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Virtual water trade and the contestation of hydrosocial territories

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ABSTRACT

Growing trade in virtual water – the water used to produce exported products from agriculture and mining sectors – affects local communities and the environment, and transforms hydrosocial territories. National and international water regulations reshape communities' hydrosocial territories by changing water governance structures to favour export commodity sectors, often inducing strong contestation from local communities. Transnational companies formulate and enforce global water governance arrangements oriented toward strengthening export production chains, often through asymmetrical relationships with local groups in water-export regions. These arrangements compromise political representation and water security for both local communities and companies.

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Introduction

Water use for export agriculture and industrial production often affects local communities and the environment. The fresh water 'embodied' in a commodity, known as 'virtual water', refers to the volume of water consumed or polluted to produce a commodity and is measured over its full production chain (Allan, 1998). Virtual water is no longer available for alternative uses. The source of water can be surface or groundwater ('blue virtual water') or the water in the soil ('green virtual water') (Hoekstra & Chapagain, 2008). Virtual water can also include the contamination of water during the production process, i.e., the amount of clean water needed to dilute a contaminated water body to reach an environmental standard ('grey virtual water').

Some scholars have proposed virtual water import to resolve national water scarcity (Allan, 1998; Zhao, Liu, & Deng, 2005). Yet, observing that virtual water export has doubled during the last decade (Dalin, Konar, Hanasaki, Rinaldo, & Rodriguez-Iturbe, 2012) and constituted nearly 30% of the world's direct water withdrawal (Chen & Chen, 2013), others have documented the negative effects of water-intensive trade patterns (cf. Dauvergne & Lister, 2012; Khan & Hanjra, 2009). Direct negative effects include water resource depletion and pollution (Dabrowski, Murray, Ashton, & Leaner, 2009; Hoekstra & Chapagain, 2008) and concentration of water use rights, which might jeopardize local livelihoods.

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Small farmers integrated into export markets can also be harmed by increased horizontal and vertical integration of export chains dominated by powerful agro-business and retailer companies, receiving relatively little benefit and heavy exposure to risks: crop failure, low market prices, debt burden and possible land dispossession (GRAIN, 2012, 2014; La Via Campesina, 2013).

Sojamo, Keulertz, Warner, and Allan (2012) and Vos and Boelens (2014b) argue that the increased export of water-intensive commodities also changes water governance, shifting control over water use from local and national actors to those who dominate global production chains. Sojamo et al. (2012) argue that the increase in international virtual water trade sharply decreases the political power for local water governance. This often lessens local authorities' control over the water resources in their territory. Instead, multinational companies and retailers set the terms of trade and establish mechanisms for local water resource use and protection. These water governance rules encompass corporate discourses about water efficiency and productivity and the benefits of international trade, aligning with rhetoric about a technology fix to increase water efficiency and productivity through, for instance, drip irrigation (Boelens & Vos, 2012).

International companies more readily gain access to local water resources when national governments promote natural resource extraction through free-trade agreements and privatization of state-owned and community-held resources, subsidizing international transport infrastructure, and allowing tax havens and permissive environmental legislation. This has enabled companies to set the terms of trade and establish private water stewardship standards as part of their corporate social responsibility (CSR) policies. Recent cases of water grabbing have despoiled local water users of control over their water resources and means of livelihoods (GRAIN, 2012, 2014; Mehta, Veldwisch, & Franco, 2012). These new definitions of 'good' water management and 'fair' distribution of water replace local values, norms and imaginaries with new ones presented as 'universal' and 'natural'. Contentiously, local stakeholders' interests are left out of policy, rules and regulation for water resources management.

The adverse effects of increased virtual water export are contested by local communities. The extent to which contestation interacts with these international trade-driven water stewardship initiatives, to define new forms of water governance, is only recently being debated. How this affects water justice by inducing loss of territorial control of and access to water resources is also a topic of recent research. This article uses the concept of hydrosocial territories to discuss the links between virtual water export and local water control, and contribute to such a debate. After this introduction, the next section identifies the drivers of increasing virtual water trade, the effects on local water users and the environment. The third section analyses the relationship between virtual water export and hydrosocial territories' transformation, taking into account the emerging corporate sector's responses to water conflicts through water stewardship and examples of contestation from below. The paper concludes by drawing some reflections for policy-making.

Drivers of increasing virtual water trade

Virtual water import has been suggested to provide food security for relatively dry countries (Allan, 1998, 2003). Accordingly, neo-liberal water policies (i.e., governmental policies deregulating the water sector and promoting international trade through social

and environmental deregulation, among other mechanisms) postulate that virtual water export taps the comparative advantage of relatively water-sufficient countries or production zones, meaning more efficient food production globally (Hoekstra & Chapagain, 2008). However, Seekell, D'Odorico, and Pace (2011) and Suweis et al. (2011) show that virtual water flows do not address relative water scarcity, but export stimulation, global financial structures and consumption. Similarly, Wichelns (2010) asserts that net virtual water trade is not related to water-related relative comparative advantages in producing and receiving regions, but to other factors of relative production advantages and consumers' demand.

Virtual water export more than doubled in the last two decades. Dalin et al. (2012) calculate that total international virtual water trade embedded in the top five agricultural and three livestock products doubled from 259 km^3 in 1986 to 567 km^3 in 2007, mainly soy export for dairy and meat production from South America to Asia and Europe. The literature on trade and globalization (e.g., Clapp & Fuchs, 2009; Gibbon & Ponte, 2005; McMichael, 2009) highlights five main drivers of such increase: growing purchasing power and diet changes by numerous consumers in emerging markets (e.g., increased meat and dairy consumption in Asia has spurred soy exports from South America to Asia, as shown by Dalin et al., 2012); expanding free-trade agreements; increasing international financing for export agriculture; national export policies; and horizontal and vertical integration of companies within the agro-export chain.

Since the mid-1990s, the World Trade Organisation (WTO) has facilitated over 60 free-trade agreements among its member states. Additionally, over 2500 bilateral trade and investment treaties have been signed (UNCTAD, 2007). This spread of free-trade agreements, driven by international organizations and northern countries, is also supported by southern countries, eager to attract foreign direct investment (FDI). Since the early 1990s, many national governments have adopted neoliberal policies for natural resource management in order to facilitate trade agreements. Some 20 countries signed free-trade agreements with the United States, which include provisions to protect foreign investors, sometimes affecting the environment and water-user communities, particularly those labelled 'informal', i.e., with no allocation of formal water rights (Solanes, 2010).

At the same time, national neoliberal policies have also included legislation to incorporate communal water into the natural resources market and apply permissive environmental regulation and monitoring to export companies (e.g., in Chile, Peru and Mexico). Moreover, neoliberal government policies and programmes in countries such as Chile, Peru, Ecuador and Colombia granted government funds to large-scale export agriculture by subsidizing dams, canals, electricity for pumping, etc.

International financing of export agriculture has played an important role in increasing global trade (Burch & Lawrence, 2009; Vestergaard, 2012) enabling international food trade (e.g., see the FAO's 2010 report on the drivers of rising food prices) and purchase of farm land (Cotula, 2012). This has facilitated land and water concentration by large transnational companies and local elites operating in the agribusiness sector. Their strategy of horizontal and vertical integration within the agro-export chain has increased their power to control flows of goods and finance around the world (Baines, 2014; Burch & Lawrence, 2009; Carolan, 2012; Fuchs, Kalfagianni, & Arentsen, 2009; McMichael, 2009; Murphy, 2008).

Examples of major companies that control agro-food chains are given by Sojamo and Larson (2012). Debbané (2013) provides the example of the Ceres Valley in South Africa where financialization played an important role in the accumulation of water by export-oriented large fresh fruit producers:

> The financial and institutional arrangements for the Koekedouw Dam exemplify the neoliberal thrust underpinning national water policy reforms. This is reflected in three important ways: the withholding of government subsidies and state-backed loans for irrigation projects; the expanded role given to the private sector in planning and building large-scale infrastructure projects; and the expanded role given to private commercial banks in financing water infrastructure. This marked a significant departure from previous practices, where the government heavily subsidized the costs of irrigation development. (pp. 2560–2561)

Effects of virtual water export on local water users and the environment

Promoters of international trade advocate that agricultural, mining, energy and industry exports generate income, employment and foreign exchange. In addition, under particular conditions, strengthening global value chains could have a positive impact on local producers (cf. EC, 2012; Goger, Hull, Barrientos, Gereffi, & Godfrey, 2014). Among other arguments, it has been suggested that increasing trade can successfully insert local producers into international markets and create new sources of income and employment for the local population. In territories where customary water rights were protected by law, such as in Chile where most water user associations register water rights, these registers contributed to protecting local rights. Nevertheless, in many instances, virtual water export has had negative effects on water resources and rural populations, especially in relatively arid areas. Increased virtual water trade has led to overexploitation and contamination of rivers and aquifers and/or regions where the political elite has grabbed water away from local communities' livelihoods (Roth & Warner, 2008).

In general, the share of virtual water exported from a country does not directly indicate the negative or positive social and environmental effects in the producing/importing region. This is because the abstract notion of virtual water hides the realities of closing basins (rivers that no longer reach the ocean), large agribusinesses' water rights accumulation, the 'race to the bottom' of ever-deeper tube wells, drying wetlands, vast agricultural areas that become unproductive due to salinization, and especially water user communities' loss of control over water resources. To assess these effects better in exporting countries, Lenzen, Bhanduri, et al. (2012) combine the calculation of net virtual water trade with indices of relative water scarcity and water exploitation. However, this fully measures neither the environmental impact nor the distributive effect on income and access to water. That said, while assessing impacts of net virtual water flows globally can be too complex, therefore inaccurate, the effects of virtual water trade can be assessed more rigorously on a local scale.

Many surface and groundwater sources are overexploited, and lack of drainage leads to waterlogging and eventually salinization (Shah, Burke, & Villholth, 2007; Wada et al., 2010). Total worldwide extraction of groundwater has increased from some 100 km^3 in 1950 to some 1000 km^3 in 2000. Thus, while world population doubled, extraction 10-

folded. This growth in agricultural pumping is concentrated in Asia, foremost in India, China and Bangladesh (Shah et al., 2007). However, aquifers are also overexploited for export agriculture in many other parts of the world. In Central and Northern Mexico, agricultural production for export to the United States deprives many smallholders of access to groundwater (Peña, 2011). Similar cases can be found in the Palestine territories (Zeitoun, Messerschmid, & Attili, 2009), India and Pakistan (Chapagain, Hoekstra, Savenije, & Gautam, 2005), and East Africa (Awange et al., 2013).

Large-scale export agriculture, mining, oil extraction and industry can also cause water contamination and reduce biodiversity (Defries, Rudel, Uriarte, & Hansen, 2010; Lenzen, Moran, et al., 2012; Longo & York, 2008). Agricultural, oil and industrial exports entail grey virtual water export. An example is the large-scale soy production in Brazil, Argentina, Bolivia and Paraguay for export to Asia and Europe, where Palau, Cabello, Naeyens, Rulli, and Segovia (2007) found severe health effects associated with groundwater contamination by agro-chemicals used to grow soy. Further, all over the world, regions specializing in mining or agriculture export show labour and living conditions at critically low levels; women in particular are affected negatively (Langan, 2011; Pearson, 2007).

Even in successful cases, such as Chile, protection of water rights has been constrained by the legal system. The government administration's operational weaknesses failed to enforce pro-sustainability measures and reduce externalities. Limitations in procedures for conflict adjudication by courts, which is expensive, have facilitated water dispossession of small water users who cannot afford the cost of litigation (Bauer, 2005). In many other countries, lack of formal registration of water use, non-recognition and/or little knowledge of customary use, takeover of water governance structures by elites, weak water management operational capabilities, and the conditional requirements (international financing, FDI, trade agreements and international arbitration courts) have contributed to dispossession and pauperization of local water users (Solanes, 2010; Solanes & Jouravlev, 2007).

Virtual water export and transformation of hydrosocial territories

The analysis in this section, of increasing virtual water exports transforming hydrosocial territories, builds on the definition of hydrosocial territories introduced by Boelens, Hoogesteger, Swyngedouw, Vos, and Wester (2016, p. 2), for whom:

> hydrosocial territories are the contested imaginary and socio-environmental materialization of a spatially bound multi-scalar network in which humans, water flows, ecological relations, hydraulic infrastructure, financial means, legal–administrative arrangements and cultural institutions and practices are interactively defined, aligned and mobilized through epistemological belief systems, political hierarchies and naturalizing discourses.

A hydrosocial territory melds meaning, actors, political power, water flows, water technology and biophysical elements (see also Del Moral & Do O, 2014; Delaney, 2008).

Increasing virtual water export creates new forms of hydrosocial territories. Water use for production that is financed and consumed within a region establishes hydrosocial territories in which water governance is mostly local. Virtual water export creates

hydrosocial territories that go beyond this level. Multinational institutions such as financing organizations and major retailers and large multinational agribusiness companies introduce rules and regulation in national regulatory frameworks, and they also influence norms and values regarding water governance.

We identify two main mechanisms by which virtual water trade and changes in hydrosocial territories become associated: 'formal' access to and control of local water sources by international companies, and imposition of water use standards on small producers.

The mechanism concentrating water access

Control over local water resources can be lost many ways. International financialization enables large companies to invest in water high-tech and equipment (e.g., for deep drilling, drip irrigation and water decontamination) and expand their operations. As this has some positive effects on local economies in host regions, it increases their political clout (e.g., to gain water concessions, pay lobbyers and the like). However, large land deals forcing indebted smallholders to sell their land, unfair sharecrop arrangements and permissive environmental regulations applied to large agricultural export companies have been documented in the land- and water-grabbing literature (e.g., GRAIN, 2014; Mehta et al., 2012). For example, in Ecuador, companies that produce export crops and sugarcane have accumulated nearly 75% of formal water rights and concentrate much more water informally and illegally, especially to export bananas (Gaybor, 2011) and flowers (Zapatta & Mena, 2013). In Peru, agribusiness companies exporting fresh fruits and vegetables to the United States and Europe have accumulated water rights and overexploit groundwater on the dry coast (Progressio, 2010; Van der Ploeg, 2008).

The less powerful local water-user groups tend to lose out when confronted with powerful new actors, such as agribusiness enterprises and mining companies (Castro, 2008). This concentration of political and economic power by major agribusiness and retailer companies establishes new hydrosocial territories in which natural resources come under control by multinational companies (cf. Van der Ploeg, 2008, 2010). Governments have shown little interest in improving their knowledge and records concerning water availability and use in order to protect local users' rights (Solanes, 2010).

The mechanism of corporate water stewardship initiatives to produce global hydrosocial territories

The fundamental change in hydrosocial territories' configuration, driven by growing exports of virtual water worldwide, is enabled by an emerging institutional setting of international trade rules, changing national policies and corporate sector codes of conduct. Hydrosocial territories are transformed through FDI, export-oriented national policies and imposition of corporate water use standards on small producers who want to export (Carolan, 2012; Vos & Boelens, 2014b).

Large companies' power over local water resource governance creates new forms of water control that redefine hydrosocial territories at a supranational governance level;

in this process, local development options, values, imaginaries and knowledge are glossed over. A mechanism of this process is the CSR standards for water stewardship often set by international retailers and producer companies, which eventually shape the practices, norms, values and imaginaries of local producers, who adopt the new regulatory and values framework in order to be able to export.

Private companies increasingly take pledges of water stewardship. A water stewardship certification scheme is formulated by, and self-enforced among, transnational retailer companies. Broadly defined, stewardship is conceived as actions taking care of public goods depending on collective management for sustainability. There are three main reasons for this engagement: to guarantee sufficient production; to reduce the risks of reputational damage; and to gain legitimacy and critical consumers' support (Hazelton, 2014; Vos & Boelens, 2014b; Waldman & Kerr, 2014).

Water stewardship standards can include protection of water sources (in quantity and quality), efficient water use, use of certain water technology and registration of water use (Vos & Boelens, 2014b). Adherence to water stewardship schemes is widespread. According to Fulponi (2007), all growers that produce for supermarkets in Europe and the United States are obliged to subscribe to one or more certification schemes. Examples of these schemes are GlobalGAP, BRC, GFSI, FOODTRACE, IFS and also some other non-corporate sector schemes such as the Rainforest Alliance. The trade-off between the income derived from virtual water export by local economies and the 'external' influences on the local hydrosocial territories is the external control over water use standards. For example, GlobalGAP defines what is 'efficient' and 'sustainable', yet with little participation by or consultation with small local producers and water users (Vos & Boelens, 2014b). Compliance by local suppliers of supermarkets and food companies with the international standards is certified by third-party auditors. Growers are audited annually by auditors who must be accredited by a certifying body under a certain scheme.

In the mining sector, the International Council on Mining & Metals (ICMM) (2014) has adopted a number of standards for its member mining companies. In one of these standards, known as 'the 10 principles of sustainable mining', principle 6 reads: '[mining companies are supposed to] seek continual improvement of our environmental performance. Assess the positive and negative, the direct and indirect, and the cumulative environmental impacts of new projects – from exploration through closure'. Mining companies have to report publically on their performance regarding these principles and provide evidence through third-party verification.

A point of concern in all these initiatives is the low transparency and democracy in formulating standards and monitoring procedures, which are set by dominant market players (Amekawa, 2009; Campbell, 2005). Although roundtables involve different stakeholders in specific sectors (sugarcane, biofuels, cotton, soybeans), large transnational companies and supranational policy networks dominate the negotiation table; organizations representing local populations, particularly small farmers, have far greater difficulties to participate and stake claims.

Furthermore, from a political point of view, standards reinforce (economic, political and discursive) power in the Global North (Fuchs et al., 2009). Certifying and audit companies are also almost exclusively from the north. Farmers have to pay for audits and this can be exclusionary, hindering small farmers (cf. Blackmore et al., 2012). In

this process of institutional change, the power to regulate water use and water quality implies shifts from local communal and national public authority to international organizations (cf. Van der Ploeg, 2008). This reveals weaknesses in the discourse on global devolution and decentralization. As in any other global space, universal rules and regulation also apply in global hydrosocial territories, leaving little space or no space at all for the intrinsic characteristics of local hydrosocial territories. Actors who dominate the decision-making processes within global and regional organizations, the corporate sector and equity funds are better positioned to influence national governance structures, discourses and norms that determine and influence access to local water sources, their use and local capacities to control virtual water export.

Contestations from below

The emerging global hydrosocial territories are contested. The politics and plans to transform hydrosocial territories and the problems brought by water use concentration and contamination of water sources have led to resistance, protests and conflicts at different scales. Resistance and protests have been related to water grabbing and contamination by agribusiness (Hall et al., 2015; Mehta et al., 2012; Smaller & Mann, 2009; Sojamo et al., 2012), construction of hydropower dams (e.g., Scudder, 2005), and water issues of minerals and oil extraction (Helwege, 2015). Protest has multiple motives and often involves diverse groups representing different local interests, attaching importance to different issues at stake. Issues and intensity of protests also vary over time. Furthermore, the form and intensity of protests are influenced by issues such as political freedoms, local leaderships, articulation of discourses and local economic dynamics.

Notwithstanding the reported strong increase in land grabbing in Africa, Asia and Latin America (GRAIN, 2012; Mehta et al., 2012) and the large volumes of water used in the agribusiness sector, relatively few cases of grassroots protests against 'water grabbing' by export agribusiness are documented. Given that public protest can be dangerous for the protesters due to adverse political and institutional contexts, protest have taken the form of anonymous, non-organized and hidden acts of sabotage, something labelled by Scott (1985) as 'the Weapons of the Weak'. For instance, Moreda (2015) describes resistance of Gumuz communities against land and water grabbing in western Ethiopia. Acts of sabotage and violence allegedly included setting fire to agricultural equipment and 700 hectares of maize ready to harvest and intimidating migrant agricultural labourers. An agribusiness company left the region because the project manager was killed by a Gumuz arrow. This form of resistance is often dismissed by local and national media, and therefore by scholars as well.

In other regions, protest is carefully organized and becomes public. Although more visible, this type of protest is seldom systematically documented, either. Furthermore, despite accusation from industry and national governments about external influences, particularly non-governmental organizations (NGOs), it is relatively rare for local, grassroots' protests to connect with national NGOs to form national alliances or even connect to international networks of activists' movements. We briefly review some illustrations of local protest against water injustices associated with expansion by

agribusiness and extractive industries. These examples were taken from academic papers and news media websites, and illustrate the point on local reaction to the effects of virtual water export:

- La Ligua (Northern Chile): in 2011, regional organization MODATIMA (movement for the defence of water, land and the environment) started its protest against overexploitation of the La Ligua and Petorca rivers and aquifer by a few large agricultural export companies producing avocadoes for export to Europe and the United States (Budds, 2009; also see http://modatimapetorca.wix.com/wwwwixcommodatimapetorca).
- Tabacundo (north-east Ecuador): flower export agribusinesses in the Tabacundo valley have grown enormously during the last decade. Nowadays some 3000 hectares of roses are cultivated in the highlands for the US, European and Russian markets. Significant amounts of water for the greenhouses come from the Acequia Tabacundo irrigation system, which also serves small farmers for subsistence agriculture and cattle raising. Given that the 'water left-over' was too little for the smallholders, in 2006 the canal was taken over by a protest march of 3000 small farmers (Zapatta & Mena, 2013).
- Northern Mexico: in this dry region, agribusiness companies extract groundwater to export fresh produce to the United States, which has mobilized many local groups to protest against unequal access to sanitation and irrigation water. For example, in March 2015, the Yaqui People from the state of Sonora defended their water and territory in a march to the capital city to protest against the construction of the Independence Aqueduct (Conn, 2015). Local communities also protest against the drilling of new wells by agro-export companies (Quintana, 2013).
- Senegal: a collective of pastoralists organized protests against a company that planted 20,000 hectares of sugarcane. The Senhuile–Senéthanol project is financed partly by Italian and partly by Senegalese companies, and the national government granted access to the land. Local pastoralists are denied access to their pastureland, firewood, migration routes for cattle and water wells. Local communities organized into the Collective for the Defence of the Ndiaël Reserve. They organized protests and demanded the company's withdrawal from the zone (Word, 2014).
- Huancavelica (Peru): local protest emerged against the allocation of water to the large-scale export agriculture developed in the neighbouring desert coastal region, Ica. Irrigation water for the agribusiness sector is taken from the Ica River, which is fed by the Andean watersheds of Huancavelica. Given the exhaustion of Ica's aquifers, largely due to the expansion of export agriculture, recent plans to divert more water into the Ica River through the Incahuasi canal would negatively impact access to water for the highland community of Carhuancho (Hoogesteger & Verzijl, 2015). Carhuancho's population protested regularly in Ica, but because their complaints were dismissed by Peruvian water institutions, they presented their case at the Public Hearing of the International Water Tribunal held in Guadalajara, Mexico in 2007 (see http://tragua.com).
- Cordova (Argentina): the soya boom in Argentina increased agrochemical water contamination. The area cultivated with soya tripled in 15 years to some 18 million

hectares. The expansion excluded peasants from land and wells they have historically used for goat herding. Protests of farmers located in the soya region and Cordoba's citizens have been going on for a decade, including marches, massive rallies, roadblocks and court cases to stop agrochemical use (Cáceres, 2015).

- Cajamarca (Peru): the gold-mining region of Cajamarca has been the scene of a vast social protest movement against water use and pollution by open-pit gold mines. Peasant communities have been protesting for a decade. Mining expansion into the Quilish mountains and opening of the new Conga mine are contested by inhabitants of the hydrosocial territory, as those mines will affect negatively their water quality and quantity (Yacoub, Blazquez, Pérez-Foguet, & Miralles, 2013). In 2010 the army was sent to Cajamarca to repress massive protest rallies violently. These protests have received support from national and international NGOs (Sosa & Zwarteveen, 2014).

These illustrations of resistance and protests show a great diversity in topics, and in their degree of connectivity with larger networks. Mining projects seem to trigger more protests than does water grabbing by agribusiness, probably due to the relatively large number of labourers who are employed by agribusiness operations (see also Vos & Boelens, 2014a).

As many protests and acts of resistance remain invisible, it is difficult to gauge the magnitude of local resistance and protests. For an idea of water-related protests and conflicts, the online EJOLT Atlas of Environmental Conflicts presents over 1000 environmental conflicts around the world, most related to negative effects on water (see https://ejatlas.org/). Water-related conflicts are also described by the Latin American Water Tribunal (Tribunal Latinoamericano del Agua; see http://tragua.com/). This tribunal has organized a total of seven public hearings between 2000 and 2012. Approximately one-third of the 60-plus water conflict cases presented at the hearings involve socio-environmental impacts of large-scale extractive industries. Other case studies on water-related conflicts can be found in the books and website of the Justicia Hídrica Alliance (see http://justiciahidrica.org/?lang=en).

The above examples show grassroots' action against water extraction and contamination by increasing virtual water export. While many local protests focus on the injustices of water concentration and dispossession, some also involve concern with the transformation and reconfiguration of local and regional (sub-national) hydrosocial territories. Changes in material control over water bodies (the spatial biophysical component of hydrosocial territories) and power relationships underlying such control (the non-material component) are directly or indirectly denounced by these social protests. These cases do not represent any statistical evidence as they use particular definitions of conflict and present cases mainly related to exposure that NGOs or media give conflicts. In reality, there are many more hidden, 'everyday' forms of conflicts, many of which never get any NGO or media attention.

Two examples illustrate the contestation from below against transformations of hydrosocial territories due to changing national forms of water governance:

- In Spain, a vast protest movement emerged against transferring water from northern Spain to the south for export horticulture. The National Hydrological Plan approved in 2001 by Spain's central government would transfer 860 million m^3 per year from the Ebro River in the relatively wet north-east of Spain to the relatively dry south of the country. The south grows fruits and vegetables for export to northern Europe. Ebro–Segura environmental organizations from northern Spain organized massive street protests against the transfer. In 2001 and 2002 in Barcelona, Zaragoza, Valencia and Brussels, over 200,000 people marched against the water transfer. In the new 2005 National Hydrological Plan, the transfer plan was abandoned (Swyngedouw, 2013). This 'Nueva Cultura de Agua' (New Water Culture) movement was against water allocation for export agriculture, and backed increasing 'regionalism', informed by political party politics and further reinforced by the central idea of the 2001 European Water Framework Directive that takes river basins as the primary unit of water governance (Lopez-Gunn, 2009).
- The 2011 Arab Spring movement in Tunisia illustrates how hydrosocial territory issues can be among the multiple issues of very heterogeneous national protest movements. In Tunisia, water governance favouring private companies allegedly was part of the mix of multiple issues fuelling the Arab Spring protest movement. Gana (2012) argues that:

> processes of agricultural restructuring during the past 20 years contributed importantly to fuel the revolutionary dynamics, thus giving a political dimension to food issues. As demonstrated by the rising farmers' protest movement (land occupations, contestation of farmers unions, refusal to pay for irrigation water) [...]. (p. 201)

Gana identified a relationship between the uprising and the past Tunisian policy bias favouring private companies:

> What these multiple forms of protests clearly reveal is the rise of social struggles in the countryside and a profound contestation of former State policies, but also a differentiation of farmer demands, according to the different social groups. Actually, there is a consensus among farmers that agricultural development should be given a renewed and increased attention in State policies, policies that farmers consider to have been biased in favour of the industrial and the touristic sectors. (p. 209)

Further, national and international public and NGOs (like the Third World Network, the Transnational Institute, Via Campesino, Food First, the Businesses and Human Rights Resource Centre, the Justicia Hídrica Alliance, EJOLT and GRAIN) protest against the emerging undemocratic global water governance. They work together with regional and local organizations and engage in lobbying and advocacy work.

Conclusions

This paper explores the relationship between virtual water export and hydrosocial territories. The central argument is that increasing virtual water export over the past 20 years has been accompanied by local contestation against changes in local hydrosocial territories aiming to turn them over to global water governance structures.

Increased virtual water trade has negative effects in regions that export agricultural and mining commodities, where virtual water trade has led to over-exploitation and contamination of rivers and aquifers. Resource capture by the political elite (water grabbing) has taken away local water user communities' livelihoods. However, producers' practices, norms, values and imaginaries also change when they accept the rules and values imposed in order to be able to export.

This paper has defined hydrosocial territories as a fusion of meaning, actors, political power, water flows, water technology and biophysical elements. Hydrosocial territories are co-constituted by the material elements (land, water, ecosystems) within that space and the social power relationships between, and interests of, the people related to that space.

Increasing virtual water export creates new forms of hydrosocial territories. Water use for production that is consumed within a region establishes hydrosocial territories in which water governance is local. Virtual water export creates hydrosocial territories that are supra-regional. Multinational institutions such as financing organizations, major retailers, large multinational agribusiness companies, and multinational NGOs impose rules and regulations, but also influence norms and values related to water governance. The power these organizations exercise creates supra-regional hydrosocial territories that ignore or sideline local values, imaginaries and knowledge. A clear example is the multiple CSR standards for water stewardship set by international retailers and companies. To study the newly emerging hydrosocial territories, the strategies of international food-chain companies should get more attention. Paraphrasing James Scott's (1998) 'Seeing like a State' approach, we suggest that research on virtual water and territory also requires 'seeing like a multinational food-chain company'.

This implies looking at how emerging global hydrosocial territories are contested. Local water users protest against loss of control over local water resources, which is echoed by national and international public and NGOs.

Policy implications for governments, civil-society organizations and companies are that governments, at different levels, can actively protect local water sources, promote just water distribution and activities to counter the negative effects of virtual water export from vulnerable territories. Local communities and their organizations, as well as local, national and international NGOs, can engage in alliances to protect local resources. Companies can protect local communities and the environment, not with standardized water stewardship schemes but by developing and implementing protective measures in cooperation with communities, local production associations, water users' associations, local and national labour unions, environmental NGOs, water basin organizations and other stakeholders.

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