



Knowledges co-creation and water conservation in the Global Souths: An introduction

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Special Issue – Knowledge co-creation and water conservation in the Global South

Abstract

This Special Issue seeks to offer empirical evidence of the forms of knowledge valued by different actors involved in water conservation practices, the dynamics of cross-fertilization dynamics, and possible tensions that emerge. It investigates knowledge dialogue and co-creation around water conservation through case studies at the local, regional and global levels, and including various types of actors – local and indigenous communities, parish and municipal governments, national governments and private businesses. It draws attention to the diverse voices and knowledge on water that are produced from the Global Souths, including traditionally marginalized actors and approaches.

Keywords

Knowledge dialogue; co-creation; water conservation; Global South

Résumé

Ce numéro spécial cherche à offrir des preuves empiriques des formes de connaissances valorisées par les différents acteurs impliqués dans les pratiques de conservation de l'eau, des dynamiques de fertilisation croisée et des tensions possibles. Il contribue à cette réflexion en étudiant le dialogue des connaissances et la cocréation autour de la conservation de l'eau à travers des études de cas aux niveaux local, régional et mondial, et en incluant divers types d'acteurs – communautés locales et autochtones, gouvernements nationaux et subnationaux et entreprises privées. Il attire l'attention sur les diverses voix et connaissances sur l'eau produites par les Suds Globaux, y compris les acteurs et les approches traditionnellement marginalisés.

Resumen

Este número especial busca ofrecer evidencias empíricas de las formas de conocimiento valoradas por diferentes actores involucrados en las prácticas de conservación del agua, su dinámica de fertilización cruzada y sus posibles tensiones. Contribuye a esta reflexión investigando el diálogo de conocimientos y la cocreación en torno a la conservación del agua a través de estudios de caso a nivel local, regional y global, e incluyendo varios tipos de actores: comunidades locales e indígenas, gobiernos parroquiales y municipales, gobiernos nacionales

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y empresas privadas. Llama la atención sobre las diversas voces y conocimientos sobre el agua que se producen en los Sures Globales, incluidos actores y enfoques tradicionalmente marginados.

1. Valuing water: between clashes and dialogues

The improvement of water conservation practices and knowledges sharing is central to ensure the sufficient provision of and access to drinking water and sanitation services in the Global Souths, as stated in Sustainable Development Goal (SDG) 6, Target 6.1: "By 2030, achieve universal and equitable access to safe and affordable drinking water for all", and Target 6.b, aiming to "Support and strengthen the participation of local communities in improving water and sanitation management." The global SDG framework adopted in 2015 is intended to ensure the effective implementation of the human right to water at the local level for the most marginalized people (Weststrate *et al.* 2019; Herrera 2019).

Beyond the global recognition of water conservation and access goals, there are competing forms of knowledge and practices in relation to water resources. On 22 May 2021, the main topic debated during World Water Day was "Valuing water", demonstrating the importance of recognizing the various forms of knowledge and practices around water resources which range from productive and economic values to socio-organizational and cultural values, politico-legal values, and technoscientific values (Dupuits *et al.* 2023).

At the global level, the production of expert knowledge (Jasanoff 2004) about water is often associated with technoscientific and market-based approaches to water. These approaches are present in discourses of integrated water resources management (IWRM) as well as ecosystem services (ES) and other types of market-based mechanisms that reveal economic and technical valuations of water. Water resources are at the cornerstone of payment for watershed and hydrologic ES programs, through the implementation of local and regional water conservation funds, and the promotion of integrated watershed management practices (Porrás *et al.* 2013). In the same vein, ES programs are often produced in the Global North and associated with scientific and technical knowledge. Consequently, global and regional ES conservation initiatives tend to produce a 'commodification' of water territories and clashes with local water rights, as well as a 'depoliticization' process (Boelens *et al.* 2014; Dupuits *et al.* 2020).

Instead, at the local level, actors from socio-environmental movements and grassroots organizations are rethinking sustainability and conservation schemes from a water justice approach. This approach pays more attention to political dynamics and draws attention to the existing inequalities around access to and control of water, and the distribution of benefits associated with its use. Discussions on water justice also consider debates about the rights of nature and the use of local/traditional knowledge and cultural practices. Water justice movements tend to interpret the global SDG agenda more from a cross-sectoral and integrated perspective, compared to the deterritorialized and functional ES schemes (Rodríguez-de-Francisco & Boelens 2016; Boelens *et al.* 2016; Boelens *et al.* 2018).

This Special Issue seeks to offer empirical evidence of the forms of knowledge valued by different actors involved in water conservation practices, the dynamics of cross-fertilization dynamics, and the possible tensions. It contributes to this reflection by investigating knowledge dialogue and co-creation around water conservation through case studies at the local, regional and global levels, and including various types of actors – local and indigenous communities, parish and municipal governments, national governments and private businesses. It draws attention to the diverse voices and knowledge on water that are produced from the Global Souths, including traditionally marginalized actors and approaches.

The Special Issue is a call for a knowledge dialogue that questions decontextualized global approaches to the study of water and that requires a continuous repositioning and relearning based on the concepts and values that are produced by grassroots movements and organizations. It pays particular attention to the processes of co-creation, negotiation and resistance around the production of water conservation knowledge at different interfaces, including urban-rural, academic-activist, local-global, public-private-community, and empirical-scientific contexts.

The key questions that inform this reflection are the following:

- Who are the actors involved or excluded from the processes of knowledge co-creation and what types of water conservation knowledge do they promote?
- Under what conditions and in what contexts do water conservation knowledges complement each other, are able to enter into negotiation, or instead promote conflict?
- What strategic encounters and conflicts can be identified between local and global knowledges on water conservation?
- How do different approaches to knowledge, learning, wisdom and information in the field of water conservation differ or complement each other?

The Special Issue features contributions from various perspectives of transdisciplinary research. On the one hand, it opens up reflections at the crossroads of different disciplines and theoretical approaches – political ecology, international law, anthropology and science and technology studies (STS) – around core concepts of environmental studies such as science, knowledge, justice and sustainability. On the other hand, it offers a combination of various research methods, including local case studies, interviews, surveys and focus groups.

2. Identifying knowledge co-creation dynamics in the field of water studies

Approaches that highlight the co-creation, co-production and the dialogues involving knowledge are gaining currency in water studies, mostly inspired by debates in political ecology and STS. The interactions between different forms of knowledge have been widely studied from a political ecology perspective, through the notion of environmental knowledge politics (Horowitz 2015; Foyer & Dumoulin 2017; Ulloa 2019; Boelens *et al.* 2019; Ulloa *et al.* 2020). This literature has analyzed the emergence of knowledge co-production in community water management (Goodwin, 2021; Dupuits, 2021), multi-stakeholder negotiation processes in the midst of water conflicts (Dupuits *et al.* 2020), and the encounters and tensions between different types of knowledge around water (Boelens *et al.* 2019; Ulloa *et al.* 2021), among other things.

Another approach to knowledge co-creation is found in work on knowledge ecology and the coloniality of knowledge (Quijano, 2008). It considers the capitalist and colonial dynamics of knowledge imposition and the need for more knowledge dialogues, where there is a:

...demand for new production processes and assessment of valid knowledge, scientific and non-scientific, and new relationships between different types of knowledge, based on the practices of classes and social groups who have systematically suffered unfair inequalities and discrimination caused by capitalism and colonialism. (de Sousa Santos 2011: 35)

The definition of knowledge co-creation remains open, however: it lacks empirical evidence to show how knowledge dialogue occurs in practice, as well as the main obstacles to its emergence and the tensions that it can generate among actors. In this Special Issue, we identify four categories of water knowledge co-creation around values, scales, epistemologies and spaces, and their potential connections or tensions. These four categories are articulated around four themes:

- global/local knowledge co-creation;
- technoscientific/traditional knowledge co-creation;
- academic/activist knowledge co-creation, and
- urban-rural knowledge co-creation.

Additionally, we identify three steps in co-creation processes: knowledge co-production (when two or more knowledge systems are completely articulated and integrated); knowledge negotiation (when knowledge systems are debated by different actors and adapted in specific dimensions); and knowledge resistance (when knowledge systems are in conflict, dialogue is absent, and one actor must sacrifice or abandon their knowledge system to adopt another). Below, we elaborate the classification of the different knowledge co-creation dynamics and how the contributions to this Special Issue address these challenges.

Cocreating values: technoscientific/traditional knowledge

Water resources are interpreted according to the values held by actors, revealing multiple competing ontologies of water (Bonelli *et al.* 2016; Blaser & de la Cadena 2018). Two main values that stand out in the interpretation of water resources are local and traditional knowledge and technoscientific knowledge.

On the one hand, local environmental knowledge – or, alternatively, indigenous knowledge or traditional ecological knowledge – refers to a "cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" (Berkes 2012: 7). In his analysis of the epistemologies of the South, de Sousa Santos (2011: 27) explains how "the movements of the Latin American continent, beyond contexts, build their struggles based on ancestral, popular, spiritual knowledge that they were always alien to the scientism typical of Eurocentric critical theory." In their contribution to this Special Issue, Duarte, Galarza & Hidalgo-Bastidas analyze how for the peasant and indigenous communities of the Tungurahua *páramo* in Ecuador, irrigation canals are essential to make their land green, feed themselves, and offer products to the market in this high tropical mountain ecosystem. The management, control and direct access to water guarantees their daily subsistence.

On the other hand, for public authorities and the private sector, water is mainly defined as a resource of vital importance for the industrial and energy production processes necessary for the reproduction of the neoliberal model (Swyngedouw 2015; Jasanoff & Kim 2015). This productive and economic value of water is often related to technoscientific and sociotechnical knowledge (see Peytavi, Bouard, Le Meur & Lejars in this issue). One particular characteristic of modern Western society is the historical and colonial imposition of scientific knowledge and the claim of its superior credibility over other forms of knowledge (De Sousa Santos 2011; Leff 2015). Duarte, Galarza & Hidalgo-Bastidas provide a concrete example of technoscientific knowledge, showing how water funds adopt technical indicators to measure water conservation, leaving aside socio-cultural indicators. They argue that technoscientific knowledge is gaining legitimacy against more traditional and cultural forms of knowledge, used to justify the exclusion of local communities from decision-making and participation processes.

In their article, Petavi *et al.* show how indigenous water perspectives held by the Kanak people of New Caledonia interact with official norms, designs and laws. They reveal how New Caledonia's current land tenure and water management situation is characterized by the co-existence of a public domain, private land ownership and customary land. They analyze the co-production and frictions (Tsing 2005) between two different interpretations of water: water management and water care. Water management considers water to be a technical object encapsulated in tubs and pipes, transformed and cleaned through different physical and chemical treatments. But water care highlights the reciprocal relationship between water and the surrounding world (Domínguez-Guzmán *et al.* 2022).

Various contributors to this Special Issue trace the conflicts that emerge between local and traditional water knowledge, on the one hand, and global processes of commodification and privatization of water, on the other (Durai & Babuji 2023). In her article, Yate Cortes highlights how the notion of injustice is at the center of conflicts between the privatization of water and collective forms of governing water at the community level. She cites the emblematic example of the 'water war' in Cochabamba, Bolivia, in the 2000s, where communities protested the privatization of water. She also analyzes how the inclusion of the indigenous notion of Sumak Kawsay, or Buen Vivir, in the 2008 Ecuadorian Constitution did not result in a concrete recognition of the plurinational values of water at the national level.

At the same time, several authors emphasize the need to go beyond dichotomous approaches that oppose scientific and local knowledge. They highlight the strategic encounters, political uses and dynamic entwining between them, where there are unequal power structures (Robbins 2003; Li 2013). It is necessary to question the borders between technoscientific and local/traditional knowledge and focus on the situated practices of different actors in the co-production and co-creation of knowledge around water conservation. For example, grassroots and indigenous movements may use expert and scientific knowledge strategically in community environmental monitoring, or for the co-management of natural protected areas, to gain credibility and support (Bäckstrand 2004; Sanchez-Vasquez 2019).

Peytavi *et al.* mobilize the concept of 'tinkering' (Mol *et al.* 2010) to understand the intertwining of different water knowledges beyond their apparent opposition. Tinkering refers to the small social adjustments and continuous adaptations and negotiations between humans, institutions, and their environment. It allows us to consider elements of water management and water care together, showing how they are continuously and variously linked in Kanak daily practices.

Other examples of knowledge co-creation are the attempts made to integrate indigenous and local knowledge in the production of scientific expertise at the global level. Authors analyze how nature-based solutions (NBS) should combine various valuations of nature and types of knowledge, community engagement processes, and ecosystem management practices (Palomo *et al.* 2021). They find that over 80 percent of NBS combine various knowledge types, from scientific knowledge to indigenous and local knowledge, which is useful for transformative change. However, NBS also tend to reproduce the domination of technoscientific knowledge over other forms.

Global conservation and Payments for Ecosystem Services (PES) policies crystallize the interactions between technoscientific knowledge and local knowledge, as well as placing power relations between actors centrally (Vadrot 2014). Ecosystem Services were originally designed to highlight the importance of ecosystems in providing goods and services to society. Yet authors have warned against the limitations of using an economic and monetary lens, ignoring other interpretations based, for example, on cultural and traditional values (Norgaard 2010; Rodríguez-de-Francisco 2013, 2015). To respond to this limitation, some authors suggest rethinking ES through their co-production between biophysical and social dimensions and their co-constitution with humans and non-humans (Schaich *et al.* 2010; Budds & Zwartveen 2020). One alternative concept to do so is 'cultural landscapes,' highlighting how social, cultural and discursive dynamics shape ecosystem services.

An illustration of how global schemes are being reframed at the local level is the recent proposal by the Confederation of the Kayambi people in Ecuador for a water resources conservation funding mechanism, named the Plurinational Water Fund (Fondo Plurinacional del Agua) (Dupuits & Mancilla Garcia 2022). This eco-territorial alternative aims to integrate urban centers, the flower industries and private companies in the conservation of high tropical *páramos*, as well as to redistribute benefits to support social development for indigenous communities and community resilience. It illustrates the local adaptation of global PES programs (Rodary *et al.* 2016), but also the possible tensions and necessary negotiations that may emerge during these processes.

In her article, Cottyn analyses the knowledge co-creation dynamics at stake around the disappearing Lake Poopó in Bolivia. The Uru people, who live around the lake and who self-identify as Qot Zuñi or "people of the lake", have developed an intimate relation of identity and belonging with the lake (more-than-human), which they guard and worship as Qota Mama (Mother Lake). Together with *titora* (*Schoenoplectus californicus*) and other reeds, aquatic birds and fish, the wind, and the water itself, the Uru have co-created water knowledges between humans and more-than-humans. However, imposed Western technoscientific schemes to manage Lake Poopó tend to reduce the lake's disappearance to a quantifiable loss of water content and equate this with the loss of cultural expressions. This has resulted in management schemes to enforce rational water use criteria that overlook Uru water needs and ancestral practices and rituals around the variability that characterized the lake's cyclical movements.

Co-creating scales: Global/Local knowledge

Despite the differences that exist between global and local approaches, there is no clear delimitation of the levels at which water knowledge intervenes (Smith 1993). On the contrary, there are various dynamics of co-production between levels, for example regarding the scalar interaction of normative systems. In her article, Yate Cortes mobilizes the concept of 'normative pluralism' (Kyed 2009; Boelens 2009) to grasp the mutual influences or resistances between normative water governance systems at the global and the local scale. She analyses to what extent the global capitalist framework around water resources clashes with national and consuetudinary legal frameworks in Ecuador.

One concrete example of how scales are interconnected is the promotion and adoption of the human right to water as a new legal framework (Bakker 2007). Yate Cortes (2023) explains how the concept addresses the contradictions between public and private management of water, through the promotion of citizen participation as a neoliberal approach. Knowledge co-creation at the international scale does not fit with local interpretations of the human right to water, as defended by social and grassroots movements in past decades.

Durai & Babuji (2023) investigate the interactions and tensions between global capitalism and the local economy of shrimp aquaculture in a coastal village located in the Mayiladuthurai district of Tamil Nadu, India. They found various relationships to water resources, from the subsistence practices of local farmers to industrial and productive interests of private businesses. They analyze the history of shrimp aquaculture in the 1990s and 2000s, and how the collapse of big corporations due to diseases and bad management turned into an opportunity for local shrimp farmers to catch hold of the economy of the village. However, within a decade of shrimp aquaculture, the subsistence economy was transformed into a market economy captured by local elites who monopolized power over lands and resources. This is again an illustration of the blurring categories of local and global scales in water knowledge co-creation dynamics.

The transnational processes of knowledge co-production may lead to different forms of social interaction between actors inserted in specific scales and interests. On the one hand, grassroots movements can act at the global scale in support of territorial water justice initiatives; on the other hand, the technoscientific approaches produced at the global scale are adapted and negotiated to be implemented locally. However, knowledge co-production may lead to tensions and conflicts between actors and scales. While knowledge co-production can improve the visibility and recognition of grassroots actors (Goodwin 2019), the increased professionalization and the acquisition of global expertise by grassroots organizations can also lead to a disconnection with local realities and with diversity (Laurie *et al.* 2005).

Many global norms are framed as blueprints and best practices that should be replicated in different contexts to improve water conservation. This is the case for water funds promoted by international experts as a successful tool for water conservation, silencing the existing tensions in their local implementation (see Duarte, Galarza & Hidalgo-Bastidas [2023]). This is an illustration of a non-functioning knowledge co-creation process between scales. As mentioned by Durai & Babuji (2023), another example of global norms promoted by international experts is the notion of 'Blue Revolution' as a best practice for water agribusiness in India (Immanuel & Narayanan 2022).

The local appropriation of globally produced knowledge can also mean conflicts and tensions between actors operating at certain scales and with specific interests (Dupuits *et al.* 2020). Numerous authors have analyzed the negotiation, adaptation and co-production processes that are at stake between global watershed and hydrologic services, on the one hand, and local water justice knowledge on the other (Southgate & Wunder 2009; Martin-Ortega *et al.* 2013). They do so through a particular focus on the political and power dynamics of knowledge co-production at the science-grassroots interface (Vadrot 2016; Brethaut *et al.* 2019).

Co-creating spaces: urban/rural knowledge

The connections or tensions between urban and rural spaces around water conservation are another key challenge for knowledge co-creation and dialogue (Hommes & Boelens 2017; Hommes *et al.* 2022). Many conflicts arise from the appropriation of rural watersheds to respond to urban water needs. Many times,

the objective of water security for urban areas produces water insecurity for rural areas (see Duarte, Galarza & Hidalgo-Bastidas 2023). These conflicts illustrate the absence of, or limitations on, knowledge co-creation and dialogue between spaces, as well as the power dynamics at stake between diverse actors.

In their research, Peytavi *et al.* adopt a spatial and socio-ethnic viewpoint to analyze the historical and colonial process of Kanak indigenous populations' marginalization from public services, including water access, through tactics of denial, de-legitimation and invisibilization. This historical context contributed to creating two co-existing life-worlds and a dual separation between people and land: the Kanak people living in tribes on restituted land, and the New Caledonian institutions and economic centers mostly concentrated in the Nouméa urban area.

In their article, Duarte, Galarza & Hidalgo-Bastidas study how various water funds have emerged in recent years to improve water conservation in rural areas to ensure water availability in the face of increasing urbanization in the Global South, trying to foster dialogue between the different actors involved. However, water funds are failing to address equity and development issues for the most marginalized people and tend to give priority to technical conservation issues. They have the potential to be spaces of dialogue, participation and knowledge co-creation but the authors show how power inequalities and asymmetries reduce the possibility of knowledge co-creation and negotiation. Consequently, direct and active participation of local communities in water funds management and conservation efforts is still limited, in comparison with more powerful actors (private companies, the State, and international NGOs). The authors conclude by suggesting that local peasant communities accept 'sacrificing' and abandoning their ancestral knowledge to the benefit of water conservation for urban areas.

In a similar vein, Yate Cortes analyses how the Tungurahua water fund in Ecuador has been prioritizing watershed conservation over the need to improve water access and social development for local communities living in watershed areas in *páramos*. One illustration of the tensions between different knowledge systems is the requirement defined by the State to create and consolidate water boards in the communities, imposing legal and technical requirements that may go against traditional forms of community organization and management. If the creation of water boards could be considered as a logic for knowledge negotiation, it can easily turn into a dynamic of knowledge resistance.

Another illustration of tensions between spaces is provided in Durai & Babuji's study, who analyze the inadequate formal regulations adopted by the Coastal Aquaculture Authority (CAA) to respond to aquaculture difficulties in Indian farmer villages. These tensions reveal a limited knowledge co-creation process between centralized public authorities mainly based in urban areas, and rural villages. Moreover, tensions occur inside rural spaces between local shrimp farmers and agriculturalists because of land degradation, water salinization and groundwater depletion caused by intensive shrimp aquaculture led by local farmers. This shows how knowledge co-creation can also be tied to tensions and resistances among the same type of grassroots and local actor that may have divergent knowledge systems and interests around water use and conservation. The authors explain how the most marginalized people – the Dalits and women – have suffered the most from the dispossession and commodification of their lands, resulting in migration and water scarcity in their daily lives.

Co-creating epistemologies: academic/activist knowledge

The growing literature on participatory action research highlights the need for cross-fertilization between academic and activist forms of knowledge and methodologies (Fals Borda 2006). One of the fields that pays particular attention to these challenges is the feminist technoscience approach, part of Science and Technology Studies (STS). This approach focuses on invisible, marginal or excluded actors who often remain outside conventional analyses. Donna Haraway (1995) developed the concept of 'situated knowledge', understood as the valorization of localized knowledge and the understanding of science and technology from their places of enunciation and production. It invites us to go beyond the dichotomy engendered by rational modernity to study the interactions between subjects and objects. It also seeks to analyze the processes of technoscience's domination over nature and oppressed peoples. It stresses the need to translate local knowledge and to assume shared responsibility.

Practitioners and grassroots actors' participation and the inclusion of their expertise in transdisciplinary research processes have the potential to co-produce societally relevant knowledge and to leverage the ability of research to empower marginalized actors and facilitate societal learning, especially in the Global Souths (Muñoz-García *et al.* 2022). Participation and co-production of knowledge in transdisciplinary research is relational, and social processes require the disclosure of the power dynamics that shape them (Fritz & Meinherz 2020).

Participatory research (PI) occurs when researchers work cooperatively or collaboratively with members of the community (and sometimes other external actors) involved in a problem (Trimble *et al.* 2014). The different actors participate in each stage as co-researchers, from defining research questions to disseminating the results. In addition to the co-production of knowledge, this strategy allows addressing or solving local problems, articulating and enhancing academic knowledge with local ones.

Another way to enhance academic/activist knowledge co-creation is by involving 'boundary objects' (Pohl *et al.* 2010) between science and policy. On the one hand, key stakeholders (water boards, community leaders, local public authorities, and NGOs) should be involved in the whole design and analytical process. On the other, the research should respond to local needs in terms of information production and access to results.

Various authors of this Special Issue mobilize ethnographic methods to foster knowledge dialogue and the cross-fertilization between academic and activist practices, reflected in the notion of 'ethnographic cosmopolitics' (de la Cadena 2015). In their research, Peytavi *et al.* use ethnographic methods to access and learn from indigenous tribes in New Caledonia, allowing for a more realistic understanding of their water knowledge and practices. This empirical involvement is key to deconstruct false imaginaries created around indigenous water knowledge and practices originating in urban areas and from government.

In her article, Cottyn draws on ethnographic methods and oral history practices to analyze the tensions between imposed Western rational knowledge on Lake Poopó in Bolivia and ancestral rituals and cultural knowledge from the Uru people. She concludes that the imposed Western techno-scientific schemes to manage Lake Poopó seemed incapable of dealing with so-called "traditional" uses that exceed "rational," "correct" and measurable procedures. As a result, Cottyn reports that over time many of the rituals the Uru used to perform, in relation to different *jalsuri*, animals, winds, etc., were discontinued.

3. Final thoughts for further analysis and debate

We found through the different contributions to the Special Issue and in broader literature that there are various forms of tinkering, interactions and co-production processes between actors, values, scales, spaces and epistemologies. This allows us to break with the classical dichotomies between different forms of technoscientific and traditional knowledge, local and global scales of knowledge production, urban and rural spaces, and academic and activist research production. The different actors involved in co-creation processes often need to adapt their knowledge practices and negotiate their claims and positions around water conservation. These blurring categories reveal the strategic use of different categories of knowledge by specific actors who seek to increase their power over water conservation issues, as seen for example in the case of local shrimp aquaculture in India. These processes echo the need for more creative encounters between scientific and non-scientific knowledge without leading to their mutual destruction (de Sousa Santos, 2011). This co-creation entails engaging with new creative categories of 'scientific science' or 'people's science' (Leff 2015).

Yet, in all the contributions to this Special Issue, the designed spaces and institutions for water knowledge co-creation are failing at some point to facilitate a real dialogue between actors, enhancing the effective participation of the most marginalized actors, or recognizing the legitimacy of 'other' values and ontologies for water. This indicates a missed opportunity to take advantage of existing water conservation institutions to facilitate knowledge dialogue. In the cases of water funds in Ecuador and Colombia, as well as in the case of water management in New Caledonia and local shrimp aquaculture in India, local and traditional knowledges fail to be fully integrated into formal governmental rules and institutions and remain

marginalized and delegitimized. In a more radical illustration of an in-existent knowledge dialogue, the traditional cultural knowledge of the Uru people around Lake Poopó has almost completely disappeared with the drying lake, because of the imposition of scientific and rational lacustrine knowledge approaches.

More broadly, the limited co-creation dynamics studied by the different authors also reveal the need for the decolonization of knowledge production and diffusion, aiming to "liberate them from cultural as well as political-economic exploitation, inequality and subjugation that hinders the realization of alternative life-worlds" (Leff 2015: 48). This appears as a determinant precondition for implementing a true knowledge dialogue among the diversity of people. As stated by Leff (2015: 49): "decolonizing knowledge is therefore an epistemological condition for deconstructing the exploitative trends of the global economy and reviving the ecological potentials and cultural meanings of local people, thereby giving life to alternative modes of production, thinking and being."

Finally, all the contributions reaffirm how water conservation and environmental degradation challenges interact with historical social inequalities and power asymmetries. This Special Issue thus invites a reflection on the necessary mechanisms for ensuring water knowledge co-creation processes that would benefit water conservation for all, instead of designing and implementing partial solutions and spaces that reproduce power inequalities among actors.

References

- Bäckstrand, K. (2004). Scientisation vs. civic expertise in environmental governance: Eco-feminist, eco-modern and post-modern responses. *Environmental Politics* 13(4): 695-714.
- Bakker, K. (2007). The "Commons" versus the "Commodity": Alter-globalization, Anti-privatization and the human right to water in the Global South. *Antipode*, 39(3): 430-455.
- Berkes, F. (2012). *Sacred ecology*. Third edition. Routledge.
- Blaser, M. & de la Cadena, M. (2018). Introduction: Pluriverse proposals for a world of many worlds. In Blaser, M. & de la Cadena, M. *A world of many worlds*. Duke University Press.
- Boelens R., E. Shah & B. Bruins (2019). Contested knowledges: Large dams and mega-hydraulic development, *Water*, 11(3): 416. <https://doi.org/10.3390/w11030416>
- Boelens R., T. Perreault & J. Vos (Eds.) (2018). *Water justice*. Cambridge University Press.
- Boelens R., Hoogesteger, J., Swyngedouw, E., Vos, J. & Wester, P. (2016). Hydrosocial territories: A political ecology perspective. *Water International*, 41(1): 1-14. <https://doi.org/10.1080/02508060.2016.1134898>
- Boelens R., J. Hoogesteger & Rodriguez de Francisco, J. C. (2014). Commoditizing water territories: The clash between Andean water rights cultures and payment for environmental services policies. *Capitalism Nature Socialism*, 25(3): 84-102.
- Boelens, R. (2009). Aguas diversas. Derechos de agua y pluralidad legal en las comunidades andinas. *Anuario de Estudios Americanos*. 66(2): 23-55. <https://doi.org/10.3989/aeamer.2009.v66.i2.316>
- Bonelli, C., Roca-Servat, D., Bueno de Mesquita, M. (2016). The many natures of water in Latin-American neo-extractivist conflicts. *Alternautas*, 3(2): 81-92. <https://doi.org/10.31273/alternautas.v3i2.1047>
- Bréthaut, C., Gallagher, L., Dalton, J. & Allouche, J. (2019). Power dynamics and integration in the water-energy-food nexus: Learning lessons for transdisciplinary research in Cambodia. *Environmental Science and Policy*, 94: 153-162. <https://doi.org/10.1016/j.envsci.2019.01.010>
- Budds, J., & Zwartveen, M. Z. (2020). Rethorizing ecosystem services as cultural landscapes: Co-constitution, power relations, and knowledges. *The International Journal of Environmental, Cultural, Economic, and Social Sustainability: Annual Review* 16(1): 41-59. <http://doi.org/10.18848/1832-2077/CGP/v16i01/41-59>
- Cottyn, H. (2023). Historicizing more-than-human knowledge practices around water in the Lake Poopó basin, Bolivia, *Journal of Political Ecology* 30(1): 401-412. <https://doi.org/10.2458/jpe.5492>

- De la Cadena, M. 2015. *Earth Beings: Ecologies of practice across Andean worlds*. Duke University Press.
- Domínguez-Guzmán, C., Verzijl, A., Zwartveen, M. Z. & Mol, A. (2022). Caring for water in Northern Peru: On fragile infrastructures and the diverse work involved in irrigation. *Environment and Planning E: Nature and Space*, 5(4): 2153-2171. <https://doi.org/10.1177/25148486211052216>
- Duarte-Abadía, B., Galarza Suárez, L. & Hidalgo-Bastidas, J. (2023) ¿Seguridad hídrica urbano-rural en los fondos de agua? Un análisis desde las relaciones de poder, la participación y la co-creación de conocimientos, *Journal of Political Ecology* 30(1): 391-400. <https://doi.org/10.2458/jpe.5295>
- Dupuits, E., Baud, M., Boelens, R. de Castro, F. & Hogenboom, B. (2020). Scaling up but losing out? Water commons' dilemmas between transnational movements and grassroots struggles in Latin America. *Ecological Economics*, 172, 106625. <https://doi.org/10.1016/j.ecolecon.2020.106625>
- Dupuits, E. (2021). Coproducción de imaginarios de justicia hídrica y desarrollo verde en Ecuador. *European Review of Latin American and Caribbean Studies* 111: 19-37. <http://doi.org/10.32992/erlacs.10713>
- Dupuits, E. & Mancilla Garcia, M. (2022). Knowledge politics around water, development and ecosystem services in Ecuador: Creative encounters and resistances. *Alternautas*, 9(2): 175-200. <https://doi.org/10.31273/an.v9i2.1149>
- Dupuits, E., Puertas, C., & Guadamud, J. A. (2023). Resistencia, negociación y cocreación de saberes para la construcción del Fondo Plurinacional del Agua en el territorio Kayambi, Ecuador. *Allpanchis*, Forthcoming.
- Durai, N. R. & Babuji, K. R. (2023). The political ecology of shrimp aquaculture in Tamil Nadu: A case study from Mayiladuthurai District, *Journal of Political Ecology* 30(1): 371-380. <https://doi.org/10.2458/jpe.5374>
- Fals-Borda, O. 2006. Participatory action research in social theory: Origins and challenges. In P. Reason. P. & Bradbury, H. (Eds.), *Handbook of action research: Participatory inquiry and practice*. (27-37). Sage.
- Foyer, J. & Dumoulin, D. 2017. Objectifying traditional knowledge, re-enchanting the struggle against climate change. In Aykut, S., Foyer, J. & Morena, E. (Eds.). *Globalising the climate: COP21 and the climatisation of global debates*. Routledge.
- Fritz, L. & Meinherz, F. (2020). Tracing power in transdisciplinary sustainability research: An exploration. *GAIA* 29(1): 41-51. <https://doi.org/10.14512/gaia.29.1.9>
- Goldman M., Nadasdy, P. & Turner, M. (Eds.) (2011). *Knowing Nature: Conversations at the intersection of political ecology and science studies*. University of Chicago Press.
- Goodwin, G. 2019. The problem and promise of coproduction: Politics, history, and autonomy. *World Development*. 122: 501-513. <https://doi.org/10.1016/j.worlddev.2019.06.007>
- Haraway D. (1995). *Ciencia, Cyborgs y mujeres. La reinención de la naturaleza*. Madrid: catedra.
- Herrera V. (2019). Reconciling global aspirations and local realities: Challenges facing the Sustainable Development Goals for water and sanitation. *World Development*, 118: 106-117. <https://doi.org/10.1016/j.worlddev.2019.02.009>
- Hommel, L., & Boelens, R. (2017). Urbanizing rural waters: Rural-urban water transfers and the reconfiguration of hydrosocial territories in Lima. *Political Geography*, 57: 71-80. <https://doi.org/10.1016/j.polgeo.2016.12.002>
- Hommel, L., Hoogesteger, J., & Boelens, R. (2022). (Re) making hydrosocial territories: Materializing and contesting imaginaries and subjectivities through hydraulic infrastructure. *Political Geography*, 97, 102698. <https://doi.org/10.1016/j.polgeo.2022.102698>
- Horowitz, L. 2015. Local environmental knowledge. Perreault, T., Bridge, G., & McCarthy, J. (Eds.) [Routledge Handbook of Political Ecology](https://doi.org/10.1016/j.polgeo.2016.12.002). (235-248). Routledge.
- Immanuel, J. & Narayanan, N. (2022). A brief history of Blue Revolution 2.0: Key drivers, actors, and policies in the Indian Context. *Economic & Political Weekly*, 57(24).
- Jasanoff, S. (2004). *States of knowledge: The co-production of science and social order*. Routledge.

- Jasanoff, S. & Kim, S.-H. (2015). *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power*. University of Chicago Press.
- Kyed, H. M. (2009). The politics of legal pluralism: State policies on legal pluralism and their local dynamics in Mozambique. *Journal of Legal Pluralism*, 59: 87-120. <https://doi.org/10.1080/07329113.2009.10756631>
- Laurie, N., Andolina, R. & Radcliffe, S. 2005. Ethnodevelopment: Social movements, creating experts and professionalising indigenous knowledge in Ecuador. *Antipode*, 37(3), 2005: 470-496.
- Leff, E. (2015). Encountering political ecology: Epistemology and emancipation. In In Bryant, R. L. (Ed.). *The International Handbook of Political Ecology* (61-73). Edward Elgar.
- Li, F. (2013). [Relating divergent worlds: Mines, aquifers and sacred mountains in Peru](#). *Anthropologica*, 55(2): 399-411.
- Martin-Ortega, E. Ojea, & C. Roux. (2013). Payments for Water Ecosystem Services in Latin America: A literature review and conceptual model. *Ecosystem Services*, 6: 122-132. <https://doi.org/10.1016/j.ecoser.2013.09.008>
- Miller C. & Wyborn C. (2020). Co-production in global sustainability: Histories and theories. *Environmental Science and Policy*, 113: 88-95. <https://doi.org/10.1016/j.envsci.2018.01.016>
- Muñoz-García A. L., Lira, A. & Loncón, E. (2022) Knowledges from the South: Reflections on writing academically. *Educational Studies*, 58(5-6): 641-656. <https://doi.org/10.1080/00131946.2022.2132394>
- Mol, A., Moser, I., & Pols, J. (Eds.). (2010). *Care in practice: On tinkering in clinics, homes and farms*. transcript Verlag.
- Norgaard R. B. (2010). Ecosystem services: From eye-opening metaphor to complexity blinder. *Ecological Economics*, 69: 1219-1227. <https://doi.org/10.1016/j.ecolecon.2009.11.009>
- Ignacio, P., Locatelli, B., Otero, I., Colloff, M., Crouzat, E., Cuni-Sanchez, A., Gómez-Baggethun, E., González-García, A., Grêt-Regamey, A., Jiménez-Aceituno, A., Martín-López, B., Pascual, U., Zafra-Calvo, N., Bruley, E., Fischborn, M. Metz, R., & Lavorel, S. (2021). Assessing nature-based solutions for transformative change, *One Earth* 4: 1-12. <https://doi.org/10.1016/j.oneear.2021.04.013>
- Peytavi, O., Bouard, S., Le Meur, P.-Y. & Lejars, C. (2023). Freshwater supply as sociotechnical tinkering: the co-creation of water knowledge and assemblages in New Caledonia, *Journal of Political Ecology* 30(1), 413–423. <https://doi.org/10.2458/jpe.5289>
- Pohl C., Rist, S., Zimmermann, A., Fry, P., Gurung, G. S., Schneider, F., Ifejika, C., Speranza, B., Kiteme, S., Boillat, E., Serrano, G., Hirsch, H. & Wiesmann, U. (2010). Researchers' roles in knowledge co-production: Experience from sustainability research in Kenya, Switzerland, Bolivia and Nepal. *Science and Public Policy*, 37(4): 267-281. <https://doi.org/10.3152/030234210X496628>
- Porras I., Alyward, B. & Dengel, J. (2013). [Monitoring payments for watershed services schemes in developing countries](#). IIED.
- Robbins, P. (2003). Beyond ground truth: GIS and the environmental knowledge of herders, professional foresters, and other traditional communities. *Human Ecology* 31(2): 233-253.
- Rodary E., Bonnin, M., Bidaud, C. & Méral, P. (2016). L'influence des services écosystémiques sur les aires protégées. In P. Méral. (Ed.). *Les services écosystémiques: Repenser les relations nature et société*. (229-248). Editions Quæ.
- Rodríguez-de-Francisco, J. C., Budds, J. & Boelens, R. (2013). Payment for environmental services and unequal resource control in Pimampiro, Ecuador. *Society and Natural Resources* 26: 1217-1233. <https://doi.org/10.1080/08941920.2013.825037>
- Rodríguez-de-Francisco, J. C. & Boelens, R. (2015). Payment for environmental services: Mobilising an epistemic community to construct dominant policy. *Environmental Politics*, 24: 481-500. <https://doi.org/10.1080/09644016.2015.1014658>

- Rodríguez-de-Francisco, J. C., & Boelens, R. (2016). PES hydrosocial territories: De-territorialization and re-patterning of water control arenas in the Andean highlands. *Water International*, 41(1), 140-156. <https://doi.org/10.1080/02508060.2016.1129686>
- Sánchez-Vázquez, L. 2019. ¿Ciencia de resistencia? Monitoreos ambientales participativos en contextos de conflicto ambiental. Reflexiones desde una mirada decolonial. *Revista de Paz y Conflictos* 12(2): 57-79. <https://doi.org/10.30827/revpaz.v12i2.10399>
- Santos, B. D. S. (2011). [Epistemologías del sur](#). *Utopía y Praxis Latinoamericana*, 16(54): 17-39.
- Schaich, H., Bieling, C. & Plieninger, T. (2010). Linking ecosystem services with cultural landscape research. *GAIA - Ecological Perspectives for Science and Society*, 19(4): 269-277. <https://doi.org/10.14512/gaia.19.4.9>
- Smith N. (1993). Homeless/Global: Scaling places. In Bird, J., Curtis, B., Putnam, T. & Tickner, L. (Eds.). *Mapping the futures: Local cultures, global change*. (87-120). Routledge.
- Southgate D. & Wunder, S. (2009). Paying for watershed services in Latin America: A review of current initiatives. *Journal of Sustainable Forestry*, 28(3-5), 497-524. <https://doi.org/10.1080/10549810902794493>
- Trimble, M., Iribarne, P. & Lazaro, M. (2014). Una investigación participativa en la costa Uruguaya: Características, desafíos y oportunidades para la enseñanza universitaria. *Desenvolvimento e Meio Ambiente*, 32, 101-117. <http://doi.org/10.5380/dma.v32i0.35603>
- Tsing, A. L. (2005). *Friction: An ethnography of global connection*. Princeton University Press.
- Swyngedouw, E. (2015). *Liquid power: Contested hydro-modernities in twentieth-century Spain*. MIT Press.
- Ulloa A., Damonte, G., Quiroga, C. & Navarro, D. (2020). [Gobernanzas plurales del agua: Formas diversas de concepción, relación, accesos, manejos y derechos del agua en contextos de gran minería en Colombia y el Perú](#). *Documento de investigación*, 103. GRADE-UNAL.
- Ulloa A. (2019). Indigenous knowledge regarding climate in Colombia: Articulations and complementarities among different knowledges. In Feola, G., Geoghegan, H., & Arnall, A. (Eds.). *Climate and culture: Multidisciplinary perspectives on a warming world*. (68-92). Cambridge University Press.
- Vadrot A. (2014). *The politics of knowledge and global biodiversity*. Routledge.
- Vadrot A. (2016). The birth of a science-policy interface for biodiversity: The history of the IPBES. In Hrabanski, M. & Pesche, D. (Eds.). *The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES): Meeting the challenge of biodiversity conservation and governance*. Routledge.
- Weststrate, J., Dijkstra, G., Eshuis, J. *et al.* (2019). The Sustainable Development Goal on Water and Sanitation: Learning from the Millennium Development Goals. *Social Indicators Research* 143: 795-810. <https://doi.org/10.1007/s11205-018-1965-5>
- Yate Cortes, S., (2023) Interacción de sistemas normativos globales y locales en la gobernanza del agua Análisis desde la experiencia ecuatoriana, *Journal of Political Ecology* 30(1): 381-390. <https://doi.org/10.2458/jpe.5293>