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# Fighting over water values: diverse framings of flower and food production with communal irrigation in the Ecuadorian Andes

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## ABSTRACT

Water management studies often overlook community diversity, different stakeholders' values, and frames to claim water rights. Using a political-ecology approach, this article examines an irrigation system in Ecuador's highlands via Fraser's principles of justice (recognition, representation, redistribution). Large flower companies and indigenous smallholders frame their arguments differently to legitimize water allocation claims. Framing is effective when it resonates with other stakeholders' values. Some unexpected findings are explained: most of the water is still used by large companies since communities took control; rules regarding water use differ greatly among sectors in the system; and small flower producers have been appearing recently.

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Community irrigation; flowers; values; communal water resource management; framing; Ecuador

## Introduction

Communal natural resource management is often studied through community institutional rules (Ostrom, 1990; Ostrom, Burger, Field, Nørgaard, & Policansky, 1999). This tends to evade the diverse values, interests and rules within communities and the complex institutional environments of communities. Studying fights over water values, and over the value of water use and control, is crucial to understand communal governance.

The Tabacundo irrigation system in northern Ecuador is a good example of these dynamic fights over water values. Water is scarce, and water access is contested. This *acequia*<sup>1</sup> was built a hundred years ago and irrigates 4200 ha. After a march in 2006, smallholders took over control of the irrigation system from the municipality. However, most of the water continued to be allocated to the hundred large flower companies. More than 2500 families use the rest of the water for subsistence agriculture. Recently, 300 of them started growing roses in small greenhouses; their claim intensifies battles over the access to, and control of, irrigation water. This case shows the diversity of values and interests – and related water use and control claims – in water user communities.

Export flower production in Ecuador started in the early 1980s. By 2001 a hundred flower companies were exporting flowers worth US\$ 238 million. In 2012 there were 571 companies on 4000 hectares, exporting flowers worth US\$ 608 million (ProEcuador, 2013). Flowers became Ecuador's fourth-largest export commodity and generated 100,000 direct and indirect jobs (Expoflores, 2013; Guerra, 2012; Harari, Harari, Harari, & Harari, 2011). Ecuador is currently third in total cut flower exports (US\$ 798 million; 10%), after the Netherlands (US\$ 4672 million; 45%) and Colombia (US\$ 1374 million, 16%) and ahead of Kenya, Belgium and Ethiopia (United Nations, 2016).

Concerns about the impact of industrialized floriculture are widespread regarding resource concentration, health, food security, ecology, labour issues and community well-being (Brassel & Montenegro, 2011; Breilh, 2007; Korovkin, 2002). Local small-holders have mixed feelings: they see the advantages of jobs, while suffering pollution, water insecurity and reduced food sovereignty (Guerra, 2012). Especially women work in the flower business, which has significant effects on gender relations (Ferm, 2008).

This study shows how an intricate set of values plays a crucial role in water allocation to different water-use sectors in an irrigation system. Using the three principles of justice formulated by Fraser (1998, 2005) – recognition, representation and redistribution – we highlight struggles over these values. We scrutinize how stakeholders strategically frame their water claims and values, and examine their practices to highlight the political dimensions of socio-environmental framings (Stott & Sullivan, 2000) and explain conflicts in terms of value-laden struggles over visions of production, authority and practice (Watts, 2000).

## Conceptual framework

We apply a political-ecology framework emphasizing water values. Martínez-Alier (2002) discussed how in conflicts over natural resources arguments and claims are often expressed using different valuation systems and languages. Duarte-Abadía and Boelens (2016, p. 18) explain that:

Languages of valuation, therefore, concretize actors' regimes of representation; they represent actors' worldviews and knowledge systems (epistemology and ontology), socio-economic interests and cultural and political relations, expressed through concepts, discourses and normative frames.

We agree with Forsyth (2001, p. 148) that the construction of socio-environmental issues involves “a hybrid blend of physical impacts, social framings and values that reflect the perspectives of more powerful groups”. Dominant valuation languages fail to recognize the cultural and cohesive function of communal land and water institutions, their complex rights systems, and their multi-layered resource use valuation and management relationships (Duarte-Abadía & Boelens, 2016; Gelles, 2000; Groenfeldt, 2006). However, the framings of peasant and indigenous communities in the Andes often question and contradict the dominant, market- or science-grounded, discourses and valuation languages. According to Boelens, Hoogesteger, and Rodríguez de Francisco (2014, p. 85–86), these value systems grow from “the historical evolution of local communities' socio-natural relationships that link people, place, and production

while shaping local water territories, organizations, identities, and cultures”. This article will argue that this division is not simply dichotomous; rather, hybrid languages and amalgamated forms of water-use valuation exist.

Fraser (1995, 1998, 2005) proposed three principles of justice to examine valuation conflicts: recognition, representation and redistribution. They represent interrelated dimensions of social struggle and are irreducible ends of social conflict. Nevertheless, a particular struggle by a social movement at a particular time might emphasize one of the three dimensions in its fight for social justice.

*Recognition* involves the cultural dimension, a struggle between dominant and subalterns’ values, imaginaries, identities, ideas, norms, ethics and knowledge (Castro, 2007; Groenfeldt, 2006). In the Andes, the cultural meaning of water is an important issue in the political struggles over water control (Boelens, 2014; Gelles, 2000). The ‘water for food sovereignty’ argument used in those struggles can be related to the moral-economy concept described by Polanyi (1944) and Scott (1977), who argue that peasants do not seek to optimize economic returns, but rather prefer to avoid risks through solidarity and self-sufficiency to safeguard the survival of their family farms.

The struggle over *representation* seeks political influence, decision-making power, legitimacy and authority. Local representativeness influences debates on water governance, with increased attention for local multi-scalar strategies to enhance communities’ claims to share in authority and decision making, and thus defend their values (Bolin, Collins, & Darby, 2008; Hoogesteger & Verzijl, 2015).

The struggle over *redistribution* attempts to restructure access to productive (land, water, labour) and economic (jobs, capital, income, property, subsidy, rent, credit) resources. In this struggle economic and social issues are intertwined:

Culture and economy are thoroughly imbricated with one another... Even our core economic practices have a constitutive, irreducible cultural dimension; shot through to the core with significations and norms, they affect not only the material well-being of social actors, but their identities and status as well. (Fraser, 1998, p. 40)

The three R’s interrelate in other ways: e.g., with access to economic resources, the fight for recognition can be financed. Increased representation will also facilitate increased recognition. Thus, the three dimensions of justice are complexly co-dependent. Values and ways of framing values intrinsically and strongly interlink the complex struggles for the three R’s.

Studying framings used by stakeholders, and their behaviour, reveals the substance and role of values among these tensions. Framing is strategic communication. Benford and Snow (2000, p. 612, 614) describe framing processes as

the generation, diffusion, and functionality of mobilizing and counter-mobilizing ideas and meaning... [Frames intend] to mobilize potential adherents and constituents, to garner bystander support, and to demobilize antagonists... Collective action frames are action-oriented sets of beliefs and meanings that inspire and legitimate the activities and campaigns of a social movement organization... [Frames are] “the outcome of negotiating shared meaning”.

Thus, a stakeholder might gain political recognition, mobilize support and attain representation if its framings have a high degree of articulation and ‘resonate’ with other stakeholders’ values.

## Field research methods

We conducted 75 interviews with floricultural farm representatives (owners, managers, technicians) and irrigation users from all irrigation sectors in April–May 2013. Follow-up field research was done throughout 2013–2015, concentrating on water distribution and control, and the practices of framing water-use values. This included 15 open interviews with local government representatives, flower export association personnel and other relevant actors. In-depth open interviews with board members and community leaders of the five irrigation sectors (October 2013 – December 2014) were fundamental to amplify the perception spectrum. The respondents have been kept anonymous.

We also examined official databases and documents regarding water concessions and the irrigation system's technical features and governance. We used satellite images from 2002 and 2013 to track the development of large (>2 ha) and small (<2 ha) flower greenhouses.

## The water question and Ecuador's flower boom

The Tabacundo irrigation system is a global flower-production hotspot, along with others in the Netherlands, Colombia, Kenya, Tanzania and Ethiopia (ProEcuador, 2013). Africa and South America share conditions for year-round flower production: constant day-length and high insolation; cool temperatures at intermediate altitudes; low labour costs; and nearby international airports. In Ecuador, as in Africa, local farming communities share the water needed to irrigate flowers in greenhouses, and the communities dispute flower companies' water use (see e.g. De Bont, Van Veldwisch, Komakech, & Vos, 2015).

The communally managed irrigation system serves more than a thousand hectares of greenhouses with waters from the Pisque River. Its history goes back to the beginning of the twentieth century. Between 1903 and 1924, large *haciendas* (feudal-like landholdings) built it using forced labour from indigenous communities. In 1924 the municipality of the canton of Pedro Moncayo extended the canal to bring water to its capital, Tabacundo. Until 2006, the municipality managed the canal, allocating and distributing irrigation turns, collecting fees and organizing maintenance. Hacienda owners, and later dairy and flower companies, dominated the municipal council (Hidalgo, 2010; Poats, Zapatta, & Cachipundo, 2007; Zapatta & Mena, 2012). Most water was allocated to haciendas, and only a small part went to communities for subsistence crops. Nowadays the system irrigates a total of 4200 hectares.

The 1960 and 1973 land reforms redistributed some land to smallholders, but many haciendas retained large tracts. From 1964 to 1970 just 10% of peasant families in the Ecuadorian Andes received land (Becker & Tuttilo, 2009). In the 1970s, many large haciendas became intensive dairy farms. This intensification paved the way for capital-intensive flower production. According to Becker and Tuttilo (2009, p. 13), the agrarian reforms

only meant deeper capitalist penetration, concentration of agricultural enterprises, and development of agribusiness. The government gave land to the peasantry but no

machinery, seeds nor technical assistance [, which impeded] their transition to sustainable agriculture... Former hacienda workers became a cheap, unskilled labour force that now lacked water, pastures and roads.

The 1980s neoliberal environment boosted the emergence of export flower agribusinesses. To enhance competitiveness, favourable fiscal and market conditions were instituted, bolstered by foreign investment (Hidalgo, 2010; Korovkin, 2002; Larrea, 2006). From 1990 to 2000 flower production boomed. National and foreign investors found their way to Tabacundo. In some cases, hacienda owners started flower farms; in others, foreign companies bought large landholdings. By 2007 in the study area more than 80% of the flower farms were financed by national investments, 5% mixed foreign and Ecuadorian, 9% US, 4% Dutch and 1% Colombian (Harari et al., 2011). By 2000, 90 big (>2 ha) companies produced flowers for export on a thousand hectares (Ochoa, 2013). About 40,000 people work in the flower industry and related activities in Tabacundo and Cayambe (Soper, 2013). Both Tabacundo (today the self-proclaimed Rose Capital of the World) and Cayambe (“We grow the world’s best roses”) developed from tranquil provincial villages into bustling commercial towns (Figure 1).

Smallholder communities have benefited little from this boom. Local people view flowers with mixed feelings: they appreciate the jobs, but consider environmental degradation from agrochemical use, social fabric erosion and the shift to a ‘commercial’ lifestyle negative (Soper, 2013). Since 2005, about 300 smallholders have built small greenhouses, putting even more tension on the distribution of water to smallholders.

The unequal water allocation and bad service towards the small landowners by the municipality led to a massive protest in 2006, after which indigenous communities took control of the system. In 2008 the water users’ organization received the official



**Figure 1.** Part of the Pisque River watershed, showing the white plastic of large and small rose greenhouses. (Photo: P. Mena-Vásconez 2014)



concession from the national authority. Yet this did not result in a substantial redistribution of water from the big flower companies to smallholder irrigators.

### Three fights over water values

Three successive struggles over water and water values in the Tabacundo system will be analyzed using Fraser's justice principles. These struggles are (1) the management takeover from the municipality by the water users' associations of Tabacundo; (2) tensions around water for big flower companies or food crops within each of the irrigation systems' sectors; and (3) the emergence of local small flower-production units.

#### *CODEMIA's takeover of the irrigation system*

After the land reforms (in 1960 and 1973), indigenous communities got access to more land, yet irrigation-water distribution remained very unequal. In Tabacundo, only 12 out of nearly 60 communities in the canal command area had water rights, whereas all hacienda land in the command area had entitlements (Hidalgo, 2010). The municipality had a major incentive to favour large farms in water allocation: the fee (paid for 24-hour irrigation turns) for flowers was many times higher than that for smallholders. This difference, legitimized as a social measure as flower producers were able to pay more than smallholders, only magnified the unequal allocation.

With increasing political organization by indigenous people in Ecuador (starting in 1992 with the '500 years of resistance' protest movement) as well as growing political recognition of indigenous rights by successive governments, communities started to question this distribution. Smallholders' frustration with the municipality grew due to the systemic discrimination against them by bureaucrats in distributing water turns. They had to wait in long queues at the city hall to pay for their turns, while flower and cattle farmers could order water by telephone. Turns already paid for were often not delivered; and water flows often did not reach their fields, while haciendas and companies received stable flows.

The 2005 drought was the turning point. Several second-tier indigenous communal organizations (STOs)<sup>2</sup> established an organization called the Pre-Directorate to assume canal administration. The Salesian University and NGOs helped communities organize, and in February 2006, 3000 users joined a rally to take over the canal. They walked along it, breaking padlocks and installing their own. The takeover led to conflicts with the municipality, flower businesses and hacienda water users. In January 2008, the National Water Authority (SENAGUA) recognized administration of the system's water by the Pre-Directorate, now called CODEMIA-CPM.<sup>3</sup> In April 2008, SENAGUA granted CODEMIA the concession for the canal's water (Hidalgo, 2010).

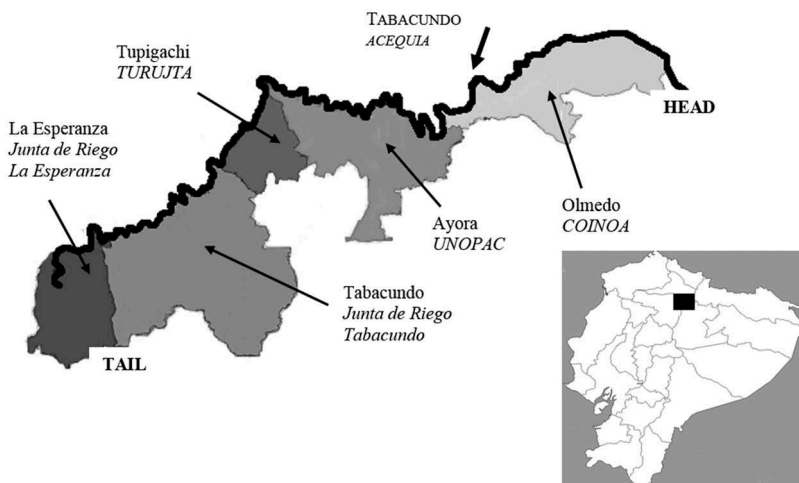
Three reasons were given by CODEMIA to justify the takeover. First, their ancestors worked to construct and maintain the canal: water rights are history- and culture-rooted. Second, water should be used for food, not flowers: water rights need to be livelihood-based. Third, irrigation water should be distributed equally: water has an important social value. Manuel Castillo, CODEMIA's chairman, stated their position:

fighting against rich people's power over water; against displacement of indigenous communities to move flower enterprises in; and against lack of water to use their land to grow food crops. He also mentioned guaranteeing efficient irrigation water use; respecting each sector's peculiarities in water use; coherent, transparent social management; and defending peasant rights by participation and recognition of capacities and earlier efforts (Moya, 2010). In an interview, Castillo said:

Indigenous peoples hold water as the blood that nurtures the *Pacha Mama* [Mother Earth]. When asked to whom water belongs, they answer unambiguously: "It is ours!" Therefore, technical language is irrelevant and they speak plainly: "The only thing that incites a massive upheaval is when they mess with our water."<sup>4</sup>

Thus, communities framed their claims to take over canal management as an 'indigenous issue', which increasingly resonated with the regional and national governments and the broader public opinion. At the national level, recognition of indigenous rights was an important issue in the election campaign of President Correa, in power since 2007. These claims for taking over the canal were also in line with the redistributive policies to enhance farmers' access to land and water that would be promoted by the 2008 Constitution.

Five irrigation sectors were established, each corresponding to the irrigated territory of a parish (Figure 2). Within each sector, water is distributed to three types of users: communities, cattle haciendas and flower companies. In total 59 communities manage water inside their territory. The head-end irrigation sector is that of COINOA in Olmedo, followed by UNOPAC in Ayora and TURUJTA in Tupigachi. The water users' associations of Tabacundo and La Esperanza were established in the tail section. All the water users in these sectors are members of the General Assembly, and delegates from the five sectors form the Board of Directors (Hidalgo, 2010).



**Figure 2.** Sector division of the Tabacundo *acequia* (canal). The first name corresponds to sector's *parroquia* (parish); the second, to the corresponding second-tier organization or *junta de riego* (water users' association). The inset shows the watershed's location in Ecuador. (Adapted from Ochoa, 2013.)



Water demand in the command area systematically exceeds the canal's supply. Annual referent evapotranspiration is about 1070 mm, while average effective precipitation is only about 600 mm, resulting in a demand of 28 Mm<sup>3</sup>/y for the Tabacundo irrigation system. However, the canal delivers a maximum of 14 Mm<sup>3</sup>/y.

Chairman Castillo (2006) has stated that they aim to redistribute water from flowers to food crops, and claim to be doing so:

The *acequia* is the product of our ancestors' hard work, which gives us rights: we have been its permanent users; we live on this water; and we are able to manage it as we have done with other resources. Our fight is based on notions of participation, equity and transparency, and on the principle that water is for all.

Indeed, since the takeover all communities receive water regularly (once every nine days). However, the percentage of redistribution is relatively small. Rough 2013 estimates indicate that smallholders used 15% (2 Mm<sup>3</sup>) of the water, while cattle haciendas used 30% (4 Mm<sup>3</sup>) and the big flower companies used 55% (8 Mm<sup>3</sup>) (Table 1). Table 1 also shows the major differences in water allocation: 8000 m<sup>3</sup>/ha per year on average for the 91 big flower companies versus only 800 m<sup>3</sup>/ha per year on average for the 2535 smallholder families. Nevertheless, water users, and especially smallholders in the tail-end La Esperanza, expressed satisfaction with their increased access to irrigation water.

Smallholders have adapted their cropping strategies to the low water availability. They grow corn in the main rainy season (January–March) and small plots of irrigated potatoes in the dry season (June–August) (Ochoa, 2013).

Partial redistribution from big flower companies to communities led the former to find other sources of water, adopting three main technological innovations. (1) Reservoirs store canal and greenhouse rooftop water. Almost all big companies have two reservoirs: one in the upper part to store canal water, and another in the lower part to collect rainwater from the rooftops of the greenhouses. Satellite images show that in 2002 there were 184 reservoirs in the system's area, which increased to 377 in 2013. (2) Wells retrieve groundwater. About half of the major flower producers have a groundwater tube well (Ochoa, 2013). (3) Pumps recover runoff water flowing in deep gorges. Besides those water supply measures, application of drip irrigation inside greenhouses has been optimized.

**Table 1.** Landholding and water use per sector in the Tabacundo irrigation system.

Sector	Total irrigated area (ha)	No. of units	Average landholding per unit (ha)	Average water use per hectare (m <sup>3</sup> /y)	Average irrigation water use per sector (Mm <sup>3</sup> /y)	Average water use per production unit (m <sup>3</sup> /y)
Smallholder subsistence agriculture	2,400	2,535	1	800	2	800
Big flower companies (>2 ha)	1,045	91	11	8,000	8	90,000
Dairy cattle <i>haciendas</i> (>10 ha)	760	26	38	4,000	4	150,000
Total	4,205	2,652			14	

Source: Ochoa (2013).

Note. This table shows how the overall water allocation to the three different types of users is estimated from the irrigated area and the net irrigation requirements for the respective crops.

Interestingly, the principal change following the takeover was not a redistribution of water but the symbolic submission of flower companies to community rules and customs. Representatives of big flower companies now attend the general assembly and participate in *mingas* (work parties). CODEMIA enforces this symbolic recognition of indigenous rules by the big flower companies. If they do not attend a general assembly or *minga*, their water supply is shut off.

### **Communities demand water for food sovereignty**

This section discusses struggles between water users with different ideas about, and valuation of, the use of irrigation water for certain crops. There are two main frames for irrigation water use in the Tabacundo irrigation system. The ‘agribusiness frame’ argues that the best way to use water is for export flower production because it maximizes efficiency, creates jobs for many people, modernizes and fosters cultural and economic dynamism, and contributes notably to the country’s GDP, within an environment of corporate social responsibility. The ‘food sovereignty frame’ argues that water should be used to produce traditional Andean food crops because that provides food security and sovereignty for local and regional people, and food crops use less water than agribusinesses. This framing counts dairy haciendas as local food producers, although this is highly industrialized, capital-intensive cattle breeding.

In general, flower entrepreneurs and workers use the agribusiness frame to legitimize allocation of most of the water to flowers in Tabacundo. Many smallholders and some local leaders use the food sovereignty frame to fight the skewed allocation. Some community leaders, as well as local politicians and governmental authorities, use both frames dynamically and look for ways of strategically blending water-use values.

Different framing and relative power of the stakeholders has led to a specific water allocation in each of the sectors among subsistence farmers, cattle haciendas and flower producers. The acceptance of water allocation to big flower companies by the smallholders in the downstream sectors is directly related to the historic presence of haciendas in those irrigation sectors, as those haciendas turned into flower companies using the historical allocation of water to hacienda land for their greenhouses (Larrea, 2006; Zapatta, pers. comm., 14 April 2014). The jobs created also add to the legitimacy.

However, communities’ contemporary institutional organization and leadership, and shifting opinions about flower or food production, also influence valuation languages and corresponding water allocation. Table 2 shows, for each of the irrigation sectors, the number of smallholders, cattle haciendas, big flower companies and the recently emerging small flower producers. Decision making on expanding or establishing new flower farms is complex. The municipality must grant permission for any change in land use. They look at environmental risk and distance from urban areas. Large companies’ economic and political power influences the decision-making process. The elected board and leaders of the irrigation sectors also have decision-making power; however, many of them refrain from opposing new floricultural expansion by smallholders, because of flower production’s potentially high economic return. In all five irrigation sectors the boards officially do not allow the further expansion of the greenhouses of big flower companies.

**Table 2.** Types of water users in the five irrigation sectors of the Tabacundo irrigation system.

Irrigation sector	Total irrigated area (ha)	Number of smallholders	Number of cattle haciendas (>10 ha)	Large flower companies (>2 ha)	Small flower producers (<2 ha)
COINOA	575	226	0	0	3
UNOPAC	1,160	631	9	4	9
TURUJTA	715	378	8	15	34
Tabacundo	1,600	926	8	65	224
La Esperanza	415	374	1	7	26
<b>Total</b>	<b>4465</b>	<b>2535</b>	<b>26</b>	<b>91</b>	<b>296</b>

Source: Ochoa (2013). Small flower producers' greenhouses were counted in 2013 satellite images.

Table 2 shows flower companies clearly concentrated in Tabacundo and, to a lesser extent, in the TURUJTA sector. UNOPAC and La Esperanza have some flower producers, and COINOA has one. It is not the altitude that dictates the low flower production in the COINOA and UNOPAC sectors<sup>5</sup>; rather, it is community leaders, who curb flower business expansion because they value subsistence agriculture and dairy farming more than flower exporting. In La Esperanza, part of the reason for the few flower producers is its position in the systems' drier tail end.

Below are illustrations of the framing by certain key stakeholders in the five irrigation sectors.

COINOA's president has said "Milk is better than flowers: can you eat flowers?" and "We need to have better territorial planning to avoid this boom of small flower farms" (9 October 2013).

In the UNOPAC sector, there are a few flower farms, divided evenly between small and large. The political authorities of Ayora Parish<sup>6</sup> stated that there are eight rose farms (between 5 and 8 hectares), but they also acknowledged that this tally did not consider several micro-farms that had appeared recently.<sup>7</sup> UNOPAC's president has stated, "We should only allow strawberries or organic summer flowers", and "There is indeed more income in flowers and pastures, but it is merely money. There are other considerations and other costs" (12 October 2013). Its vice-president added: "There are more disadvantages than advantages. It is true that there is more business, but there is also less water, and also more violence, divorces ... " (12 October 2013).

TURUJTA's president commented: "People prefer to work their own land, but they do not have sufficient irrigation water", and "Working in the flower greenhouses is very bad for workers' health" (13 October 2013).

Tabacundo's president, a community leader who led the 2006 protest, has been a member of CODEMIA's board ever since. He said, "We should not demonize the flower companies. Territorial planning should be better; we should diversify" (11 October 2013). La Esperanza's president added, "Flower companies use rainwater very efficiently", and "Fifty percent of our people work with big flower companies" (25 October 2013).

Large agribusinesses have their own ways of framing the social and economic valuation of water uses. In some points these agree with the community, more specifically with those families who have started a small flower farm. According to a large flower company owner and manager in the nearby zone of Píntag (16 January 2013):

We hire ten times more people than any other crop, using the same water more efficiently... Food security has to be analyzed carefully. Traditional crops are risky businesses. Hail or frost can destroy the harvest, while flowers grow under controlled environments. Maintaining traditional crops in these conditions is a romantic utopia. Look at what happened in Tabacundo. People were emigrating. Flowers transformed it into one of the wealthiest cantons, with a per capita income similar to Chile's, when it was one of the poorest. Women who were destined to be prostitutes are now harvesting roses ... who were second-class citizens as hacienda milkmaids, are now respected people with work contracts.

Another large flower farm manager in Tabacundo added: "Our workers get benefits that would be impossible had they had their own plot, with or without flowers: free transportation, day care centres, leisure trips, extra free days" (5 March 2013). A third interviewee agreed: "The community has benefited not only from jobs but from the maintenance of roads and other services the company provides for the entire neighbourhood" (5 March 2013).

Local authorities walk on slippery ground trying to accommodate divergent water-use values through an intermediate discourse. They defend water for food-based smallholder agriculture, for large-scale flower production, and also for small flower producers. These are the words of a municipal environmental management director and a municipal manager of solid waste (9 June 2013):

Small businesses have developed a profitable activity. What we want is for these growers' children to study and stop migrating. How many migrants do we have? The country needs to generate jobs. Indeed, we cannot control everything, but it's because the State doesn't collaborate with us, doesn't tell us what we need to do. We need to support these small businesses.

Unequal water allocation, defended and opposed by framing, is reproduced on a daily basis in distributing scarce irrigation water. Four *aguateros*, canal operators appointed and paid by CODEMIA, operate the 150 gates along the main canal. There is a fixed water delivery programme with irrigation turns once every nine days, lasting 24 hours. However, CODEMIA adjusts it according to vested rights, crops, fee payment and water availability.

After receiving water, each community delivers it to the users according to its own rules (which vary widely among communities). Communities also organize maintenance, infrastructure improvement and fee collection. Several communities have reservoirs and a piped distribution system to individual plots. Some communities with small flower producers have installed water meters in the piped systems to control the volume delivered to each user.

Aside from the unequal allocation, irrigation water is also stolen. Especially in drier periods, at night flower companies send armed guards, while communities organise *rondas*, groups of men armed with *machetes*, to defend the water scheduled for their communities (Hidalgo, 2010). Moreover, some flower companies pump water from the canal to irrigate flowers on the uphill bank, which is against CODEMIA's rules (but apparently tolerated). In several cases a major flower company's intake from the main canal is inside its own property, so neither the *aguatero* from CODEMIA nor community representatives can check the gate against established delivery schedules.

The differential tariff system introduced by the municipality remained in place when CODEMIA took control. As explained, this system was designed to foster a solidarity mechanism, but ended up being a strategy to get more money by granting extra water to those who paid more. Fees are paid at two levels. At the first level, all user groups that take water directly from the main canal (big flower companies, big cattle ranchers, and communities – including small flower greenhouses) pay a monthly fee to CODEMIA. The fees, based on a nominal flow of 32 L/s for 24 hours, are US\$ 1.60 for communities, US\$ 7.60 for cattle ranchers, US\$ 15.00 for small flower growers, US\$ 20.00 for mid-sized flower growers, and US\$ 40.00 for big flower companies. Thus, big flower companies pay 25 times as much per cubic metre as smallholders do. However, in practice, due to hydraulic properties of the distribution system, the groups with larger intakes get more water than they pay for.

The fee is the same every month, regardless of actual water delivery. CODEMIA's board sets the fee based on their planned budget, using the revenues collected (US\$ 12,000/month) to pay for management costs, operation and maintenance of the main canal, and SENAGUA's water tax. Fees are paid at the office, and fee recovery is high, as non-payers are punished by closing their gate.

The second level is fee payments inside communities. Each community establishes its own fees. Total fees should cover the CODEMIA fee plus costs to construct reservoirs, piped systems, etc., and operation and maintenance costs inside the community. Most communities charge a volumetric fee (e.g. US\$ 1 per hour for non-flower producers and US\$ 2 per hour for small flower producers).

Although the unequal water allocation system and the differentiated tariff system are relatively stable (without fundamental changes during recent system governance transformations), they do constitute dispute when diverging value systems clash.

### ***Emergence and growth of small local rose farms***

Since ca. 2005 all sectors have seen the emergence of small (up to 2 ha) flower farms owned and managed by local people, many of whom once worked for large farms. Very small greenhouses have materialized, both in urban conglomerates and next to oxen-ploughed fields. A GIS analysis shows that in 2002–2003 there were no small flower farms, while in 2013 there were close to 300, mostly in Tabacundo and to a lesser extent in la Esperanza and Tupigachi. Even Ayora and Olmedo show scattered small flower farms at very high altitudes (Table 2).

As explained, some small flower farms have started with help and financing from a big flower company. Because these smallholders sell their flowers to the larger companies, the larger companies in this way evaded CODEMIA's ban on greenhouse expansion and probably also strict control of production and labour conditions. Other smallholders have established their small greenhouses with other sources of investment capital, like a loan from a rose intermediary or the Banco de Fomento (a state bank that provides loans at preferential conditions to smallholders). Small producers are not organized in associations and have no shared post-harvest facilities, so they depend on intermediaries or big companies to export their flowers.

The land devoted to flowers in this system has not yet increased substantially with emerging small rose farms. Up to 2013, a total of 102 ha of small flower greenhouses

had been installed. They use 5% of the irrigation water, about one-third of the water allocated to smallholder communities (Table 1). Nevertheless, the seemingly uninterrupted growth of small rose farms raises concerns about the allocation of this scarce resource. The allocation of the canal's water for subsistence crops is not year-round and not sufficient to grow greenhouse roses.

This boom in small flower producers only in certain sectors does not relate to biophysical conditions, as mentioned, but to collective rule-making structures and community leaders' discourses and framing. Community leaders in the upper sectors claimed that they were opposed to flower farms, big or small, but that the communal assemblies had the final decision. That is how some small flower farms got permission from the community. The TURUJTA chairman said: "Farms that are already established cannot be ousted, but it is important to set limits; yet that is going to be tough. We have not set any official limit yet" (13 October 2013).

In the tail-end sectors, Tabacundo and La Esperanza, floriculture is growing and the framing of the irrigation sectors' board members is somewhat different. Community leaders expressed hesitation concerning the prohibition of smallholder flower farms; the valuation of 'appropriate water uses' is more prominent. A former president of the Santo Domingo 2 water users' association stated: "How can we say yes [about establishing greenhouses] to some and no to others? It would imply an unjust denial of the opportunity for a better income" (25 October 2013).

The financial incentive for smallholders is high. Apparently, many value the potential high income and accept (or are not yet aware of) the risks. As of April 2015, a small rose farmer<sup>8</sup> received US\$ 0.17 per rose from intermediaries.<sup>9</sup> They can harvest 100 roses per m<sup>2</sup> per year (Franze & Ciroth, 2011). This means that a small greenhouse of 0.25 ha generates about US\$ 43,000 per year, which will repay the investments in 10 years (US\$ 60,000 for the greenhouse and patents for the roses, plus interest of US\$ 9000/y, assuming an interest rate of 5% per year, possible with government loans). With other production costs – fertilizers, energy, water, transport and insecticides – estimated at US\$ 10,000/y, the average income for a small rose-grower family (with three family members working full-time in the greenhouse and no personnel hired) is US\$ 24,000/yr. An alternative wage-labour income (at US\$ 300/month) for this family's members would be around US\$ 10,800/y (assuming year-round full-time employment). Alternatively, subsistence-crop income at local prices for the 1 hectare owned would be US\$ 5500/y (assuming production of 10 MT/ha of potatoes at a farm gate price of US\$ 0.5/kg and a second crop of corn, 1 MT/ha, at the same price). Thus, the income from small rose farms seems quite attractive.

Several small flower growers also expressed their pride as independent entrepreneurs in the flower sector:

Not only can I receive more money, but I am free from floods and frosts... I care for each one of my roses as if they were my daughters, not as in large farms, where they expect a percentage of loss. (small flower grower, Santo Domingo 2, 28 March 2013)

With flowers I have been able to keep my family together. It is also for psychological reasons that I prefer flowers over cattle or vegetables. (small flower grower, Tabacundo, 13 June 2013)

I thought first of planting tomatoes because I needed cash, but since I worked at large rose farms I decided to take that path... I am doing quite well; the problem is that the



community decided to prohibit more plantations... Now I can't expand! (small flower grower, Tabacundo, 07 October 2013)

However, the risks are serious. Pests, diseases, low prices, lack of water and labourers, changing consumer preferences, municipal land-use ordinances, etc. could drastically cut the income of a small rose producer. Also, small rose producers report problems collecting their payments from intermediaries (Mena-Vásconez, Boelens, & Vos, 2016).

Small rose producers' high (potential) income puts pressure on food sovereignty framing and non-commodity water-use valuation. The small rose growers' sector now generates US\$ 9 million annually, using 5% of the available canal water, but this share is rapidly growing. Even community leaders who favoured the food sovereignty framing hesitated to prohibit small-scale flower production, because it would deprive fellow *comuneros* of potentially higher incomes. When asked about the decision-making process and rules about new flower greenhouses, community leaders 'pass the buck'. They want the municipality, the parish or CODEMIA to prohibit flower expansion. The growing number of smallholders turning to rose production makes water allocation an increasing problem. Allocation to the subsistence sector is already low (only 15%), so the big flower companies' water share (now 55%) is under stress. Big companies will not readily agree to another cut in their assignment. Ultimately, the fight over allowing smallholders to grow roses is a fight over water control. Here, water valuation languages and water-use valuations are dynamically deployed, in such a way that, between the poles of 'food' and 'flowers', many hybrids develop. Ultimately, they all strategize to creatively enhance recognition, representation and redistribution in ways that may realize their interests in the definition and implementation of what they regard as the most appropriate water use.

## Discussion

Here we reflect on the 'values-based political ecology' approach applied to analyze the Tabacundo irrigation system. Fraser's recognition, representation and redistribution have proven useful in understanding the complex struggles over values, the diversity of strategies and the distributive effects.

Stakeholders gain relative power if others recognize their values and interests. They use strategic framing to advocate their values and to gain legitimacy. Discussions of community water governance, in particular new-institutionalist perspectives, habitually neglect the diverse values and multiple identities and discourses within communities. For instance, Ostrom's (1990) widely used eight design principles for common pool resource institutions imply a rather homogeneous community and common interests. While Ostrom's school later incorporated more variety (e.g. Ostrom, 2009), its universalist neo-institutional language and approach continue to struggle with fundamental concepts such as contextuality, cultural diversity and power differentials (see e.g. Duarte-Abadía & Boelens, 2016; Espeland, 1998). In practice, not only is the value of the water disputed, but especially the value of water *use*, and even the value of *who controls the water*. In this sense, water rights are sustained not only by local principles such as "hydraulic property" (Boelens & Vos, 2014) but also by recognizing a legitimate

value for irrigation water use and control. And here, as this case shows, the battlefield of valuation systems and languages is not restricted to ‘capitalist’ versus ‘non-commodity producers’. Value perspectives driving smallholder flower producers – such as individual self-determination, individualized water security, externalization of farming rationality and knowledge, and commoditization of inputs and outputs – are not always shared by smallholders who use irrigation water for food crops and who may see flowers as too risky a way to escape poverty.

Recognition of values involves the struggle for *representation* in decision-making bodies. Studies of community water governance (e.g. Agrawal, 2001; Ostrom et al., 1999) do not usually pay much attention to how legitimacy of communal leadership is closely tied to regional and national political ideas. Power differences and conflicts within communities tend to increase when government regulations recognize or delegitimize community leadership values. Within communal institutions, the dynamics of water resource management are complex and Janus-faced. In Ecuador, Tabacundo leaders could remain in power by strategically framing their claim to governing water in ‘indigenous movement’ language, while also strategically using the financial benefits derived from allocating water to commercial flower producers, who pay 25 times as much per cubic metre of water. Community leaders pass the buck of forbidding proliferation of small flower greenhouses, dodging the responsibility for taking potential income away from their fellow community members. Discourse shopping, creatively drawing sometimes on indigenous/food security discourse and at other times on the discourse of neoliberal entrepreneurship, is part of this strategy.

The struggle to *redistribute* access to productive resources and income in Tabacundo is clear at different levels. Flower export earnings are significant. Studies of community water governance often assume that irrigated production is for subsistence or the local market. When commercial agriculture depends on community water management, other dynamics are at play, rather than the neoclassical economic thinking of profit maximization. However, moral-economy explanations also fall short, because risk aversion and solidarity are not central to smallholders’ choice to grow flowers. Values of pride, economic returns and self-determination or food sovereignty seem to be more important in Tabacundo. Thus, the struggle to control water implies a struggle over irrigation imaginaries (either as food provider or exporting hotspot), but also over preference for water allocation to export crops because they represent a profitable business in which the heavy investments cannot be put at risk.

Using strategic framing and valuation languages to understand struggles over the three R’s yields interesting insights into these complex, layered struggles. Strategic framing is dynamic and requires interpretation of stakeholders’ values and interests and the framing context. As framing changes and adapts to the context, frame interpretation must be integrated and heuristic. Therefore, it is essential to observe actual practices, including biophysical analyses such as hydrology (climate change, crop water needs) and hydraulics (in water distribution). Financial analyses also further fathom economic interests and valuing. They all converge in the arena where divergent water valuation languages are being disputed, transformed and strategically blended.

## Conclusions

The communally managed Tabacundo irrigation system in the Ecuadorian Northern Andes has some unusual features. Most of the increasingly scarce irrigation water is used by about a hundred big export flower producers; we found broad diversity in rules on water allocation in the different sectors of a single system; and, recently, many smallholders have established their own small flower greenhouses.

The present-day skewed access to canal water in the Tabacundo system, a legacy from the hacienda era, has not been challenged much by the smallholder-controlled water user organization that took over in 2006. Smallholders in the two sectors with the most flower companies accepted the vested water rights of the big companies, and most smallholders believed that water for the big flower companies was good, because it generated jobs. However, the boom in small-scale flower production by smallholders is increasingly coming to the fore. Beyond dichotomous conflicts between large capitalist flower growers/haciendas and community subsistence agriculture, this generates growing intra-community debates and conflicts, and significantly challenges the existing community allocation rules' moral values. It also leads to strategic shopping in, and creative blending of, multiple 'food' and 'flower' discourses, upsetting existing perspectives on water-use values.

Only by identifying stakeholders' strategic framing and practices, scrutinizing the resonance of values that produce legitimacy for claims and authority, unravelling interaction, and investigating changes in actual water distribution and economic behaviour will we understand the interplay among values, framing, and the resulting communal water governance.

## Notes

1. Smaller and earthen canals, different from usually larger and lined *canales*.
2. Second tier organizations (STOs) are organizations within rural parishes and above communities. Each rural parish with indigenous communities has an STO. STOs engage in advocacy for access to land, water, agricultural inputs, and training.
3. Consorcio de Desarrollo de Manejo Integral del Agua y Ambiente Cayambe-Pedro Moncayo (Consortium for the Development and Integrated Water and Environmental Management of Cayambe-Pedro Moncayo).
4. Solo el agua puede rebelar a los indios. *El Comercio*, June 6, 2009. Retrieved from <http://www.elcomercio.com/actualidad/agua-rebelar-indios.html>.
5. One small flower farmer, who had returned after working for larger farms, was prosperous, with two small farms at 3000 metres above sea level. At higher altitudes, roses grow more slowly, but taller.
6. Personal communication, president and vice-president, Ayora Autonomous Decentralized Government, 20 December 2012.
7. One owner is the protagonist of *Ana, volar sin alas* (<http://www.justiciahidrica.org/Ana-VsA/Ana-FlyingWithoutWings.htm>), a documentary linked to this project that chronicles the struggles and dreams of a peasant woman who established a small rose farm.
8. Pers. comm., Ana Farinango, small intermediary-dependent rose farmer, 4 April 2015.
9. Up to November 2014 she obtained 47 cents per flower, until prices plummeted due to international and domestic economic dynamics.

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