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Hydrosolidarity: A Socio-Political Reading of a Moral Concept

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ABSTRACT: Solidarity as a moral appeal has made a regular appearance in water policies, but the concept has rarely been theorised in relation to water governance from a socio-political perspective. As a consequence, the real-life sociological and political underpinnings of hydrosolidarity have remained underexplored. This has limited its conceptual elaboration, analytical use and practical applicability in critical water governance theory and practice. Recent developments in sociopolitical research on solidarity have the potential to make up for this gap. This literature broadly defines solidarity as the willingness or moral obligation to share and redistribute material and immaterial resources. It emphasises solidarity as a situated praxis that is influenced by, and simultaneously constitutive of, social structures. Drawing from this literature, we identify four perspectives through which theories of hydrosolidarity can be enriched: first, an exploration of the sociopolitical foundations of hydrosolidarity as situated praxis; second, an expansion of the spatial imaginaries of hydrosolidarity; third, a broader understanding of the role of infrastructures for hydrosolidarity; and, finally, a more thorough theorising of hydrosolidarity beyond the human. These four perspectives, we argue, open up new lines of empirical inquiry on collective water governance.

KEYWORDS: Solidarity, water, governance, sociopolitical theory

INTRODUCTION

In the history of water governance, the term hydrosolidarity has made regular appearances under various guises. The Spanish Regeneracionismo (Regenerationism) movement of the late 19th century and early 20th century referred to solidaridad hídrica, which aimed to study and address the causes of Spain's decline; the concept was later resurrected by dictator Francisco Franco to legitimise large-scale water diversions as part of an attempt to colonise the 'backward' Spanish interior (Duarte-Abadía and Boelens, 2020). More recently, the Swedish hydrologist Malin Falkenmark defined hydrosolidarity as a "balancing of human livelihood interests" and promoted it as a diplomatic strategy for addressing conflicts of (often geopolitical) interests in integrated water resources management (IWRM) (Falkenmark and Folke, 2002; Gerlak et al., 2011). Throughout its various appearances, hydrosolidarity has been treated as a normative addition to (and legitimation of) modernist techno-managerial approaches to water governance. Yet the real life sociological and political underpinnings of such normativity have remained undertheorised.

While the term itself is rarely used (although see Harrington, 2015; Keessen et al., 2016; Kemerink et al., 2009), the idea of solidarity is not foreign to the various social and political theories of water management (Ravi Raman, 2010; Vos et al., 2020; Shi et al., 2021). The interrelated fields of common pool resources (CPR) theory and political ecology of water, in particular, mobilise associated (albeit not entirely overlapping) concepts. CPR theory has paid ample attention to the question of collective action

in relation to water care, use and management. CPR scholars have emphasised the conditions under which collective capacities to share and regulate scarce resources such as water can be developed (Ostrom, 2009). In this scholarship, however, most attention goes to the role of institutions in the management of collective resources (Ostrom, 1990). Analytically, many of these studies draw upon notions of economics and rational choice theory, while morality and its sociopolitical basis have received little attention. More emphasis has also been put on the efficient and effective management of resources rather than on the "balancing of (water-related) human livelihood interests" which Falkenmark and Folke (2002: 4) termed hydrosolidarity. Critical CPR scholars have focused on a more politicised understanding of water-related livelihood interests. They have turned their attention towards (unequal) resource access and have emphasised how rules and institutions are deeply embedded in contested socio-institutional and cultural contexts (Whaley, 2018). These studies point out that institutions for collective action not only regulate collective action but also produce inequalities in access, often re-enforcing the exclusion of marginalised social groups (Ribot and Peluso, 2003; Johnson, 2004; Quintana and Campbell, 2019). The social and analytical ambition of critical CPR is to adopt a political sensitivity and contribute to a more equal and just distribution of resources (Whaley, 2018, 2022). Less attention has been paid, however, to understanding the morality of hydrosolidarity and its potential for challenging and/or perpetuating water injustices.

On the other hand, frameworks in water research that are inspired by political ecology, such as waterscape approaches (Swyngedouw, 1999; Karpouzoglou and Vij, 2017) or hydrosocial territories frameworks (Boelens et al., 2016), expose the fundamentally contested sociopolitical entanglements of water, society, infrastructure, nature and power, and emphasise the varied geographies of water governance (Hoogesteger et al., 2016; Duarte-Abadía et al., 2019; Flaminio et al., 2022). These approaches have focused above all on developing a better understanding of the tensions, conflicts and injustices that arise from unequal power relations (Flaminio, 2021; Flaminio et al., 2022; Hommes et al., 2022; Manosalvas et al., 2023). In some of these studies, the issue of solidarity receives more explicit attention. It appears above all in the analysis of environmental justice struggles and movements. There, hydrosolidarity is approached from two different angles. First, some studies have investigated the institutionalisation of solidarity through the creation of shared normative frameworks (Hoogesteger, 2015; Hoogesteger et al., 2023a; López-Gunn, 2012; Mustafa and Qazi, 2007). These studies implicitly refer to hydrosolidarity as a moral framework that results from the collective organisation and management of water provision systems and from the struggles that emerge to create and sustain such systems (Shi et al., 2021; Aubriot, 2022; Hoogesteger and Verzijl, 2015; Hoogesteger et al., 2023b). Second, mobilising classical social movement theories, water justice studies have tried to understand how actors build coalitions and act in solidarity with each other for a shared goal or against common challenges and enemies (Vos et al., 2022; Flaminio, 2021; Ravi Raman, 2010). Here, in parallel with wider social movement theory, two lines of analysis coincide. The first of these is a field of research that explores the motivations and drivers of coalition building, this motivation often being situated in a perception of injustice (Sultana and Loftus, 2015; Sultana, 2018; van den Berge et al., 2022). The second line of analysis involves a fascination for the organisational intricacies of social movements and their relationship with political opportunity structures (Hoogesteger, 2017; Spronk and Sing, 2019). Both lines of research explore hydrosolidarity from their specific angle while ignoring other dimensions. Whereas the latter social movement literature focuses on the social relations that facilitate hydrosolidarity, the former puts moral politics at centre stage.

In light of the fragmented and often implicit exploration of solidarity conducted by the various critical schools analysing water governance, we observe a need to more coherently conceptualise and understand hydrosolidarity as a sociopolitical concept. This would allow us to throw a more critical light on the ethics of hydrosolidarity and would bring this into conversation with wider institutional and political studies of water. To theorise the sociopolitical underpinnings of hydrosolidarity, we base ourselves on the recent insights about solidarity found in wider social theory. These allow us to better

understand how and under which sociopolitical conditions hydrosolidarity can be advanced. This helps us to imagine what role hydrosolidarity can play in shaping more just and equitable relations and practices in collective water governance (van der Zaag, 2007; Kemerink et al., 2009; Boelens et al., 2023). In the remainder of this article, we first discuss the conceptual elaboration of solidarity in wider sociopolitical theory. We then spell out the four main angles from which this literature can inspire and enrich a theory of hydrosolidarity. In the third section, we discuss how these insights can be deployed in future critical water research and water governance practice. In our conclusion, we provide an overview of the directions for research that emerge from our review, while also warning about potential pitfalls and limitations.

SOLIDARITY IN SOCIAL THEORY

Solidarity has been a longstanding, if not foundational, concern for the Western social sciences, with correlates in other global cultures (Supiot, 2015). In its most general terms, the concept can be defined as the moral obligation or "willingness to share and redistribute material and immaterial resources drawing on feelings of a shared fate and group loyalty" (Oosterlynck et al., 2016: 765), with similar definitions to be found in Bayertz, 1999; Stjernø, 2004; Scholz, 2013). Such a definition points at a normative, ethical dimension (willingness or moral obligation to share), tied firmly to social structures (a shared fate or group loyalty) (Oosterlynck et al., 2016). It is indeed this dialectic between morality and social structure and between the individual and the larger collective (Scholz, 2008: 5) that has puzzled social scientists since the 19th century. From August Comte to Karl Marx, early western European sociologists tried to make sense of the rapid changes in their societies by asking themselves similar core questions about solidarity; these included: what shapes our social interactions beyond mere self-interest; where do solidarities emerge from; and (more pragmatically), can we 'foster' or 'preserve' solidarities in times of social change?

First, in response to these questions, they have pointed at different 'structural' roots of solidarity (see Oosterlynck et al., 2016). Comte, Durkheim and Tönnies were interested in theorising the possibility of social integration in modern, individualising societies. They conceived of solidarity as the social glue that stimulates individuals to share with, and collaborate in, a larger collective. Durkheim's classic analytical distinction between mechanic and organic solidarity (which more or less coincides with the interpretations of Comte and Tönnies) provides perhaps the most systematic exploration of the structural roots of solidarity. Whereas the former type of solidarity is based on a shared identity where traditional values 'automatically' trigger a 'mechanic' solidarity, 'organic' solidarity emerges from a recognition of mutual interdependence in the context of a heightened division of labour. Karl Marx presents a competing imagination of the relationship between social structure and solidarity, picturing solidarity as emerging from social conflict that is embedded in social class structure. These conflictual roots of solidarity have been expanded by Max Weber, who identified additional social divisions beyond class. Marx and Weber do not consider solidarity to be the glue of entire societies (as Comte, Durkheim and Tönnies did). Rather, they see it as binding smaller collectives that are in competition or conflict with each other. Similar to the previous authors, however, Marx and Weber do consider solidarity as expressed in prosocial behaviour, based on a shared fate or collectivity.

Second, these 19th century theorists have pointed at a simultaneous bottom-up and top-down dialectic of solidarity. Thijssen (2012) argues how, for Durkheim, solidarities are not unidirectionally imposed on individual actors by social structure; rather, they emerge from a reciprocal interaction between universal structural traits (forces of 'system integration' such as group norms or interdependence) and particular intersubjective orientations (forces of 'social integration' such as affect, emotions or cognition). Durkheim, in other words, considers micro-level moral behaviour as dialectically linked to macro-level social structures. Solidarity is founded in social structure but emerges through social praxis; this allows for local dynamics that result in historically and geographically specific combinations

of mechanic and organic types of solidarity. Karl Marx – in order to explain the variability and malleability of class solidarity – similarly introduces a distinction between class-in-itself (as a product of social structure) and class-for-itself (as a subjective consciousness). In Marxist literature, subjective class consciousness is a condition for solidarity but is rarely regarded as straightforwardly determined by social structure; instead, class consciousness must be constructed through practices of solidarity. Obfuscation, strategic manipulation, and division by opposing classes can inhibit the development of a class consciousness that is in line with class structure and can reorient resulting solidarities. Max Weber's analysis of classes and status groups likewise discusses how intersecting social relations can disturb the direct imprint of social position onto consciousness and morality.

In current social theory, scholars care less about the effect of macrosocial structure on microsocial praxis, though an influential exception is the school of social capital research initiated by the work of Robert Putnam (2001, 2007). Most present-day scholars of solidarity are more focused on exploring the micro-level actualisation of solidarity through sociopolitical praxis. Their accounts of the political histories and geographies through which solidarity becomes articulated present solidarity as variable and contested rather than structurally determined (Featherstone, 2016; Oosterlynck et al., 2017; Kelliher, 2017). Whereas these studies sometimes risk being overly voluntaristic in relation to solidarity's malleability, they have initiated a valuable debate on the spatiotemporal contingency and politics of solidarity.

From this perspective, it becomes logical to not speak of solidarity as such, that is, as a characteristic of social relations; rather, one should speak of solidarities, in the plural, when indicating the variegated forms in which solidarity is actualised in context. It shifts a study of solidarity from an analysis of it as a general property of social relations, to an exploration of how relations of solidarity are being forged through time and place-based praxis (Oosterlynck et al., 2017; Loopmans et al., 2020; Bauder, 2021; Bono and Loopmans, 2021; Piacentini et al., 2023). Below, we will further elaborate four particular dimensions of solidarity scholarship that we consider to be of relevance for a research agenda on hydrosolidarity: (1) a discussion of the sociopolitical foundations of moral solidarity, exploring its affective and cognitive dimensions; (2) a discussion on the contingency of solidarity that includes an exploration of its variegated spatiotemporal appearances and dimensions; (3) a discussion of the role of infrastructures for solidarity; and (4) an elaboration of an approach to solidarity that includes the more-than-human, based on a recognition of the socio-ecological entanglements of humans and non-humans. In Section 3, we systematically review how progress in these four fields of solidarity research can open up new avenues for sociopolitical investigations of hydrosolidarity.

Affect, cognition and the sociopolitical foundations of solidarity

The microsocial focus on practices of solidarity adds a distinct political angle to solidarity research. Instead of following Durkheim and Comte in studying (national) social integration and stability, this line of thinking focuses on the boundedness of solidarity and asks the questions: with whom is solidarity enacted, and how are solidarity's boundaries being established, contested and reshuffled. This literature also explores what motivates individuals to practice solidarity (Bazzani, 2023). In parallel with the classic division between mechanic and organic solidarity, two complementary motivational processes are distinguished (see, for example, Johnson, 2019); these are: a cognitive process focusing on a recognition of the responsibility that comes with interdependence (Young, 2010; Massey, 2004), and an affective process of empathy and familiarity that is explored in the literature on care (Lawson, 2007).

Geographer Doreen Massey is a prime source of inspiration for studies of solidarity as responsibility. Reflecting on how globalisation is lived at the personal level in multicultural cities, she points out how everyday experiences of global connectivity can stimulate a recognition of mutual interdependence and the enactment of transnational solidarity (Massey, 2004, 2005). She clearly situates this solidarity in the cognitive realisation that our global connectivity with others is determining our life chances (and those

of the individuals with whom we are connected). This places upon us a reciprocal responsibility for the well-being of those on whom we are dependent for our own life and livelihood (see also Gatens and Lloyd, 2002; Young, 2010; Noxolo et al., 2012).

Many scholars, in contrast, indicate that solidarity also has an affective dimension. Affect refers to the nexus between emotions and actions, how emotions or feelings directly 'affect' our actions (Ahmed, 2004; Massumi, 2015). This is explored in both the study of social movements (for example, Johnson, 2019) and in studies of care (Lawson, 2007; Middleton and Samanani, 2021). Care is broadly defined by Fisher and Tronto (1990: 40) as a, "species activity that includes everything that we do to maintain, continue and repair our world so that we can live in it as well as possible". Studies of everyday care (Moosa-Mitha, 2016) connect practical expressions of care (providing care) with their emotional, affective groundings (caring about) (see Milligan and Wiles, 2010; Middleton and Samanani, 2021). As put by McEwan and Goodman (2010: 109), care is, "about 'feeling' as much as 'doing', it is about 'doing to' as much as 'feelings from'". Whereas feelings of care inspire caring practices, such caring practices in return also build and strengthen the connections, communities and identities that structure such feelings. Emotions linked to empathy and compassion – driven by an embodied experience of closeness or similarity – are identified behind practices of care. Rather than responsibility per se, care thus identifies a more particularistic, potentially exclusionary form of solidarity (Johnson, 2020). As Barnett and Land (2007) explain, "the value of care is necessarily derived from it being a virtue of partiality, extended to some particular others on the grounds of attachments of feeling or emotion".

To conclude, we identify two often-intertwined dimensions in the politics of solidarity: responsibility and care. While both require responsiveness to the needs of others, the former does so on the basis of an understanding of interdependence whereas the latter is triggered by feelings and emotions of identity and familiarity that allow one to 'feel along' (Komter, 2005; Barnett and Land, 2007). In that sense, care explores a somewhat different structural basis for practices of solidarity than the more cognitive conception of responsibility, being based on emotional proximity rather than on relational connectivity. Both dimensions thus embody a distinctive politics. Responsibility seems to be connected to a solidarity based on mutuality and reciprocity with interdependent others, while the concept of care emphasises altruism and (power) asymmetries in practices of solidarity with emotionally close others (Lawson, 2007). The interaction between these processes paints an uneven landscape of inclusion and exclusion from practices of solidarity (Thijssen, 2016).

Spatial imaginaries of solidarity

In recent geographical studies of solidarity, a flurry of spatial forms has been identified. Two important theoretical insights can be distinguished: first, a distinction between spaces of dependence and spaces of engagement; second, the adoption of the TPSN (territory, place, scale, network) framework to analyse and describe solidarity's spatial dimensions of location and reach.

Current studies of solidarity, as evidenced above, suggest that it is not a direct outcome of social structure. The studies bear witness to the fact that solidarity is not a given, even in the face of shared experiences or interdependencies. In the light of this insight, geographical readings of solidarity have introduced an analytical distinction between spaces of dependence and spaces of engagement. This casts aside any notion of a predetermined spatiality of solidarity. This distinction was introduced over two decades ago by Kevin Cox (1998) in a study on the spatial solidarity strategies of labour unions in the face of increasingly mobile global capital. It remains fruitful in understanding all forms of solidarity-building in relation to shared interests or challenges. Spaces of dependence are defined by the spatiality of those "relations upon which we depend for the realization of essential conditions for our material well-being and our sense of significance" (ibid: 2). It refers to the spatial organisation that structures our interests. The defence of these relations, however, does not necessarily entail a similar spatial organisation. Spaces of engagement, as the spaces through which relations of solidarity are built and maintained, can take on

entirely different forms. Studying social movements, geographers have regularly emphasised how social movements are not necessarily tied to the (local or national) territories in which they want to realise political change; rather, they can (and do) build trans-local or transnational collectives of solidarity and support (cf. Routledge et al., 2007; Featherstone, 2016; Pan and Loopmans, 2021; Rahbari, 2019).

To make sense of the variegated spaces of engagement, the subfield of social movement geographies has adopted and enriched the TPSN framework (Jessop et al., 2008) to describe and explain the diverse spatial expressions of social movement solidarities (Nicholls, 2009; Uitermark et al., 2012; Miller, 2016; Loopmans et al., 2020). The TPSN framework introduces a comprehensive conceptualisation of the locational anchorage of social movement solidarities and of their geographical reach. It pits more top-down, often state-led, institutionalised forms of solidarity against bottom-up ones. Formal, top-down governed solidarity institutions such as welfare states or charity organisations (Thijssen, 2016), deploy territoriality (Sack, 1986) as a tool to locate, contain and control relations of interdependence and familiarity. Such territorial forms of solidarity are generally rooted in an idea of an interdependent community that is bound by a shared territory (Coțofană and Kuran, 2023), be it a national homeland (Varró, 2012; Coțofană, 2022), subnational territories such as cities or regions (Paasi, 2011), or a supranational union (Hadjimichalis, 2011; Keating, 2021). Defining territories and borders within which solidarity is to be practiced, nation states try to draw sharp spatial distinctions between those who are to be in solidarity with each other and those who are not. Moreover, states are often organised as hierarchical complexes of nested territories (state scales) with increasingly wide reach from the local to the global. Variations in the reach of solidarity are similarly structured in a scalar way, with more exclusionary – but stronger – forms of solidarity within the smallest territory ('community solidarity'), expanding progressively to higher-level territories (Smith, 2000).

Doreen Massey (2004, 2005), in contrast, introduces a more relational understanding of space to make sense of bottom-up solidarities, in the process presenting a very different understanding of solidarity's location and reach. Recognising the particularism and partiality of solidarity, Massey rejects the idea that territories are the only basis for such particularism or that solidarity should necessarily be circumscribed by territorial boundaries (Sharma, 2020). She identifies solidarities on the basis of a cognition of global interdependence that reveals a network structure of responsibility with meshes and nodes, one that does not cover an entire territory and may also cross territorial borders (Chatterton, 2005; Darling, 2010; Morris, 2016). Such a "flat ontology of space" (Marston et al., 2005) belies a scalar understanding of reach; that is, in contrast to scaled hierarchical extensions, networks stretch across large distances without necessarily changing qualities. Massey's locational understanding of solidarity also differs from a territorial one. Instead of locating solidarity within a bounded area, Massey situates it in a place. Places, in her usage, are not defined by borders, but rather through (intersubjective) relations; that is, a location becomes a place when it acquires social meaning, when it becomes a source and subject of identification and affect for a group of people. Massey (2005: 184) asserts that responsibilities are grounded in places with which we associate ourselves and that our relationship to place shapes, and is shaped by, our solidarity with others in that place (Pierce et al., 2011; Loopmans et al., 2012). She emphasises that place identities are dependent on relations with other places and that shared places can thus become the spatial grounding for solidarity across wider networks of relationships (Oosterlynck et al., 2017). When looked at from such a relational perspective, places function as nodes in networks, combining proximity with connectivity at larger distances. Places are where different relations in the network come together making the distant as immediate as the local, whereas the non-connected local can become very distant.

Similar reflections on location and reach have emerged in geographical scholarship of care (Barnett and Land, 2007; Milligan and Wiles, 2010). The affective basis of care seems, at first sight, to require spatial and temporal proximity; this reflects a territorial imagination, as in the literature on home or community care (Means et al., 2008). An emotional, affective geography of care, however, reveals how relational networks can facilitate care for spatially distant but affectively close others, whereas spatially

close others for whom positive emotions are lacking or negative emotions are dominant may be excluded from care. Such distinction between spatial distance and affective distance upsets the territorial basis for the selectivity of care (Moosa-Mitha, 2016). This does not mean that the territorial basis of care is impossible or needs to be entirely discarded. It means rather that, in relation to care, territory and scale need to be questioned as the pre-eminent spatial categories. Under the relational paradigm, geographies of care have embraced "the way care varies across its spaces and its actors, the duties involved, and the rationales motivating and shaping care" (Hanrahan and Smith, 2020: 2). This includes the entanglement of interpersonal relations of care with wider societal institutions and structures that are organising solidarity on a more territorial basis (McEwan and Goodman, 2010); it also opens up the possibility of horizontal relational networks of care crossing territorial boundaries that may exhibit very different spaces of inclusion and exclusion (Adams et al., 2018).

Solidarity infrastructures

A third line of exploration in the recent literature on solidarity focuses on the role of infrastructures. Geographers studying solidarity in social movements have pointed at the importance of specific 'solidarity infrastructures', stressing the impact of the sociomaterial environment in structuring responsibility and care. In detailed empirical studies, the roles of community libraries, housing squats, or workers' centres have been investigated, both for their place-based organisation of solidarities and for their relational expansion and mobility (Griffin, 2023). Examples range from Featherstone's (2012; 2023) discussion of the role of port facilities in the construction of global networks of solidarity, to Kelliher's (2021) research on the way flying pickets in the 1970s and 1980s UK labour movement were facilitated by existing networks of union or workers' centres. Others have emphasised how the availability of places for encounter and mobilisation functioned as breeding grounds for the construction and learning of alternative ethics, political subjectivities, and solidarities (Spijkers and Loopmans, 2020; Pan and Loopmans, 2021; Karaliotas and Kapsali, 2021; Karaliotas, 2024). Such solidarity infrastructures do not emerge out of thin air; rather, they are often the product of a longer and intense history of community- and solidarity-building (Kelliher, 2017; Piacentini et al., 2023). Such infrastructures may emerge first as rather bounded and specific 'caring spaces' for particular groups (Radicioni and Weicht, 2018), later becoming nodes in wider networks of responsibility (Pan and Loopmans, 2021). These infrastructures also function as connectors between different networks and scales of solidarity. Bono and Loopmans (2021) indicate how cooperative solidarity infrastructures in Cuba allow solidarity to move up from the local to the regional and national scales, along the way transforming affect-based community solidarities into more cognition-based norms of national solidarity. Rahbari (2019) similarly explores how digital infrastructures not only support transnational practices of solidarity, but also transform and translate solidarities from one place to another. All these studies point to the important role that spaces of encounter and other sociomaterial infrastructures play in facilitating the development of solidarity and shaping its socio-spatial structure (Loopmans et al., 2020; Kerstetter et al., 2023).

Solidarities beyond the human

The more-than-human turn in social sciences has revamped discussions on the possibility of solidarity beyond the boundaries of our species (Plumwood, 2009). Whereas the study of solidarity has originated from profoundly human-centred traditions in the social sciences, a recent material turn has expanded the concept to include the more-than-human world (Scholz, 2009; Coulter, 2016; Tschakert, 2022). Scholars working on more-than-human relations have convincingly discussed both the cognitive and affective grounds of more-than-human solidarity, although discussions about the mutuality and boundaries of such solidarities remain unresolved (Cojocaru and Cochrane, 2023). The questions remain: what kind of solidarities are possible, and with what kind of Others?

Tschakert (2022) identifies both affective and cognitive encounters with more-than-human others that bear the potential of stimulating more-than-human solidarity. In her account, visual and embodied

confrontations with more-than-human victims of climate change (for example, drowning polar bears or burning koalas) stimulate affective solidarity based on empathy for the non-human. Moreover, what Tschakert calls "ethical encounters" confront us with human – non-human interdependencies. They stimulate us to recognise our "kinship" (Haraway, 2016) with Other Earthlings (Latour, 2021) and our necessary entanglement in collaborations to make the Earth inhabitable for various kinds of nature (Lovelock, 2003). Our interdependence requires us to cultivate "response-ability" for those beings with whom we are connected (Haraway, 2018; Lobo, 2019), as well as for the web of complicity itself of which we are a part. In environmental literature, a recognition of interdependence and responsibility is reflected in the widely used "environmental stewardship" concept (Mathevet et al., 2018).

Two major points of dissensus occur in the literature on more-than-human solidarity. A first point of dispute relates to the role of agency in solidarity. Mutual interdependence calls for reciprocal, mutualist responsibilities from all actors involved, whereas affective motivations can stimulate more one-directional, non-reciprocated acts of care. There are differences, however, in the extent to which authors are willing to attribute agency to the more-than-human world, and there are thus also differences in the extent to which they can see mutuality in more-than-human solidarities. Few authors today refute the agency of animals or plants (Büscher, 2022; Srinivasan, 2022); however, the extension of agency to so-called 'inanimate' or even 'non-sentient' nature (air, landscapes, water bodies) is more controversial. It has been propagated nonetheless by prominent scholars such as Bruno Latour (2020) or Petra Tschakert (2022), who do so on the basis of nature's ability to 'talk back' to and thereby affect humans and their practices.

A second point of contention is the issue of morality; this includes dissensus as to whether solidarity's basis of cognition and affect can be attributed to non-humans. Scholz (2013), for instance, recognises the possibility of solidarity on behalf of non-humans but refutes the possibility of solidarity with non-humans. Solidarity with non-humans assumes a mutuality in terms of motivations for solidarity (see Cojocaru and Cochrane, 2023). Scholz recognises the perspective of non-human agency, but does not consider this agency to be conscious and driven by affective or cognitive motivations. Such a sharp distinction is disputed by biologists (for a general perspective on animal morality and empathy (see, for example, de Waal, 2006, 2010; also see Cram et al., 2022, for an overview of human – wildlife collaboration; see Spottiswoode et al., 2016, regarding the purposive mutualism between honeyguide birds and honey-seeking humans). The limitation of agency to the human world is also disputed in traditional ontologies. These often explicitly attribute conscious and motivated agency to elements of the non-human world such as lakes, landscapes, mountains or rivers. As sentient landscapes, they are presented as purposively entering into relations of collaboration and solidarity with (some) humans (Bacigalupo, 2018; Coțofană and Kuran, 2023).

The more-than-human turn in solidarity research is very recent and can offer a lot to the expansion of our understanding of solidarity (Hurst et al., 2022). It forces us to reflect on the affective and cognitive processes stimulating solidarity beyond-the-human and requires us to consider the distinction between solidarity with and solidarity on behalf of (human and more-than-human) others, which necessitates both moral and ontological consideration. These reflections suggest that culturally different worldviews and changing philosophical and scientific insights may affect who can and cannot be imagined to be included in communities of solidarity, and how the character of that solidarity is conceived.

AN AGENDA FOR SOCIOPOLITICAL RESEARCH ON HYDROSOLIDARITY

The above review of sociological and geographical studies of solidarity has highlighted four dimensions that can inform a sociopolitical conceptualisation of hydrosolidarity. This is not to say that these four perspectives are entirely absent from studies on water governance. They have parallels in, and touch on, several lines of inquiry in existing water research and hold important potential for enriching existing water scholarship and practice. Up until now, however, no body of literature has systematically

scrutinised, debated and theoretically elaborated upon the notion of hydrosolidarity from a critical sociopolitical perspective.

Table 1. Theoretical insights for a sociopolitical investigation of hydrosolidarity

Field of exploration	Main insights	Research questions for empirical studies of hydrosolidarity
Sociopolitical foundations of solidarity	• solidarity emerges from a dialectic between structure and praxis • practices of solidarity are mediated through cognition (linking structures of interdependence with a morality of responsibility) and affect (linking structures of familiarity with a morality of care)	• Apart from shared water resources and state territories, what other structures of interdependence, but also familiarity, provide a moral basis for hydrosolidarity practices? • How do cognition (interdependence/responsibility) and affect (familiarity/care) intersect and how does this dialectic define the boundaries and depth of hydrosolidarity?
Spatial imaginaries	• analytical distinction between spaces of dependence and spaces of engagement • a coherent sociopolitical framework for different imaginaries of location (place, territory) and reach (network, scale) and their sociopolitical effects	• How do spaces of dependence and spaces of engagement overlap or differ? • How do spatial imaginaries of location (place and territory) and reach (network and scale) structure and affect the content and delimitation of hydrosolidarity (sociopolitical effects)?
Solidarity infrastructure	• sociomaterial infrastructures of solidarity determine the possibilities and spatial expression of solidarity	• How is (the recognition of) interdependence affected by the materialities and infrastructures of water? • How do non – water-related infrastructures contribute to shaping the spaces of engagement, and thus hydrosolidarity?
Beyond human solidarities	• interdependence and familiarity extend beyond the human, raising the possibility of more-than-human solidarities • different ontological perspectives on non-human agency and sentience affect the delimitation and content of more-than-human solidarity in practice	• How do ontological imaginaries and experiences of the agency and sentience of diverse animate and inanimate water-related and water-dependent non-humans lead to different expressions of hydrosolidarity among and beyond humans?

In this section, we examine where and how the above-mentioned four fields of exploration on hydrosolidarity can enrich and inform critical water research. The insights set out in this contribution are summarised in Table 1 and will be elaborated upon in the subsequent subsections. These subsections are structured around specific subfields of the literature that illustrate the applicability and relevance of the hydrosolidarity concept. Each subsection will focus on a theme in the water literature, elaborate on its affinity with the hydrosolidarity concept, discuss the limits of how this theme has been treated in the existing literature, and explore how a hydrosolidarity perspective can help to overcome such limits. In so doing, we are spelling out an agenda for hydrosolidarity research.

Sociopolitical foundations of community-managed irrigation and water-centred social movements

Existing water research, in some respects, reveals a strong affinity with theories of solidarity; one example of this is its recognition of interdependence as a social foundation for collaboration and sharing. This is particularly apparent in the literature on community-managed irrigation, which has paid much attention to the norms and values that structure community-based collaborative water management practices. Institutional economists have discussed how norms and values influence collective action in irrigation management (Meinzen-Dick et al., 2002; Araral, 2009). Sociocultural studies on community-based irrigation and domestic water supply management show how practices of collaboration and sharing are also structured through collective belief systems and shared cultural interpretations of interdependencies (Feng et al., 2023). Boelens (2015) shows how identity, culture, organisation and related normative frameworks are closely interwoven in irrigation communities in the Andes. He also emphasises how such cultural structures are dialectically tied to practices, and he describes water cultures as an object of political struggle (Boelens, 2014). A focus on these cultural politics of irrigation has revealed the malleability of solidarity in such communities. Perramond (2012), for instance, shows how water adjudication in the American state of New Mexico has changed the notions of interdependence among users of former community-operated irrigation networks (acequias) through the individualisation of water rights. Water users shifted their engagement from local irrigation communities to establishing ties with higher levels of government. Hoogesteger (2015) shows how, in Ecuador, the enforcement of state-imposed normative frameworks in the Pillaro irrigation system led to conflicts among different communities. The new water rights systems were shown to undermine existing communitarian identity and related normative frameworks.

In line with our hydrosolidarity perspective, these and other studies highlight that community-managed irrigation strongly relies on normative frameworks that identify responsibilities and mutual expectations structuring collective action and collaboration. Such normative frameworks are the product of sociopolitical processes (Aubriot, 2022; Boelens, 2014; Hoogesteger et al., 2023b). Most of these studies, however, implicitly or explicitly assume that these normative frameworks of solidarity derive from a recognition of mutual interdependence (based on the sharing of water resources). A hydrosolidarity perspective would emphasise that solidarity is not solely based on interdependence, but also on familiarity; it would pay as much attention to practices of care as to responsibility. This dimension of care, as well as its interaction with responsibility in shaping hydrosolidarity, has hitherto remained underexplored in community-managed irrigation systems.

As pointed out above, attention has also been given to the importance of identity ties in structuring collaboration; however, there is a need to further explore which identities and other structures of familiarity shape the boundaries of hydrosolidarity in particular cases, and how they do so. Paying attention to this dialectic could shed light on problems of inclusion in, and exclusion from, water management communities; this is identified in, for instance, feminist political ecology (Leder et al., 2019, 2024). Morality does not only play a key role in irrigation communities; norms and values are also very influential in other types of water collectives, in water-centred social movements (see Vos et al., 2020), and in other forms of collaborative water governance (Warner, 2006) where water-sharing interdependence is not central to bringing people together. Trade unions and Indigenous movements –

and federations including both – have played a key role in mass mobilisations of people through their relations to community-managed irrigation and domestic water supply systems. This has been exemplified in the movements against water privatisation in Cochabamba, Bolivia, and in the reformulation of the water law there (see Assies, 2003; Perreault, 2006). Mass mobilisation has also been seen in the irrigators movement and Indigenous movement in Ecuador, whose members collaborated in agitating for a new constitution in which water played a central role (Becker, 2011; Hoogesteger, 2017). Such mass mobilisations have enabled their leaders to force negotiations with national policy-makers. In Spain, the Nueva Cultura del Agua movement was able to mobilise large numbers of citizens who identified with their demands and proposals (Fuentes, 2012). Studies of these movements highlight the contextual factors that created the fertile ground for mass mobilisations; they also highlight the important role played by trade unions, federations and networks. Here, the dialectic between responsibility and care is even more complex; understanding how relations of interdependence and affect interact thus becomes crucial to understanding the mobilisation potential of such movements.

Spatial imaginaries of rooted water collectives

Water research has always been profoundly sensitive to geographical difference. In critical water research, a variety of spatial imaginaries have been mobilised to understand the location and reach of water governance. These range from local place-based community water use and management collectives to global movements that have advocated for the 'human right to water' (van den Berge et al., 2022) or multi-scalar dam removal networks (Hommes, 2022). Nonetheless, the spatial imaginings of water collectives as such are rarely a topic of research as such, and when they do appear, are seldom discussed in a systematic way. The notion of hydrosolidarity introduces two perspectives that are relevant to an understanding of the workings of space in relation to sharing and collaboration in such collectives. The first perspective distinguishes between spaces of dependence and spaces of engagement; the second puts forward a systematic analysis of the sociopolitical effects of spatial imaginaries through the TPSN framework.

The relevance of distinguishing between spaces of dependence (on water) and spaces of engagement (for water) is acknowledged through the concept of rooted water collectives, as developed by Vos et al. (2020). Focusing on the interaction between local water communities and wider water-related social movements, they define rooted water collectives as, "either multi-scalar organizations that engage in communal management of common property resources or multi-scalar organizations that form a social movement, alliance or federation that advocates for democratic common property resources governance" (ibid: 2). Their research reveals how the spatialities of common property resources (spaces of dependence) and of 'advocating' (spaces of engagement) do not necessarily overlap, but rather interact in complex ways. Hoogesteger and Verzijl (2015), for instance, show how local communities of the Ecuadorian and Peruvian Andes were able to defend their access to water and territory through the creation of strategic alliances and collaborations with other communities, water users federations, and state actors and non-state actors who were active at different spatial scales; they accomplished this by engaging in what they called "grassroots scalar politics" (see also Boelens, 2008).

A second field where alternative geographies of water governance have been imagined, is that of integrated water resources management, participation, and river basin management. Involving a variety of non-state or parastate actors (Warner et al., 2008; Joslin, 2023), this field has challenged the dominance of state-led, territorial approaches to water governance. The creation of multistakeholder platforms, river basin committees, advocacy networks, and diverse forms of learning alliances (many of which have been advanced and supported by international organisations) speak of the geographical diversity of hydrosolidarity.

Although research on such initiatives has flourished, little attention has been given to the problematisation and theorisation of the various spatial imaginaries of location (place and territory) and

reach (network and scale) mobilised in these studies. If the geography of these spaces receives any attention at all, it rarely builds on any political spatial theory that explicates how particular spatialities structure and affect the content and delimitation of hydrosolidarity among those who participate in these spaces of water governance.

As pointed out above, the literature on social movements has deployed and expanded the political-geographical framework of TPSN to study the social movement politics of solidarity. With few exceptions (Beveridge et al., 2017), the TPSN framework has been largely ignored in critical water studies. For a sociopolitical perspective on hydrosolidarity, we believe it is crucial to have a systematic understanding of the spatial dimensions of solidarity. Geographical research on social movement has taught us that each spatial form comes with its own particular workings of solidarity and its own ways of including and excluding. Paying attention to these different influences on hydrosolidarity is crucial to understanding how rooted water collectives function and what their sociopolitical effects may be.

Widening our geographical imagination allows us to see that the relation between places/networks and territories/scales is not an either/or story. Studies on hydrosocial movements reveal how relational, networked solidarities can emerge both within and among nested organisational scales (Hoogesteger and Verzijl, 2015). They emphasise that place-based solidarities can be rooted in, but are not limited to, local settings. Rooted water collectives develop into transboundary, cross-scalar organisations (March et al., 2019; Vos et al., 2020). Such networked mobilisations develop alternative solidarity which cuts across the 'us versus them' logic that is based on (sub)national territorial forms of water governance (Shi et al., 2021; Devkota et al., 2023). Such networked organisations reveal their own spatial logic of exclusion and inclusion based on nodes and meshes rather than on territorial boundaries. This leads us to conclude that there may be a variety of answers to the question of location (where is solidarity, and why there?) and reach (how far does solidarity stretch, and why this far?). The answers to these questions define who is bound by hydrosolidarity, and how. Consequently, in concrete research settings, hydrosolidarity's location (its 'where') is always to be discussed in terms of territory as well as place, while discussions about its spatial extent (reach) should include an analysis of scales, as well as networks. Moreover, hydrosolidarity's spaces of dependence need also to be studied separately from its spaces of engagement. Their spatial expressions in terms of location and reach might affect each other, but do not necessarily overlap. In the next section, we will explore how the materialities and infrastructures of water feed into these geographies of hydrosolidarity.

Differentiating infrastructures and materialities of dependence and engagement

In shaping interdependencies among water users, water research has long attributed a major role to water bodies such as rivers, aquifers and lakes and to infrastructures such as embankments, dams, canals and pipelines (Mirhanoğlu et al., 2024). The literature on hydraulic property relations, for instance, reveals how the development of infrastructure generates interdependencies other than mere codependence on a specific water source. Coward (1983) has emphasised that it is not possible to build infrastructure without establishing property relations. In community-managed systems, this translates to: "[those] who invest in generating irrigation infrastructure and artefacts generate or reorganize property rights over the hydraulic works they construct" (Boelens and Vos, 2014: 57). This property relationship is a socio-hydraulic-infrastructural relationship of interdependence that strongly binds users to the system and to each other in order to ensure its functioning and sustainability (see also Hoogesteger, 2013; Mirhanoğlu et al., 2023).

A hydrosolidarity perspective could help flesh out how materialities and infrastructures shape these co- and interdependences. Such a reading would point at the role of cognition. It would emphasise that hydraulic interdependence between actors contributing to the building and maintenance of water infrastructure is more acutely recognised than a mere hydrological connection where actors happen to use and share a single water body such as a creek, river, aquifer or lake without making collective

investments. The issue of scale also plays a role. How does the size of an irrigation system, a river, or an aquifer affect the recognition of hydraulic or hydrological interdependence?

The material foundation of such recognition becomes even more apparent when thinking of 'non-actionable' codependence. In rivers and other surface water bodies – due to established systems of water rights, the visibility of the infrastructure, and often its size – it is usually easy to pinpoint who is using and who is polluting 'shared' waters (Wester and Hoogesteger, 2011). This visibility renders hydrological codependence actionable, as codependent actors are driven to act on each other's activities, which again stimulates mutual interdependencies (ibid). As Hoogesteger and Wester (2015) point out, with aquifer use it is much more challenging to pinpoint these hydrological interdependencies. Groundwater access is largely determined by small, dispersed technology as, "farmers [and other users] located above an aquifer can sink wells independently of each other over a significant areal extension" (Kemper, 2007: 156). The relatively small, partly invisible, individualised and atomistic character of groundwater infrastructures (wells and pumps) dispersed over large areas renders the recognition of connectivity and interdependence less obvious (Sanchis-Ibor et al., 2023). This presents great challenges for the regulation of groundwater use (Hoogesteger, 2018; Molle et al., 2018) and the development of user-based mechanisms for groundwater governance; this is shown, for instance, by Hoogesteger and Wester (2017) for Central Mexico, and by Closas et al. (2017) for the La Mancha Oriental Aquifer in Spain (see also Molle and Closas, 2020). Similar issues of cognition and actionability are identified as drivers of change in social relations when irrigation communities switch from surface irrigation to less-actionable drip irrigation (Mirhanoğlu et al., 2023). Sese-Minguez et al. (2017) examined how the introduction of drip irrigation in traditional irrigation systems in the Cànyoles Watershed in Spain transformed practices, cultural heritage, and existing normative frameworks and related irrigation practices (see also Hoogesteger et al., 2023a).

Another classic problem related to the materiality of water and its infrastructures is the issue of asymmetry. Recognised early on in CPR theory (Ostrom and Gardner, 1993), the asymmetric relations of interdependence between upstream and downstream users of water pose particular challenges for collaboration and water-sharing institutions (Lundqvist and Falkenmark, 2000; Janssen et al., 2011). Political ecology approaches to asymmetry have emphasised the conflictual politics brought about by material asymmetries. As water use and extractions increase and/or water quality deteriorates, it is often the downstream users that bear the brunt, experiencing reduced access to water in terms of both quality and quantity (Molle et al., 2010). As these problems become more acute, hydrological connectivity becomes more evident; this leads to conflicts, negotiations and potentially new hydrosolidarity among users and related stakeholders in a watershed. One of many examples is the establishment of a water-sharing model and related agreement as part of the efforts of the Lerma-Chapala River Basin Council in Central Mexico (Wester et al., 2008). CPR approaches have identified asymmetry as a particular challenge, and political ecologists have discussed how asymmetries are at the basis of conflictual politics; however, a hydrosolidarity perspective seeks rather to understand the sociopolitical processes that shape hydrosolidarity in such a context and the role played in this by infrastructure. A hydrosolidarity perspective could help illuminate how collaboration and sharing can become possible under conditions of asymmetry and how infrastructural and material bearers of interdependence shape the inclusions and exclusions of hydrosolidarity.

Both examples have shown how a sociopolitical theory of hydrosolidarity can throw a new light on existing debates around the role of materiality and infrastructure in water governance; however, the most important contribution of the wider solidarity literature to water studies would be to lead us beyond a narrow focus on water and water-related infrastructures. Granted, qualitative small-scale studies of the social effects of water infrastructure have long emphasised that water infrastructure does not have a linear, unmediated effect on hydrosolidarity. This is the case, for instance, in studies that investigate how actors try to mitigate the spatial asymmetries of access in irrigation systems by developing parallel – but not necessarily spatially overlapping – solidarities. These studies emphasize the interaction between infrastructures and institutions (Uphoff, 1986; Van der Kooij et al., 2015; Kemerink et al., 2016). Here, it

is clear that hydrosolidarity is not only shaped by the (actionability of) hydraulic/hydrological interdependencies; it is also affected by other, complementary or competing systems of solidarity that are drawn upon and mobilised by actors to shape hydrosolidarity to their best interest (Mirhanoğlu et al., 2022; Devkota et al., 2023). Broader water-centred social movement networks may even entirely lack a perception of interdependence that is based on a specific water body or a hydraulic infrastructure (Hoogesteger, 2017; Vos et al., 2020; van den Berge et al., 2022).

In other words, water research has always acknowledged the significance of infrastructure, while simultaneously recognising a world beyond water infrastructures. Strangely enough, this has not led many researchers to consider the materialities of hydrosolidarity that lie beyond water infrastructures. Drawing upon the wider literature on solidarity, our hydrosolidarity perspective would do exactly that; it would emphasise the need to include in our analysis of sociomaterial relations not only the materiality of water and water-related infrastructures, but also the relational infrastructures (termed 'solidarity infrastructures' in the wider solidarity literature) such as public squares, village pubs, community centres, religious and office buildings, the internet, and cell phones – in short, the material structures where the social relations underpinning actions of solidarity are developed and maintained (Loopmans et al., 2020). Including these relational infrastructures in water research would allow us to distinguish infrastructures of dependence (water-related materialities and infrastructures) from infrastructures of engagement (non – water-related infrastructures that play an important role in the shaping of hydrosolidarity). Mirhanoğlu (2023) indeed looks beyond the hydraulic infrastructures that shape irrigators' spaces of dependence, and relates how spaces of engagement for hydrosolidarity build upon very different infrastructures. The latter often mitigate the asymmetries in hydraulic infrastructures (see Mirhanoğlu et al., 2022). Mirhanoğlu's (2023) case study describes a small-scale irrigation community in Turkey; there, the mayor's office and waiting room form an infrastructure that shapes relations of patronage and solidarity between farmers and decision-makers, while the irrigators' fields are places where mutual solidarities with the water guards are developed. The importance of communication infrastructures is documented by Sanz et al. (2019); they show how knowledge generated by models helped policy-makers and water users reach agreements for sharing the waters of the Jucar River Basin, pointing out the important role that knowledge- and information-sharing infrastructures can play in the development of collaboration.

To conclude, the notion of hydrosolidarity brings to the study of infrastructure and water governance an explicit problematisation and analysis of cognition in the way infrastructural and material interdependencies shape collaboration and sharing. The paper further expands our understanding of infrastructures of hydrosolidarity from infrastructures of dependence to infrastructures of engagement. This implies that studies of hydrosolidarity will always need to investigate and problematise hydraulic, hydrological, and 'other' materialities and infrastructures. They will need to consider how characteristics such as size, requirements of use and operation, accessibility, visibility and spatial reach matter for the development and shaping of (the boundaries of) hydrosolidarity in specific settings.

More-than-human hydrosolidarity

Increasingly, researchers have come to acknowledge that other-than-human beings deserve attention in critical water scholarship and that hydrosocial interdependencies extend beyond the human (Houart et al., 2024). As Hurst et al. (2022: 2) emphasise, "water infrastructures function through both human and other-than-human doings". Woelfle-Erskine and Cole (2015: 298) describe, for instance, how beaver works along the Columbia River, USA, "inevitably transgress private property lines, interrupt human irrigation and landscape schemes, and shift fence-able pastures and orchards toward dynamic patchworks of thicket, meadow, stream, bog, and woods". In so doing, beavers enable, "the emergence of whole worlds of creatures and new kinds of relations among them" (ibid: 308), including, we would add, 'humans'. These insights bear upon collective water management, as is emphasised by Druschke et al. (2017); they analyse how migratory species such as river herring and brook, brown, and rainbow trout influenced human decisions about several dams along Rhode Island's Wood-Pawcatuck Watershed.

Goedeke and Rikoon (2008) argue, on the basis of their research on otters in a river restoration project in Missouri, USA, that non-humans such as animals, plants, soil and water should be integrated into restoration narratives and projects. This is based on the recognition that the results of such projects depend on the compliance of both human and other-than-human beings.

Such insights point at the need to conceive of hydrosolidarity as not being limited to human subjects. The language of care and responsibility has been fruitfully deployed in studies addressing more-than-human hydrosolidarity. Rivers, water bodies in general, and the non-humans with whom they are codependent have been identified as relatives and ancestors who offer or require care (Parsons et al., 2021; Yates, 2022). There has also been consideration of the role of water bodies in structuring relations of interdependence and responsibility between and among different groups of humans and non-humans (Oslender, 2016; Reyes-Escate et al., 2022). From this perspective, "other-than-human actors have immense potential to challenge and transform networks, recruiting human and nonhuman beings alike" (Houart et al., 2024: 6).

Studies of water governance around the world have revealed the various ways in which different cultural frameworks interpret these more-than-human engagements. The sociopolitical literature on more-than-human solidarity introduces a discussion of how such wider ontologies can affect our understanding of what concrete (eco)hydrosolidarity might entail in terms of content and delimitation (see also Venot and Jensen, 2022). In studies of hydrosolidarity, it calls for explicit attention to the differences in interpretation of the sentience, consciousness and purposive agency of non-humans and how this influences the limits of those with whom one can (or cannot) imagine being in solidarity 'with' versus 'on behalf of'. It raises important metaphysical questions in relation to conceptions of human-non-human interdependencies and familiarities and makes us wonder in which ways these interdependencies and familiarities affect a morale of more-than-human care and responsibility. Such an ontological critique would contribute to the re-politicisation of water ontologies, as was called for by Boelens et al. (2024). It would shift the focus to the strategic (mis)utilisation of conceptualisations of more-than-human hydrosolidarity and to its empowering/disempowering effects for specific human and non-human individuals and groups.

CONCLUSION

In this paper, we have elaborated the claim that a sociopolitical theory of hydrosolidarity bears much potential to expand and deepen our understanding of the politics of water. We contend that in many subfields of water studies, hydrosolidarity is a prominent – albeit implicit and undertheorised – concept. Based on recent insights from a resurgent literature on the subject of solidarity in sociology and geography, we have spelled out four directions in which a theorisation of hydrosolidarity would strengthen such studies. (1) We discussed how water research focuses mainly on the recognition of interdependence to explain and understand solidarity, and how it should also engage more explicitly with the affective relations underpinning hydrosolidarity. To fully understand the inclusions and exclusions of hydrosolidarity, its cognitive and affective dialectics need to be studied in conjunction. (2) We then emphasised how empirical water research reveals a flurry of spatial imaginaries, but rarely develops a coherent theorisation of the spatialities of hydrosolidarities or of its sociopolitical effects. We draw upon the wider literature of solidarity to introduce an explicit distinction between spaces of dependence and spaces of engagement and to translate the TPSN framework borrowed from political geography into an understanding of the politics of hydrosolidarity. (3) We discussed how the water literature has long emphasised how materialities and infrastructures of water create interdependencies, but how it has yet to elaborate on the role of infrastructures and materialities in shaping the cognition of such interdependencies and their translation into hydrosolidarity. Moreover, and importantly, in understanding hydrosolidarity, water research needs to start paying attention to the infrastructures of engagement as well as infrastructures of dependence. (4) Finally, we draw attention to how the various

ontological turns in water research have brought about an interest in more-than-human hydrosolidarity based on a recognition of the water-related codependence between humans and other-than-humans. We emphasise, however, that there has been too little reflection on how the various ontological understandings affect what kind of beyond-the-human hydrosolidarity can be imagined, and how that produces specific forms of inclusion and exclusion.

With this review paper, we aim to stimulate further theoretical and empirical research on hydrosolidarity which takes into account these sociopolitical and geographical insights. While we believe such research can enrich wider theories on water politics and governance, it will also have practical relevance. Water interdependencies are only expected to increase and become more complex, and the current literature offers us only superficial insights into how such interdependencies affect a morality of solidarity and cooperation. In the real world, hydrosolidarity is not merely a theoretical concept; rather, it is an urgent practical challenge. There is a need for more detailed insights into the conditions that render it (im)possible and the way it is being produced and shaped in concrete cases.

Finally, we would like to bring up some limitations of our approach. We believe that a sociopolitical theory of hydrosolidarity makes significant contributions to our understanding of the normative frameworks underlying collaboration and sharing in the governance of water resources; however, the politics of water is guided by much more than mere norms and values. Our notion of hydrosolidarity sheds a sociopolitical perspective on a concept that is often approached in decidedly apolitical ways. This also leads us to warn against viewing hydrosolidarity as a purely positive thing. Hydrosolidarity is not a rosy panacea for water justice and equality. On the contrary, our research shows how the dialectic of hydrosolidarity produces its own very real boundaries and exclusions, as much as it stimulates (sometimes oppressive) norms of sharing and caring. This down side of hydrosolidarity, which often threatens to disempower already-marginalised and less-powerful groups of humans and non-humans, can be illuminated and understood through exactly the kind of sociopolitical reading of hydrosolidarity we propose here.

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