

# RIVER OF CONTENTION: SCARCITY DISCOURSE AND WATER COMPETITION IN HIGHLAND PERU

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## I. INTRODUCTION

The policy prescriptions of international institutions seeking to transform fresh water governance in Latin America are driven by fear of an impending crisis due to an absolute scarcity of fresh water. The assumption that scarcity is the fundamental problem for the governance of fresh water resources leads to adoption of three main types of policy solutions. One is to build a new institutional architecture to support integrated water resource management (IWRM) at the national and river basin levels. The second is to emphasize new infrastructure to capture free flowing water, the transfer from regions of abundance to regions of deficit, and new technologies that make water delivery more efficient (e.g., drip irrigation). The third solution is to treat water as an economic good by pricing it, creating transferable rights in water, and supporting the development of water markets.

These policy prescriptions, coupled with World Bank and InterAmerican Development bank loans, have driven recent water reforms in Peru, a country where water conflicts have been numerous and often severe, posing difficult if not insuperable challenges for water governance. Is water scarcity the reason for these conflicts, or are other factors equally if not more important? And, are policies shaped by a fear of impending scarcity part of the solution or part of the problem?

Glacial retreat due to climate change has led to predictions of water scarcity, and Peru is no exception. This perception of impending scarcity is acute in Peru's Río Santa watershed, which extends from the snowcapped peaks of the Cordillera Blanca down to arid coastal lands in the regions of Ancash and La Libertad. Fed by meltwaters from the world's largest tropical glaciated land mass, the Santa watershed has become an international poster child for climate change.<sup>1</sup> There is some debate among hydrologists as to whether and when river flows will diminish, but competition for the Santa's waters is already severe.<sup>2</sup> However, it is not clear from my analysis of water conflicts in the valley or from meetings and interviews with irrigators,

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<sup>1</sup> See DAENE C. MCKINNEY & ALTON BYERS, U.S. AGENCY INT'L DEV., ADAPTATION TO CLIMATE CHANGE: CASE STUDY—GLACIAL RETREAT AND ADAPTATION OPTIONS IN PERU'S RIO SANTA BASIN, available at [http://www.cae.utexas.edu/prof/mckinney/Peru/Peru%20Case%20Study%20Jul2011\\_v6\\_Draft\\_Final.pdf](http://www.cae.utexas.edu/prof/mckinney/Peru/Peru%20Case%20Study%20Jul2011_v6_Draft_Final.pdf) (exploring the specific characteristics and vulnerabilities of the Río Santa Basin).

<sup>2</sup> See, e.g., Barbara D. Lynch, *Vulnerabilities, Competition and Rights in a Context of Climate Change: Toward Equitable Water Governance in Peru's Río Santa Valley*, 22 GLOBAL ENVTL. CHANGE 364, 364 (2012).

fishers, local officials, and water managers that water competition is an artifact of scarcity. Nor is it clear whether the water shortfalls experienced in the watershed are due to demography, climate change, or rising demand. It is clear, however, that understanding water competition and conflict in terms of scarcity will have implications for technological and economic approaches to water management and, more broadly, for institutional approaches to water governance. These approaches will have outcomes that may or may not be equitable.

What are the implications for water management and water governance when water competition is understood in terms of scarcity? To address these questions, I first review several different positions on water scarcity and their policy implications. I then ask how these are reflected in the Peruvian water regime that has taken shape in the past decade. Then, I look at water competition and conflict in the Rio Santa Valley and ask whether and how they relate to scarcity and scarcity discourse. I conclude by suggesting alternative approaches that might lead to more equitable or inclusive water governance and do more to prevent the water crisis predicted by international experts.

## II. WATER SCARCITY AS A DRIVER OF WATER POLICY

The idea of scarcity underlies much of the contemporary writing about water governance, writing that comes from a transnational network or epistemic community of water experts and, in many cases, proponents of IWRM.<sup>3</sup> In 1992, members of this network crafted the Dublin Statement on Water and Sustainable Development, a set of very general policy guidelines prepared for the United Nations Conference on Environment and Development. The statement opens with the following paragraph:

Scarcity and misuse of fresh water pose a serious and growing threat to sustainable development and protection of the environment. Human health and welfare, food security, industrial development and the ecosystems on which they depend, are all at risk, unless water and land resources are

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<sup>3</sup> KEN CONCA, *GOVERNING WATER: CONTENTIOUS TRANSNATIONAL POLITICS AND GLOBAL INSTITUTION BUILDING* (2006).

managed more effectively in the present decade and beyond than they have been in the past.<sup>4</sup>

Similarly, the World Bank's 2008 World Development Report argues that agriculture is "by far the largest user of water, contributing to water scarcity."<sup>5</sup> The challenge, it states, is "to use less water in the face of growing water scarcities."<sup>6</sup> The World Bank opens its discussion of issues in a document entitled "Sustaining Water" by stating, "Water is a scarce resource that has a multitude of interdependent uses (irrigation, drinking water, sanitation, energy and environmental services)."<sup>7</sup> A 2007 Food and Agriculture Organization (FAO) bulletin warns, "By 2025, 1,800 million people will be living in countries or regions with absolute water scarcity, and two-thirds of the world population could be under stress conditions."<sup>8</sup>

Not all members of the fresh water epistemic community are equally convinced that the world is running out of water. The 2006 Human Development Report talks about a global water crisis but casts it in terms of water insecurity or deprivation of access to water.<sup>9</sup> "The scarcity at the heart of the global water crisis," it argues, "is rooted in power, poverty and inequality, not in physical availability," and it identifies the underlying cause of scarcity as institutional and political rather than physical.<sup>10</sup> Since 2010, preoccupation with risk and uncertainty has displaced scarcity discourse to some extent, and the term water stress is used with increasing frequency.<sup>11</sup> That said, the idea of scarcity continues to inform water governance debates.

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<sup>4</sup> Int'l Conference on Water & the Environment, Jan. 26–31, 1992, *The Dublin Statement on Water and Sustainable Development* U.N. Doc. A/CONF.151/PC/112 (Mar. 12, 1992), available at <http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html>.

<sup>5</sup> WORLD BANK, WORLD DEVELOPMENT REPORT 2008: AGRICULTURE FOR DEVELOPMENT 4 (2008), available at <https://openknowledge.worldbank.org/handle/10986/5990>.

<sup>6</sup> *Id.* at 182.

<sup>7</sup> WORLD BANK, WORLD BANK GROUP IMPLEMENTATION PROGRESS REPORT OF THE WATER RESOURCES SECTOR STRATEGY, SUSTAINING WATER FOR ALL IN A CHANGING CLIMATE 4 (2010), available at <http://siteresources.worldbank.org/NEWS/Resources/sustainingwater.pdf>.

<sup>8</sup> WaterLex, *Special Issue: Water Cooperation and Human Rights* (Mar. 2013), available at <http://www.waterlex.org/resources/documents/WWD%202013%20WaterLex%20messages.pdf>.

<sup>9</sup> U.N. DEV. PROGRAMME, HUMAN DEV. REPORTS, BEYOND SCARCITY: POWER, POVERTY AND THE GLOBAL WATER CRISIS 3–6 (2006), available at <http://hdr.undp.org/en/content/human-development-report-2006.pdf> [hereinafter WORLD DEVELOPMENT REPORTS 2006].

<sup>10</sup> *Id.* at 2.

<sup>11</sup> See Len Abrams, *Water Scarcity*, THE WATER PAGE (Oct. 5, 2013), [http://www.africanwater.org/drought\\_water\\_scarcity.htm](http://www.africanwater.org/drought_water_scarcity.htm) (explaining the different terms in international discourse).

Water scarcity is attributed to population growth, economic development, growing demand for food and other agricultural products, and urbanization on the one hand and inefficient, wasteful, and profligate use on the other. It is widely thought that climate change will bring scarcity to an unprecedented level, creating new problems whose solutions are not to be found in traditional water management repertoires. Glacial retreat in the Andean “water towers” is emblematic of this issue. The 2010 World Development Report on Development and Climate Change states that changes in water availability “may be so rapid and unpredictable that traditional agricultural and water management practices may no longer be useful. . . . This is already the case for the indigenous communities in the Cordillera Blanca in Peru, where farmers are facing such rapid changes that their traditional practices are failing.”<sup>12</sup> Thus, the report deploys the specter of climate-induced scarcity to delegitimize the local knowledge, institutions and practices of campesino communities<sup>13</sup> and small farmers to justify the transfer of water management authority to state agencies.

Viewing the problem of freshwater access in terms of absolute, physical scarcity has policy implications. One set of policy prescriptions, emanating from a belief in scarcity emphasizes institutional change. “Meeting the water scarcity, challenge,” according to the World Bank, “will require integrated management of water use at river-basin levels for better water allocation across sectors, and greater efficiency in the use of water within irrigation systems.”<sup>14</sup> It goes on to argue that decentralized governance models are more likely to be successful than those reliant on centralized bureaucracies.<sup>15</sup>

The question is whether water governance policies designed to manage water more efficiently produce inequities in water allocation and distribution that deprive some groups of access to the water essential for their lives and livelihoods. On this point, Swyngedouw argues that “particular social groups lack access to water not because of real or alleged water scarcities, but because of differential entitlements associated with differential power

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<sup>12</sup> WORLD DEVELOPMENT REPORT 2010, *supra* note 7, at 137.

<sup>13</sup> Campesino communities, recognized by the state, are rural jurisdictions that may lie within or be coterminous with municipalities. These rural settlements—descendants of the indigenous communities recognized in the early twentieth century—are characterized by collective land and water tenure and an elected president and directors, and a degree of autonomy from the municipalities and districts in which they are located. See INT’L LAND COAL., *Campesinos Communities and Land Use*, <http://www.landcoalition.org/sites/default/files/legacy/legacypdf/angoc/ch6/ch6p06.pdf?q=pdf/angoc/ch6/ch6p06.pdf>.

<sup>14</sup> WORLD DEVELOPMENT REPORT 2008, *supra* note 7, at 184.

<sup>15</sup> *Id.* at 185.

relations.”<sup>16</sup> He goes on to say that scarcity may be produced when fear of a “hydro-socio-ecological disaster” is used to justify investment in big water projects and water commodification.<sup>17</sup> The 2006 UNDP Human Development Report puts it even more bluntly: “scarcity,” according to the report, is “manufactured through political processes and institutions that disadvantage the poor.”<sup>18</sup> Thus, when coupled with policies that favor water consuming industries and the construction of large public works for water storage and transfer, political institutions and processes that under-represent the interests of poor and highly vulnerable water users can produce scarcity.

Infrastructural approaches to addressing scarcity have also received considerable attention. This is not surprising given the abundance of engineers in the epistemic community that has grown up around freshwater management and governance. Addressing the problem of glacial retreat in the Andes and the Himalayas, the World Bank suggested additional investments in water storage, irrigation planning and system design.<sup>19</sup> Criticized in the 1990s for its initial investment in the Chixoy, Narmada, and other ill-conceived dam and hydroelectric projects, the Bank moved away from lending for big infrastructure projects.<sup>20</sup> But by 2003, it had returned to its earlier eagerness to fund big dam and water transfer project developments.<sup>21</sup>

The European Declaration for a New Water Culture has criticized this emphasis on what it calls “supply-side strategies.”<sup>22</sup> These strategies, which had become the normal mode of state intervention in water management by the mid-twentieth century, emphasized the construction of massive public

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<sup>16</sup> ERIK SWYNGEDOUW, U.N. DEV. PROGRAM, HUMAN DEV. REPORT, *Power, Water, and Money: Exploring the Nexus* 63 (Feb. 2006) (Erik Swyngedouw), available at <http://hdr.undp.org/en/reports/global/hdr2006/papers/swyngedouw.pdf>.

<sup>17</sup> *Id.* at 52.

<sup>18</sup> WORLD DEV. REPORT, *supra* note 9, at 11.

<sup>19</sup> 2011 O.J. (L 2010/2270INI) 5–7, available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2013:056E:0067:0074:EN:PDF>.

<sup>20</sup> See generally International Rivers Network, *The World Bank's Big Dam Legacy* (October 2007), available at [http://www.internationalrivers.org/files/attachedfiles/the\\_world\\_banks\\_big\\_dam\\_legacy.pdf](http://www.internationalrivers.org/files/attachedfiles/the_world_banks_big_dam_legacy.pdf) (exploring previous projects and making recommendations).

<sup>21</sup> *Id.*

<sup>22</sup> Foundation for a New Water Culture, Madrid, Feb. 18, 2005, *European Declaration for a New Water Culture*, available at [http://www.isiim.agropolis.org/OSIRIS/doc/EuropeNWC\\_dr ed.pdf](http://www.isiim.agropolis.org/OSIRIS/doc/EuropeNWC_dr ed.pdf).

works for water storage, transfer, and hydropower generation.<sup>23</sup> The Declaration sees these projects, which are justified as scarcity-preventing, as scarcity producing.<sup>24</sup> “Problems of scarcity,” it states, “are usually caused by abusive and unsustainable water use resulting from large-scale projects for economic development, rather than basic use by a population.”<sup>25</sup> The supply-side approach, with its emphasis on infrastructure, has a powerful constituency—one that includes staff of international lending institutions, transnational engineering firms, and irrigation engineers working in government bureaucracies.<sup>26</sup> At the end of the day, the emphasis on megaproject construction has helped to stimulate expansion of the very demands it was intended to satisfy. Moreover, these megaprojects, despite much of the rhetoric that has surrounded them, turn out to be less about water conservation than about water redistribution and, as a corollary, the redistribution of water stress.

In the course of over-stimulating demand, governments may also adopt policies that make access to water less equitable. The European Water Declaration argues that the redistribution of scarcities associated with supply-side strategies exacerbate inequities “owing to the weakness of democratic systems in promoting social participation in the design, implementation and monitoring of [water] policies.”<sup>27</sup>

The third, and perhaps dominant, approach to the problem of scarcity is economic. Conca points out that the idea that treating water as a scarce economic resource will lead to its conservation is central to the IWRM paradigm.<sup>28</sup> This assumption underlies the guidelines or principles produced by the 1992 Dublin Water Conference, a meeting of international water experts in preparation for the 1992 UN Environment and Development Conference in Rio de Janeiro.<sup>29</sup> The fourth and most widely accepted of the Dublin principles defines water as an economic good and links scarcity to the

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<sup>23</sup> See, e.g., SANJEEV KHAGRAM, DAMS AND DEVELOPMENT: TRANSNATIONAL STRUGGLES FOR WATER AND POWER (2004); PATRICK MCCULLY, SILENCED RIVERS: THE ECOLOGY AND POLITICS OF LARGE DAMS (2001).

<sup>24</sup> International Rivers Network, *supra* note 20, at 1–2.

<sup>25</sup> *European Declaration for a New Water Culture*, *supra* note 22.

<sup>26</sup> For example, Ministries of Energy, Natural Resources, and Economy and Finance.

<sup>27</sup> *European Declaration for a New Water Culture*, *supra* note 22, at 8.

<sup>28</sup> CONCA, *supra* note 3.

<sup>29</sup> International Conference on Water and the Environment, *The Dublin Statement on Water and Sustainable Development* (Jan. 31, 1992), available at <http://www.undocuments.net/h-20-dub.htm>.

failure to recognize its economic value.<sup>30</sup> In so doing, as Conca observes, the statement steered water governance discourse away from an emphasis on water as a basic human right.<sup>31</sup> This shift was consonant with the general neoliberal trend in global trade and development policy.

In the wake of the Cochabamba water war of 2000, rights discourse has reemerged in international water discussions, culminating in the adoption of the July 2010 UN General Assembly resolution recognizing access to clean water and sanitation as a human right.<sup>32</sup> Nonetheless, UNESCO's fourth World Water Development Report states that "a sense of the economic value of water in its different states and uses is a necessary part of water management."<sup>33</sup> The report goes on to suggest that in well-functioning water markets, prices can reflect the value of water necessary to secure the most valuable water uses.<sup>34</sup> The report backs away from a market fundamentalist position, calling instead for regulation by public institutions.<sup>35</sup>

Economic prescriptions deriving from an emphasis on scarcity range from elimination of subsidies for profligate water use to water pricing and the development of water markets.<sup>36</sup> Water markets are seen as contributing to the efficient allocation of water among diverse users. Liberalization of trade policies, the Bank argues, would lead to greater efficiency by encouraging the import of water-intensive commodities to water-scarce nations, which would in turn specialize in less thirsty crops with higher market value.<sup>37</sup> In a study for the World Bank, De la Torre, Fajnzylber, and Nash argue that water marketization would facilitate inter-basin water transfers to alleviate regional scarcity and dam building and hydropower development would reduce the impacts of variation in yearly river flow.<sup>38</sup> Lastly, the 2010

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<sup>30</sup> *Id.*

<sup>31</sup> See CONCA, *supra* note 3.

<sup>32</sup> G.A. Res. 64/292 ¶ 1, U.N. Doc. A/RES/64/292 (July 28, 2010), available at [http://www.un.org/en/ga/search/view\\_doc.asp?symbol=A/RES/64/292](http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/64/292).

<sup>33</sup> U.N. EDUC., SCIENTIFIC, & CULTURAL ORG., THE UNITED NATIONS WORLD WATER DEVELOPMENT REPORT 4: MANAGING WATER UNDER UNCERTAINTY AND RISK 284 (2012), available at <http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/WWDR4%20Volume%201-Managing%20Water%20under%20Uncertainty%20and%20Risk.pdf>.

<sup>34</sup> *Id.* at 220.

<sup>35</sup> *Id.* at 272.

<sup>36</sup> See generally WORLD DEVELOPMENT REPORT 2008, *supra* note 5.

<sup>37</sup> *Id.*

<sup>38</sup> See generally The World Bank, The International Bank for Reconstruction and Redevelopment, *Low Carbon, High Growth: Latin American Responses to Climate Change* (2009) (Augusto de la Torre, Pablo Fajnzylber, John Nash), available at [http://www.preventi.onweb.net/files/7574\\_bm10121.pdf](http://www.preventi.onweb.net/files/7574_bm10121.pdf).

World Development Report calls for transferrable water rights, full-value pricing, and well-regulated markets coupled with strong institutions and expert information.<sup>39</sup>

The emphasis on scarcity in international policy circles raises several questions. First, what is scarcity? Second, is scarcity an appropriate point of departure for conversations about water governance and allocation? Third, what problems does an emphasis on scarcity occlude, and what problems might it exacerbate? Fourth, are the institutional, infrastructural, and economic policies proposed to combat scarcity likely to improve or restrict access to water, particularly for populations and ecosystems that are highly vulnerable in the face of natural and economic disasters.

Swyngedouw in an exhaustive, if provocative, background paper for UNDP devotes considerable attention to the negative effects of scarcity discourse on water equity and asks us to differentiate between scarcity and restricted access to water.<sup>40</sup> His basic argument is that the water scarcity experienced by particular groups in society is relative and has little relationship to its absolute availability; rather, it is socially produced.<sup>41</sup> Lack of access to water occurs “not because of real or alleged water scarcities, but because of differential entitlements associated with differential power relationships.”<sup>42</sup> This position is shared by scholars from the Stockholm Water Institute, who talk about “scarcities” rather than “scarcity” and define these as “socially and politically induced challenges.”<sup>43</sup>

Reference to scarcity as the cause of water stress has political, ideological, and economic implications. On the economic side, Swyngedouw concludes that scarcity discourse serves as a justification for supply-side investment—construction of infrastructure for water capture and for its transfer from places where it is perceived to be abundant to those where it is apparently scarce—and for water commodification, if not privatization.<sup>44</sup> But the function of scarcity in the marketization of water goes further. Scarcity, for Swyngedouw, is what makes the market work. Therefore, making a market-based strategy for water governance work may

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<sup>39</sup> WORLD DEVELOPMENT REPORT 2010, *supra* note 5, at 49–58.

<sup>40</sup> See generally SWYNGEDOUW, *supra* note 16.

<sup>41</sup> *Id.* at 7.

<sup>42</sup> *Id.* at 63.

<sup>43</sup> Hakan Tropp, Malin Falkenmark & Jan Lundqvist, SIWI (Stockholm Int’l Water Inst.), *Water Governance Challenges: Managing Competition and Scarcity for Hunger and Poverty Reduction and Environmental Sustainability*, in 13 HUMAN DEVELOPMENT REPORT OFFICE OCCASIONAL PAPER 3 (2006).

<sup>44</sup> *Power, Water, and Money*, *supra* note 16, at 49, 64.

require the social production or engineering of scarcity. Proponents of water markets may find it helpful in such cases to attribute the resulting maldistribution of water to naturally or demographically produced scarcity. In this context, environmentalists who define water resource problems in terms of water scarcity may unwittingly find themselves in the position of creating the very shortfalls they seek to prevent.

Alternative framings of fresh-water issues may do more in the long run to encourage water conservation and to achieve more equitable allocation. Greater attention to how water uses can be complementary rather than competitive, for example, may encourage the development of strategies for equitable allocation across sectoral lines. An emphasis on complementarity can also create opportunities for conservation and water reuse. For example, in northern Peru I found complementarities between use for milling, cloth processing, micro hydro, and irrigation as well as between upstream and downstream agricultural uses.<sup>45</sup> At the river basin level, a water regime based on complementarity would oblige upstream water users to maintain the capacity of the landscape to store water and to use it in ways that permit urban and agricultural reuse at lower elevations. The burden of behavioral change would fall on major polluters. In sum, however, but an emphasis on maintenance of a usable water supply and sharing during shortfalls may reduce vulnerability.

Similarly, emphasis on water stress, rather than scarcity, would draw attention to the needs of groups whose lives and livelihoods are particularly vulnerable to changes in water quality as well as availability. Lastly, a focus on access, although it may lead to the supply-side solutions that create new demands, draws our attention to the distribution of water across ethnic, national, and socioeconomic lines.

### III. SCARCITY AND WATER POLITICS IN PERU<sup>46</sup>

Water scarcity is a problematic concept in Peru, yet it underlies major changes in the nation's water regime, changes which include its 2009 water law which authorized the establishment of a centralized agency for water

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<sup>45</sup> See Barbara Deutsch Lynch, *The Bureaucratic Transition: Peruvian Government Intervention in Sierra Small-Scale Irrigation* (1988) (dissertation, Cornell University).

<sup>46</sup> Unless otherwise noted, data for this section is drawn from unstructured, open-ended interviews conducted by the author in Lima and Huaraz with officials of the Autoridad Nacional del Agua (ANA), the Ministry of the Environment (MINAM), the Defensoria del Pueblo in May–June 2011, and September–October 2012.

policy administration and the creation of new watershed-level institutions comprised of private and government representatives.<sup>47</sup> Peru has the third largest volume of fresh water per capita in South America, but within the country, water is unequally distributed. The country is comprised of three distinct regions: the well-watered but sparsely populated selva with 13% of the nation's population of approximately thirty million inhabitants; the drier sierra, watered by mountain streams and glacial meltwaters, home to 32% of the population; and the arid coast, which is home to 54% of Peru's population, the bulk of its industrial activity, and 77% of its irrigated land, much of which is devoted export agriculture.<sup>48</sup> Approximately 98% of the nation's water supply flows into the Amazon drainage, which contains 26% of the nation's population. The coast, in contrast, with less than 2% of the nation's water, finds itself almost totally dependent on water coming out of the Andes.<sup>49</sup>

This imbalance between population and industrial activity concentration on the one hand and water availability on the other is the product of agricultural and industrial policies enacted over the past century, but it is often viewed in terms of scarcity. This emphasis on scarcity is reflected in massive government support for coastal irrigation and for the transfer of "excess" real water from the Amazon basin and the highlands—where it is integral to the maintenance of natural and agroecosystems and to domestic food security—to the coast where export agriculture predominates.<sup>50</sup> One national water authority official interviewed in 2012 suggested that the concept of the watershed be enlarged to include places of water deficit and places of water abundance in order to encourage equitable sharing of the resource through its transfer from water-abundant to water-scarce regions.<sup>51</sup>

Not all water transfers involve real water. Over the past decade, economists have taken an increasing interest in transfers of what is termed

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<sup>47</sup> Reglamento de la Ley de Recursos Hídricos, Ley No. 29338 (2009) (Peru), available at <http://www.ana.gob.pe/media/533045/reglamento%20lrh%20-%20n%C2%BA%2029338.pdf>.

<sup>48</sup> INEI (Instituto Nacional de Estadísticas e Informática), Anuario de Estadísticas Ambientales 23 (2011), available at <http://www.inei.gob.pe/BiblioINEIPub/BancoPub/Est/Lib/0978/Libro.pdf>; Julio F. Alegria, The Challenges of Water Resource Management in Peru 6 (2007), available at [http://www.uwgb.edu/envsustain/Full\\_paper%20Challenges%20Water%20Resources%20\\_JF%20Alegria\\_.pdf](http://www.uwgb.edu/envsustain/Full_paper%20Challenges%20Water%20Resources%20_JF%20Alegria_.pdf).

<sup>49</sup> J. Painter, UNDP, *Deglaciation in the Andean Region*, in 55 HUMAN DEVELOPMENT REPORT OFFICE OCCASIONAL PAPER (2007).

<sup>50</sup> See Juana Vera Delgado & Linden Vincent, Community Irrigation Supplies and Regional Water Transfers in the Colca Valley, Peru (International Mountain Society 2013), available at <http://www.bioone.org/doi/pdf/10.1659/MRD-JOURNAL-D-12-00119.1>.

<sup>51</sup> Interviews with National Water Authority engineers (names withheld), in Lima, Peru, (Sept. 21, 2012).

virtual water—or water in the form of agricultural products.<sup>52</sup> Peru has more fresh water per capita than any other South American country.<sup>53</sup> In a context of perceived world scarcity, the country becomes an attractive candidate for virtual water exports in the form of water-intensive crops even though water stress is often severe in the areas where export production takes place—areas where population and economic activities are also concentrated. At present, Peru is exporting virtual water in the form of vegetables, table grapes, rice, animal feed, and biofuels. Transfers of virtual water can have perverse outcomes, as in cases where water is transferred from water-scarce to water-abundant localities. In the Ica Valley, for example, asparagus production is creating water scarcity as it depletes local aquifers. It is beginning to compete for water not only with small farmers and urban consumers in the lower Ica Valley, but with cultivators and livestock producers in the upstream region of Huancavelica.<sup>54</sup> At a global level, very little of this produce is destined for arid countries; over half of Peru's production finds its way to the United States, and most of the rest goes to Western Europe.<sup>55</sup> The tradeoffs required for continuing emphasis on export agriculture are implied, but unstated in UNESCO's WWDR4 conclusion that “[g]iven the intention of a number of countries in the region to play a major role in satisfying increased global demands for food and biofuels, irrigation will need to become more water-

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<sup>52</sup> See, e.g., UNESCO, *Managing Water Under Uncertainty and Risk*, in 4 UNITED NATIONS WORLD WATER DEVELOPMENT REPORT 10 (2012).

<sup>53</sup> D. Olson, *Recursos Hídricos*, in PERU: LA OPORTUNIDAD DE UN PAIS DIFERENTE: PROSPERO, EQUITATIVO Y GOBERNABLE (M. Giugale et al. eds., 2006).

<sup>54</sup> Gerardo Damonte, *Dinamicas de Concentracion y Escasez de Agua: El Boom Agro-Exportador y Los Pequeños Propietarios en la Cuenca Media y Alta del Rio Ica* (2012); M.T. ORE ET AL., INSTITUTO DE ESTUDIOS PERUANOS, *EL AGUA ANTE NUEVOS DESAFIOS: ACTORES E INICIATIVAS EN ECUADOR, PERU Y BOLIVIA* (2009); Urteaga 2012; A.K. Chapagain & A.Y. Hoekstra, *The Global Component of Freshwater Demand and Supply: An Assessment of Virtual Water Flows Between Nations As a Result of Trade in Agricultural and Industrial Products*, in 33 WATER INTERNATIONAL 19–32 (2008); N. HEPWORTH, J.C. POSTIGO, B.G. DELGADO & P. KJELL, *DROP BY DROP: UNDERSTANDING THE U.K.'S WATER FOOTPRINT THROUGH A CASE STUDY OF PERUVIAN ASPARAGUS* (2010).

<sup>55</sup> *Peruvian Asparagus Exports Grow 13% Annually*, ANDINA AGENCIA PERUANA DE NOTICIAS (Aug. 21, 2013), <http://www.andina.com.pe/english/noticia-peruvian-asparagus-exports-grow-13-annually-471281.aspx>. According to the website of Peru's Ministry of Agriculture (MINAG), “Los principales países de destino de las exportaciones del espárrago fresco fueron principalmente EE.UU. con 69% del total de las exportaciones en el año 2006, seguido de los Países Bajos con 10%, Inglaterra con 9% y España con 8%.” *Comercio Mundial*, PERU MINISTERIO DE AGRICULTURA Y RIEGO 3 (2013), <http://www.minag.gob.pe/portal/sector-agrario/agricola/cultivos-de-importancia-nacional/esp%C3%A1rragos/comercio-mundial21?start=2>.

efficient.”<sup>56</sup> The implication is that *all* irrigators, whether or not they are engaged in the export of virtual water, will have to share the burden of installing expensive new irrigation equipment on their lands. Revenues returned to the state from virtual water exports may be used to produce valuable social goods, but within stressed watersheds—including the Río Santa valley—ecosystem health and the livelihoods of the poorest and most vulnerable water users, already endangered, would be further impaired.

Water scarcity discourse has also stimulated investment in farmland as a vehicle for virtual water exports. In Peru, considerable resources have been devoted to what is termed expansion of the agricultural frontier. In practice this has meant construction of large-scale irrigation works to bring water to arid lands, which are then sold to large foreign and domestic agroexport investors through public auctions.<sup>57</sup> Smaller and Mann conclude that “what are often described now as land grabs [foreign investments in farmland in Africa and the Americas] are really water grabs: the purchase or long-term lease of land in order to obtain the water rights that come with the land under domestic law or with the investment contract itself.”<sup>58</sup> The authors go on to state that these investments shift water to “essentially long-distance farming” at the risk of displacing local food producers and taking away their water rights and that these transfers are more likely where free trade agreements are in place.<sup>59</sup> In other words, at a global level, scarcity concerns are stimulating foreign investment in land for the capture of virtual water. In Peru, these investments are occurring in conjunction with the expansion of large-scale irrigation, aquifer mining and land concentration.<sup>60</sup>

Big coastal irrigation systems existed in Peru’s coastal region in prehistory, but they were built with increasing frequency in the early twentieth century.<sup>61</sup> Beginning in the 1970s, large-scale water transfer and irrigation projects were undertaken with the purpose of opening new lands on

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<sup>56</sup> UNESCO, *MANAGING WATER UNDER UNCERTAINTY AND RISK*, 4 UNITED NATIONS WORLD WATER DEVELOPMENT REPORT 203 (Caroline Andrzejewski et al. eds., 2012).

<sup>57</sup> Zulema Burneo, *The Process of Land Concentration in Peru*, INT’L LAND COAL. 14 (Jan. 2011), [http://www.landcoalition.org/sites/default/files/publication/1022/PERU\\_ENG\\_web\\_21.06.11%202.pdf](http://www.landcoalition.org/sites/default/files/publication/1022/PERU_ENG_web_21.06.11%202.pdf).

<sup>58</sup> Carin Smaller & Howard Mann, *Thirst for Distant Lands: Foreign Investment in Agricultural Land and Water*, INT’L INST. FOR SUSTAINABLE DEV., FOREIGN INVESTMENT FOR SUSTAINABLE DEV. PROGRAM 3 (May 2009), [http://www.iisd.org/pdf/2009/thirst\\_for\\_distant\\_lands.pdf](http://www.iisd.org/pdf/2009/thirst_for_distant_lands.pdf) (alteration in original).

<sup>59</sup> *Id.* at 7–11.

<sup>60</sup> Burneo, *supra* note 57, at 11–33; Damonte *supra* note 54.

<sup>61</sup> Burneo, *supra* note 57, at 11–33.

the coast.<sup>62</sup> As noted above, increasingly the objective of these massive projects is to improve state lands for sale to investors, effectively augmenting water demand.

One ongoing effort is the Olmos-Transandino project. Still under construction, the ecologically and socially problematic Olmos project includes a recently completed nineteen kilometer long tunnel that diverts water from the Huancabamba River, an eastward flowing Amazon tributary to the Pacific drainage on the North coast.<sup>63</sup> By the 1990s, state-funded projects were undertaken with a new objective: improvement of state lands for sale to investors and export-oriented agroenterprises. The Olmos Transfer project, for example, called for expropriation of 110,000 hectares of irrigable land belonging to campesino communities for sale to agribusiness producers.<sup>64</sup> So, infrastructure improvement in Peru, justified by the threat of scarcity, has helped to fuel an agroexport boom and a corollary transfer of virtual water to the water-abundant United States and Western Europe. As a result, demand for water has expanded enormously. Where subterranean waters are exploited, as in Ica and Lambayeque, water scarcity is indeed being produced.

#### *A. Scarcity and Water Commodification*

The definition of water as an economic good, enshrined in the Dublin Principles, is based on the premise that market mechanisms would result in its more efficient use and allocation among uses.<sup>65</sup> One way of treating water as an economic good is pricing it in a way that ensures conservation. But unless the price of water is calibrated with the ability to pay, pricing simply shifts water to its most profitable rather than its most essential uses. At this point, the Peruvian government has not enacted national water pricing policies, although this is occurring in some municipalities.

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<sup>62</sup> *Id.* at 2.

<sup>63</sup> WWF (Worldwide Fund for Nature), PIPEDREAMS? INTERBASIN WATER TRANSFERS AND WATER SHORTAGES 23 (2007), available at [http://www.wwf.or.jp/activities/lib/pdf\\_freshwater/freshwater/pipedreams\\_27\\_june\\_2007\\_1.pdf](http://www.wwf.or.jp/activities/lib/pdf_freshwater/freshwater/pipedreams_27_june_2007_1.pdf).

<sup>64</sup> *Id.*; Eduardo Zegarra, *Mercado y Reforma de la Gestión del Agua en Peru*, in REVISTA DE LA CEPAL 83, 107–20 (Aug. 2004).

<sup>65</sup> See, e.g., HELEN INGRAM ET AL., *The Importance of Equity and the Limits of Efficiency in Water Resources*, in WATER, PLACE, AND EQUITY (C.J.M. Whitely et al. eds., 2008), available at <http://mitpress2.mit.edu/books/chapters/0262232715chap1.pdf>.

Water rights can be allocated in a number of ways. The Peruvian water law declares water to be the property of the state.<sup>66</sup> The law recognizes the preexisting water rights of indigenous and campesino communities, although this recognition can be construed quite narrowly, and the rights are not antecedent to, but rather granted by the national water authority.<sup>67</sup> Moreover, the government may use its authority to distribute water according to what it deems to be the highest and best use, overriding other legal commitments.<sup>68</sup>

In Andean communities, rights to surface water are typically tied to land and to contributions to irrigation system maintenance.<sup>69</sup> Some economists favor full commodification of water through the creation of simple, transferrable water rights.<sup>70</sup> Where water is treated as alienable property, this would in principle facilitate its flow from places of abundance to places of scarcity, enhancing spatial equity. But, in Peru, full commodification of water would manufacture scarcity in two ways. Just as real estate markets exclude the poor from housing while creating new demands for real property, market pricing of water and water rights would restrict or even exclude poorer cultivators and urban water users from access to a safe and reliable water supply as it increases demand. This would result in differential access.<sup>71</sup>

Second, commodification creates scarcities when it facilitates the transfer of water to places and uses where its application would be most profitable. The Olmos Project is an example, but Stensrud and Andersen also make this point in a study of irrigation in the Colca Valley following construction of the massive Majes project, which transferred water from campesino communities to agribusiness enterprises on the coast.<sup>72</sup> So, we have here a Catch-22. Where fear of scarcity fosters implementation of market-based approaches to water allocation, water stress and apparent scarcity is produced as water is shifted from life-sustaining to profit-generating uses.

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<sup>66</sup> Reglamento de la Ley de Recursos Hídricos, Ley No. 29338, Título I, Art. 2 (Peru).

<sup>67</sup> Capítulo III, Art. 64.

<sup>68</sup> *Id.* at Título I, Art. 2

<sup>69</sup> See Rutgerd Boelens, *The Politics of Disciplining Water Rights*, 40 DEV. & CHANGE 307, 309–10 (2009) (analyzing official policies incorporate local water laws).

<sup>70</sup> *Power, Water, and Money*, *supra* note 16, at 49.

<sup>71</sup> Alana Boland, *The Trickle-down Effect: Ideology and the Development of Premium Water Networks in China's Cities*, INT'L J. URB. REGIONAL RES. 21–40 (Mar. 2007) (reporting that economic liberalization in China in the 1990s was accompanied by differentiated access to urban water and a process of splintering urbanism that limited access to clean household water to wealthier citizens).

<sup>72</sup> Astrid Stensrud & Astrid Andersen, *A NEW WATER CULTURE? TECHNOLOGIES AND TERMINOLOGIES OF WATER AND CLIMATE CHANGE IN PERU (1969)* (Paper prepared for Annual Congress of the Latin American Studies Association, San Francisco).

*B. Peruvian Water Politics and the Production of Scarcity*

While the treatment of water as an economic good is a major driver of scarcity, shortfalls may be created even where full marketization is absent. Scarcity can be politically produced where states seek to encourage or simply ignore activities that are highly water consumptive. At a national or watershed level, the result is expansion of demand. To meet new water demands, states may encourage aquifer mining and large water transfer projects that produce scarcity.

This is indeed happening in Peru where water marketization has yet to occur. The nation's 1969 water law abolished private ownership of water making it property of the state.<sup>73</sup> "Administrative control resided [and still does] with the Ministry of Agriculture, which supervised a nested hierarchy of water user associations."<sup>74</sup> In highland communities, associations established by law operated side by side with autonomous local irrigator organizations.<sup>75</sup> Communities accepting state aid for irrigation improvements were expected to bring local water institutions into conformity with the water code. The 1969 water law called for more efficient water allocation and creation of new rights, but allowed for adjustments to changing patterns of demand, particularly during periods of drought.<sup>76</sup> The law should have made water allocation more equitable and reduced vulnerability to drought, but enforcement was erratic and private interests often prevailed.<sup>77</sup>

In the 1990s, the government of President Alberto Fujimori drafted legislation that would have privatized water and created tradable water rights, but irrigators vociferously opposed the changes and the bill was scrapped when Fujimori left office in 2000 in the face of mounting scandals.<sup>78</sup> Subsequent governments have recognized water as belonging to the nation.<sup>79</sup> This retreat from a strong neoliberal position is reflected in the 2009 water law which also recognizes the rights of indigenous and

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<sup>73</sup> Ley General de Aguas, Decreto Ley N°17752 (Peru), available at <http://www.congreso.gob.pe/ntley/Imagenes/Leyes/17752.pdf>.

<sup>74</sup> Lynch, *supra* note 94, at 9.

<sup>75</sup> *Id.* at 370; PAUL H. GELLES, WATER AND POWER IN HIGHLAND PERU: THE CULTURAL POLITICS OF IRRIGATION AND DEVELOPMENT 135 (Rutgers Univ. Press 2000).

<sup>76</sup> Ley General de Aguas, Decreto Ley N°17752 (Peru).

<sup>77</sup> PAUL B. TRAWICK, THE STRUGGLE FOR WATER IN PERU: COMEDY AND TRAGEDY IN THE ANDEAN COMMONS 240 (Stanford Univ. Press 2003).

<sup>78</sup> Symantha A. Slaughter-Holben, *Demand Management and Peruvian Highland Irrigation Systems*, 22 POL. & LEGAL ANTHROPOLOGY REV. 14, 14–15 (1999).

<sup>79</sup> Zegarra, *supra* note 64, at 107–20.

campesino communities to manage water according to their uses and customs (*usos y costumbres*).<sup>80</sup> Like the 1969 law, it can, as many irrigators fear, be used to justify water privatization, but to date, outright privatization of water and creation of water markets has not happened.<sup>81</sup> Simplification of water rights is a more likely outcome. If the emergent regime creates a unified legal framework encompassing all water uses, it would, as Boelens argues, reduce the array of possible water sharing arrangements that could be implemented under changing climatic conditions and undermine the ability of water user groups to collectively manage water.<sup>82</sup>

In sum, much of what looks like scarcity in Peru is simply inequitable or constrained access to relatively clean water resulting from policies that have (1) encouraged expansion of demand, particularly in arid areas, (2) turned a blind eye to water contamination by mining and manufacturing activity, (3) encouraged aquifer mining and the transfer of water from the highlands to the arid coast, and (4) created institutional forms that systematically under-represent the most vulnerable urban and rural water users. In addition, intraregional and interregional inequities are responsible for the production of scarcities in highland Peru, deepening the vulnerability of poor rural communities to climate-related stress.

Government policies have stimulated expansion of demand by fostering the growth of the nation's mining, export agriculture, and energy sectors. These constraints are produced by an inequitable distribution of political power and a lack of sectoral or jurisdictional representation rather than water scarcity per se. With climate change and the absence of equitable water governance, water pollution and diversion are giving rise to water conflicts and exacerbating the vulnerability of neighborhoods, communities, and ecosystems.

#### IV. WATER COMPETITION AND SCARCITY IN THE SANTA WATERSHED<sup>83</sup>

The Río Santa watershed, as noted above, has become something of a poster child for climate-induced water scarcity. Indeed, water stress in the valley is intensifying, and numerous water conflicts have erupted over the

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<sup>80</sup> Reglamento de la Ley de Recursos Hídricos, Ley No. 29338, Título III, Art. 64 (Peru).

<sup>81</sup> Zegarra, *supra* note 64, at 107–20.

<sup>82</sup> Boelens, *supra* note 69.

<sup>83</sup> Unless otherwise noted, this section is based on data from interviews with government officials, community leaders, and NGO personnel conducted from 2007–2012 in the cities of Huaraz, Lima, and Marcará in the communities of Vicos, Canrey Chico, and Catac.

past decade.<sup>84</sup> International capital, working in tandem with national enterprises and the Peruvian state, has been a major contributor to water stress in the Río Santa watershed. Enterprises in the mining, energy, and export-agriculture sectors have claimed water rights, tacitly and quasi-legally in the case of the mining industry (which sees itself, and is seen by the state, as a minor water user despite its serious impacts on water quality) and the hydropower industry. Agribusiness enterprises in the large coastal irrigated areas have received formal water rights together with irrigable land. These favored industries compete for water and land with domestic food and livestock production, mountaineering and ecotourism, a growing aquaculture industry, and urban water systems. Water contamination by mine wastes, untreated sewage, and agrichemicals constitutes a serious threat to public health and to the integrity and sustainability of natural and agroecosystems.

Water conflicts have proliferated as a result of these activities. Some of these conflicts pit jurisdictions against one another; others involve competition for water among economic sectors and subsectors. While most sectoral conflicts have an upstream-downstream dimension, this is not always true of jurisdictional competition among communities, municipalities, or regions. Environmental justice respect for existing community and municipal water rights lie at the core of many conflicts.

Conflict has taken different forms at different points in the watershed. In the high Andes (above 3,300 meters), water disputes are often mine-related.<sup>85</sup> The mining sector mushroomed in the 1990s.<sup>86</sup> In 2010, minerals accounted for 61% of export earnings.<sup>87</sup> Transnational enterprises pay royalties to the government, some of which returns to regional and local governments where the mines operate.<sup>88</sup> Mine royalties are narrowly targeted, while

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<sup>84</sup> Examples of transnational enterprises that have affected water quality and access include Barrick Mining Company and Duke Energy. For a discussion of Duke's claims, see Mark Carey, *The Politics of Place: Inhabiting and Defending Glacier Hazard Zones in Peru's Cordillera Blanca*, in *DARKENING PEAKS: GLACIER RETREAT, SCIENCE, AND SOCIETY* 229, 181–91 (Ben Orlove, Ellen Wiegandt & Brian H. Luckman eds., 2008).

<sup>85</sup> Barbara Deutsch Lynch, International Conference at Yale University: Water Access, Food Sovereignty, and Peru's Water Regime 13 (Sept. 14–15, 2013) ([http://www.yale.edu/agrarianstudies/foodsovereignty/pprs/30\\_Lynch\\_2013.pdf](http://www.yale.edu/agrarianstudies/foodsovereignty/pprs/30_Lynch_2013.pdf)).

<sup>86</sup> ALANA WILSON, PERU'S SOCIAL CONFLICT IS ABOUT MORE THAN MINING 1 (Fraser Institute 2012), available at <http://www.fraserinstitute.org/uploadedFiles/fraser-ca/Content/research-news/research/articles/peru-social-conflict-is-about-more-than-mining.pdf>.

<sup>87</sup> *Peru Exports Rise 31.1 Percent in 2010 to Record Levels*, ANDEAN AIR MAIL & PERUVIAN TIMES, Jan. 29, 2011, <http://www.peruviantimes.com/29/peru-exports-rise-31-1-percent-in-2010-to-record-level/10707/>.

<sup>88</sup> Damonte, *supra* note 54.

environmental impacts of mining are diffuse. As transnational mining operations proliferated, so did small marginal enterprises lacking pollution controls. Extraction and road building bring arsenic and heavy metals to the surface and into the Santa, and leaching from old mine tailings continues unabated. Both are polluting the Santa and making some of its tributaries too toxic for irrigation or domestic use. Road building and the movement of heavy equipment through the spongy terrain of the high meadows (*puna*) is reducing the water storage capability of the land and may well contribute to absolute scarcity down the road. Mining is also blamed for stream acidification and reduction of vegetative cover in Huascarán National Park, a reserve encompassing much of the Cordillera Blanca and surrounding *puna* lands.<sup>89</sup> In addition, ores are often washed with water to separate useful ore from tailings, but Ministry of Energy and Mines (MEM) officials charged with monitoring pollution are reluctant to impose sanctions that could affect the financial performance of the sector.<sup>90</sup>

In December 2010, a decision by MEM to grant a permit for mineral exploration on the shores of Lake Conococha, the Santa's headwaters, led to a massive protest by livestock-producing and farming communities, urban water users, and defenders of the Huascarán National Park.<sup>91</sup> Protesters blocked the highway from Lima to Huaraz and marched in the streets of the region's cities calling for cancellation of the license to pollute. The conflict abated only when the government suspended the exploration permit.<sup>92</sup> In January 2011, responding to coalition demands, the national water authority declared that mining exploration and other industrial activities would not proceed in the wetland near the lake shore.<sup>93</sup>

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<sup>89</sup> See Walter Silverio, *Cordillera Blanca*, [http://www.grid.unep.ch/activities/global\\_change/cordillera.php](http://www.grid.unep.ch/activities/global_change/cordillera.php) (last updated July 5, 2010). See generally Milagros Sosa & Margreet Zwartveen, *Exploring the Politics of Water Grabbing: The Case of Large Mining Operations in the Peruvian Andes*, 5 WATER ALTERNATIVES 360, 360–75 (2012) (characterizing these activities as a form of water grabbing).

<sup>90</sup> Republic of Peru Wealth and Sustainability: The Environmental and Social Dimensions of the Mining Sector of Peru, *Environmentally and Socially Sustainable Development Department, Latin America and the Caribbean Region*, PG# World Bank Rep. No. 38044-PE (2005), <http://siteresources.worldbank.org/INTPERU/SPANISH/Resources/TheEnvironmentalandSocialDimensionsoftheMiningSectorinPeru.pdf>.

<sup>91</sup> Lynch, *supra* note 2, at 364–73.

<sup>92</sup> *Mining License's Cancellation Ends Huaraz Strikes*, LIVING IN PERU (Dec. 13, 2010), <http://www.livinginperu.com/news13709>.

<sup>93</sup> *Agua de la Laguna Conococha no se Usará para Proyectos Mineros*, EL COMERCIO, PERÚ (Jan. 21, 2011), [http://elcomercio.pe/planeta/701798/noticia-agua-laguna-conococha-no-se-usa-para-proyectos-mineros\\_1](http://elcomercio.pe/planeta/701798/noticia-agua-laguna-conococha-no-se-usa-para-proyectos-mineros_1).

The 2010 conflict was about many things, but it was not about water scarcity. In the first instance, it was about competing and incompatible uses of land and water—mining versus agriculture and domestic use. It also had to do with ecosystem protection within a national park and the right of a campesino community to control land and water use within its boundaries.

A somewhat similar, less widespread, but far more protracted conflict took place in the Callejón de Huaylas, or the middle river basin. This part of the watershed is home to Andean farming systems, commercial agriculture, small-scale mining, and numerous small urban settlements. Despite urbanization, outmigration, and land abandonment, the Callejón remains a reservoir of agrobiodiversity; its cultivators make a substantial contribution to regional food security.<sup>94</sup> Deterioration of potable water and small-scale irrigation infrastructure built in the 1960s and '70s is reducing water accessibility for small farmers and domestic water users. Competition between irrigators, domestic water users, and the energy sector has become intense.

An illustrative dispute was over rights to Laguna Parón, a glacial lake high in the Cordillera Blanca. In 2008, Cruz de Mayo, a campesino community, blocked access to the lake to protest water withdrawals for power generation.<sup>95</sup> One protagonist in the Parón conflict was a Duke Energy subsidiary authorized to manage the Cañon del Pato hydroelectric plant which supplies power to the region's cities and industries and to the national grid.<sup>96</sup> Demand for electricity has expanded rapidly in Peru and in the region, due in no small part to growth in the mining industry.<sup>97</sup> To offset variations in Río Santa flow and meet peak power demand, Duke drew water from Lake Parón.<sup>98</sup> The company claimed the right to control releases partly on its purported property rights to the lake and partly on the claim that its technical expertise could prevent disaster.<sup>99</sup>

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<sup>94</sup> Barbara Deutsch Lynch, *Equity, Vulnerability and Water Governance: Responding to Climate Change in the Peruvian Andes* 13, available at <http://www.icid18.org/files/articles/566/1277944530.pdf>.

<sup>95</sup> Lynch, *supra* note 85, at 13.

<sup>96</sup> Kristina Aiello, *Duke Energy and the Disappearing Waters of Peru*, North American Congress on Latin America (Oct. 7, 2009), <https://nacla.org/node/6149>; Barbara Fraser, *Water Dispute Illustrates Balance Between Climate, Livelihood* AMERICAN CATHOLIC (Feb. 21, 2010), <http://www.americancatholic.org/news/report.aspx?id=2247>.

<sup>97</sup> *Peru: Renewable Energy Industry*, U.S. DEP'T OF COMMERCE 1, available at [http://www.iberglobal.com/files/peru\\_energias\\_renovables.pdf](http://www.iberglobal.com/files/peru_energias_renovables.pdf)

<sup>98</sup> See Aiello, *supra* note 96 (outlining the conflict at Lake Paron).

<sup>99</sup> Fraser, *supra* note 96.

But its releases were incompatible with the irrigation needs of communities with long-standing rights to lake water, including Cruz de Mayo. Water often came at the wrong time of day, and its flow, too rapid for irrigation, caused soil erosion. The small city of Caraz also depended upon the lake for its domestic water supply, but during dry periods Duke's releases left insufficient water to meet urban needs. The blockade lasted eighteen months as officials from Caraz and surrounding communities petitioned the government for redress.<sup>100</sup> After months of negotiation, the national water authority announced that the lake was part of the Huascarán National Park and "the property of all Peruvians" and that communities with preexisting rights to lake water would control releases for agriculture, drinking water, and hydropower on the condition that Duke be allowed to lower the lake level should it become dangerously high.<sup>101</sup> The agreement fell apart in 2011 when a Constitutional Court ruled in favor of Duke's right to the lake.<sup>102</sup> Local groups vowed to continue their protest against Duke's control of lake levels.<sup>103</sup>

The Lake Parón conflict was not about scarcity but about access, timing, and rights claims based on two fundamentally different views of how and by whom water should be governed. Rights claims legitimated by a faith in expert management were pitted against "traditional" rights claims grounded in local knowledge and underlain by a sense of place-based equity. As one local activist argued, "We must make clear that the water could disappear and with it the life support for many communities and the town of Caraz. The right to life and to manage one's own resources is in play."<sup>104</sup>

In its lower reaches, the Río Santa forms the boundary between the regions of Ancash and La Libertad, and a substantial fraction of the watershed lies within the latter's boundaries. Antagonism between the regions has been marked.<sup>105</sup> Regional competition is aggravated by the presence of two large coastal irrigation and water transfer systems: Chinecas in the Region of Ancash and CHAVIMOCIC, Alan García's pet project in

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<sup>100</sup> Aiello, *supra* note 96.

<sup>101</sup> Fraser, *supra* note 96.

<sup>102</sup> Barbara Fraser, *Andean Community, Fighting for Water Rights, Wins Peruvian Award*, EL MENSAJERO CATOLICO (2011), <http://en.elmensajerochester.com/news/world-nation/andean-community-fighting-for-water-rights-wins-peruvian-award/>.

<sup>103</sup> *Id.*

<sup>104</sup> Salvemos Parón, *Perú: conflicto Medioambiental en el Callejón de Huaylas*, ACCIÓN POR LA BIODIVERSIDAD (Aug. 26, 2008, 5:16 PM), <http://www.biodiversidadla.org/layout/set/print/content/view/full/43392> (original in Spanish).

<sup>105</sup> See Blanca Rosales, *Peru: Water Isn't for Everyone*, INTERPRESS SERVICE NEWS AGENCY (Apr. 18, 2009), <http://www.ipsnews.net/2009/04/peru-water-isn39t-for-everyone/>.

the Aprista region of La Libertad. These compete for the Santa's waters.<sup>106</sup> Still under construction, CHAVIMOCHIC transfers water into the Chau, Viru, Mochica, and Chicama valleys for irrigation, power generation, and urban water supply for the city of Trujillo.<sup>107</sup> The project, now in phase three of development, vastly increases demand for Río Santa water at a time when supply is likely to become more variable, if not more limited, due to climate change. CHAVIMOCHIC irrigated area is considerable. In 2006, 86% was concentrated in the hands of eleven agribusiness enterprises.<sup>108</sup> Of these, a single asparagus producer purchased 33% of all the land reclaimed during the first two phases of the project.<sup>109</sup> Chincas is an older scheme. It is less than half the size of its rival and appears to be somewhat less dominated by huge agroexport enterprises. Chincas is supposed to supply water for the city of Chimbote and to irrigated lands in the coastal reaches of the Nepeña and Casma valleys, but its infrastructure is in poor shape, and water from the main canal only gets as far as the Nepeña valley. Both water transfer projects have reduced the supply available to older and smaller coastal irrigation canals serving local food producers and to Chimbote, Peru's third largest city.<sup>110</sup> Here one could argue that scarcity is a major driver of water conflict, but scarcity is politically produced. The likelihood of equitable allocation not only among the two irrigated areas but also among water users living and working downstream is reduced by a long tradition of regional antagonism fueled by national partisan politics.

As these cases indicate, competition in the Santa watershed is still largely local, but serious upstream-downstream imbalances exist in the irrigation sector. The upper basin accounts for 40% of the watershed's irrigated area and 70% of its irrigators, while the coast accounts for some 70% of irrigated area (about 135,000 ha) and 30% of irrigators.<sup>111</sup> This imbalance will become more marked when the latest phases of the two projects are completed.

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<sup>106</sup> *Id.*

<sup>107</sup> M.T. Oré et al., *El Agua ante Nuevos Desafíos: Actores e Iniciativas en Ecuador, Peru, y Bolivia*, INSTITUTO DE ESTUDIOS PERUANOS, LIMA (2009); J.S. Kus, *Chavimochic: A Peruvian Irrigation Project*, CONGRESS OF LATINAMERICAN GEOGRAPHERS (CLAG), YEARBOOK (1987), <http://sites.maxwell.syr.edu/clag/Yearbook1987/kus.htm>.

<sup>108</sup> Burneo, *supra* note 57.

<sup>109</sup> *Id.*

<sup>110</sup> According to 2007 census data, the population of Chimbote was 328,987, or 31% of Ancash's population. About 30% of Chimbote's population lacks access to potable water. See Lynch, *supra* note 2, at 369.

<sup>111</sup> J. Hendriks, *Cambio Climático y Gestión de Recursos Hídricos en la Cuenca Ampliada del Río Santa*, IUCN (June 5, 2008); Burneo, *supra* note 57.

CHAVIMOCHIC landowners are entitled to a fixed yearly allocation of 10,000 m<sup>3</sup>/ha.<sup>112</sup> In contrast, the water rights of highland irrigators are defined in terms of access to a canal's total flow for a fixed time period, so the latter get less water during droughts. Nonetheless, large coastal agroenterprises fear that climate change will affect their access to water. In 2008, Peru's Association of Exporters demanded that the government guarantee their access to sufficient water to prevent anticipated losses.<sup>113</sup> If met, this request would mean taking water away from highland food producers and urban residents in order to transform it into virtual water through the production of agroexports. To date, it does not appear that highland irrigators have experienced reductions in water supply as a result of transfers to the special projects, although Bury et al. suggest that this is imminent.<sup>114</sup> A more immediate source of tension is the role that the former are assigned in water conservation. Highland irrigators have been assigned the role of watershed protection; they are being asked to plant trees on their land and to install expensive water saving irrigation technologies. In response, local irrigation officials and community leaders argue for a quid pro quo: if coastal enterprises want more water, they need to pay highland cultivators to adopt conservation measures—whether hi-tech irrigation systems or reforestation.

In sum, if we look at water competition in the Santa watershed, we find that it occurs less because water is scarce than because its multiple uses are incompatible. Water demand for power generation and agroexports has been growing as a result of the government policies of the past twenty-five years, while policies that have favored growth of mining have rendered water unfit for irrigation or human and animal consumption. There is an intimate relationship between agroexport growth and scarcity discourse because the latter has been used to justify construction of the water transfer apparatus that has allowed this growth to occur. In addition, because they use sophisticated irrigation technologies, agribusinesses are portrayed as modern and water conserving even though they are responsible for the export of virtual water that could be used to enhance food security. Yet, it is likely

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<sup>112</sup> Fernando Chanduvi, *Changing Deserts into Agricultural Lands*, 24 GRID MAGAZINE 6–8 (Feb. 2006), available at <http://www.fao.org/docrep/009/a0409e/A0409E03.htm#ch3.1>.

<sup>113</sup> Lynch, *supra* note 85, at 15.

<sup>114</sup> See Jeffrey Bury et al., *New Geographies of Water and Climate Change in Peru: Coupled Natural and Social Transformations in the Santa River Watershed*, 103 ANNALS OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS 363, 363–74 (2013) (using models to predict future shifts in water availability and human reaction).

that as water supply becomes erratic due to deglaciation, scarcity will be experienced most severely by those water users lacking secure water rights.

#### V. CONCLUSION

While water stress is prevalent in the Santa watershed, conflict is not about scarcity but about competition resulting from jurisdictional conflict, the incompatibility of different sectoral uses of water, and access to water, which is inequitable and uneven at best. In addition, water stress is being produced by mine pollution that makes the river's water unfit for irrigation or livestock and human consumption, and in the future, it may be manufactured by water transfers to the lands of agroexport investors.

Alternatives to scarcity-creating water regimes are present in some Andean communities where water rights are tied to community membership, place, water supply, the agricultural cycle and labor contributions to system operation and maintenance. These regimes are, at least normatively, responsive to vulnerabilities produced by drought because they entail obligations to the water resource, and in times of scarcity a moral economy of subsistence may come into play. At the river basin level, water regimes based on complementarity encourage conservation and improve water quality.

Lastly, we need to turn our attention to political issues of representation and exclusion. While there is support for water user consultation on paper, Peruvian institutions have much to do to make inclusion of the most vulnerable water users in decision-making roles a reality. Policies that recognize the relationship between water and land and the importance of water in sustaining local ecosystems, programs that encourage complementarity, and inclusive institutions may in the end contribute more to sustainability and conservation than those based on a fear of scarcity.