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Title: Social capital transformation in the Ecuadorian Highlands; a case study of the Pillaro Irrigation System, Tungurahua¹

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Abstract

In this paper I show, based on the case study of the Pillaro Ramal Norte Irrigation system how a new autonomous supra-community water user organization conformed with the support of an external agent. I describe how the water user organizations consolidated based on the transformation of inward and outward looking social capital. I argue that the support of external agents was important in bringing about this transformation. External agents facilitated the development of a shared new normative framework in newly created water user organizations and developed technical and organizational water management skills of water users within the confines of the irrigation systems. Nevertheless in creating new water management organizations it shifted existing power positions and social capital at the detriment of the already existing community and second tier organizations that initially struggled for the construction of the irrigation system.

¹ This article retakes parts of- and further elaborates on Hoogesteger, J. 2012b. Trans-forming social capital around water: Water user organizations, water rights and non-governmental organizations in cangahua, the ecuadorian andes. *Society & Natural Resources: An International Journal*, , DOI:10.1080/08941920.2012.689933..

1 INTRODUCTION

Since the beginning of the 1990s water user organizations were created in state-managed irrigation systems throughout the world. In Ecuador NGOs supported the water users in many irrigation systems, to form and sustain their water users organizations through the development of both inward looking as well as outward looking collective action. The intervention processes rested on the idea that irrigation systems could be best managed and sustained through collective action of organized water users. In this paper I present the case study of the Pillaro Ramal Norte Irrigation system in the Ecuadorian Highlands. I first analyze the importance of social capital for groups that aim to get ahead around a specific issue; in this case access to irrigation water. I focus on understanding how existing forms of community based social capital were trans-formed² into water user organizations based on state imposed normative frameworks and organizational structures. I argue that the trans-formation of inward and outward looking social capital are important when forming new organizations aimed at sustainably managing their irrigation systems and show that the creation of new organizations that are based on social capital is not always a straight forward process as existing local power relations and normative frameworks are challenged in these new spaces.

In Ecuador, since the early 1930s the state got involved in the creation of supra-community irrigation systems through the construction and management of hydraulic infrastructure that crossed and therefore physically united several communities with water flows, infrastructure and managing organizations (Zapatta 2007). State agencies were created to manage, direct and control these socio-natural systems and deliver water flows at the individual plots of the water users. In doing so, it profoundly changed existing local spaces by creating new natures (hydraulic infrastructure and water flows), and new social relations and power geometries between local bureaucratic water management institutions, local communities and water users. In doing so new scales and spaces were created around the management of water flows for water delivery to new water users.

As shown in Hoogesteger (2012a) with the advent of neo-liberal ideologies since the early 1980s, the central role of the state in irrigation system management got questioned for several reasons. At international and national level, increasingly autonomous water user organizations that -based on collective action- would take over irrigation management responsibilities from state agencies were promoted. Because of their size many irrigation systems need collective action to coordinate water delivery and administration, operation and maintenance tasks (Boelens 2008). Perreault *et al.* (1998) build on the idea of social capital to analyze the formation of such water user organizations. For these organizations to consolidate, social capital has to be developed at different levels in the water user organizations.

In this article I first analyze two important forms of social capital; namely inward and outward looking social capital. Second I present the historical development of inward

² I use the term trans-formed social capital to indicate that it was (1) mutated from existing forms of social capital, and (2) formed into new structures of social capital around water (see also *ibid.*..

looking social capital in the Ecuadorian highlands at community level. Then, I present the development of social capital at levels that stretch beyond the community and analyze the specific case of autonomous water user organizations through an in depth case study of the history and development of the Píllaro Ramal Norte irrigation system. I focus on the processes through which social capital was trans-formed³ around water. This case illustrates how, with external support water users were able to establish a water user organization that enables them to sustainably manage their irrigation systems. The discussion focuses on the implications these case studies have on understanding how irrigation infrastructure, water flows, social capital, norms of reciprocity and networks of civic engagement form the basis for the consolidation and sustainability of autonomous water user organizations. In the conclusions I retake these elements presented in the discussion and explain how through the consolidation of autonomous water user organizations new democratic spaces that often compete with other organizational forms have been created in the Pillaro Ramal Norte Irrigation system.

The data of the case study of the Píllaro Ramal Norte irrigation systems were gathered in between 2008 and 2010 through fieldwork in the irrigation systems. Data gathering consisted of eighteen in depth semi-structured interviews, two focused group discussions, and various informal interviews and observations in the field. This primary material was supplemented by reviewing secondary material of the Ecuadorian Central for Agricultural Services (CESA) and other researchers who have worked in the area. Through the research design data were gathered from amongst the included actors only (water users and CESA's personnel). This results in an insider's story about social capital transformation and the construction of the socio-technical spaces that are embodied in irrigations systems and their organizations. To reconstruct the history of the irrigation systems and water user organizations the interviewees were selected through a snowball sampling methodology (Heckathorn 1997). This started with personnel from CESA who work with the communities belonging to the abovementioned irrigation systems. From there, people that had been actively involved in the water user organizations at different moments in time were selected and interviewed. During field visits to the irrigation systems with personnel from CESA, and with leaders of the water user organization, new interviewees were approached from among the water users.

2 WATER USER ORGANIZATIONS AND SOCIAL CAPITAL

Social capital operates through relationships of trust and reciprocity and is rooted in social relations. It can function as an asset to achieve desired outcomes of individuals and collectives by means of influencing on agents, reinforcing identity and recognition, supporting individuals and mobilizing/facilitating collective action (Portes 1998; Reimer *et al.* 2008). Closed bonding networks of people who share a common frame of reference (religious, political, ethnic, class) sometimes impede the formation of social cohesion beyond the group boundaries (Ryan 2011). Therefore, to develop supra-community cooperation, bridging relationships among groups that are somehow 'different' (in terms of religion, political views, ethnicity, class) are of

³ I use the term trans-formed social capital to indicate that it was 1) mutated from existing forms of social capital, and 2) formed into new structures of social capital around water.

utmost importance. In these contexts bridging can be facilitated by explicitly establishing a) commonly shared objectives, and b) the norms of reciprocity that provide the rules of interaction within the network. Reimer *et al.* (2008) argue that trust and reciprocity are a consequential component of the normative structures that define social relations as they maintain and organize the connections in these networks by establishing ‘reasonable’ expectations concerning what others will do through ‘systems of sanctions and incentives that ensure consistency in those actions’ (Reimer *et al.* 2008: 259).

Social capital in Ecuadorian Andean communities is expressed in their diverse efforts to collectively maintain and transform local places and ways of life (Bebbington and Perreault 1999). These efforts are generally coordinated through community-wide labor (*mingas*). *Mingas* are often compulsory for community members⁴ and are usually prepared and coordinated by community leaders and discussed in community assemblies. Before the fall of the hacienda hegemony in rural areas *mingas* were generally practiced for the benefit of local hacienda owners and urban elites (Korovkin 1997). Nowadays *mingas* are organized for activities and projects that benefit the community such as maintenance and construction of access roads, water supply and irrigation systems, schools and other infrastructure.⁵

Even though ever-more Andean families are scattering territorially through migration to work and trade in urban centers (Bebbington 1993; Jokisch 2002), *mingas* still exist in almost all communities (Korovkin 1998). One of the results of temporal labor migration, that is predominantly done by men, is that women have come to play a crucial role in rural community life and in *mingas* (Boelens and Zwartveen 2002). Specific rules for participation and collaboration in *mingas* have changed to adapt to new local realities. For instance communities increasingly organize *mingas* and meetings in weekends or holyday periods to facilitate the participation of migrant and wage-labor dependent community members. Another common rule is that the responsibilities of absentees can be shifted within households (delegated to husband/wife, parents or children); or in time; or be met financially. Participation in these community activities defines internal social relations and sometimes the distribution of resources such as access to land, water, forests or pastures (Boelens 2008).

Like many other community affairs, in the Ecuadorian highlands most communities manage their water resources through *mingas* and other forms of collective action and social organization that are embedded in their own rules and rights systems (Boelens 2008). For smallholders and indigenous peoples within communities that have water use systems (domestic water supply or irrigation or multi-purpose), local autonomy, collective action and the local rights frameworks are therefore often the only way to defend individual (often family) water rights from external threats (Beccar *et al.* 2002). These are engendered through instruments of self-governance and autonomy that build on and re-create social capital around water. In the following sections I explain the importance and differences between inward looking and outward looking social capital for autonomous water user organizations.

⁴Participation and work tasks are assigned according to the capacity of the individual. Elderly and pregnant women are usually exempted from work.

⁵In externally funded projects, communities usually agree to provide the required (un)skilled labor through *mingas*.

2.1 Inward looking social capital

For the development of social capital in water user organizations, bonding ties among its members are necessary. Bonding refers to ‘inward looking’ ties of people that share a common group identity and/or goal (access water from a shared irrigation system). Because of their size many irrigation systems need supra-community cooperation to coordinate water delivery and administration, operation and maintenance tasks (Beccar *et al.* 2002). It follows that for these organizations to consolidate, social capital has to be developed at scales that go beyond the community level through bridging. Bridging refers to ties that bind different groups or individuals (with heterogeneous identities) together for ‘getting ahead’ along shared goals. According to Ryan (2011), bonding and bridging are not mutually exclusive as people usually bond along one social dimension while they bridge and sometimes have conflicts across others in a continuum of social relationships. So, in irrigation systems water users usually bond along their shared goal of accessing water, while conflicts over political views, identity or religious beliefs exist.

The normative framework that consolidates the rules of interaction for materializing individual access to water in irrigation systems, is the cornerstone on which inward looking social capital is built on in autonomously managed water use systems. According to Boelens (2008) these normative frameworks are defined by two different kinds of rights which are (p. 59):

- a) Access and operational rights: These define access to water and infrastructure and the operation of the system and entail the right to: withdraw and use part of the water flow; use the water intake, conduction and distribution infrastructure to get water to a plot; access information on the management of the system; to represent users and to implement decisions regarding water distribution and system management including penalties and the enforcement of rules; and the right to take part in social activities related to the system’s water management.
- b) Control rights: These grant individuals the right to take part in collective and democratic decision-making through the right to be eligible and occupy positions in the water users organization and decide over management and system operation (water distribution, irrigation schedules, flow rates, water use purposes, organizational forms, posts, responsibilities) through democratic procedures through which decisions are taken over; the inclusion and exclusion of members; changing or expanding the hydraulic system and irrigation technology; transferring the rights to third parties; and changing the internal rights and regulations.

How these rights are defined in an irrigation system is greatly dependent on the history of the irrigation system (Boelens and Doornbos 2001). To materialize water delivery, water users are bonded to and depend on the socio-technical characteristics and boundaries of the water use system. This makes exclusion and inclusion as well as rule enforcement through restricting water delivery to the rule breaker an especially strong relational mechanism. Through these mechanisms which are engrained in locally specific water rights systems (see Boelens 2009) normatively established social capital can be conceptualized as one of the main drivers behind the mobilization of collective action for the maintenance of the irrigation system and the participation in decision making within water users organizations.

Participation in collective action that is called upon by the water users organizations is usually a part of the normative framework of irrigation systems. Non-participation in this collective action (be it for the perpetuation of the irrigation system or for broader issues of regional or national interest) usually leads to fines and in some cases also the temporary and/or definitive loss of the right to access water within the irrigation system. For their maintenance, expansion and modernization these organizations have developed important permanent or temporary linkages with external state and non-state organizations through outward looking social capital as is explained in the next section.

2.2 Outward looking social capital

Developing broader networks in which outward looking social capital is established through bridging and bracing linkages is important for social groups (Rydin and Holman 2004). Bridging refers to ties that bind different groups that often have different normative frameworks and sometimes different goals and is often used to mean connections beyond a defined boundary (institutional, territorial, ethnic, class). It is important in that it links different institutions and individuals together creating the potential to acquire benefits through broader extra-group networks. The benefits can be: access to resources, information or the development of political agency. For instance bridging capital can link government agencies, donors, non-governmental organizations and local communities and ideally bring mutual benefits to all the different actors involved.

Rydin and Holman (2004) introduced the term bracing to point out a specific form of bridging in which connections between a limited group of people or institutions establish stronger and more selective relationships. These relationships are strategic in nature and are important for making them effective; therefore they are less extensive and variably dense in a network. Bracing capital is seen as the establishment of targeted links and is usually defined in the form of alliances that form in a network to work-on or solve a specific problem at hand. Although broader social networks are of utmost importance, the development of bridging and bracing capital, as Portes (1998) states:

are not a natural given and must be constructed through investments strategies oriented to the institutionalization of group relations, usable as a reliable source of other benefits (p.3).

In this sense, since the 1980s in the Ecuadorian Highlands there has been an increased proliferation and active encouragement of institutional arrangements for involving water users in irrigation management and the development of broad water centred networks. These attempt to give a greater role in policy making, administration and management of water affairs to local level civil society by stimulating the self-management of what was previously provided and organized by the national or local state (see Cremers *et al.* 2005; Hoogesteger 2012a). How both forms of social capital have been trans-formed and is presented though the case study of the Pillaro Ramal Norte irrigation system presented below.

3 TRANSFORMING SOCIAL CAPITAL IN THE PÍLLARO RAMAL NORTE IRRIGATION SYSTEM⁶

After acquiring land during the agrarian reforms of the 1960s and 1970s (see de Janvry and Sadoulet 1989), many communities engaged in struggles for obtaining irrigation water through either the rehabilitation of old formerly *hacienda* owned irrigation systems or the construction of new ones (often financed by external agents and the state). One of these territorially bound peasant organization was the Federation of Farming Organizations of San Andres and Píllaro (*Federación de Organizaciones Campesinas de los Cantónes San Andres y Píllaro*, FOCCAP) in the Píllaro borough of the province of Tungurahua in the central Ecuadorian Highlands. As a community leader explains:

In every community we had organized a committee of development ... later we organized in the FOCCAP to bundle our efforts to find external sources of support to develop the region. We started first with some funds of PRODEPINE⁷. With the organization we have progressed, progressed, progressed...

The history of the North Píllaro irrigation system begins at the end of the 1960s. At the time, INERHI built the Pisayambo dam and the Pucará hydro-electric power station. INERHI's plans envisaged the construction of the Píllaro irrigation system in order to productively use the water that had passed through the hydro-electric power station for irrigation purposes. A tunnel of three kilometers and a distributor, which divides the flow into two main sections, the Píllaro Ramal Norte and the Ramal Sur system were built, but because of a lack of funds further construction of the irrigations system was suspended in 1971 and was only retaken after continued struggles of the FOCCAP. In 1995, FOCCAP began to work in collaboration with the communities of the parish of San Andrés to complete the 17.6 kilometers of the main canal of the Ramal Norte system. As one of the former community leaders explains:

We have fought; we have tried to fund our projects. ... We tried to get the governments to help us but we also organized ourselves... every Saturday and Sunday we were working on the main canal. We had a president of all the communities and he used to call us out to work through mingas.

According to FOCCAP the communities dug the canal through 90,000 *mingas* and other material and financial contributions (Dries van den and Jaramillo 2000). In 1997, the communities at the head-end of the main canal began using water. While working on the construction of the canal, FOCCAP sought through outward looking social capital technical and organizational external support in order to complete the irrigation system. As part of these efforts, between 1996 and 1997 they approached

⁶ The Píllaro irrigation system is composed of the Píllaro Ramal Norte and Píllaro Ramal Sur main canals. At the time of study the technical and organizational interventions in the Píllaro Ramal Sur had only started and were based on the intervention methodology that had been used in the Píllaro Ramal Norte canal. Therefore I focused my case study only on understanding the organizational development of the Píllaro Ramal Norte canal as is explained in this article.

⁷ This World Bank financed project financed local development projects through second tier organizations Andolina, R., N. Laurie and S. Radcliffe. 2009. *Indigenous development in the andes; culture, power and transnationalism*. Durham and London: Duke University Press ; therefore, to access these funds, the communities formalized their collaboration through the creation of FOCCAP.

several NGOs including CESA, that had a long trajectory and vast experience in irrigation intervention projects and in attracting funding to execute these projects.

At the end of 1998, with foreign development funds, CESA began a participative diagnosis and planning process that resulted in a Local Development Plan and funding proposals to start an intervention process in the area. In May 2000, CESA -that had been able to access development funds from German (*Welthungerhilfe and Deutsche Gesellschaft für Zusammenarbeit*) and Spanish (Intermón-Oxfam) donor agencies- began to work with the communities on a) the construction and installation of the secondary and tertiary canals of the irrigation system in the San Andrés parish⁸, and b) the organization of water management organizations. Between 2001 and 2003, after a prolonged lobbying process by part of FOCCAP, the Corporation for Regional Development of the Central Sierra (*Corporación de Desarrollo Regional de la Sierra Centro*, CORSICEN) reconstructed and lined the main canal of the irrigation system in collaboration with CESA. At present the irrigation system, has a water allocation of 1,270 litres/second with which 3,270 hectares are irrigated with a water distribution ratio of 0,39 litres/second/hectare, benefitting some 3100 families (Dries van den and Jaramillo 2000).

3.1 Trans-forming inward looking social capital in new organizational spaces

In the area strong bonds of social capital existed at community level and was coordinated at supra-community level through FOCCAP. Nevertheless, after the external intervention process CESA has taken over the central role of facilitating and supporting the consolidation of water user organizations at different levels of the irrigation system. Based on state guidelines their intervention process that was accompanied by CORSICEN stipulated the formation of Water Assemblies (*Juntas Sectoriales*) responsible for the operation, management and administration of the secondary and tertiary canals through Modular Committees (*Comités Modulares*). This has led to the organisation of 25 Water Assemblies (11 in San Andrés and 14 in Urbina). The water users were organized in structures that were created alongside the existing community structures and alongside the already existing FOCCAP even through initially the FOCCAP wanted to become the organization responsible for the management and administration of the irrigation system.

To coordinate the operation, maintenance and administration of the main canal and the coordination of the Water Assemblies, the Central Water User Organization for the Píllaro Norte (*Junta Central de Riego Píllaro Ramal Norte*) canal was consolidated. The Central Water User Organization for the Píllaro Norte canal in turn is part of the Water Users Association Píllaro (*Junta Central de Riego Píllaro*). This association congregates the water user organizations of the Northern main canal as well as that of the Southern main canal of the Píllaro irrigation system (a pre-assembly had been in existence since 2005). After its consolidation, the Water Users Association Píllaro has become the organization that represents the interests the water users of Píllaro towards external organizations (see also table 1).

⁸ The second phase of the project, (beginning in 2005) included the communities of Urbina parish in the project.

Table 1 Organizational structures of the Pillaro irrigation system (own elaboration).

Level	Functions
Water Users Association Pillaro	Coordinates the administration, operation and maintenance of the main canal and tunnel up to the Santa Rita distributor. As legal representative organization of the water users of Pillaro it represents water users interests at local, regional and national levels through NGOs and state agencies.
Central Water Users Organization Píllaro Norte canal	Administration, operation and maintenance of the main canal and water distribution to the Water Assemblies. Representation of the users of the North Canal of the Píllaro Irrigation system in the Water Users Association Píllaro and with external agents. With external support it has been able to construct a field office for the administration and collection of the irrigation fees and it is also the office where the ditch tenders are based.
Water Assemblies	Administration, operation and maintenance of the secondary reservoirs and canals for each sector. Distribution of water to the Modular Committees by means of a ditch tender.
Modular Committee	Administration, operation and maintenance of the tertiary canals and distribution to plots amongst users (with or without a ditch tender).

State guidelines have determined the normative framework of the water users of the Pillaro irrigation system. This normative framework, which was imposed on top of already existing organizational forms was the basis for the trans-formation of social capital in the water user organizations but its imposition and the creation of new spaces has not been uncontested. As a community leader explains:

I think it would be better if the community organization and the water organizations would be together. Now each one calls separately for assemblies. One for issues concerning water; the other for other issues. I think these should work together. We used to do all in the community organization... and that kept us united. Now divisions have been created because of two different assemblies... now there are people that do not want to know anything about the community.

The normative framework that was imposed established the access and operational rights as well as the control rights within the newly created water centered organizations. These included the following important principles:

a) Access and operational rights which include amongst others:

- All landholders within the potentially irrigable area of the system (which is defined by state technicians) are eligible to acquire a water entitlement through two mechanisms:
 - a) Acquired rights: All users who participated in the *mingas*, meetings and mobilizations for the construction of the main canal, and in the *mingas* for the construction of the secondary canals are entitled to become users of the irrigation water.
 - b) Bought rights: Those who did not participate in and contribute to the construction of the canals may ‘buy’ their water rights and become members of the irrigation system. To do this, the new users must: a) have their land within the irrigation system’s zone of influence (as established by the plans) or b) apply to the users’ register of the Junta Central de

Riego (JCR – Central Irrigation Assembly), and c) pay the equivalent of ten days' wages and a fixed amount per plot of land (a plot of land is around 2000 m²).

- Water allocations are proportional to land tenure at a distribution ratio of 0.39 l/s/ha.
- Infrastructure and water flows of the primary and secondary canals are operated in principle by a ditch tender.
- At tertiary level and at plot level either water users or ditch tenders can operate and infrastructures and water flows.

Control rights include amongst others:

- The structures of the organizations and the formal contents of the normative framework for water management are predefined by state established legal guidelines.
- Water users organizations are responsible for the administration, operation and management of the irrigation system at different levels in the irrigation system.
- General assemblies are the highest decision making body of the water users organizations.
- All water users with a formal water right have a voice and a vote in the general assemblies.
- The day-to-day decisions and coordination of the water users organization and its management is delegated to a democratically chosen directive board.
- All water users have the right to become eligible for the different positions of the directive board of the organization.
- All the water users democratically choose the members of the directive board for a period of two years during general assemblies.
- The general assembly has the faculty to destitute the directive board members before their two-year period is fulfilled.
- Rights, responsibilities, rules and sanctions of water users can be established locally by the general assembly and can include fines and the temporal or permanent loss of the right to access water.

Through their organizations and based on this normative framework which one user called 'egalitarian yet not equitable' making reference to the fact that it does not take into account the previous investments of people through *mingas* and community participation, at present the water users administer, operate and maintain their irrigation system and ensure water delivery at plot level. Nevertheless internal differences and conflicts still exist and will probably remain.

For instance the collective of water users of the parish of Urbina, has a very well working organization in which high levels of trust persist. These are based on the already existing forms of social capital in the community. They have formed a Cooperative of Water Users of Urbina through which the water fees are collected from the different families and then are paid to the Water Users Association collectively. This Cooperative has built its own office which is used to discuss water issues in the Parish as well as other issues of collective interest. In this venue local conflicts over water are discussed and solved based on their local normative framework.

On the other hand there are communities that, while having strong internal community bonding have not in first instance bridged and in second instance bonded with the water users organizations outside of the boundaries of their community. As a staff of CESA explains:

There are people that do not respect the normative framework... they refuse to pay the water tariff... we have had a lot of problems especially with the community of Huapante Grande where people do not want to pay... saying that if they pay it will only be for their sector and community to for instance paint the church. (CESA staff-1)

Cases of individuals that fail to recognize the normative frameworks of the water user organizations also exist in the irrigation system causing several problems and delays with the construction of the infrastructure:

There are a lot of problems regarding the right to let water pass through private plots by means of the construction of the needed canals. It seems that sometimes once people have their access to water secured, people forget about the collective interest of the water user organization. (CESA staff-2)

In general terms, the organizational structures have kept on working according to the established water rights and internal statutes even though there are different visions and practices on how these are to be implemented. For CESA technicians who have trained many of the younger leaders, the formal established rules have to be implemented in order to make the irrigation system and its organization work well. Nevertheless this sometimes is at odds with the norms of older community leaders that have their roots in the community traditions of reciprocity:

In the last years we have had some conflicts... the Water Assemblies have separated themselves from the community structures... and the new directives have applied a lot of monetary sanctions and that creates conflicts. ... Of course there are people that forget to pay but we have to convince them that we all have to pay.

Despite the many conflicts that arise within the organizations, in general terms the organizations (be they community based and/or water user based) have proven to have the capacity for organising collective action for water delivery and the functioning and renovation of the organisational structures even though normative frameworks have been adapted and internal conflicts and struggles remain. As one of the water user says: 'in general and despite the conflicts that persist and sometimes arise, people have kept together in the *mingas* and in the assemblies.' A feeling that CESA shares when one of its staff members asserts that:

We feel we have created a good social basis of trained water users that are working for the service of the larger good of the water users [through their organizations].

3.2 Co-producing outward looking social capital

Outward looking social capital has been present in the area for a long time. In first instance it enabled the communities to unite in the FOCCAP. Once united in the FOCCAP the organized peasants established good contacts This also enabled FOCCAP to link and brace with CESA and other external actors such as CORSICEN, the municipality of Pillaro and with different national state instances such as PRODEPINE and the Ministry of Agriculture, Livestock and Fisheries (MAGAP).

Still CESA has given a lot of attention to the further co-production of outward looking social capital. In doing so it has developed networking and negotiation skills (linking and bracing social capital) of the water users and especially the leaders of the organizations. The development of skills has been done through formal trainings through courses but also by supporting and advising the leaders of the organization throughout the processes and negotiations they have with external agents. This sometimes takes the form of formal advices but often implies doing things together with the users; a strategy that brought forward its fruits for both CESA and the organized water users.

The water users have been able to obtain the support of the town council of Pillaro for the construction of 23 night reservoirs. Moreover, the town council has supported some of the production and commercialisation initiatives that have been carried out in the irrigation system. In 2007, the water users were able to obtain resources from MAGAP for the further improvement of the irrigation system (reservoirs and sprinkler irrigation) of Píllaro Ramal Norte and for the construction and expansion of the Píllaro Ramal Sur. Initially these resources would be channelled to CORSICEN that was formally responsible for the irrigation system. Yet, based on the bad experience the water users had with CORSICEN, they managed to negotiate that the funds (4 million dollars) were channelled and managed by the Provincial Council of Tungurahua (which has a good reputation with regards to the management and execution of projects in the province).

The Water Users Association Píllaro was able to amend the terms of the system's formal water allocation in 2008. With support of CESA specialists, the water users negotiated a contract modification with CORSICEN, SENAGUA, the national council on electricity (CONELEC) and the company that operates the Pucará hydropower station (Hydroagoyán S.A). They managed to change the legal status and terms of use of the water allocation of the Pucará power station from a power station allocation into a multi-purpose water allocation, which made irrigation the priority use. This way, the irrigation system has improved its water supply. The power station, through which water is supplied to the Pillaro Irrigation System, has changed its functioning regime to prioritize the supply of water for irrigation purposes.⁹ At present CESA has stopped its direct involvement in strengthening the water users organizations in Píllaro Ramal Norte and is working with the water users of the Píllaro Ramal Sur, consolidating their organizations and developing their water management skills.

4 Discussion: New organizational spaces and the re-shuffling of power relations

This article shows how the Pillaro Ramal Norte water users organizations consolidated as new social spaces with the support of CESA. This process of social transformation and the creation of new local social (and technical) spaces and scales (modular committees, water assemblies and water user organizations) went paired with the consolidation of new natures through the construction and expansion of irrigation infrastructure and the related water flows. These new scales have bought

⁹ Although legally and on paper these changes have taken place, their implementation is still not always followed because for power generation purposes the new operation guidelines are not ideal. Therefore it has kept on being an issue of struggle.

about several changes in terms of social relations, especially as they were created alongside existing community structures and social relations. Of course many of the social relations and bonds of trust and reciprocity in the water centred organizations built on those that had been created in community organizations and the FOCCAP. Nevertheless within the new spaces of decision making that also have different territorial and membership boundaries also new social dynamics are generated. These new dynamics are shaped by the newly introduced normative frameworks and skills that are based on a rationality that differs from those of the community based organizations (Boelens 2008). In this case the state guidelines established the rationality of a large part of the normative framework. An although as Boelens (2008) explains that local communities change and adapt these normative frameworks to hybrids in which their own values are represented, these new hybrids also incorporate and normalize some of the elements of the externally imposed frameworks. This often creates conflicts and struggles between different individuals that strategically use and borrow elements of these different frameworks (Roth *et al.* 2005).

An alternative to the imposition of these external normative frameworks and the creation of two different local spaces of social capital transformation (which often generates local conflicts), is the development of new locally rooted normative frameworks through participative processes as is described in detail for the case of Cangahua in Hoogesteger (2012b). In Cangahua due to a long participative process a locally rooted normative framework was created for the management of the irrigation system. This resulted in the strengthening of community organizations and their social capital. The basis for this was making these organizations responsible for the management of water affairs at local level (as also happens in most autonomous community managed irrigation systems) (Boelens and Doornbos 2001).

Yet despite the fact that the irrigation system and water flows are managed by new organizations and new externally imposed normative frameworks (that in most cases are informally and in practice adapted and mixed with already existing frameworks), enough inward looking social capital has been transformed (bonding and bridging within and across the different organizational levels in the irrigation system) to arrange the internal affairs and management tasks needed to sustain the irrigation system and deliver water. This is done despite internal conflicts in- and among the different levels of the water centred organizations. I attribute the permanence of cooperation and collective action in the water user organizations to the importance of water in everyday life and the livelihoods of most water user. As one user said: ‘... despite the conflicts we now have our water. Before we had to fetch it in the river; and now we have it in our homes’ and another asserts the importance of irrigation when stating ‘these soils were only good for barley and maize... now we can sow potatoes, vegetables... we have a small pasture for the animals’.

This same need for cooperation to ensure water delivery through water user organizations has been the driving motive for the development of outward looking social capital. This capital which was already developed within the communities and the FOCCAP has been further strengthened by capacity building activities of CESA and their direct support in many of the negotiations with external agents. Yet, contrary to broadly carried inward looking social capital that is permanently needed for the management of the irrigation system, outward looking social capital is only needed at specific moments in time. Furthermore this capital is often only mobilized by a few

leaders that link and brace with external agents for getting ahead with one specific demand, which most of the time is related to the sustainability and modernization of the irrigation system. In other cases, such as described in (Hoogesteger 2012a; b), this external capital can also serve water users to develop political agency at provincial and national level. At these levels often the demands of water users are broader and concern struggles not only of the specific irrigation system, but more generally of the broader group of peasant water users.

At the level of outward looking social capital the fragmentation that has been created between the community and the water user organizations also has effects. While broader community demands for recognition and/or development projects used to be carried out by second tier organizations and their related national federations (Becker 2008; Perreault 2003a; b), at present new national federations that focus exclusively on issues around water have emerged. These new water centred federations often have different mostly water and irrigation specific demands, allies and strategies. The proliferation of these issue specific federations has, according to Petras and Veltmeyer (2006) and Bretón Solo de Saldivar (2002), often weakened more progressive movements that demand structural social change and social equity. While this might indeed be a result of the rise of issue specific federations and networks around water, it is also a mechanism to achieve very specific demands and concerns with palpable positive results for the water users.

5 Conclusions

The creation of new organizational spaces in which social capital gets formed and is mobilized most of the times builds on/and transforms existing forms of social capital present in other groups (see Hoogesteger 2012b; Perreault *et al.* 1998). This example of the Pillaro Ramal Norte Irrigation system clearly shows that the basis of the inward looking social capital through which the irrigation system is administered, maintained and operated rests on the social capital that existed in the community organizations of the region; many of which wanted to also manage irrigation within their boundaries. These organizations had in first instance struggled for the development of their communities' through the creation of their own development committees that sought to find institutions and projects that would fund local development projects. Through in first instance bridging among communities and in second instance bonding, these communities united in the FOCCAP in order to access funds that were channeled through PRODEPINE. The social capital that existed at these two levels was mobilized inwardly through assemblies in which collective decisions were taken and *mingas* for digging the main canal of the irrigation system and outwardly by searching institutions with which they could brace in order to finance diverse development projects such as support with credits, access to markets, funds to build roads, schools and other basic services and build the desired irrigation infrastructure.

As Portes (1998) states this social capital has three complementary functions which are: a) a source of social control and enforcement of the shared normative framework (*mingas* and assemblies), b) a source of support from other members of a defined and bounded group (collaboration through FOCCAP), and c) a source of benefits through broader extra-group networks (access to external funds and projects). Nevertheless

with the creation of new organizational spaces for the management of water flows and the irrigation system this existing social capital was not only mutated to new spaces; it was also developed in new forms sometimes fragmenting existing community based social capital through the imposition of a new normative framework and organizational space that was based on state guidelines. These changes have brought about changes in the existing social relations and have transformed these in very locally specific ways. For instance in the community of Huapante Grande the community structures and normative frameworks have remained fairly untouched. In others such as in Urbina, and especially at higher levels the Central Water Users Organization Píllaro Norte, and the Water Users Association Píllaro, new normative frameworks and dynamics in social relations have evolved that are specifically concerned with water management. These new organizations and its leaders have in some cases explicitly side-lined the already existing organizations and normative norms that existed in the FOCCAP by claiming the water domain as theirs and delegating 'other' rural development issues to FOCCAP.

In terms of the mobilization of collective action through social capital (Putnam 2000), the new water user organizations have transformed communal relations in variegated manners. They have shifted social relations from those based on a strong sense of a shared community identity into associational relations that are based, not on a shared identity, but on the shared interest of materializing irrigation water delivery to the plots. In doing so divides have been created within communities between those that have access to irrigation water and those that do not. This divide has consequences for the capacity of community organizations to mobilize collective action. The presented case shows that at least in some of the communities in Píllaro, communal organizations have seen their capacity to mobilize collective action for the benefit of the whole community reduced. The newly created axis on which social relations of reciprocity have developed in and around water and agricultural production with irrigation, now competes with other binding elements such as a shared cultural and/or territorial identity which sums up to the fact that through the ever increasing insertion of rural families in broader networks and markets the social capital that is engrained in community structures become less relevant for the sustenance of rural livelihoods (Jokisch 2002; Korovkin 2003).

In terms of outward looking capital also new organizational scales are created based on hydraulic boundaries and one very specific shared goal. Whereas the mission of the FOCCAP is to stimulate and struggle for the development of its communities in a broad sense; the water user organizations have just one single yet very powerful shared objective which concentrates around irrigation management (Ruf 2000). As these organizations shared the same pool of constituent members they compete with each other for their commitment and the renovation of new leaders; a competition which often gets tilted towards the water centered institutions. This happens because the members' dependence on access to water to maintain their livelihoods preempts the strength of the water centered normative framework (Boelens and Hoogendam 2002; Hoogesteger 2012b). At broader scales such as that of provincial and national federations and networks this same process is taking place sometimes challenging the legitimacy and achievements of the longstanding federations and unions such as that of the Ecuadorian indigenous movement.

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