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Political ecologies of water in South Africa: A literature review

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Abstract

Given the existence of a thriving epistemic community on water sciences, the high politicization of environmental issues in the country as well as the active mobilization of a grassroot movement inspired by environmental justice, South Africa appears to be an ideal case to study the development of a political ecology (PE) approach. Moreover, since the apartheid regime, water issues have long represented a marker of extreme inequality.This paper aims at drawing a panorama of the PE of water in South Africa, its main topics and approaches. In our definition, the PE of water is concerned with human–environment relations, with explicit considerations for power relations. In the first section, we identified texts that, according to this definition, constitute the core of the PE of water in South Africa, going beyond a mere "politics of water." In the second section and in the discussion, we undertook an in-depth analysis of the main topics addressed by authors, such as environmental flows, "free basic water policy," prepaid water meters. PE of water is strongly connected to international debates about the link between water and power, but also capable of addressing in a critical way the specificities of the South African waterscape. It stems from this review that critical PE in urban settings in particular dominates the discipline. We could also note that the PE of water in rural areas tends to put a bigger emphasis on the "politics of ecology" whereas urban PE tends to focus more on the "ecology in politics," although both thrive to examine the human–environment relations in an integrated manner.

This article is categorized under:

Human Water > Water Governance

Human Water > Value of Water

Human Water > Rights to Water

KEYWORDS

political ecology, South Africa, WATER

1 | INTRODUCTION

There is a long tradition of linking environmental and political issues in South Africa. In 1991, E. Koch and J. Cock published *Going Green: People, Politics, and the Environment in South Africa* which gave a comprehensive overview of the impact of apartheid regime on diverse environmental problems and the way to solve two crises: *the crisis in nature (whereby we have reached the limits of nature as a source of raw materials and as a sink of our waste products) is linked to the crisis of justice (meaning increasing social exclusion and inequality) in two ways: firstly, in that the poor and the powerless are most negatively*

affected by pollution, and secondly, in the unequal consumption of resources. (Cock, 2010). One year before, in *Water, Waste, and Wildlife: The Politics of Ecology in South Africa* Koch, Cooper, and Coetzee (1990) underlined the specific impacts of apartheid regime on water, attributing the bulk of South African resource to White farmers and urban dwellers, and living the vast majority of Black and colored people without minimal access to safe water. A vast movement of grassroots organizations[1] also raised awareness around the political dimension of water issues. Under the apartheid regime, water access displayed a very high level of inequality. After 1994, the African National Congress government redrafted completely the South African water law and policy. Twenty-five years after the end of apartheid, water issues are still highly debated in political arena in South Africa.

Against this backdrop, we believe that the objective of this paper consisting of drawing a panorama of political ecology (PE) of water in South Africa, is particularly relevant and can prove to be fruitful in this part of the world especially. Indeed, our hypothesis is that the high politicization of environmental issues, the existence of grassroots environmental organizations as well as a thriving epistemic community on water sciences might have made South Africa a very fertile ground for the development of a PE approach of water issues.

Given the diversity of the field, it is not always easy to provide a commonly accepted definition of PE. Hence, PE has sometimes been defined by what it is not, that is, *apolitical ecologies* (Robbins, 2004). This emphasizes that at the very core of the PE project, there has been an intent to repoliticize environmental issues against the resurgence of neomalthusianist trends in the 1970s. Moreover, assuming a normative underpinning, some political ecologists recognize up front that *firmly opposed to environmental injustice, a Political Ecology approach commits us to helping to bring about a better world through contesting the reproduction of socio-natural inequalities* (Loftus, 2009, p. 954). This radical point of view is however far from being unanimously endorsed by all political ecologists.

As P. Walker already noted in 2005 Political Ecology "*coherence as a field of study and its central intellectual contributions remain the subject of sometimes contentious debates*." (Walker, 2005). A common denominator for PE seems to aim at developing *an integrated understanding of how environmental and political forces interact to mediate social and environmental change* (Bryant, 1992, p. 12). For numerous authors though, despite this proclaimed goal, PE has lately become *primarily a social science/humanities study of environmental politics* (Walker, 2005, p. 73). Calling into question a recent trend in PE that does not sufficiently engage with the biophysical world, some researchers no longer explicitly identify with PE although their work strongly resonate with the PE school of thought (Turner, 2016, p. 2). Taking into account these relevant criticisms around the latest developments in the field, we adopt Robbins' definition of PE's objective, which is to *explain linkages in the condition and change of social/environmental systems, with explicit consideration of relations of power* (Robbins, 2004, p. 12).

In this paper, we, first, evoke the methodology and challenges linked to the task of constituting a corpus of academic work claiming an explicit reference to PE, and motivate our choice to extend our search to papers dealing more broadly with the "politics of water" in South Africa (1). As already stated, the field of PE is characterized by a diversity of approaches. Hence, considering the evolution of the discipline's scope and objectives upon time, we acknowledged that it was somehow difficult to take the decision to limit our corpus to a unique understanding of PE (a political ecology *stricto* sensu) or even to authors *explicitly* mentioning this conceptual framework in their publications (see also Turner, 2016). Section 1, therefore, represents a first step allowing us to identify texts that constitute the core of the PE of water in South Africa according to our definition of PE. We, then, analyze in more details these publications in Section 2. Finally, in the discussion section, we propose a first assessment of the characteristics of the PE of water in South Africa in comparison with PE general orientations.

2 | PANORAMA OF THE "POLITICS OF WATER" IN SOUTHERN AFRICA

2.1 | Building a corpus: The problematic use of databases

In order to have the most complete overview of the academic publications in PE (books, book chapters, papers, reports, PhD dissertation, and Master thesis), we first did a research through databases (such Scopus, Science Direct, Scielo SA, etc.) and previous literature surveys. We conducted this search with a geographical focus on Southern Africa as per the object of the review initially commissioned. The results were not entirely satisfying for three reasons: first, some references that we already knew were missing; second, the lists retrieved included too many incorrect results; and third, South African authors and publications about South Africa represented a huge proportion of these publications. This is coherent with the general pattern of aquatic sciences in the region already underlined by Pouris (2018).[2] Since that first search yielded not enough relevant references, we decided to perform a second search in the catalog of unpublished material of Southern African universities and websites of research centers such as the Water Research Commission or the Council of Scientific & Industrial Research. Finally, we completed the corpus with an extensive analysis of the "reference section" in the papers already identified as falling within the remit of PE.

A preliminary research in databases with Google Scholar and Scopus was conducted with the query "Political ecology" AND "water" AND "Southern Africa." The former retrieved 5,640 results, the later only 10. We then made the same query in databases such as Science Direct, Wiley, and JStore. The first results show that "political ecology" *stricto* sensu is only a small fraction of publications on water in South and Southern Africa, and such publications are very difficult to spot in the databases. In "Science direct" database from Elsevier, with the query "Political ecology" AND "water" AND "Southern Africa" in "all fields", we retrieve 123 results (nine before 1998, 32 between 1998 and 2008, and 82 since 2008). But the list displays a lot of unsolicited papers (for instance adding papers dealing with Southern America, or papers that do not deal with water), and we found only 13 relevant papers, somehow linked to PE in Southern Africa. The same query in other databases such as Wiley, brought similar results with 104 papers proposed (including six before 1998, 30 between 1998 and 2008, and 68 since 2008). But again, for our research purpose, only seven papers were relevant. Finally, in Ebscohost SocInde , a database more focused on social sciences, we launched a search with the key words "Political ecology" AND "Water" AND "Southern Africa". This yielded more results (341) - with 228 only for the period 2008–2018 only-, but again with very few relevant references.

We also made a query to Scientific Electronic Library Online (SciELO) SA, which describes itself as "South Africa's premier open-access searchable full-text journal database in service of the South African research community". The search engine did not recognize "POLITICAL ECOLOGY" as a subject. WATER as a subject retrieves 1,364 articles, which underlines again the importance of the scientific community working on water in Southern Africa. We submitted a "WATER + POLICY" query, with 69 results, mostly in Water SA and very few mistakes in the list, but only two papers referring explicitly to PE approach (other results were about water governance, water policy, IWRM, etc.). The query "Water" AND "Governance" provided 36 matches. Finally, in the Knowledge Hub of the Water Research Commission (http://www.wrc.org.za/Pages/KnowledgeHub.aspx), which contains 2,629 documents (reports, Water Wheel magazine, Water SA articles, policy briefs, etc.), the query "Political ecology" retrieved 526 results, most of them dealing with water policy but not PE per se.

As the queries in databases were not sufficient, in order to build our own corpus for this paper, we decided to use the references listed in five types of documents:

- Papers which conducted a literature review about water issues in Southern Africa (Ashton et al., 2012; Jacobs, Pouris, & Naidoo, 2014; Meissner, Funke, Nienaber, & Ntombela, 2013; Pouris, 2018; Roux, Breen, & Carruthers, 2014; Swatuk, 2015).
- Global PE literature reviews (such as Loftus, 2017; Walker, 2005).
- Papers which contain in their title "political ecology."
- Books (such as Cock, 2006, or MacDonald, 2002) and Water Research Commission reports which often present a much more developed bibliography.
- Unpublished academic literature (Master Thesis, unpublished material) from the institutional repositories of University of Cape Town, (https://open.uct.ac.za/), University of Pretoria (https://repository.up.ac.za/handle/2263/31741), Unisa (http://uir.unisa.ac.za/handle/10500/506), and WitwatersRand University (http://wiredspace.wits.ac.za/handle/10539/45/discover).

Based on that first assessment, we ended up with a corpus of references that engage with the "politics of water" broadly speaking. In the next section, we introduce the various themes and disciplinary backgrounds of these references, before selecting out of this corpus, papers constituting the core of the PE of water (according to our definition) that we will examine more in depth in Section 2. The idea was to distinguish papers that are concerned with "social-environmental interactions" from papers that mainly deal with a "politicized environment" and treat the biophysical environment as merely a contextual background (Zimmerer & Bassett, 2003, p. 3). Once again, the core of these references consists of either scholars explicitly claiming such affiliation to the PE realm or with works that are shaped by a PE perspective of human–environment relations even when they do not explicitly refer to such theoretical legacy. Hence, the final selection of papers constituting the core of the PE of water analyzed in Section 2 (more than 50 papers marked with a * in the reference section) rests on our intricate knowledge of the literature in South Africa. For this reason too, we eventually decided to narrow down our inquiry to this country only rather than to Southern Africa as initially planned.[3] We indeed considered that, in such conditions, it might be tricky to perform a relevant selection of papers for less well-known terrains from our viewpoint.

2.2 | A first overview of papers related to the politics of water in Southern Africa

A preliminary analysis of the "politics of water" in the region shows that two disciplines dominate this study area, that is, geography and political science. The most important production in terms of books and papers published since the beginning

of this century has discussed the politics of water through the lens of "hydropolitics." Hydropolitics adapts to the water sector the classical political science questions of "who gets what [water], when, where and how" (Turton, 2002, p. 16). One of the most active school of hydropolitics was the African Water Issues Research Unit (AWIRU), based at the University of Pretoria, directed in the 2000s by Anthony Turton, who made also clear references to PE approaches (Turton, 2000). Researchers from the AWIRU published a vast amount of publications on hydropolitics in Southern Africa. This group was linked to the London Water Research Group directed by Anthony Allan, exchanging views and sharing research interests, for instance about the Lesotho Highlands Water Project (Mirumachi, 2015; Mirumachi & Van Wyk, 2010). Ex-members of the AWIRU are still active today, as shown by the publications of R. Meissner (2015) and R. Meissner et al. (2013); Meissner, Steyn, Moyo, Shadung, and Jacobs-Mata (2018) for example.

In his literature review on water conflicts and cooperation in Southern Africa, Swatuk's paper (2015) also mostly deals with a hydropolitics framework. He presents more than 200 references and identifies two "waves" in the geopolitics of water in Southern Africa. First, during the post-Cold War years, focusing on "*resource scarcities and the possibility of 'water wars*'" and after the mid-2000s around the "*rise of fears surrounding the impact of a changing climate on water resource regimes*." Meissner et al. (2013) did also perform a comprehensive literature survey of research on water resource management institutions published between 1997 and 2011. Their main findings are (a) that "s*cientists are focusing predominantly on catchment management agencies and aspects regarding their institutionalisation and organisational functionality*" and (b) "*that research on water resource management institutions has been conducted predominantly by scientists from the natural sciences*."

Another set of works is focusing more on governance and water policies. Paper from Derman and Ferguson (2003), Movik (2011, 2014), Bourblanc (2013), Mehta et al. (2014), and Sutherland, Scott, and Hordijk (2015) are using PE approaches in order to examine the implementation of the new water policies in South Africa, such as environmental flows (Bourblanc, 2013) or the water allocation reform (Bourblanc & Blanchon, 2015; Movik, 2014).

Within the discipline of geography, "urban critical political ecology" is largely dominating the field in Southern Africa. Most of the "critical" or "radical" political ecologists are geographers and are using the same mix of theoretical references: eco-marxism (Noel Castree for instance), French theory on power and domination (Michel Foucault, or Pierre Bourdieu), or Antonio Gramsci. Following the works of D. Harvey and E. Swyngedouw, many of them draw a specific attention to the "flows of power and flows of water" (Swyngedouw, 2004). Their work is often very critical toward water policies (Bond, 2002), with specific case studies on the implementation of prepaid water meters (Loftus, 2006), the commodification of water services (Dawson, 2010; MacDonald & Ruiters, 2005; Smith, 2001), sanitation (Galvin, 2015, 2017), or issues with the implementation of the Free Basic Water Policy in South Africa (Smith, 2001).

Beyond the diversity of case studies (Durban—Galvin, 2017, Cape Town—Smith & Hanson, 2003, Johannesburg—Bond, 2002), the research work described have in common to include a global perspective. In that respect, works in Southern Africa are particularly illustrative of a global research agenda on the right to water for instance (Sultana & Loftus, 2012), or on the consequences of neoliberalism (MacDonald & Ruiters, 2005) and the fight for water justice. Another finding is that most of the texts are signed or cosigned by European and North American scholars, and/or researchers affiliated with European and North American research institutions. Even if we acknowledge that researchers may have spent long field works in Southern Africa, for PhD research and Postdocs for instance, and have had long-term collaboration with Southern African research institutions, it shows that the research agenda of PE in Southern Africa is driven by western academic topics and trends, which can also induce some kind of bias towards topics deemed relevant within the global debates to which it is highly connected. Last but not least, one specific branch of the critical PE engaged with gender issues, which is used in two case studies in Cape town (Harris et al., 2018) and in Lesotho (Braun, 2005, 2015) and in rural areas (Galvin, 2011).

Finally, a flourishing literature on the politics of water is stemming from environmental history and anthropology. In the former, authors such as W. Beinart (1998, 2000, 2012), F. Cleaver (1998, 2000, 2012), J. Mac Gregor (2009), and J. Fontein (2006, 2008, 2015) among others, have accumulated very important empirical material about environmental history of African rivers, particularly on the Zambezi. If this "school" is not directly related to PE, however, as J. Fontein noted (2008): "*the increasing sophistication and maturity of African environmental and social history […] provides an excellent springboard from which to explore the complex and detailed relationship of water with society, culture, history and political organization*." The special issue of the *Journal of Southern African Studies* (2008) on "the power of water: landscape, water and the state in Southern and Eastern Africa" demonstrated perfectly how close political ecology, environmental history, and anthropology actually are.

3 | MAIN ISSUES AND RESEARCH TRENDS IN THE PE OF WATER IN SOUTH AFRICA

In this second section, we present some of the main debates that we have identified in the South African PE field in the last 20 years. From this discussion, we can see that PE goes further than noticing a political imprint on nature. The PE of rural waters can sometimes go as far as emphasizing how much social relations change nature (2.1.) whereas urban PE has lately focused more on how nature and material dimensions change society (2.2.).

3.1 | Repoliticizing environmental science and technologies

An important set of works in the tradition of a more "radical" school of PE investigates the social construction of environmental science and knowledge in the government of nature. Alongside research focused on the meaning and social production of water scarcity, we study the implementation of environmental flows at the local level, confirming how much knowledge and technologies are embedded within existing power relations and contribute to reproducing them.

3.1.1 | Repoliticizing water scarcity

Works around the hydropolitical framework are interested in how power influences access to, or exclusion from, water. In that respect, scholars have focused on the issue of the water allocation reform in South Africa (Bourblanc & Blanchon, 2015; Movik, 2014) or how water resources are being shared in rural areas (Marcatelli, 2018) showing how, on the ground, status quo has been maintained, largely benefiting white irrigators and protecting their water allocation despite the political agenda of redressing inequalities toward historically disadvantaged individuals in postapartheid South Africa. Turton and Warner (2002) call such *resource capture structural scarcity*. They demonstrate how dam construction in the country such as the Pongola-Poort dam for instance is a testimony to the skewed water distribution patterns. This shows how water technologies themselves are far from neutral but effectively work for the powerful. The South African *water plumbing system* perfectly illustrates the common saying that *water flows uphill towards money and power*.

Moreover, Turton and Warner (2002) emphasize the fact that the perception of scarcity is economically and culturally mediated, that is, the demand and need for water do not necessarily conform to the 3 L/person/day established at the international level as the bare minimum for human survival but *depend on social and consumptive habits that are culture-bound, differing between countries and within regions.* They conclude that *water scarcity is more than just a simple non-availability of water*. In some instances, water is available but just accessible for a privileged few. Bourblanc and Blanchon (2017) conclusions on the Crocodile East river echoe authors who show that water scarcity is not purely a natural phenomenon, but also a socially constructed one, historically and geographically situated. They demonstrate that nowadays in a river basin known to be overallocated, the water scarcity largely stems from management decisions and political choices that are not rendered explicit but embedded within technical discussion and computerized model manipulations. The expert discussion that impacts on the status of water resources in the area eventually maintains a status quo that benefit the well endued, that is, the water allocation of white irrigators at the expense of new comers such as Black emerging farmers for whom there is no longer available water to be redistributed.

3.1.2 | Reinventing nature: The implementation of the "ecological reserve"

Works on environmental flows (called the ecological reserve[4] in South Africa) have shown how selective expert knowledge can sometimes be, when it avoids questioning entrenched interests and take for granted water use for electricity production for instance. Indeed, Eskom, the national producer of electricity needs a lot of water to cool down its coal-fired power stations. Yet, in the Komati Basin, when scenarios to "reconcile" growing water demands with insufficient water supplies are elaborated, the huge volumes of water cast aside and transferred out of the water-stressed river basin are taken for granted and never discussed. The water needs of Eskom are brought out of the equation and naturalized (Bourblanc, Fernandez, & Gaudin, 2019). Moreover, unraveling expert knowledge around environmental flows in South Africa offers an occasion to witness a reinvention of Nature. During the implementation phase, the ecological reserve has been recalculated and redefined which led to discussions where building a dam for the sake of catering for environmental flows has been considered (Bourblanc & Blanchon, 2017). Such artificialization of nature is no surprise in South Africa where rivers are so heavily "regulated," that is, dammed. That's why from the very beginning the concept of the "Reserve" has matched the culture of "engineering nature"

prevalent within the Department of water affairs. Since the idea of decommissioning dams has never seriously been considered, dam releases therefore became the privileged way to provide for environmental flows. Such releases very often occur counter seasonally, that is, at odds with natural cycles of low and high flows or even drought. Hence, the reconceptualization of the ecological reserve through modeling is just the latest development of an engineer rationality that used to build dams for economic activities (farmers' water demands, cities' water demands, etc.) but which is now considering building dams for the sake of ensuring the sustainability of the ecosystem, as a way to find a new legitimacy for hydraulic infrastructures. Against such backdrop, there is no surprise in realizing that historically, civil engineers from DWS in charge of building dams were the ones commissioning aquatic scientists to determine a "reserve for the environment" (Bourblanc, 2017). In that respect, works on the genesis of the reserve before it was officially enshrined in the law illustrate Aubriot, Fernandez, Trottier, and Fustec (2018) statement that "*science does not precede the development of technology*": Common belief takes that scientific knowledge is at the basis of technology but in actuality, technology can often motivate the production of knowledge (Aubriot et al., 2018). Since technology may motivate the development of new scientific knowledge, it is likely to orient the production of such knowledge toward specific directions, that is, directions that suit the need of the technology promoters, legitimizing its use.

Discussing the interwoven linkage between material and social dimensions of water resources, we have seen that the PE of water in rural areas mainly underlines how politics shapes the biophysical world. We will see in the next subsection that recent works in Urban PE of water have put the emphasis on the reciprocal relation, insisting on ways in which nature can influence society.

3.2 | Building citizenship through drinking water access

Swyngedouw's work on the Spanish waterscape had the objective to understand how natural resources and state power might be mutually constitutive in the resources-state nexus (Bridge, 2014; Scott, 1998). The PE of water in South Africa also investigates such coproduction processes but in contrast to previous works, it tends to focus more on the micropolitics rather than on the relation between water and statecraft. Against this background, authors discuss the neoliberal governance of water which has entailed the production of a capitalist waterscape, with the increased dominance in South Africa of water meters and disconnections and their implication on people's representations of citizenship. More surprisingly, some authors argue that the often-perceived progressive measure of free basic water[5] is consubstantially linked to the flow restrictor devices and to the neoliberal agenda.

3.2.1 | Beyond the State: New understandings of power relations

Not surprisingly for the neo-marxist tradition that characterizes number of references in the PE of water (Dawson, 2010; Nash, 2013), environmental struggles are considered to be constitutive of the State and alternative worlds. Angel and Loftus (2019) underlines the *socio-ecological basis of the state as it emerges in relation to struggles over right to water*. Addressing the figure of the State, several works have recognized how much South Africa public administration in charge of water used to fit the profile of a *hydrocracy* fulfilling the objectives of a typical "hydraulic mission" (Molle, Mollinga, & Wester, 2009). Hellberg underlines how much this hydraulic mission was connected to the creation of the South African racist state (Hellberg, 2018, p. 97). None of these authors followed the environmentally deterministic nature of Wittfogel's "hydraulic society" thesis though nor did they really explore the relationship between water, power, and statecraft. Following the criticisms of Scott's thesis (1998), and thus moving away from "The State" in its supposed unicity, more works decided to rather concentrate on micropolitics and decentered "technologies of rule" and social power within society.

Against this background, Foucauldian and Gramscian approaches have been favored to identify a more diffuse expression of power at the microlevel and in the ways through which societies are ruled and governed. Focusing on expressions of power at the individual level and in everyday life, Foucauldian authors demonstrate how studying water inequalities does not only imply questioning water access but also analyzing how such inequalities relate to definitions of "the self". In contrast, power issues are investigated from a societal viewpoint in the Gramscian theory, rediscovered thanks to D.S. Moore (1998), an anthropologist working on Zimbabwe's Eastern Highlands. Authors argue that the Gramscian understanding of hegemony and of the way it works is precious as it helps us "move from the grand displays of power represented in large-scale engineering works to the subtler ways in which power works through everyday hydraulic practices" (Ekers & Loftus, 2008, p. 709). Against this backdrop, flow restrictor devices have drawn a lot of attention.

3.2.2 | The social life of a technical device: The effects of prepaid water meters in a racially divided society

Analyzing inequalities in water access in urban settings (Galvin, 2017; Loftus, 2006; Smith & Hanson, 2003), some authors have investigated more in depth the relation between drinking water access and citizenship. Harris et al. (2018) discussion of water materialities in relation to citizen engagement puts a greater emphasis on how biophysical or ecological characteristics of resources impact on sociopolitical processes. These authors describe in which ways the material conditions of water (here understood as water access and water quality) might reconfigure community engagement. Using statistical analysis, they corroborate, in a more rigorous manner, previous research that suggested an influence of material conditions of resources on the ways in which resources are perceived, used and ultimately governed. Rather than exploring the role of social mobilization in the improvement of water material conditions (securing better water access or quality), they interrogate the reverse relation, that is, how material conditions may drive sociopolitical processes such as citizen's engagement. Their results show that "*water access and quality are significant predictors of Community engagement, albeit in opposite directions (access has a negative relationship,and quality a positive one).*" These findings have implications beyond mere attempts at securing better access or quality, and, through the multiple interactions with decision-makers and governing bodies, have repercussions on a broader sense of citizenship as well.

Rodina and Harris (2016) work on the rollout of a water conservation and water demand management devices which started in 2007 in Cape Town (and elsewhere) is interesting as the authors claim it had major practical as well as political implications in people's daily life (Rodina & Harris, 2016). They highlight how *notions of the state, and state power and authority, are shaped by specific interactions with differentiated municipal water and sanitation infrastructures, which in turn shape how citizenship is understood and narrated.*

Loftus (2006) early work on prepaid water meters in Durban had opened the way in studying the shifting social life of the technology from metering the rich for conservation purpose to metering the poor when the policy of free basic water started being implemented. Von Schnitzler works in Soweto (2008, 2013) also offer very interesting insights. She also focused on technical–political devices such as prepaid meters for basic services in water and electricity, showing that the scale of deployment of such technology in South Africa was globally unprecedented. The author traces back the trajectory of the device as a counterinsurgency tool against the antiapartheid "rent boycotts" in the townships in the 1980s to its use nowadays in a postapartheid context. She posits that prepayment devices are permeated with political content. Reciprocally, such device very much impacts on the sociopolitical realm as well: *They not only redefine and materialize the shape of the civil link with the state, but also, and more importantly, actively participate in the construction of particular subjectivities* (Von Schnitzler, 2008).

For von Schnitzler, such technologies herald a particular fiscal relationship which first *has been shaped by the ways in which the antiapartheid struggle unfolded* (Von Schnitzler, 2008) and which today reformulates the social contract between the State and its citizens. She rightly emphasizes that: *infrastructure has never been merely a neutral conduit for the provision of services, but has always been bound up with questions of belonging and citizenship […] Similar to other postindependence projects, the extension and improvement of basic services, from education or health to electricity and water, was seen as central to national reconstruction.[…]* (von Schnitzler, 2013). Yet today those technologies are shifting *the meaning of 'people-driven development' from an emphasis on democratic participation to one stressing citizens' fiscal responsibility towards the nation. […] Central to this process was the constitution of citizens as fiscal subjects overlaying the dominant rights-based discourse of the anti-apartheid movement, allied to a quest to 'normalise' the fiscal relationship between the state and its citizens in the aftermath of apartheid. The act of payment, and thus of recognizing one's obligation to the state, came to be seen as a prerequisite for inclusion within the new political community.* (von Schnitzler, 2008). In her book, Hellberg (2018) goes even further, linking such device to the continuation of a racial separation in postapartheid South Africa. If Linton focused on "what is water" in his ground-breaking book, Hellberg (2018, p. 2) sets to look at what water does (to people) using a Foucauldian-inspired biopolitical perspective, that is, *connecting the individual with broader networks of power.* She shows how water technologies *produce, or further entrench, distinctions between lives and lifestyles*, differentiating between populations. She posits that the governing techniques of neoliberal biopolitics (linked to liberalization, privatization, and commodification of water) display *the will to divide* that in the case of South Africa, serve to reproduce social hierarchies. Following Kooy and Bakker's work (Bakker, 2013; Kooy & Bakker, 2008) on water imaginations and identities, she concentrates on water narratives and representations of water in water users' own account, referring to *hydromentalities*.

3.2.3 | Free basic water and the human water right within the neoliberal governance agenda

Loftus in particular has been directly linking water use restriction technologies (prepaid meters, etc.) to the implementation of free basic water. Indeed, municipalities, fearing the incentive for an unrestrained consumption that such free water policy could trigger, were eager to find some hydraulic control system to limit the average consumption. He demonstrated *the remarkable power that water infrastructure is currently acquiring over the lives of residents in the South African city of Durban*, power that the author equates to a dictatorship. Against this backdrop, the author denounces the fact that *non-human entities such as water meters, flow limiters and money acquire an alien power over people's lives. This takes place as nature internalises, embodies and expresses these capitalist social relations. Much of the recent enthusiasm within political ecology for non-human agency merely reiterates an argument concerning an external (and binarised) relation between society and nature rather than looking at the fusion of socio-natures and the explosive internal relations that 'things' come to embody as a result of this interaction being mediated through capitalist production and exchange. Curiously, in the case of Durban, this power has been heightened through the introduction of a free basic water policy.* (Loftus, 2009, p. 965). This allows Loftus to conclude that *free water is being produced as a commodity.* This striking paradox is echoed in Yates and Harris (2018) who are also skeptical about the free basic water measure. While most criticisms around human water rights and free basic water directly link them to an expression of neoliberal politics, these two authors state that neoliberal politics and free basic water coconstitute each other ("discursively, practically, and in policy implementation"). In other words, unlike most authors, they insist on how technologies and sociotechnical devices produce specific governance regime rather than only deriving such devices from neoliberal governance regime.

4 | DISCUSSION AND CONCLUSION

An interest for ways in which water and politics are intertwined is not new within geography. A century ago, geographers tended to view this relationship in a more deterministic way though, overemphasizing the power of nature over societies. Lately, with the emergence of the PE agenda, the bulk of the research studying the influence between social and material aspects of water issues has revolved around the opposite influence, for instance demonstrating the impact that the framing of water challenges have on the range of solutions discussed to tackle them (Swatuk, 2017). Nowadays, research eliciting the social construction of natural resources is a well-developed trend in PE (Bridge, 2014). On the other hand, the questions around "how and why the materiality of water itself is crucial to […] political formations" have been proportionately less investigated within PE (Anand, 2011, p. 544).

Indeed, as already stated, the field of PE is characterized by a diversity of approaches, with its ultimate objective having evolved over the past few years from studying the causes of environmental change to primarily examining the discursive and social politics of access and control over natural resources (Walker, 2005). Considering these recent evolutions, some scholars dealing with integrated human–environmental systems might no longer recognize themselves in the PE framework despite the proximity of their approach and concern (Turner, 2016). Hence, we acknowledged that it was somehow difficult to take the decision to limit our corpus to authors explicitly mentioning this conceptual framework in their publications. We therefore identified works that could match to some degrees our definition of PE as "*an integrated understanding of how environmental and political forces interact to mediate social and environmental change*" (Bryant, 1992, p. 12) "*with explicit consideration of relations of power*" (Robbins, 2004, p. 12). With this definition, we acknowledge the focus on power relations as one of the distinctive features of PE alongside with the commitment to engage with the biophysical nature and/or its representation rather than considering the natural environment as a mere contextual element in the analysis.

Taking stock of the literature review conducted above, we can, first, point at urban PE representing the core of the PE of water in South Africa, ahead of the PE texts dealing with rural water. Hence, despite the role of peasant studies in the emergence of the PE subdiscipline (Benjaminsen & Svarstad, 2009) as well as the critical importance of studying inequalities in water allocation for the farming sector in South Africa, we can note relatively few research dedicated to the issue as compared to a proliferation of works investigating unequal water service delivery and in particular the unfulfilled promises of a right to water enshrined in the South African Constitution.

Second , it appears that works inspired by the original political economy of environmental change and neo-marxist tradition (Blaikie, 1985) within PE is still very vivid in the PE of water in South Africa. Focusing on water struggles in Durban, Loftus for instance emphasizes how *conditions of possibility for radical alternatives are embedded within the complex political ecologies of water struggles. How to build on these while recognising their continued embeddedness within the production of everyday environments is the crucial question for future work on political ecologies of water.* (Loftus, 2009, pp. 966–967).

The liberation and social transformation dimensions constitutive of one branch of PE are therefore well represented in the field in South Africa.

Third, borrowing from Turner's categorizations, works focusing on the *ecology in politics* has been the primary concern of urban PE whereas works on the *politics of ecology* relates more on the PE of water in rural areas, emphasizing how social relations change nature. In urban PE, Rodina and Harris (2016) evoked how *"in South Africa the state is understood and narrated in multiple ways, notably differentiated by interactions with service provision infrastructure*." In this relation, water services hold a special role because unlike other basic services such as electricity, water is essential to survival and not substitutable. However, with regard to Walker's criticism of recent PE, it is worth mentioning that when analyzing how material conditions change society, urban PE tends to consider primarily representations of nature and perceptions of water technologies rather than the biophysical world per se. For these authors, perceptions are indeed key to people's relations to water services. For instance, we can say that although engineers keep saying that water needs to be pumped, treated, distributed, reticulated, and so on, water is first and foremost perceived as a "natural resource," that is, a natural element whose access through rivers or boreholes is almost unmediated (a "gift from God," falling from the sky and harvested in water tanks like in most rural areas). The materiality of water is therefore always mediated by perceptions.

Fourth, from a theoretical viewpoint, Gramscian and Foucauldian approaches are the two schools of thought dominating the discussion around the PE of water in South Africa. It is worth mentioning that this field of study tends to focus more on micropolitical dynamics rather than on macrolevel relations between water management and statecraft.

Finally, authors like Loftus have claimed that the PE of water engages with new theoretical debates *at the forefront of developing new approaches to human–environment relations* (Loftus, 2009, p. 954). Ekers and Loftus posit the PE of water as a distinct subfield within more general PE. For them, *an empirical focus on water has served to revitalise historical geographical materialism, providing new insights into produced environments, uneven development, and the politics of urban metabolisms*. (Ekers & Loftus, 2008, p. 698). More than a mere "politics of water," the PE of water could thus offer another avenue to interrogate the interplay between the material and the political dimensions of water in a more balanced and integrated manner. Above all though, the PE of water in South Africa is concerned with the crucial role of water in the process of (re-)producing power in the world. This inquiry about power dynamics is seen as a necessary step to solve the environmental crisis. In that respect, PE authors choose to account less for the so-called global water crisis for instance and tend to distance themselves from such a "crisis" framework for fear of appearing overly fatalist. During the concerning water shortage in Cape Town in 2017-2018 for instance, M. Galvin challenged the "natural" explanation in terms of climate change worsening drought episodes. Instead, she pointed at unfair distribution of water between sectors and irresponsible water consumption levels in affluent areas of the city rapidly depleting water resources (Galvin, 2018).

CONFLICT OF INTEREST

The authors have declared no conflicts of interest for this article.

ENDNOTES

[1] Organizations such as Vaal Environment Justice Alliance or the Environmental Justice Network Forum: more than 230 representatives of such movements gathered at the South Africa National Conference on Environment and Development hosted by the University of Cape Town in 1991. Water issue was one of the main topics of this meeting.

[2] According to Scielo (Scientific Electronic Library On Line South Africa, 1,534 papers, books, and reports on water issues, covering from natural sciences (hydrology, biochemistry, freshwater biology, geomorphology) to water policy and governance issues, were published in South Africa since 2007.

[3] We however decided to keep the references dealing with Political Ecology in Southern Africa in the reference section.

[4] The "ecological reserve" corresponds to water left in the river to perform its ecological functions and ensure the long-term sustainability of aquatic and associated ecosystems.

[5] Free basic water covers the basic human needs, that is, water provided for free to every individual in order to cover their needs on a daily basis such as drinking, cooking, and sanitation.

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