Ecological Economics 143 (2018) 276–285

Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Analysis

The Global Water Grabbing Syndrome

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ARTICLE INFO

Article history:
Received 13 June 2016
Received in revised form 28 February 2017
Accepted 28 June 2017
Available online xxxx

ABSTRACT

Large-scale acquisitions of agricultural land in developing countries have been rapidly increasing in the last 10 years, contributing to a major agrarian transition from subsistence or small scale farming to large-scale commercial agriculture by agribusiness transnational corporations. Likely driven by recent food crises, new bioenergy policies, and financial speculations, this phenomenon has been often investigated from the economic development, human right, land tenure and food security perspectives, while its hydrologic implications have remained understudied. It has been suggested that a major driver of large-scale land acquisitions (LSLAs) is the quest for water resources that can be used (locally) to sustain agricultural production in the acquired land. The appropriation of water resources associated with LSLAs has often been termed 'water grabbing', though to date a formal definition of such a normative and inherently pejorative term is missing. The intrinsic assumption is that the acquisition of water undergoes the same dynamics of unbalanced power relationships that underlie many LSLAs. Here we invoke hydrological theories of "green" and "blue" water flows to stress the extent to which water appropriations are inherently coupled to land acquisitions and specifically focus on blue water. We then propose a formal definition of blue water grabbing based both on biophysical conditions (water scarcity) and ethical implications (human right to food). Blue water grabs are appropriations of irrigation (i.e., blue) water in regions affected by undernourishment and where agricultural production is constrained by blue water availability. We use this framework to provide a global assessment of the likelihood that LSLAs entail blue water grabbing.

1. Introduction

At the beginning of the 21st century human societies live in a world with limited natural resources, increasing population and expansion of production systems that are highly material, energy, waste and pollution intensive (Rockström et al., 2009; Giampietro et al., 2011; Muradian et al., 2012; Ravera et al., 2014). In the context of escalating societal demand for food, fuel and fibers, agribusiness corporations have increased their pressure on land and land based resources, particularly in the developing world where large agricultural areas are considered as "underperforming". In recent years, a large number of business operations have specifically concentrated on land acquisition in developing countries (e.g., Cotula, 2009; Byerlee and Deininger, 2013). The phenomenon, which has been popularized as 'land grabbing' or 'global land rush', has attracted the attention of media and international organizations, as well as academic research. An emerging body of scholarly literature has analyzed the transformations associated with large-scale land acquisitions (LSLAs) and the power dynamics of access and use of land resources (e.g., Borras et al., 2011; De Schutter, 2011; Cotula, 2013). Recent work has synthesized the acquisition procedures and social dynamics of LSLAs (Nolte et al., 2016; Dell'Angelo et al., 2017), investigated their impacts on rural livelihoods (Davis et al., 2014; D'Odorico and Rulli, 2014; Oberlack et al., 2016) on food security (D'Odorico and Rulli, 2013) on sustainable development (Dell'Angelo et al., in press) and the underlying drivers of the phenomenon (Messerli et al., 2014) pointing at determining factors such as food security (Kugelman, 2012), financial speculation (Fairhead et al., 2012), or energy production (Scheidel and Sorman, 2012).

In the arena of studies on large-scale land acquisitions and land grabbing an alternative hypothesis has been investigated: what if the fundamental driver of the global land rush were the need for water rather than for land itself? (Skinner and Cotula, 2011; Allan et al., 2012; GRAIN, 2012; Mehta et al., 2012; Woodhouse, 2012; Franco et al., 2013). Water is a natural resource that is key to the economic development and many rural and industrial societies. An understudied mechanism of water appropriation in a globalized world is associated with large-scale land investments in agriculture. Understanding the issue of land acquisition through hydrological lenses provides an alternative way to look at transnational land deals and their effects on target and investors countries. The use of concepts such as virtual water and water footprint in

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http://dx.doi.org/10.1016/j.ecolecon.2017.06.033
0921-8009/

the study on transnational land investments show that globalization dynamics may involve and affect water resources of developing countries, often in a hidden - but not less relevant - way (Rulli et al., 2013; Rulli and D'Odorico, 2013; Breu et al., 2016). A first preliminary assessment of global appropriation of water through large-scale acquisition - defined as "water grabbing" - quantified the amount of water globally appropriated through crop production in the acquired land and its potential effects on food security in the developing countries affected by these land investments (Rulli et al., 2013). In other instances the term water grabbing has been used to identify the direct physical appropriation of local water resources for example through withdrawals for hydropower (Matthews, 2012; Islar, 2012) or mining (Sosa and Zwarteveen, 2012).

In fact, there is some ambiguity in the way the term "water grabbing" has been used in the literature. At least part of the confusion arises from by the fact that it has been used with respect to different forms of water appropriation and to describe different dynamics. The formal definition of this term is not a trivial task because of its normative/value charged character and the need to specify the biophysical and institutional conditions characteristic of water grabs.

In this paper we first review the peer-reviewed literature that explicitly uses the term 'water grabbing' and analyze the different meanings this concept can assume. We then provide a novel operational framework to define and assess the water grabbing associated with large-scale land acquisitions (LSLAs) at the global scale, focusing on the distinction between blue and green water. We then use this framework to provide a global characterization of this phenomenon, and examine the ongoing "global water grab syndrome".

2. Water Grabbing: Different Definitions and Defining Characteristics

2.1. What is Water Grabbing?

While on the concept of land grabbing there is a broad semantic consensus and it has been formally defined by a coalition of international organizations (ILC Tirana Declaration), the concept of water grabbing is neither used officially in policy *fora* nor unofficially by international development organizations. As we show in this section, the concept of water grabbing has been used by different authors in peer-reviewed publications to indicate relatively different phenomena. The common denominator among the different definitions is that there is an aspect of injustice and power imbalance which is represented by the word 'grabbing'. Water grabbing means something different from water appropriation, exploitation, extraction, consumption, or use. It involves the notion of 'grabber' and 'grabbed', a dynamic of usurpation based on the power imbalance between subjects that lose and subjects that win, unjustly. The definition of water grabbing deals with the ethical question of when it is appropriate to define a particular case of typology of natural resources extraction as 'grabbing'. It also deals with the biophysical question of how do we quantify or identify the appropriation of a resource, that by its own nature is fluid, renewable and difficult to quantify (Rodríguez-Labajos and Martínez-Alier, 2015).

2.2. A Complex Problem, Different Conceptualizations

The main attempt to define the concept of water grabbing in a systematic way can be found in a special issue edited by Mehta et al. (2012) in *Water Alternatives*. A collection of 14 different papers addressed different aspects of this phenomenon and characterized the different ways water grabbing may take place. Mehta et al. (2012:197) defined water grabbing as "*a situation where powerful actors are able to take control of, or reallocate for their own benefits, water resources already used by local communities or feeding aquatic ecosystems on which their livelihoods are based*". This broad definition can be applied to a variety of different political and socio-environmental processes of water appropriation.

Wagle et al. (2012) refer to water grabbing as illicit diversion of water from agricultural to industrial uses (e.g., for coal plant refrigeration) without compensation or consultation of the affected farmers. Matthews (2012), instead, uses the concept of water grabbing when powerful private and state actors mobilize political, institutional and economic power to control water for hydropower with no consideration for social and environmental impacts. Arduino et al. (2012) refers to water grabbing when downstream water quality is affected by contamination induced by a large-scale land deal. Bossio et al. (2012) refer to water grabbing in the context of foreign direct investments (FDIs) negatively affecting other local water users and their formal or informal and customary water rights. Velez Torres (2012) uses this concept to illustrate the historical exercise of power that leads to dispossession of a minority in favor of capitalist expansion of water-based projects. Duvail et al. (2012) provide as an example of water grabbing the over-abstraction of water that will affect local users, especially downstream. Sosa and Zwarteveen (2012) describe the changes in water use and land tenure and waterscape reconfigurations caused by mining operations. Islar (2012) consider water grabbing as the physical diversion of water for hydropower development and the associated reallocation of water use rights at the expenses of people's customary rights. Drawing on the definition of land grabbing given by Kay and Franco (2012), Hertzog et al. (2012) define water grabbing as the appropriation of water resulting from large-scale land acquisitions by powerful actors. Bues and Theesfeld (2012) consider water grabbing as a transformation in local water governance systems induced by the appearance of new and more powerful foreign actors that negatively affect the traditional users. Gasteyer et al. (2012) interpret the historical conflict and power dynamics of the Israeli/Palestinian competition over land and water as a case of water grabbing. Finally, Houdret (2012) refers to the concept of water grabbing to describe the reallocation of water resources that produces increased ecological and socio-economic marginalization of local farmers.

The common denominator of these definitions is that they all point to situations of power unbalance in the appropriation of water resources, often in disregard of local users and their customary rights.

2.3. Multiple Dimensions of Water Grabbing

The different cases and definitions of water grabbing reviewed above can be summarized in few typologies of water appropriation related to different dimensions of agricultural, industrial, material and energy metabolic expansion (see Table S1). Water can be grabbed for a variety of uses such as coal plant operation (Wagle et al., 2012; Islar, 2012), hydropower production (Matthews, 2012) and mining (Sosa and Zwarteveen, 2012). In the agricultural sector water, a resource that is variable both in space and in time, is grabbed through large-scale land acquisitions as direct appropriation of water, including both rainfall on agricultural land and irrigation water (Rulli et al., 2013; Hertzog et al., 2012) or in the form of environmental contamination (Arduino et al., 2012; Duvail et al., 2012; Rulli and D'Odorico, 2013). Moreover, water is considered grabbed as the result of intensification of irrigation promoted by FDIs, water based infrastructural projects, or commercialization of agriculture (Bossio et al., 2012; Velez Torres, 2012; Bues and Theesfeld, 2012; Houdret, 2012). It is important, however, to recognize the difference between consumptive and non-consumptive uses of water. In the former case water is returned to the atmosphere in the form of water vapor through the process of evaporation (e.g., from a reservoir built for hydropower generation) or plant transpiration (e.g., crop production) and is not (immediately) available for other uses. In the case of non-consumptive uses, water is used (e.g., hydropower generation) and then returned to downstream water bodies where it remains available for other environmental, industrial or societal uses (e.g., Hoekstra and Chapagain, 2008). Water footprints of human activities (i.e., water used in those activities) are typically defined with respect to consumptive water uses (Hoekstra and Mekonnen, 2012). Here we refer to water appropriations