of each community.

The case studies

Both case studies analyzed in this research (Roggia La Farfenga and Roggia La Gabbiana) are based on the plain area south of the city of Brescia, in the Lombardy region of northern Italy. They are *consortia*: self-governed irrigation groups (supported at the local and regional government level) with the aim of allowing farmers to use the resources available on their land autonomously. These organizations were aimed to manage both the water naturally available from the basins presented in the ground area of the municipality and the network of man-made channels necessary for irrigation purposes during the farming dry season. The *consortia* have traditionally occupied substantial part in the agricultural environment of the area, since the land where the two groups are placed in is characterized by richness in sand and poorness in clay. For this reason, the fields have always required important flows of water for the maintenance of a minimum level of productivity of the different crops developed for the livelihood of the local population, whose main activity historically is farming. Located between the Alps and the rich land of the Padana plain, these communities did not face difficulty in capturing the right quantity of water needed for their fields until they had adopted a traditional rotation of crops, based on periodical changes of the exploited areas that guaranteed regeneration of the soil and a constant care for the whole network of ditches.

Both institutions were informally established by the end of the 19th century in the same municipality's territory (Borgo San Giacomo) by autonomous groups of farmers who, in common, were exploiting irrigation ditches.

The Farfenga consortium spans two different local municipalities, Borgo San Giacomo and Orzinuovi, following the Roggia Farfenga, the spring-fed river that constitutes the main source of water for the agriculture community. It is composed of three different streams that join in the locality of Rossa, Orzinuovi, the head of the central water basin, for an extension of 2.5, 1.7 and 1.6 km respectively in a north-south direction. In this first branch we find natural springs that generate enough water for irrigation. In the second and third branches the main part of the natural flow comes from a few natural springs in minor channels. The three branches link around half a kilometre before the first

irrigated land. This should assure irrigation equality for all the fields that are part of the consortium, without oscillations in the availability of the resource according to different locations of the lands to be irrigated.

The spring water river Gabbiana follows exactly the same oxbows of Farfenga, sharing the head with it and then the main stream, just half a kilometre east. It is important to stress the fact Gabbiana runs right through the village of Borgo San Giacomo, therefore changing the physical attributes this second community is going to face, bringing different appeals and requirements during the management process.

Currently both communities are composed of about forty households, including farmers who grow corn for the food market or for livestock feed in fields of a limited dimensions. In fact, very few members of these groups can be considered big land-owners since the average extension of a farmer's property is around ten hectares.

The municipality had not been through substantial processes of migration and the communities' members are part of a consistent social environment, sharing a widespread sense of affiliation to the territory also due to the same culture. A high level of attachment to the local community has also been developed thanks to the respect of some religious norms of Catholicism that helped increase a cognitive substrate among the farmers of an implicit respect for the past and social tradition.

Both groups have a formal body of representatives, with a president and other officers, whose members are elected every three years. Decision-making happens at the constitutional level through this body, but informal interactions provide the basis for what happens at the formal level. Members are mainly males who hold title to property, but those who rent land can also be part of the decision-making process. Those who depend on the water include farmers and their families who live on the land year round, and extended family members or friends who might help with farm work. The majority of farmers are over 50 years old, and younger members are leaving the communities in large numbers, so the social reality as a whole is aging from year to year. The average level of education of these communities is lower than the rest of the village population since the obligation to attend school until the secondary level has only recently been extended in Italy.

It is relevant to stress land in this part of the country is highly valued in the marketplace, and crops consistently bring in high prices. As said, these lands also benefit from European subsidies and the farm communities therefore are affluent; there are no members who live at subsistence level. However, some differences in income among households do exist: members range from average middle class to upper-middle class. Additionally, while some members' income remains the same from year to year, other members receive increases in income over time.

This happens within the groups, without substantial differences among the communities.

It is clear the two institutions face similar physical and social environments, over which they could craft autonomously self-governing irrigation systems over time. To do that, they needed to establish agreements regarding irrigation times, rotation of the crops, and preservation of the main and secondary ditches. With water being a national commodity, these informal arrangements and social ties amount to an attempt to regulate the usage of a natural resource whose primary importance was becoming an object of competition among different social-economical alternative uses. Clarifying the inability of a private property right on water, the national and local law gave plenty of space to the farmers about interventions on managing rules about allocation of the resource, such as rotation time rules among different fields. However, the two communities have developed their own process of institutional construction in different manners.

About the Roggia Farfenga consortium, we have indications the institution began at the end of the nineteenth century, but the first official notation about the group did not appear until 1910. At that time, a gathering of local farmers created maps of the land and initiated a constitution as a more formal group. The group employed an engineer to work on the maps and to construct a rotation scheme for water use, but these were not officially recorded or regarded seriously by the consortium. In 1944, they began to discuss a rotation scheme once again, but they were unable to reach consensus with regard to how it would work. Due to problems of scarcity and contestation of rules by those who lived outside the community but still cultivated land, the group was only able to draft its official statute in 1993.

Even if the constitution formalized the consortium and established rules about keeping records of water usage and approving yearly schedules to facilitate water management, this has not meant an achievement of common understanding among irrigation facilities.

On the other hand, the La Gabbiana consortium has been able, since the beginning of its establishment in 1931, to connect a formalization of the institution with a common agreement and a sense of environmental awareness connected with the irrigation practices.

In this second case, the farmers recognized the importance of clarifying immediately in the bylaws what the objectives were of the whole group: the usage, the conservation, the defence, and the implementation of the common property, as well as its administration.

Results from the case studies

No significant differences in the vision of the resource in the two communities have been noticed. Most of the farmers face the issue of managing water and are able to recognize the physical value of this commodity in contemporary society. They acknowledge

water has particularities with respect to other assets they use for farming, such as seed and the land, which they do not perceive as the same issue of scarcity and urgency. Indistinctly all the farmers have noticed a reduction in the availability of water during the past two decades due to significant changes in agricultural practices that have brought a transformation in the way common pool resources are more generally used. The consortia themselves began as traditional agricultural villages where crops were combined and planted in rotation in order to maximize soil fertility and crop yield. During that time, the farmers paid consistent attention to the water channels: they were cleaned monthly, and the water patterns were monitored to make sure excess water was flowing into underground cisterns to provide for future uses. However, a shift occurred in the consortia conception of common pool resource in the 1980s when the European Union pursued a decision to subsidize corn crops, causing corn prices to outpace those of other crops. Following the rational calculations of many other consortia in Italy and the rest of Europe, these two communities ended rotation practices and shifted to a monoculture of corn.

As this culture requires water primarily from May to the first half of August when crops are ready, Farfenga stopped monitoring the water channels for the rest of the year to make sure water was flowing properly and being appropriately stored by the cistern system. Whereas natural springs and streams had previously been sufficient to irrigate every field in the village, the intensive use of water from May to August necessitated the construction of two new wells, respectively in the late 1980s and late 1990s. The unsustainable water usage persisted, causing the first well to run dry in the first decade of the corn monoculture, and the second well is currently in a state of serious depletion. Farmers are also planting more seeds to increase corn yields, so each field requires more water during peak season.

Due to these conditions, all Farfenga farmers are experiencing scarcity. However, their approach to the situation varies from household to household: some farmers recognize scarcity as a serious problem and wish to alter usage patterns accordingly, others do not acknowledge it as a concern and do not wish to alter usage.¹ It is important to recognize the farmers' attitudes about water management are not related to their own water problems: some farmers face scarcity all year and do not wish to alter usage patterns, while others who do wish to initiate new practices are not yet facing year-round scarcity.

Farfenga has experienced a social environment based on local leaders who have brought the institution to pursue selfish appeals instead of common outcomes. In this group, members have very little trust in the consortium or the board of representatives, even if elected by themselves.² This appears to be strictly linked with the recent history of corruption this group has faced, in turn related to selfish behaviours

just mentioned: leaders took advantage of power positions for rent-seeking for a long time. This broke the trustworthiness among the community members, sharing suspicion instead of building networks of mutual support and approval among the users.

In the Gabbiana consortium, farmers did not stop either the constant maintenance of the channels or developing water allocation procedures. The group has experienced a higher level of trust, probably due to the presence of individual attributes of a different kind among community members and representatives. A common sense of awareness has been noticed about the mutual benefits of trustworthiness, as well as higher attention and investment in social networks that have allowed the community to establish its institutional development on trust basis.³ These profitable expectations regarding other people's behaviour could be grounded in both the individual and the group levels. We found positive past experiences such as mutual adherence to agreements and successful conclusions of consortium activities have enabled members to learn from socialization how to invest more in the community⁴. In turn, these identities the farmers intentionally created through their own behaviours have helped an internalization of common values and social norms found extremely well shared among all Gabbiana members. It has been recognized that a high level of mutual understanding regarding norms violations probably was generated on the same well-established trust bases of the community. This has led to a better sense of affiliation and awareness of respect for the group, with a strong feeling of responsibility by the single user for the common. Water streams even ceased to be just an instrument of profit and became a source of sharing identities: "We have to understand that the channel is ours, it is made by us, and we are that channel."⁵

Discussion and conclusions

Why have these communities performed in such different ways over time? According to the discussed hypothesis, at the base of the institutional performance, there are internal and shared values that mark farmers while they are managing natural resources. The main goal of these case studies has been to show the role that internal and shared values play in the process of institutional construction for water management. In the empirical analysis a positive relationship exists between the achievement of sustainability of the institutional arrangements and the presence of values connected with altruistic behaviours in self-governing irrigation systems. These values are vehicles of collective learning and foundations of social order inside the community of users, as well as instruments of consciousness regarding the necessary institutional adaptation and flexibility. However, opportunistic behaviour is very likely to be found in communities of this kind. According to Repetto (1986), inevitably most

of the available rents are captured by those with power, influence, and wealth, and rent-seekers think using the resource efficiently is much less important than gaining control of the allocation mechanism. Institutional rules that require irrigators to cover the cost of operating and maintaining their systems and to contribute to the recovery of the initial investment in the institution, could help contain rent-seeking behaviours. However, that process could also be extremely challenging as the Farfenga group showed. The norms applied in informal relationships and used in cultural tradition are forms of a shared knowledge and as such implicitly fostered by an innermost circle. This process of internal-values establishment with positive outcomes has not been achieved in the Farfenga case. The main reason could reside in the features of the internal values of the community members. Data show a clear preference by these farmers towards selfish behaviours and attitudes, carried out in a short-time view of the exploitation process. Not seeing a common and shared benefit in cooperation, members' inability of dialogue and deficiency of reciprocity made the institution collapse. Where substantial temptation to engage in opportunistic behaviour does exist, no set of rules will be self-organized (Ostrom V. 1980). In such regard, the present research found the existence of a common set of internal values is useful in increasing the institutional performance and in controlling opportunistic behaviours. If participants do not view the specific rules crafted to organize a particular irrigation system as being appropriate, a behaviour that violates accepted norms may not be sanctioned.

As in the Farfenga case, if a formal structure is viewed as illegitimate, behaviour that undercuts the maintenance of that structure will not be viewed with disapprobation. Consequently, if opportunism becomes the dominant mode of behaviour in irrigation systems, ultimately all users will be hurt. When institutions are well crafted, opportunism can be substantially reduced, and even if the temptations can never be totally eliminated, they can be held in check. Moreover, the data brought evidence that the existence of a small number of social actors with Kantian aspects in rural irrigation groups has remarkable effects on overcoming collective action problems.

In the Gabbiana case, farmers did not stop either the constant maintenance of the channels or developing water allocation procedures. The reason seems to reside in a shared awareness regarding responsibilities on the part of the whole community with regard to the resource, as well as personal exposure of long-term planning among them. In particular, the person called

to supervise stream maintenance has had a key role in this consciousness of the whole group about the need for constant attention to water infrastructures. He has been able to recognize the channels were as important a resource as the water itself. As a consequence, he has directed his efforts on activities, given for free, whose objective was to ensure an optimal level of stream preservation over time. This sort of innovator has helped the community to overcome short-term exploitation of the resource, bringing it toward a more general level of consciousness about needs of sharing communitarian values among farmers. In his own behaviour, he clearly shows Kantian aspects, as well as a strong consistency with Boudon's axiological rationality.

As Gabbiana case shows, in order to decrease opportunistic behaviours community members need to invest voluntarily in coordination activities such as monitoring and sanctioning, along with constant irrigation channel maintenance. Coordination could be achieved by learning how to do joint tasks better, by assigning one person the responsibility to be in charge of other users, and by establishing a rule specifying how particular activities are to be undertaken, along with establishing how that same rule is monitored and enforced by participants, external enforcements, or both.

This research stressed the existence of a common set of values is extremely useful in increasing the institutional performance and in controlling opportunistic behaviours. An important point to recognize is that genuine trustworthiness, i.e. the individual preferences consistent with conditional cooperation, is an independent and non-reducible reason for explaining how communities achieve environmental preservation. Trust is the most powerful instrument of connection between institutional arrangements and values. It is enhanced when individuals are trustworthy, networked with one another, and acting within institutions that reward honest behaviours (Marshall 2005).

The present results also support Ostrom's (1998, 1999) idea of a core relationship existing among trust, reputation, and reciprocity. It has been determinate, indeed, that those factors are dependent on the community's past experiences and on the capacity of their members to recognize a major common interest in preserving the resources. Once in place, those factors enhance the capacity of a community to govern its environment and, in particular, to foster the process of institutional adaptation that is necessary for a long term management of water resources.

ENDNOTES

1. From the comment of one member: "There is no problem. We face the same situation every year and, in any case, we can have another well. I do not see so much urgency. There is no crisis regarding water, overall here."
2. "I do not trust anyone else than the members of my family. Why should I trust them?" (one member of Farfenga referred to the board of representatives).
3. From the words of one past leader of Gabbiana: "I trust them, why should not they trust me? I really think all of them are honest. I treat themselves as I am used to behave with myself. They are all friends to me and I hope I am considered a friend by them."
4. From the words of a former secretary: "It is sometimes difficult to make an agreement that could be good for everybody, but the only way is speaking with people, the dialogue, and make that they could understand that there is something that is good for all. I cannot count how many kilometers I did going from one ranch to another one, but once obtained the agreement all is okay, is over, and I am happy, even if it has been hard to make."
5. From the words of the current secretary of the consortium.

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