



An approach to pluralizing socionatural resilience through assemblages

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Abstract

Resilience provides a forward-looking framework to understand human–environment relations. Yet, adopted through a system-modelling approach in coupled social-ecological systems, it often reinforces a functionalist vision of the world as an interconnected whole, unable to engage with the multiplicity of people’s practices navigating change. I argue for sustained engagement with resilience and propose a socionatural approach to overcome its system-modelling limitations, thinking through the world’s entities as inherently social and natural. I discuss how socionatural resilience can be pluralized through assemblage ideas and reflect on the implications that an ontological politics of resilience poses for our conceptual framing and methodologies.

Keywords

assemblage, pluriverse, political ontology, resilience, social-ecological systems, socionature

1 Introduction

We live in a world of complexity, uncertainty and change (Scoones and Stirling, 2020). Whether related to climate change, extreme weather events, political uprising, market and economic instabilities, it is evident that we simply do not and cannot know exactly what changes are in motion. In this context, frameworks, concepts and ideas that capture these contingencies are suggestive. Resilience is one such concept. Widely adopted across diverse fields, from ecology, psychology, human security and international development, resilience thinking can be broadly described as a framework to understand complex systems and the processes of change impinging upon them, holding dynamism and unpredictability into view (Folke, 2006; Gunderson and Holling, 2002; Walker et al., 2006).

Across disciplines, resilience has worked as a ‘boundary object’ (Star and Griesemer, 1989); malleable, slightly ambiguous and therefore able to bring together a range of epistemic communities without a clear consensus on its precise meaning (Brand and Jax, 2007). While for some this lack of ontological coherence puts the practical relevance of resilience at stake (Brand and Jax, 2007), others believe that it is precisely thanks to this conceptual fluidity that resilience thinking opens new spaces for knowledge formation outside traditional disciplinary divides (Anderson, 2015; Dwiartama, 2016; Simon and Randalls, 2016; Walsh-Dilley and Wolford,

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2015). Arguably, while a strong universal conception may provide an operationalizable framework of analysis, forging resilience into a technical object closes our eyes to the multiplicity and contextualities of building resilient lives on the ground (Shah et al., 2017; Simonin, 2015; Walsh-Dilley, 2016). This is particularly evident in the field of development, where resilience has been defined as the ‘new mantra’ (Rigg and Oven, 2015), a ‘paradigm’ (Kaika, 2017) and a ‘buzzword’ (Bouzarovski, 2015), a characteristic individuals, communities and ecosystems must have to withstand shocks and minimize harms (Brown, 2015). Yet, following Anderson (2015: 61), using resilience as a universally valid and beneficial characteristic hides that ‘there is not and never has been *one* “resilient subject”’ (emphasis added) and that it is precisely through the exploration of its multiplicity that the political purchase of such a fluid concept lies (Dwiartama, 2016; Simon and Randalls, 2016).

In this article, I bring these arguments on resilience multiplicity forward and, following Walsh-Dilley and Wolford (2015), I suggest that taking resilience itself as an object of inquiry, rather than a self-evident entity, presents a unique opportunity to politicize the concept, making it more relevant and inclusive for people and places. In particular, I focus my attention on resilience ideas in the context of global environmental change (Brown, 2014), which draw primarily from the field of ecology (Holling, 1973) and social-ecological systems (SESs) dynamics (Berkes and Folke, 1998) – systems where social and ecological elements interact with one another across scales. In my analysis, I am guided by critical resilience scholars such as Cote and Nightingale (2012) and Cannon and Müller-Mahn (2010) who emphasized how the system approach that underpins SES’s understanding of human–environment relations is problematic (Ingalls and Stedman, 2016; Turner, 2014; Welsh, 2014) and that a more plural formulation of resilience is to be

achieved through ‘a movement of thought that is truly counter-systemic’ (Walker and Cooper, 2011: 157).

In fact, while the SES framework represented a genuine step towards understanding change through interconnected social and natural processes (Berkes et al., 2008; Colding and Barthel, 2019; Folke, 2006), the system-modelling approach SES analysis relies upon, promotes the image of a world as an organized interconnected whole (Bell, 2005; Kwa, 2002; Law, 2004b), unreflexive of the position from which any system construction is made from (Cannon and Müller-Mahn, 2010). The system metaphor SES resilience is fond of, thus risks resembling a functionalist ‘theory of everything’ (Bell, 2005: 476) where objects can be fully classified as either social or natural, and their relations explained through interactions across nested scales of analysis (Bell, 2005; Kwa, 2002). As a framework to unpack complexities, the system approach thus often hides the messiness, disjuncture and multiplicity that are a key part of what resilience is ultimately about (Folke et al., 2010).

While arguing for continued engagement with resilience ideas as a useful heuristic to think about our individual and collective capacities to deal with change and transform (Brown, 2015; Ungar, 2004), I also posit that an analytical shift is required to give recognition to the multiple ways it is experienced and practiced on the ground. As Simon and Randalls (2016) rightly point out, resilience rendered singular is politically dangerous, because it hides the conflicts and contestations at stake when one ‘reality’ of resilience is chosen to matter more than others. My objective is thus to turn this moment of ‘undefinition’ (Walsh-Dilley and Wolford, 2015) into an opportunity to rethink resilience beyond system-based interpretation of human–nature interactions, through a relational understanding of the world as co-constructed socionature (Swyngedouw, 1999). I call this ‘socionatural resilience’ to

highlight the absence of any line of demarcation, boundaries or fixed scale of analysis, remarking the disorder, unknowability and messy character of the world's objects as inherently social *and* natural (Swyngedouw, 1999).

To further pluralize socionatural resilience and explore its ontological politics (Blaser, 2014; Mol, 1999), a politics of what resiliences are allowed to exist, I use assemblage ideas (Anderson et al., 2012) as an analytical lens to explore multiple co-productions of socionatural resilience as enacted through heterogeneous assemblages (Mol, 2002). Grounded on the work of postcolonial (Blaser, 2014; Blaser and de la Cadena, 2018; Escobar, 2015; Sundberg, 2014) and Science and Technology Studies (STSs) scholars (Law, 2004a, 2015; Mol, 2002; Watson-Verran and Turnbull, 1995), the analysis proposed has emancipatory potentials. Borrowing from Blaser (2014: 49), coming to terms with 'the very heterogeneity of the heterogeneous assemblages' we form, makes us open the 'promises and politics of a multiplicity of worlds animated in different ways'. Such plural account of the world (Blaser and de la Cadena, 2018; Sundberg, 2014), a world in which multiple resiliences fit, requires methodological practices capable of resonating with worlds assembled in minor keys (Katz, 1996) and a heightened reflexivity over the cuts we chose to make as we amplify some realities while silencing others (Coleman and Ringrose, 2013; Law and Urry, 2004).

The proposed understanding of socionatural resilience as multiple thus responds to Cote and Nightingale (2012) invitation to situate resilience analysis; providing accounts that are always partial, always for a particular collection of entities and in a particular context. As a result, I argue that for resilience to remain a useful concept to think with, it needs to be reflexive and transparent of the ontological, epistemological and political assumptions each interpretation advances; as a key moment to politicize the concept going forward. The

framework proposed indicates a step in this direction.

I present my arguments based on an interpretative review of the literature of resilience in the context of global environmental change. Firstly, I trace its archaeology and unpack the knowledge systems driving resilience's ideas across epistemic communities. Then, I explore the limitations of a system approach as compared to a relational understanding of resilience as socio-natural, substantiating my arguments with examples from water scarcity. Finally, I propose assemblage as an analytical lens that pluralizes socionatural resilience and reflect on the implications that an ontological politics of resilience multiple poses for our conceptual framing and methodologies.

II Resilience: An Archeology of the Concept

Contemporary resilience thinking originates across a number of disciplines, most notably ecology, psychology and disasters studies. Among these, the field of ecology has provided the most fertile ground for resilience ideas in the context of global environmental change (Walker and Salt, 2012). Its origins are widely attributed to the work of Holling who defined ecological resilience as 'the persistence of systems, and their ability to absorb change and disturbance and still maintain the same relationship between populations or state variables' (Holling, 1973: 14). Ecological resilience was thus first defined as a system's property allowing ecosystems to return to an equilibrium state after disturbance (Gunderson and Holling, 2002; Walker et al., 2006). Subsequent work influenced by theories on complex adaptive systems and non-equilibrium dynamics (Scoones, 1999) shifted the emphasis from persistence to adaptive capacities as the ability 'of a system to absorb disturbance and reorganize while undergoing change so as to still retain the same structure, identity and feedbacks' (Walker et al.,

2004: 2). In contrast with old approaches focused on the ‘balance of nature’ and system’s carrying capacity (Marsh, 1965), resilience ideas focused instead on dynamic change, emphasizing the scope, diversity and interchangeability of resources available within a system to maintain its functioning across multiple stable states (Folke et al., 2010; Walker et al., 2004, 2006). This emphasis on non-equilibrium dynamics marked the beginning of a ‘new ecology’ (Scoones, 1999; Zimmerer, 1994), where command-response ecosystem management tactics gave way to unpredictability and transformations as key variables to study dynamic ecological processes (Folke, 2006).

At the same time, recognizing how environmental problems could not be looked at in isolation from the social context where they emerge (O’Brien et al., 2009), at the end of the 20th century resilience ideas extended to coupled SESs (Berkes and Folke, 1998); the ‘interdependent and interlinked systems of people and nature nested across scales’ (Bouamrane et al., 2016 cited in Colding and Barthel, 2019). The SES framework thus represented the first genuine attempt towards bringing together social and natural perspectives to understand the world’s dynamics, remarking how separating humans from nature is both arbitrary and artificial (Berkes and Folke, 1998; Colding and Barthel, 2019). As highlighted by Walker et al. (2006), ‘although [in a SES] the social and ecological components are in all effects distinct and identifiable, they cannot easily be parsed for either analytic or practical purposes’. Within an SES, it is neither humans embedded in ecological systems, nor ecosystems embedded in human ones, but rather human systems are shaped by, and in turn shape, ecological components through nested cross-scalar interactions (Walker et al., 2004). The shift in analytical emphasis is clear. Taking as an example dynamics of groundwater recharge/extraction, an SES analysis would focus not only on geomorphological properties of the aquifer, rainfall

availability, surface runoff and so on but look at patterns of groundwater access regulated through formal and informal institutional arrangements above the ground (Kulkarni and Shankar, 2014), focusing on the ways social and natural subsystems co-evolve through a ‘two-way feedback relationship’ (Berkes, 2007: 285) where coping, adaptive and transformative capacities are key (Folke et al., 2010; Keck and Sakdapolrak, 2013).

It is precisely the novelty of these ideas that fuelled resilience’s uptake in the social sciences (Bouzarovski, 2015), particularly in the context of natural resource management (Ostrom and Janssen, 2004). In this field, social resilience is understood as the ‘ability of groups of people or communities to cope with external stresses and disturbances to their social infrastructure as a result of social political and environmental change’ (Adger, 2000: 349). Social resilience is therefore institutionally determined, where institutions provide the ‘methodological linchpin’ (Olsson et al., 2015: 4) enabling the translation of resilience from ecosystem dynamics to the social arena. Yet, while drawing ecosystem boundaries is a widely accepted practice within natural sciences, institutions give rise to highly contested configurations whose axiomatic structure should not be assumed a priori (Cleaver and Franks, 2005; North, 1991). In particular, rational choice institutionalism upon which social resilience finds its ground (Ostrom, 2009) focuses on identifying design principles and rules ensuring sustainable natural resource management in a given ecosystem (Ostrom and Janssen, 2004; Young, 2010). Analytical emphasis is directed towards comparing resource management practices to identify attributes in a social system that would allow change to happen while retaining the overall functionality of the SES (Ostrom, 1990). For example, Lebel et al. (2006) highlight how SES resilience is enhanced when institutions are participatory and flexible and enhance cross-scale connectivity and multilayered polycentricity, while

Berkes (2002) stresses the importance of bringing multiple expertise to the table, including lay knowledge, to harness local understanding of change and stimulate innovation.

These perspectives are innovative and highlight for the first time the role of local ecological knowledge and of informal institutions as the ‘unwritten rules of the game’ in shaping social resilience. At the same time, their design-driven approach has come under scrutiny by critical institutional voices (Cleaver and De Koning, 2015; Cleaver and Franks, 2005) who highlighted how, in practice, institutions are sticky and elude design, calling for more attention to the power-laden interactions between individuals within and across institutions (Cote and Nightingale, 2012). For this reason, according to Cannon and Müller-Mahn (2010), a key issue of resilience thinking stems from the system-modelling approach inherent in the SES framework. Their critique is illustrative, as they argue that by unreflexively assuming that social and ecological components could be studied with a common epistemology, social resilience overlooks how human systems embody power relations that cannot be studied through functionality models common to understand ecological system’s dynamics (Cannon and Müller-Mahn, 2010; Cote and Nightingale, 2012). Echoing their voice, a number of political ecologists have suggested that resilience risks becoming post-political (Wilson and Swyngedouw, 1981), falling short to capture how power relations and competing values are not external but rather central to how system dynamics unfold (Cote and Nightingale, 2012; Fabinyi et al., 2014; Ingalls and Stedman, 2016; Leach, 2008; Pelling, 2010; Sinclair et al., 2017; Turner, 2014). The analysis of Cote and Nightingale (2012) is particularly instructive here, as they argue to move away from abstract descriptive analysis of institutional arrangements ensuring social resilience, towards a situated understanding of the process and relationships supporting their configurations.

The unreflexive adoption of a system analogy to the social sphere is particularly evident in the invocation of community resilience (Berkes and Ross, 2013; Norris et al., 2008), largely adopted in the context of rural development (Brown, 2015). Conceptually speaking, community resilience sits somewhere in between SES and psychology frameworks, where it refers to a positive process of adaptation whereby individuals develop capacities to withstand adversity and deal with threats (Luthar and Cicchetti, 2000; Masten, 2001; Ungar, 2004). Berkes and Ross (2013: 6) thus define community resilience as ‘the capacity of its social system to come to work *towards a communal objective*’ (emphasis added) and identify a set of characteristics such as strength of social networks, leadership and engaged governance enabling its achievement. Critically, this approach bears the same descriptive and homogenizing marks characteristic of social resilience analysis. For this reason, MacKinnon and Derickson (2013) rightly point that taking communities as self-evident and homogeneous entities is problematic because it risks reifying resilience a universal imperative, giving no recognition to competing interests and power dynamics cutting across seemingly homogeneous communities (Cooke and Kothari, 2001). Examples of these tensions and contradictions are plentiful (Argade and Narayanan, 2019; Carr, 2019; Clement et al., 2014; Taylor and Bhasme, 2020) including Harrison and Chiroro’s (2017) case of a community-based ‘resilience enhancing’ irrigation scheme in Malawi which resulted in patterns of accumulation and dispossessions along gender, class and ethnicity lines. While Jordan (2015) and Nightingale (2015) have drawn attention on the misconstruction of a topographically bound and closed community, that overlooks the extended support networks people leverage during times of sudden shocks.

These studies are indicative and draw attention on the centrality a ‘politics of scale’ (Ingalls

and Stedman, 2016; Nightingale, 2015) in determining both the spatio-temporal location where change is seen to occur and where resilience is to be built (Ingalls and Stedman, 2016). On the one hand, multi-scalar dynamics are central to SES approaches, where they are examined through the ‘panarchy’ (Gunderson and Holling, 2002), a model of interlinked SESs undergoing continued adaptive cycles of growth, accumulation, restructuring and renewal at multiple scales. For example, Cumming et al. (2006) highlight how scalar mismatches between the scale of environmental variation and that of the social organizations lead to a loss of resilience in the whole SES, while Ahlborg and Nightingale (2012) examine the importance of knowledge scales held by individuals and collectives as an additional cause of mismatch. Yet despite attention to scalar dynamics, SES frameworks give little to no relevance to the power negotiations driving the selection of a specific scale of interest (Ingalls and Stedman, 2016; Sinclair et al., 2017; Turner, 2014). Voices from the field of political ecology have repeatedly showcased how scale is not something out there but rather depends on the vantage point of a particular observer (Herod and Wright, 2008; Sheppard and McMaster, 2008). As Sayre (2005) has remarked, the selection of a focal scale is characterized by two moments: an epistemological one, when the scale is selected, and an ontological one, when the scale is treated as a given entity. SES resilience often moves from one moment to the next without due recognition (Ingalls and Stedman, 2016), thereby overlooking how whether a system is resilient or not, is contingent on the selected scale of analysis.

An illustrative example is provided by Armitage and Johnson’s (2006) analysis of SES resilience and globalization in two coastal communities in India and Indonesia. They show how on the one hand, economic transformation has damaged coastal ecosystems, suggesting the loss of resilience at the local scale, while a

broader focus on global economic processes reveals a thriving, resilient market economy. For this reason, Fabinyi et al. (2014) rightly identify the question of scale as central, positing how too often resilience tends to focus on the scale of a community, overlooking both global processes like the market economy (Evans and Reid, 2013), as well as individual-level inequalities. For this reason, for MacKinnon and Derickson (2013), resilience reinforces internalist conception where resources have to be found within a particular system rather than sourced across a global-to-local interconnected space (Swyngedouw, 2004). This is often the case in the context of development, where resilience has been linked to neoliberal ideologies calling on the most vulnerable to adapt to a world of generalized crisis (Evans and Reid, 2013; Kaika, 2017; MacKinnon and Derickson, 2013; Welsh, 2014).

As alternatives to this ‘liberal resilience’ (Rigg and Oven, 2015), forward-looking frameworks propose rights and justice-based approaches (Matin et al., 2018; Walsh-Dilley et al., 2016; Ziervogel et al., 2017), making the object of resilience not the institutional, ecological and technological infrastructure ‘per se’, but the procedures through which individuals gain access to the assets needed to improve their livelihoods and enhance their well-being. These bottom-up investigations indicate precisely where the transformative potential of resilience lies (Brown, 2015) as they prioritize the subjective experiences and everyday practices of people navigating change first hand (Shah et al., 2017; Walsh-Dilley, 2016). These situated, transformative and grounded conceptualizations offer a place from where to start pluralizing resilience experiences and practices ‘from the ground up’, as we engage directly with the meanings resilience takes from people’s own situated location (Walsh-Dilley and Wolford, 2015).

Tracing an archaeology of resilience across disciplines, in this section, I have followed the

ways resilience thinking has worked as a boundary object, connecting perspectives and ideas across epistemic communities. While in some respects this work of translation has proven problematic (Brand and Jax, 2007), resilience ideas have nonetheless provided a forward-looking concept that emphasized the centrality of change, unpredictability and interconnected dynamics inherent to our worldly existence. As a heuristic for thinking about change and transformation, resilience thus remains a useful concept to ‘think with’, as long as its constructions through unequal power relations are held in clear analytical focus. In the critique that follows, I therefore respond to Cote and Nightingale’s (2012) invitation to situate resilience analyses and propose an investigation that engages with the complexity of its multiple constructions on the ground. As I will further unpack in the next section, the system approach upon which resilience ideas rest is problematic and should be challenged. By promoting the image of a world as an organized interconnected whole (Bell, 2005; Kwa, 2002; Law, 2004b), SES thinking is unreflexive of the situatedness and partiality inherent in any process of a system’s construction – it being human, ecological, technological, socio-natural (Barad, 2007; Haraway, 1988; Harding, 1986). There are multiple ways to ‘systematize’ (or, as I will call it later, to ‘assemble’) resilience, depending on the subject doing the construction. Yet this multiplicity is currently missed by systemic approaches to resilience (Bell, 2005).

Before moving onto a critique of system thinking, I should clarify that while my primary focus is on SES dynamics, resilience ideas within the fields of psychology, sustainable development and disaster studies also make extensive use of system thinking analytically, if not strictly ontologically (Olsson et al., 2015; Welsh, 2014), as they model society through its constitutive parts (a community, a household and an organization). As a result, they could also be examined on similar grounds.

III System Thinking Meets Relational Ontologies: Introducing Socionatural Resilience

SES resilience is grounded on a system ontology (Olsson et al., 2015; Turner, 2014; Welsh, 2014), where the world is imagined to consist of a series of systems connected with one another through mutual interdependencies regulating the whole as a functioning unit (Bell, 2005; Kwa, 2002; Law, 2004b). Through a system approach, SES analysis first identifies the problem in question and then delimits the system in consideration by demarcating clear boundaries around it. The system itself is assumed to exist independently from the observer and its constituting parts fully discerned as either social or natural, connected with one another through cross-scalar nested interactions (Gunderson and Holling, 2002). In a coupled SES, emphasis is placed on the challenge-response mechanism driving interactions *between* two well identified subsystems (natural *and* social) unpacking the impact of human actions over nature, or vice versa (Cannon and Müller-Mahn, 2010). The SES framework thus retains both conceptual and ontological distinction between social and biophysical entities, aiming to identify those features that enhance the system’s capacities to adapt in the wake of disturbances or transform when current conditions become unsustainable (Folke et al., 2010; Walker et al., 2004). Kwa (2002) therefore calls the SES approach as ‘holistic’ in the sense that it integrates individuals and natural objects who may appear heterogeneous at the phenomenological level into a single system at a higher level of analysis. The system approach thus ‘looks up’, connecting a multiplicity of events into an overarching causally interconnected whole (Bell, 2005; Kwa, 2002; Law, 2004b). What emerges, according to Bell (2005: 475), is a rather monolithic configuration, held together through a series of mechanisms that allow ‘little movement other than feedback loops into

themselves'. For this reason, Bell continues, while the SES approach sets off to account for complexities across interlinked social and natural components, it ends up resembling a unified 'theory of everything', where 'the whole controls the parts, and the parts serve to produce the shape of the whole' (Bell, 2005: 475).

This functionalist interpretation has been challenged by constructivist positions from the fields of political ecology (Braun and Castree, 2001; Castree, 1995; Swyngedouw, 1999), STSs (Jasanoff, 2004; Latour, 1993), feminists (Haraway, 1991; Harding, 1995), indigenous and postcolonial scholars (Blaser, 2013; Escobar, 1996; Sundberg, 2014) in their critique of the nature/culture and human/non-human. From different angles, these scholarships tackle 'the question of nature'; in other words, the tensions, displacements and contradictions that emerge when we stop considering nature as an independent domain outside of human history, acknowledging the role of multiple practices of signification in co-constructing what we apprehend as 'nature' in each situation. While acknowledging that an independent 'real' nature does exist (Castree, 1995) and that scientific knowledge cannot make objects as it pleases (Jasanoff, 2004), these scholars also tell us that some level of epistemological constructivism is both unavoidable and consequential. Unavoidable because we always come to understand the 'natural' as ontologically real through the terms and categories of our language (Demeritt, 2001), and consequential because our ontologies and epistemologies are always approached from situated and necessarily partial perspectives delimited by our historical-geographical positions (Haraway, 1991). Translated onto our analysis of resilience, this perspective reveals that the boundaries of a system and the line separating nature and society are not universally fixed but rather permeable and constructed at particular historical conjunctures through discursive and material practices that determine how we relate to one another and

towards 'nature' (Cannon and Müller-Mahn, 2010).

In this regard, I consider the critique advanced by Cannon and Müller-Mahn (2010) to be particularly suited here, as they highlight how the components in an SES not two but three: the social, the ecological and the coupling itself: the latter representing the act of fixing of the borderland between social and ecological subsystems. This demarcating hand, feminist and postcolonial scholars taught us (Haraway, 1988; Harding, 1995; Mignolo, 2002), is inevitably shaped by the socio-economic, political and geographical milieu of the observer. The boundary thus constructed separates those actors considered social, sentient and able to make a difference (a field generally restricted to 'us' humans) and the 'others', it defines the scale at which resilience is to be found, and its interaction at higher and lower scales of analysis. Delimiting these boundaries, thus effectively regulates how change is perceived and evaluated in a society, the reactive measures seen possible and real and those that, through what Spivak (1985) calls 'cognitive failure', are not given a chance to exist. In this regard, Cannon and Müller-Mahn (2010: 631) continue, 'the meaning of the "coupling" in a coupled social-ecological system is the product of different ways that nature is perceived, and from the way that the social is constituted with particular types of economic and political processes that determine which bits of nature are useful and how it is going to be used'. This calls for a reflexive analysis of the process through which a specific understanding of both nature and society is achieved in an SES (Cote and Nightingale, 2012; Sinclair et al., 2017), how this stable meaning produces a coherent vision of resiliency and, most importantly, whether this vision could be disrupted through constructions along alternative lines.

Engaging with these arguments offers a critical as well as a constructive engagement with resilience ideas (Latour, 2004) as it highlights

how, if a system and the borderlands between its social and natural components are constructed, then they may also be constructed otherwise, for example, by blurring the boundaries between its socionatural relationalities (Swyngedouw, 1999). First introduced by Swyngedouw (1999), *socionature* is a term that encapsulates the ever-present interconnections that tie natural and social realms together, describing a world of relations and processes rather than things in themselves. Unlike SES's dynamics, socionatural relations are grounded in a relational ontology (Castree, 2003), attending to the internal dialectics and fluidity through which things mutually co-constitute one another as inherently natural *and* social at the same time. As Swyngedouw (1999) argues, there is no 'thing like' ontological or essential foundation, but things are hybrids; subjects *and* objects, human *and* non-human, material *and* discursive, through and through. A socionatural interpretation of resilience offers a more dynamic, open and reflexive interpretation for unpacking complexities (Kwa, 2002), where the demarcation between natural and social things gives way to a myriad of heterogenous entities *constituted through* their relations with one another in a continuous process of flux and change. Socionatural resilience therefore attends to the ontological inseparability of nature and society across scales, focusing on the cultural, economic, political and historical processes that give rise to a particular resilient configuration.

In the remaining part of this section, I illustrate the shift that a socionatural perspective introduces to the way we approach resilience analysis, illustrated through the case of water scarcity in the context of rural development. While I highlight the productive potential of a socionatural reading or resilience, I also hint towards some of its remaining limitations, suggesting assemblage ideas as a further analytical lens to engage with coexisting socionatural co-productions across spatial and temporal scales (Blaser, 2014; Goldman et al., 2018).

I Socionatural Resilience to Water Scarcity: An Example

As mentioned at the beginning of this section, after identifying a problem of interest, the SES approach demarcates boundaries around it, following either its ecosystem or social lines. In the case of water scarcity in a groundwater-dependent socioecology, an approach would be to follow the boundaries of an aquifer, the underground layer of rocks bearing groundwater, identifying its social components as the population withdrawing water for various purposes and the formal and informal institutional arrangements regulating access (Kulkarni and Shankar, 2014). While for an SES analysis the aquifer itself appears as a rather self-evident entity, a socionatural interpretation would question whether the aquifer boundaries may not be as 'real' and fixed as it seems, highlighting how its interconnection with lakes, rivers or forest makes drawing such precise line of demarcation around the system artificial (Linton and Budds, 2014). But even assuming this line could be drawn, neatly separating natural from social components becomes a blurry affair. Is the groundwater in the aquifer, pumped through various kinds of technologies, channelled through human-constructed wells and regulated by institutional, political and economic arrangements a natural entity, fully described by its biophysical composition (H₂O)? Or does the materiality of water exceed this biophysical character, turning it into a substance whose value can only be described in relation to other natural, material, mechanical and human entities in a particular historico-geographical context (Bakker, 2012; Bear, 2013; Birkenholtz, 2009; O'Donovan, 2019)?

These questions necessitate reflection as they determine those responses considered appropriate to enhance resilience to droughts and those that will be discarded because not fitting dominant narratives. An SES interpretation is aligned with what political ecologists have called

'modernist' understanding of water (Boelens et al., 2016; Linton, 2014; O'Donovan, 2019), as a vital resource sustaining the well-being of social entities and their ecosystems. As such, it has to be sustainably managed and regulated through appropriate governance mechanisms (Linton, 2014; Yates et al., 2017). Interpreting water scarcity as an issue of quantity and mal-institutional practices, SES resilience focuses mainly on technical- and governance-based interventions to improve the infrastructure for water provision, encouraging the efficient management of groundwater to extract 'more crops per drop' (Argade and Narayanan, 2019; Mikulewicz, 2019; Taylor and Bhasme, 2020). While these approaches undoubtedly increase the overall water availability per capita and provide key benefits at some level of analysis, critiques also highlight how they conceal the ways in which environmental change is profoundly co-emergent and embedded within, rather than impacting upon, social system's dynamics (Ensor et al., 2019; Mehta, 2007; Mehta et al., 2019; Nightingale et al., 2020). For example, Taylor (2013) highlights that resilience and vulnerability to water scarcity reside not only on the capacities of social actors to mobilize resources but on the ways in which already marginalized people are adversely incorporated into political, social and economic relations across local–global relations.

By contrast, socionatural resilience would engage more deeply with water's 'gritty and fleshy reality' (Bakker and Bridge, 2006: 8), unpacking the ways water is inherently biophysical (H₂O) but also social, historical, economic and highly political. In this regard, Linton and Budds (2014) propose the 'hydro-social cycle' as a framework to theorize water–society relations as co-constituting one another through the simultaneous circulation of a biophysical water flow and of the social, political and economic significance entangled through that flow (Bakker, 2002). Rather than treating water as homogeneous, a hydro-social analysis attends to

waters' hybrid nature, reflecting on the material and symbolic qualities that give water its emplaced significance. The hydro-social flow is therefore discursive as well as deeply material, entailing the concrete circulation of water, and of the socio-economic relations, technologies and power structures regulating its distribution (Bakker, 2002; Linton, 2010). For example, Goldman et al.'s (2016) study of a drought in Maasai pastoralists in Kenya highlights the tensions that emerge when a systemic approach meets a relational understanding of water as hydro-social. While for scientists relying on scientific modelling a drought is deduced from rainfall measurements in a given area, for Maasai herders a drought is understood when lack of pasture forces them to migrate in search of fodder. In this example, a hydro-social analysis would unpack the different interpretations of water each actor supports, questioning what knowledge structure each articulates, and the ways they embody different interests and power dynamics (Linton, 2010).

This shifted analytical focus has profound implications for the fairness and equity of the interventions designed to enhance resilience. In fact, while SES analysis values lay observations of environmental processes (Berkes and Folke, 1998; Berkes et al., 2008), its openness to 'non-scientific' measurements conceals more profound onto-epistemological discrepancies between lay and scientific ways of knowing (Agrawal, 1995). In particular, SES analysis conceives lay knowledge as static and fixed, something that can be usefully integrated into scientific assessments when long-term data are lacking (Cote and Nightingale, 2012). Yet, in the very moment the two collide, the superiority of scientific measurements is axiomatically assumed against local interpretation of change, suddenly becoming cultural barriers, beliefs and myths to be dispelled (Nielsen and Reenberg, 2010). Falling outside dominant scientific frame of 'what a drought is', Maasai herders, as it is the case for many rural groups and individuals

in semi-arid parts of the world (Blaser, 2009; Mehta et al., 2019), are considered unable to cope with droughts, having limited knowledge of new agricultural practices that would enable them to account for long-term changes, prepare and adapt. Cote and Nightingale (2012) thus suggest that situating questions of resilience as contestations over legitimate knowledges highlights the more profound need for approaches that uncover the ontological positions behind different understandings of change, keeping in tension their multiplicity, rather than falling back onto singularity (Yates et al., 2017).

I therefore suggest that to pluralize socio-natural resilience we need to go further than what suggested by classic interpretations of 'socio-nature' such as those proposed by Swyngedouw (1999) and Linton (2010). Inspired by neo-Marxist ideas (Harvey, 1996), these accounts implicitly abide to a Western commitment over a singular, all-encompassing reality (Law, 2015). While calling into question the ontological categories associated with social-natural binaries, these examinations proceed as epistemological projects exposing socio-environmental conflicts as divergent perspectives over a singular shared reality (Forsyth, 2004). Thus, for example, the production of the Spanish waterscape narrated by Swyngedouw (1999) is interpreted as the historical construction of a particular hydro-social configuration, representing the symptom of a specific socio-physical reality. While the narrated hydro-social transformations are ridden by contestations and conflicts, these are reified at the level of values, cultures and beliefs. Reality, on the other hand, remains one, determined and singular, rather than fractured, contested and plural (Forsyth, 2004). As Law (2015: 127) would put it, a socio-natural interpretation of resilience still implicitly abides to a 'one-world world' ontology, where 'matters of reals' are interpreted as less consequential 'matters of beliefs'.

On the contrary, according to Goldman et al. (2018) the Maasai example suggests that

differences between the scientific community and pastoralists cannot be explained at the level of epistemology (different ways of knowing water scarcity) but rather reflects more profound ontological differences about of *what a drought is*. The two are enacting two distinct (albeit sometimes overlapping) hydro-social cycles 'in the plural'. I thus concur with Goldman et al. (2018) when they suggest that to pluralize our interpretation of socio-environmental dynamics, there is a need to acknowledge that not only nature and society are co-produced, but that multiple socio-natural co-productions always coexists (Blaser, 2013; de la Cadena, 2010).

Coming to terms with multiple realities as enacted through different socio-natural practices means acknowledging that interventions to enhance resilience represent a form of ontological politics (Blaser, 2013; Mol, 1999) as they implicitly or explicitly articulate *a* pathway and *a* vision towards *one* desirable future (Simon and Randalls, 2016). Taking seriously these 'worldly struggles' of resilience, thus necessitate adding a further lens of analysis, one that enables us to unpack '*what* [a certain resilience interpretation] joins up together, *where* it might span, *who* makes it so, *how* it might get there and *why* this is good?' (Simon and Randalls, 2016: 7, emphasis in original).¹

Following postcolonial (Blaser, 2013, 2014, 2016; Blaser and de la Cadena, 2018; Escobar, 2015; Sundberg, 2014) and STSs scholars (Law, 2004a, 2015; Mol, 1999, 2002), in the next section, I begin engaging with these questions and propose assemblage ideas (Anderson et al., 2012) as a language to pluralize socio-natural resilience. By attending to realities enacted through everyday practices (Mol, 2002), the assemblage analysis proposed avoids reducing differences to cultural perspectives and takes seriously the possibility and politics of a multiplicity of worlds assembled in different ways.

IV Socionatural Resilience Through Assemblages: Exploring Its Ontological Politics, Pluriversal Sensitivity and Methodological Praxis

The concept of assemblage is increasingly adopted in geography, as part of an ongoing ‘relational turn’ in the field (Anderson and McFarlane, 2011; Braun, 2006, 2008; Castree, 2003). While there have been attempts to construct assemblage into an overarching theory (see DeLanda’s, 2006 work building from Deleuze and Guattari’s, 1988 philosophy), many prefer to think of it as an orientation (Anderson and McFarlane, 2011; Anderson et al., 2012; Dewsbury, 2011) a method (Law, 2004a) or a metaphor to explore a world in continuous formation, unpacking socionatural arrangements as heterogeneous meshes of human and non-human entities. Acknowledging the conceptual fluidity surrounding the term, I specify my rather loose use of assemblage ideas which, following Law (2004a: 42), I see as an open ‘process of bundling, of assembling, or better of recursive self-assembling in which the elements put together are not fixed in shape, do not belong to a larger pre-given list, but are constructed at least in part as they are entangled together’. According to Law (2004a), assemblages should be understood as a verb as much as a noun, for they highlight the tensions between the world as a distinct arrangement of socionatural relations and an empirical focus on the *practices of composition* through which shapes emerge and may endure (Anderson et al., 2012: 174).

Postcolonial scholars in particular have looked at the language of assemblages ‘in the plural’ as holding emancipatory potential for decolonizing geographical engagements. Of particular relevance is the work of Blaser (2013, 2014, 2016), Escobar (2015, 2018) and Sundberg (2014) who incite us to go beyond the

ontological blurring of the nature–culture divide that, following Eurocentric socionatural lines of construction, ends up privileging certain human–non-human assemblages at the expenses of others (Sundberg, 2014). Multiplicity, they tell us, is central to assemblage ideas, not only because of the various connections that compose an assemblage (Deleuze and Parnet, 2002), but for the possibility of engaging with the numerous assemblages composing our world. Thus, according to Blaser (2014: 51) ‘if the heterogeneity of always emerging assemblages troubles the political, the very heterogeneity of these heterogeneous assemblages troubles it even more’. For this reason, Watson-Verran and Turnbull (1995) argue that no term is able to capture the amalgam of technologies, places, collective action, people, voices and emotions that compose heterogeneous worlds than an assemblage analogy does. Compared to similar relational approaches such as actor-networks (Latour, 2005), metabolic circulations (Swyngedouw, 2006), rooted networks and relational webs (Rocheleau, 2016), assemblage’s strength lies precisely in their capacity to deal with coexisting complexities, keeping open their multiplicities without reducing them to singularities.

As opposed to the ‘one-world’ stories in search for a unifying universal truth (Law, 2015), an assemblage analysis allows us to engage with the enactment of multiple socionatural relations, exploring their coexisting configurations and the conditions under which something new could be produced (Anderson and McFarlane, 2011; Müller, 2015). Such assemblage-informed inquiry is thus well placed to pluralize socionatural resilience, engaging with Simon and Randalls’s (2016) questions over the ethico-political implications of multiple resiliences as equally valid and real.

A useful example to understand reality as multiple and assembled through everyday practices is Mol’s (2002) ethnographic exploration of atherosclerosis disease in a Dutch Hospital.

While spending time with patients, radiologists, laboratory technicians and doctors, Mol finds that the disease assumes multiple forms: as pain voiced by patients to their clinicians, as the narrowing of blood vessels observed through a microscope and as changes of sound frequency detected through Doppler ultrasound machine. In each site, the disease is enacted through different assemblages made of people, medicines, technologies, medical records, surgery instruments, feelings, waiting rooms and so on. Each assemblage enacts one version of arteriosclerosis yet, as Mol shows, this multiplicity not always adds up. Therefore, in some instances there is pain, without the narrowing of blood vessels, in other there are changes in sound frequency, but not pain. While this multiplicity is rendered singular through a series of politico-managerial procedures that selectively discard some manifestation in favour of others, *at the level of practice*, arteriosclerosis (or we could say reality) is multiple.

Reflecting on how socionatural resilience can be pluralized in a similar manner, I go back to the water example and ask what would it mean to take seriously the existence of multiple ‘water worlds’ – the water of scientists, of government agencies and of local communities – when it comes to opening new spaces for alternative resilient futures to emerge (Yates et al., 2017)? A recent news article by Adusumilli and Kumar (2020) discussing strategies to enhance resilient agriculture in rain-fed areas of India indicates an interesting direction. While not directly referring to questions of ontology, the authors challenge the ‘irrigation-as-usual’ approach promoted by mainstream government policies as being neither the most effective nor the only irrigation ontology there is for securing resilience against droughts. Mainstream policies in fact commonly see irrigation as the process by which humans purposefully deliver water to plants at certain intervals. This ‘irrigation-as-usual’ ontology enacts a heterogeneous assemblage involving a network of canals and

pipes channelling water from dams and streams, or alternatively it engages with a dotted landscape of privately owned wells, pumping water from underground aquifers. Relying on what Jasanoff (2005) calls ‘technologies of hubris’, this strategy manages rainfall uncertainties by securing regular supplies of water that supports high-value water-intensive crops farmers can sell to markets for an income. This practice relies on the enactment of a specific neoliberal resilience (Chandler et al., 2016) that places emphasis on farmer’s rational choices and their capacities to compete in an interconnected market economy where the externalities of unsustainable water supply are often hidden.

By contrast, looking at the everyday doings of small and marginal farmers reveals alternative irrigation practices and a socionatural resilience achieved in completely different terms (Mehta, 2007). Instead of seeing irrigation as a regulable water flow, Adusumilli and Kumar (2020) suggest that in rain fed areas irrigation should be seen as the supply of water as moisture to the soil. This entails the careful practice of securing stable moisture content at the interstices of soil particles where plant roots penetrate. This not only provides ‘irrigation’ in the strictest sense but also favours the growth of bio-colonies at the roots of plants that facilitate the absorption and transportation of nutrients to the leaves. This alternative ‘irrigation-as-moisture’ ontology supports a rich and diverse assemblage, promoting agriculture practices suited to less water intensive traditional crop varieties, such as millets and pulses, generating healthier soils for plants and other living organisms (Mehta, 2005; Shiva, 1991). Drought resilience in this case is thus less reliant on secure water inputs, crops sale and integration with the market economy but is expressed as the resourcefulness and self-reliance of agroecological farming practices (Singh et al., 2018).

Similarly to Mol’s example of a disease rendered singular through the silencing of non-conforming practices, mainstream irrigation

policies often reduce resilience in rainfed areas to a singular issue of investments in external water supply (Mehta, 2005). Policies that erase controversies and grant resilience a singularity are hegemonic as they foreclose the very possibility for diverse coping strategies to emerge. By contrast, when we pay attention to multiply assembled realities as enacted through practices, it finally becomes possible to interrogate the ontological politics of alternative resilient configurations and uncover what is at stake when worlds that are ‘more than one but less than many’ (Mol, 2002: viii) create the illusion of unified shared reality.

For Escobar (2015), political ontology refers to the power-laden practices involved in bringing into being a particular world and the interactions among worlds as they strive to sustain their own existence. Following his approach and that of many indigenous scholars (Blaser and de la Cadena, 2018), I suggest embracing the ‘pluriverse’ – the progressive composition of a world that not necessarily reduces to one (Blaser, 2014) – as a specific politics to engage with resilience’s multiplicity. The pluriverse is by definition not concerned with identifying one supposedly independent and ‘better’ reality but relates to the possibility that multiplicity creates to address political problems (Blaser, 2013). In a postcolonial world, the pluriverse becomes a tool to ‘first, make alternatives to the one world plausible and second, to provide resonance to those other worlds that interrupt the one world story’ (Escobar, 2015: 22).

When it comes to socionatural resilience, this necessitates, first and foremost, coming to terms with the non-universal applicability of the categories and concepts we use (Mignolo, 2002), and a recognition that resilience itself is the product of a specific Western tradition, not necessarily false, but situated, partial and never innocent (Chakrabarty, 2008; Mignolo, 2009). While many find resilience to be a useful concept, acknowledging the pluriverse means accepting that resilience itself, as a framework,

an idea or a practice, may be unthinkable, unimaginable or simply insignificant outside a certain onto-epistemological sphere (Goldman et al., 2018; Shah et al., 2017). This requires humility and a sensibility to producing ethnographic accounts that are attentive to other world-making practices (Blaser and de la Cadena, 2018), taking seriously what happens when we ask others to define resilience and explain what it means from their own lives and locations (Walsh-Dilley and Wolford, 2015). For example, Shah et al. (2017) find that standard SES resilience indicators were unable to account for Filipino farmers expression of resilience as affective and emotive attachment to the landscape. As a result, concepts like resourcefulness, self-reliance, hopefulness (Singh et al., 2018), as well as rootedness and resistance (Brown, 2015) could only be an initial list of concepts that emerge when we start naming resilience through non-dominant socionatural practices.

Before concluding, it is also necessary to reflect on the impacts that engaging with an ontological politics of resilience has on our own methodological praxis. This consideration is critical, for if reality is multiple and enacted, then our research practices are themselves involved in enacting the worlds we seek to describe (Law, 2004a; Law and Urry, 2004). As Law and Urry (2004) suggest, methods are not only descriptive but performative and themselves productive of a social world. It follows that if our investigations are implicated in the ontological politics of world-making, then we can, to some extent, also think of using ‘methods that strengthen particular realities while eroding others’ (Law and Urry, 2004: 397). Law (2004a) thus proposes ‘method assemblage’ as a strategy to think of methodologies as the crafting of boundaries between what is present and real, what is ‘manifestly absent’ – that which while not present can be envisioned – and what is ‘othered’ and relegated to the unthinkable. Thinking of our methodologies as assemblages

in this way reveals how our research do not simply detect realities but participate in the crafting of relations, amplifying some connections while excluding others. While by Law's own admittance there is no way of avoiding these boundary-making practices, method assemblage is an attempt to imagine more flexible boundaries and subversive ways of enacting presence and creating absence (Law, 2004a: 84).

Understanding our methodologies as ways of relating to multiply assembled worlds requires situating our analysis (Cote and Nightingale, 2012), taking responsibility of the cuts we make when privileging assemblages enacted by those whose stories we seek to tell. As we counter the one-world story of SES resilience, engaging in acts of 'border thinking' (Mignolo, 2000) means situating our accounts in those resilience practices that have so far been silenced and marginalized (Katz, 1996), keeping at bay the illusion of our own innocence and non-complicity in other worlds.

V Conclusions

'It matters what concepts we use to think concepts' (Strathern, 1992 cited in Blaser and de la Cadena, 2018: 6).

In this sentence, Strathern urges us to take care of the grammar we use to advance our arguments, not only because concepts legitimize knowledge but more fundamentally because of their reality-making effects. Despite the criticisms, I have argued that resilience remains a useful concept to 'think with' and I speak with Cote and Nightingale (2012) when they say that resilience is a body of work worth developing and extending. Its contributions have reached well beyond the promise of providing a common language across scientific communities to help us thinking through human–environment interconnections. Resilience thinking has shown a resiliency of its own precisely because it has captured the very

dynamic, fluid and unpredictable quality of the world, asking us to reflect on the relationalities we would like to nourish as we navigate these changes. Resilience has thus ignited our imaginations and pushed us to reflect on the significance of striving for better conditions, as individuals and collectives.

At the same time, resilience also seems to have become the victim of its own success, trapped in a mode of thought that confined the 'science of surprise' (Folke et al., 2010) into a universalizing and functionalist framework, unable to engage with the multiple experiences and practices expressed by people navigating change. I have suggested that for the term to remain useful, the system metaphor upon which the SES framework relies upon should be challenged. With its persistent sense of an organized and functional whole that can be fully discerned and described by an un-positioned observer, the SES approach ultimately hides how things do not necessarily all work together and ignores how the very act of constructing a system is partial and situated, necessarily reflecting one vision for the future over another. At the same time, borrowing from Bell (2005: 477), my analysis is not directed towards 'chaos and disorder, for dropping the "p" from "panarchy"', but rather should be read as an invitation to reposition resilience in a world that is messy, discontinuous, multiple, related but not necessarily in sync. Reflecting this shift, I have proposed 'socionatural resilience' as a framework for thinking through the relational character of things beyond systemic boundaries (Swynedouw, 1999) and suggested its use in conjuncture with assemblage ideas as an analytical lens to pluralize resilience work.

I indicated that assemblages ideas informed by postcolonial (Blaser, 2014; Sundberg, 2014) and STS (Mol, 1999, 2002) scholarships are well suited to leave behind the one-world world ontology (Law, 2015) residual in many understandings of socionatural relations that implicitly privilege certain human–non-human

configurations at the expenses of others (Sundberg, 2014). Through a focus on multiple worlds as enacted through hybrid assemblages, the analysis proposed is open to an exploration of the ontological politics of resilience multiple, directing our attention towards thinking of the pluriverse as a concrete possibility. From an ethico-political stance, keeping open the tensions and contradictions that emerge when multiple interpretations of resilience emerge, rather than 'explaining differences away' (Verran, 2014) is key for a radical and emancipatory program that politicizes resilience. Finally, acknowledging how our own method assemblages are themselves performative and participate in the making of socionatural worlds, it is necessary to be reflective about the worlds we want to help making resilient through our own research practices (Law and Urry, 2004).

What remains to be asked is the extent by which academics, researchers and practitioners raised in a tradition of Western scholarships are prepared to grasp the implausibility of a universal shared reality and embrace others as equally valid and real. Feminist and decolonial scholars illuminate the way (Goldman et al., 2018; Nagar and Ali, 2003; Sundberg, 2014; Visweswaran, 1994; Yates et al., 2017), as they urge us to 'do our homework' (Spivak, 1985) practicing reflexivity and situating ourselves to the best of our possibilities, unlearning the sanctioned ignorance that can make us blind to other marginal realities. Only by learning to listen to, rather than speak 'for' and 'about' the people with whom we research (Kapoor, 2004; Nagar and Ali, 2003), we will be able to take seriously the possibilities emerging from other resiliences expressed by people on the ground.

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Note

1. I would like to clarify that while also Simon and Randsalls (2016) engage with the ontological politics of resilience, my interpretation differs from their analysis in a substantive way. While for them resilience multiplicity resides in its boundary object characteristic and can be investigated by following its discursive articulations across different epistemic communities, I use Mol (2002) and other Science and Technology Study scholars interpretation attending to resilience multiple as enacted practices.

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