Access as the means for understanding social-ecological resilience: Bridging analytical frameworks.

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Abstract: Social Ecological Systems (SES) resilience has become the mainstream analytical framework for understanding the interactions between the social and environmental dynamics of change. However, issues around the role of power and agency, which have been described as blind spots by critics, have raised concerns regarding its application to real-world empirical cases. We explore how Ribot and Peluso's (2003) Theory of Access can be applied to address critical theoretical gaps in SES by examining how its structural and relational access mechanisms relate to diversity, feedbacks and connectivity , which are central to the dynamics of SES. Testing this through two different case studies, on land use issues in Mexico and marine fisheries in the United Kingdom, we illustrate how an analysis focused on access deepens our understanding of resilience. We argue that the insights provided by the Theory of Access contribute to an improved theorisation of the "social" in social-ecological resilience.

Key Words: Resilience, Social Ecological Systems, Theory of Access, Power, Agency

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Introduction

Global environmental change is disrupting peoples' access to resources in many different ways (Thomas and Twyman, 2005, Leach et al., 1999, Ellis and Allison, 2004; Langridge et al., 2014). However, while changing access to resources has received some attention, a more nuanced understanding of access is still missing from many policy discourses particularly those framed through the lens of Social-Ecological System (SES) resilience (Carpenter et al. 2001; Brown 2013; Berkes & Ross 2016). We focus this paper on Social-ecological systems resilience, which has gain predominance in development policy making and practice over the past decade (Leach 2008; Béné et al., 2013; Brown, 2013). By conceptualising "people and nature as interdependent systems", the concept of Social-Ecological System brings an added focus to the dynamics of global change between people and their environment across scales through feedbacks, diversity and connectivity (Folke et al., 2010:23). However, significant criticisms of SES have emerged, particularly with regards to its "social component" (Davidson 2010; Cote and Nightingale 2012; Béné et al. 2013; Fabinyi et al. 2014). In particular, the mechanisms communities use to gain, control and maintain access to natural resources in response to change are still largely under theorised in the SES literature. We propose that the influential Theory of Access (ToA), published over 15 years ago by Ribot and Peluso (2003), which defines access as "*the ability to obtain material and immaterial benefits from things*" (page 153) provides insights that help deepen SES resilience theory.

At the heart of criticisms surrounding SES is the debate over whether resilience is an ability intrinsic to communities or a capability developed from external entities (Carpenter et al. 2001; Olsson et al. 2004; Brown & Westaway 2011; Berkes & Ross 2013). This is because the systems view of SES has tended to mask, what are referred to as 'internal factors' within communities:

the power and agency individuals within a community have to shape their resilience in response to shocks (Davidson 2010; Brown and Westway, 2011; Béné et al. 2013). Resilience scholars have instead argued that that "resilience at the community level is strongly influenced by the actions and interactions of individuals and groups within the community" (Berkes and Ross 2016: 186). However, aggregating at the level of a community or social system, downplays the differences within communities including the power struggles at play, and has oversimplified the processes for resolving adaptation challenges equitably (Brown and Westway, 2011; Cote and Nightingale, 2012; Béné et al. 2013; Fabinyi et al. 2014).

This paper starts by reviewing four key criticisms that have emerged and relate to theoretical gaps in the structural and relational dimensions of SES resilience. These gaps have led to overemphasising people-nature connections and dependency on natural resources, ignoring power dynamics due to aggregating the social, paying insufficient attention to agency over structure, and to a poor consideration of tradeoffs due to a normative 'win-win' discourse. We explore how the ToA can address these gaps within the conceptualisation and language of SES resilience and argue that the ToA has potential to enable a deeper and more grounded view of the "social" component of SES resilience. We test this by examining how the ToA structural and relational mechanisms relate to three key characteristics of SES resilience: connectivity, diversity and feedbacks (Biggs et al. 2012; Baggio & Calderón-Contreras 2017). We apply our framework to a case study from the global north: a coastal fishing community in the UK (White, 2015a) and a case from the global south: a mountainous indigenous community in Mexico (Calderon-Contreras, 2011), each based on doctoral research carried out by the authors while at the University of East Anglia (see Table 1). These cases are from vastly contrasting contexts but both represent SES facing profound social, ecological and economic changes. We conclude by reflecting on what the ToA adds to the wider scholarship on SES resilience.

(INSERT TABLE 1 HERE)

Four Theoretical Gaps of Social Ecological Systems Resilience

In one of their seminal papers, Folke et al., (2010:23) enquired: "Are there deeper, slower variables in social systems, such as identity, core values, and worldviews that constrain adaptability? In addition, what are the features of agency, actor groups, social learning, networks, organizations, institutions, governance structures, incentives, political and power relations or ethics that enhance or undermine social–ecological resilience?" These questions indicate some of the critical theoretical gaps in SES resilience, which require drawing on other analytical frameworks. They also recognise that people's actions and practices are shaped through more than their access to natural resources. Indeed, people also rely on access to other types of resources that are necessary for their wellbeing, for instance, to fulfill their basic needs or social roles and status (Leach et al., 1999; McGregor et al., 2007). In this section, we summarise four pertinent gaps identified in the social science literature on SES resilience.

People-nature connections: governance and dependency on natural resources

Discussions relating to the governance of SES were heavily influenced by debates concerning the commons, particularly those of Ostrom (2005), which identifies diverse types of collective action worldwide where natural resources are effectively managed without the participation of politico-legal institutions. Ostrom (2005) suggested that successful bottom-up approaches, referred to as 'self-governance' or 'co-governance', are possible depending on specific characteristics, such as the type of resource and communities or the institutional and the external environments. However, the notion that successful collective resource management institutions most derive from local communities is often mistakenly based on the assumption

that their main concern is the conservation of natural resources (Fabinyi *et al.,* 2014). However, this has been challenged by cases where, for instance, fishermen continue to harvest declining resources even when it is economically unviable to do so and alternative employment exists (Pollnac et al., 2001; Daw *et al.* 2012). In reality, as Cote and Nightingale (2012) emphasise, human behaviour is often influenced by wider economic, social and cultural concerns other than the environment. By understanding access to natural resources as shaped by relational and structural mechanisms, the ToA broadens the scope for analysis of people-nature interactions.

Power dynamics and inequality

Because collective action and institutions have been emphasised in the governance of SES consensus building has been privileged over contestation and resultantly, issues of power and inequality have been downplayed (Fabinyi et al 2014). Power struggles, which often arise during a change phase, have effectively been placed in a blind spot. Institutions are based on a multitude of factors – economic, social, cultural, political – which in turn, shape inequality including who negotiates adaptation and how (Cleaver, 2002). As governance structures are embedded within a social and cultural context, institutions are likely to exhibit wider realms of power, which should be scrutinised rather than taken for granted. For example, although absent from SES resilience, power features strongly in the 'community development' literature where resilience is framed as 'resistance', and the existence of different levels of power and contestation are recognised (Brown, 2015). By examining both structural and relational mechanisms of access, the ToA brings power and inequality into focus.

Insufficient consideration of agency

While SES scholars recognise that particular individuals within an organised social unit might shape SES resilience outcomes by exerting leadership or supporting social relations (Folke, 2006), the SES resilience literature has long emphasised the importance of institutions for adaptation: "social resilience is institutionally determined [as] institutions permeate all social systems" (Adger, 2000: 354). Critics claim that an overemphasis on social capital and institutions as preconditions for successful adaptation or transformation has tended to assume that people lack agency (Brown and Westaway 2011; Coulthard, 2012; Brown 2014). However, the role of agency in responding to and directing change is significant. Unlike responses in ecological systems, *"people can imagine how things might be and do things to bring those conditions about"* (Brown and Kulig, 1996/1997 in Norris et al. 2008: 141).

As the ToA highlights, agency is gained, maintained and controlled through rights-based, structural and relational mechanisms. According to Ribot and Peluso (2003:154) "Different people and institutions hold and can draw on different 'bundles of powers' located and constituted within 'webs of powers' made up of these strands. People and institutions are positioned differently in relation to resources at various historical moments and geographical scales. The strands thus shift and change over time, changing the nature of power and forms of access to resources". Viewed through this lens, the ToA can add emphasis to the role of agency in SES resilience.

Consideration of tradeoffs: winner and losers

The often normative framing of SES resilience has been raised as problematic and has led to questions of: "Resilience of what, to what, and for whom? (Cutter 2016; Meerow, Newell, and Stults 2016). Answering this requires a deeper examination into what valued characteristics should be retained, or what the thresholds for transformation should be (Béné et al.

2013). However, as noted above, communities often do not share the same objectives. Hence, the outcomes of social-ecological change produce a wide array of winners and losers. Depending on the scale, resilience might represent different outcomes for some community members, while for others it could be a source of vulnerability (Leach 2008). As Marschke & Berkes (2006) found, local level interventions may improve resilience at the household level, while also causing degradation of resources at other scales. However, when an aggregate view of a 'social system' or community is taken, the impacts of change may fall disproportionately and invisibly on individuals of particular gender, age or wealth who may be marginalised. For instance, Daw et al. (2015) found that marginalised female traders in Kenya relying on low-value fish tend to be further marginalised by any management aimed at increasing catches of more valuable fish. Because resilience may simultaneously increase and decrease for different units at different scales of analysis, it is important to allow analytically for contradictions and ambiguities that may occur and to consider whose criteria are being used to define resilience.

Furthermore, although SES resilience has been applied as a useful heuristic tool for studying how different communities respond to change, it does not cope explicitly with the interlinkages across the Social Ecological System scale and the community, household and individual scales. What the ToA provides are insights that allow more grounded responses to questions of "resilience to what?" and "resilience for whom?" (Cutter 2016; Meerow & Newell 2016), which allows a more explicit exploration of the winners and losers from changes in SES..

In the following section, we argue that ToA offers a means to examine the theoretical gaps summarised in this section. In particular, we focus on how the TOA's structural and relational mechanisms of access, which incorporate knowledge, authority, technology, labour, identity and social relations, relate to diversity, feedbacks and connectivity in SES. Then, using two case

studies, we demonstrate how bridging these two frameworks enables a better framing of agency and power and conceptually deepens our understanding of SES

Testing Social-Ecological Systems Resilience through a Theory of Access Lens

We argue that both the ToA and SES frameworks can be complementary in understanding how resource-dependent communities respond to environmental, economic, political and social changes. Whilst the ToA has been instrumental for understanding "how people benefit from things" (without necessarily focusing on the effects of shocks), SES resilience focuses on the effects of shocks over the dynamic relationship between people and the environment. As we have argued earlier in this paper, more explicitly considering questions around dependency, the role of agency and power struggles, inequalities and tradeoffs around access to resources, through using a ToA framework can deepen our understanding of SES resilience.

The complex and dynamic interactions between ecological, social and economic factors are the focus of attention of SES resilience, which also provides recognition that such interactions are not static and most importantly unpredictable. This, as Béné (2014) contends is *"in itself a progression with respect to previous conceptions of the world which might have relied too heavily on an assumption of equilibrium and immobility".* According to the resilience literature, these interactions are typically non-linear and, although they may seem 'simple' at the local level, they accumulate in an unpredictable manner, generating behaviours and structures that cannot be understood as a simple outcome of local traits: the sum is greater than the sum of its parts. Although complex and unpredictable, these structures and behaviours can be better understood when analysing three key properties that all SES have and that affect their resilience: diversity, connectivity and feedbacks (Biggs et al. 2012). These three properties are which allow a SES to

remain in the same regime or change into a different one (Carpenter et al. 2001; Walker et al. 2004; Folke & Rockström 2009; Biggs et al. 2012).

After briefly describing the three key properties of SES: diversity, feedbacks and connectivity, we map how they relate to the structural and relational mechanisms of access (*via access to technology, capital, markets, labour, knowledge, authority, identities, and social relations*) put forward in the ToA and explore how these might theoretically play out at the community level.

Diversity

According to Folke et al. (2005) and to Olsson et al. (2004), diversity is critical for the ability of SES to adapt to changing environments through providing diversity in terms of actors, knowledge, worldviews, ecosystems, cultural traits, institutions and livelihoods. Essentially, diversity provides options. It offers a range of strategies for responding to change, uncertainty and surprise, such that a SES with increased diversity may be considered more resilient than those that are more homogenous (Ostrom 2005; Cardinale et al. 2012; Baggio and Papyrakis 2014).

Accessing different sources of capital for investment and labour opportunities can enable a range of livelihood diversification strategies such as beekeeping, firewood collection, shrimp and mixed fisheries in the same SES across seasons. They have been found to increase resilience to shocks including political and economic crisis (Kibria et al. 2018). Livelihood or market diversification allows people to respond to changing conditions, at different scales providing crucial opportunities for building or undermining SES resilience (see Galaz et al (2015). However, accessing diverse options may not always be feasible. Instead, specialisation in a livelihood strategy may be favoured, for instance in response to competition for resources.

However, market or livelihood specialization can create vulnerabilities due to dependency that may lead to collapse (Cumming & Peterson 2017). For example, Daw et al. (2012) found that more specialised fishermen were considered less resilient than fishermen with a generalist livelihood strategy because they had limited capacity to diversify into other forms of fishing or employment during difficult times.

While the SES resilience literature often emphasises ecological diversity in terms of species and landscapes as providing options for livelihood adaptation, diversity in access to capital, technology, labour and markets are central to livelihood adaptation and innovation in the face of change (Janssen et al. 2006). In particular, recent SES literature highlights the importance of social relations and networks for resilience to shocks such as flooding (Islam & Walkerden 2017), earthquakes (Guarnacci 2016) and hurricanes (Kim & Hastak 2018). The role of diversity in social networks in resilience, primarily based on the idea of social capital, has been examined in natural resource governance (Bodin and Crona, 2009). Unfortunately, this framing often misses the role of power and agency in responding to change (Cleaver, 2005). However, an analysis of access mechanisms, as proposed by the ToA, takes power into account in individual or collective responses to change (Berbés-Blázquez et al. 2017). Examining how diversity shapes access via structural and relational access mechanisms in the context of livelihood adaptation can provide a deeper analysis of how resilience may be enabled or constrained.

Feedbacks

Significant pressures in what are termed "controlling slow variables" can cause a system to suddenly change from one regime to another if certain thresholds are exceeded leading to a change in dominant feedback loops in the SES (Armitage & Johnson 2006; Biggs et al. 2012; Kaplan-Hallam et al. 2017). These feedbacks allow communities to control the way in which they

respond to external impacts across scales. For example community-based local processes have fed into global debates such as climate change and sustainability (Balvanera et al. 2017); including achieving change in regional and national policy-making through increasing awareness of local level issues (Brunner & Grêt-Regamey 2016). However, feedbacks can also create unsustainable lock-in scenarios which may be undesirable for certain individuals, groups or communities, leading to conflicts locally (Biggs et al. 2012).

Knowledge and authority have a central role in the governance of SES. Social norms, customary authorities and values are key elements of local institutions that enable or constrain access to resources through feedbacks between community members. Certain studies have demonstrated that in SES, the interplay between authority and knowledge is crucial to determining "Who decides what should be made resilient to what? For whom is resilience to be managed? And for what purpose?" (Lebel et al. 2006: 9).

Connectivity

The SES resilience literature has highlighted the importance of connectivity. For example, connectivity can ease recovery from disturbance and change by facilitating exchanges of information or good practice. It refers to the interdependencies or dependencies between the different components of a SES, and the intensity with which they are connected. Innovation in management and ideas require connectivity to improve social collaboration and learning (Baggio and Calderón-Contreras 2017; Balvanera et al. 2017).

Identity is often a powerful mechanism in shaping social ties and connections. In particular, common identities and social relations can often bind individuals together in a community or through forming groups across communities, where different levels of power often accumulate.

These connections can strengthen internal dependencies, and ultimately determine who benefits or loses from access to a resource (Gimelli et al. 2018). Hence, identity plays an important role in different "types of communities" being recognised, and as a consequence, in a differentiated resilience.

However, high connectivity can also increase the speed and intensity at which social and ecological problems can spread (see Bodin and Norberg 2005). For instance, isolated forest patches in a fragmented landscape may escape wildfires (Peterson 2002), whereas the spread of pests or diseases might be more likely in highly connected agricultural landscapes (Baggio and Hillis 2016). Similarly, social networks may facilitate governance of ecological resources (Bodin and Prell 2011; Schoon et al. 2014), but they can also negatively affect the SES by increasing homogenization of ideas and worldviews or by creating tensions particularly when inequality in prominent (Baggio and Hillis 2016; Bodin and Norberg 2005). Identities and social networks are part of the relational mechanisms of access that shape resilience through connecting people to place and to each other..

The case studies in the following section are used to illustrate how the ToA can be used as an analytical tool for examining the theoretical gaps outlined earlier in this paper, to deepen understandings of the dynamics of SES resilience, particularly in relation to diversity, feedbacks and connectivity, as argued above.

Illustrations from the Field

Using two case studies including an inshore coastal fishing community in the UK and a mountainous indigenous community in Mexico (Table 1) we illustrate how the access mechanisms in the ToA relate to core properties of SES resilience and exemplify empirically how

this can led to deeper insights for SES resilience. Both selected cases in this paper draw on PhD fieldwork. The case study of San Francisco Oxtotilpan, in Mexico included focus groups with the main official and traditional authorities, a series of transects with local villagers and qualitative in-depth interviews analyzed and coded after the fieldwork thematically (see Calderon-Contreras, 2011,). The Cromer case study in the UK, involved semi-structured interviews with the fishing community, key informant interviews with government representatives, archival and secondary data analysis and questionnaires with visitors and residents (see White, 2015a).

Cromer is a coastal community in the East of England, with a traditional crab fishery, which historically supported thousands of fishermen and their families. The fishery remains important today although it has reduced in size to around 50 boats and 75 fishermen. Once more diverse in terms of target species, fishermen now specialise in a seasonal, small-scale crab fishery. Access to most UK fisheries became increasingly restricted through national fishing boat licences following signs of overfishing and stock collapses in the North Sea, in the late 1970s. In addition, high costs and the difficulty of the activity, together with the regulatory framework for fisheries, reduce the incentives for becoming fishermen (White 2015b). Over time, the traditional double-ended wooden beach boats typical of Cromer were replaced by fibreglass 'skiff', operated by one fisherman, or larger crewed boats from a few harbours. Access to the fishery is regulated through a shellfish license. However, the levels of exploitation are only limited by technological limits of fishing capacity and access to capital, markets and labour. However, fishermen have experienced stricter regulation over time, which have been imposed through a top-down decision-making process at regional, national and European scales. This motivated high levels of support from the fishing industry for leaving the European Union during the referendum, as campaigns promised to return sovereignty over their resources to British fishermen (Phillipson and Symes 2018).

In addition, communities have changed according to new social, demographic and economic dynamics. Housing in the region, has been lead by retirement and second home purchases. Also, the region is regarded as important for it potential as offshore wind energy producer, which contributes to national carbon emission reduction targets to fulfilling global climate change commitments. Resultantly, fishermen now increasingly compete for space over where to fish and perceive marine conservation as a further threat. Nevertheless, the Cromer crab fishery is still symbolically important and provides local employment through tourism. The fishery, the fishing families, and the wider economy it supports are considered by many in the community as resilient, due to their persistence and adaptation in the face of change (White 2018). However, a deeper analysis using a ToA lens reveals some of its hidden vulnerabilities tradeoffs.

San Francisco Oxtotilpan is a *Matlatzinca* indigenous village located in Mexico´s central highlands, with complex and deeply culturally rooted practices encompassing all sorts of knowledge about access to natural resources. It is located at the edge of the fourth highest volcano of Mexico (4600masl), the Nevado de Toluca. Being a former National Park, the Nevado de Toluca has long been considered important regionally, for its natural heritage and its provision of ecosystem services, including one of the largest forest reserves and fresh water reservoirs for Mexico City. The *Ejido* is the local community's land tenure system, characterised by a communal ownership of available land-based resources. In recent years, these traditional authorities and customary institutions have clashed with federal authorities, which have imposed strict regulations, especially over traditional extractive activities carried out for hundreds of years (Calderón-Contreras 2011).

San Francisco Oxtotilpan is a good example of a SES with a wide array of livelihood strategies carried out by local communities, in their struggle for persisting and adapting to the uncertainty

of social-ecological change. Agriculture and forest activities still represent their main source livelihood and identity as an indigenous group; however, climate change, economic and political crises and the influence of external pressures such as the introduction of Genetically Modified Organisms (GMOs), migration and loss of cultural traditions represent the main sources of vulnerability.

Case study comparisons

Table 1 shows the different pressures that each case study community has been responding to, particularly since the 1990s, and how property and rights-based access mechanisms have governed the SES. For instance, while access to natural resources in both cases are mediated through formal legal mechanisms (fishery licensing and land titling), more informal and customary claims also mediate mechanisms of access by which local communities can maintain the flux of benefits from resources in the face of change. It is often the differences in these claims that lead to conflicts.

Over the past few decades, the area in which the Cromer Crab fishery operates has shifted from an open access regime, to one based on limited and structured access to a public resource in the context of Marine Spatial Planning. The case of San Francisco Oxtotilpan is slightly different. In 2013 the federal government passed a law that that changed the Nevado de Toluca from a more restrictive and exclusionary National Park into a more flexible protection regime, opening the possibility that external actors from the State and private companies increase their claims and stakes over the locally available resources, such as forest and agricultural land and their consequent ecosystem services. These changes in resource property and ownership have profound implications for the resilience of these SES.

(INSERT TABLE 2 HERE)

Our analysis of access mechanisms reveals that resilience cannot be considered as a definitive end, or a desired state (Table 2). Regardless of the case, structural and relational mechanisms access mechanisms can interact to foster or hinder resilience through diversity, connectivity and feedbacks. This builds from Adger's definition of resilience as "the *ability* of a system to withstand shocks to their social infrastructure" (2000:361); an approach that recognises that resilience is a characteristic of SES, one that should not be normative or imposed from outside of the system. The analysis of case studies offer illustrations of what resilience constitutes for different community members at different scales, and the tradeoffs produced between them. Although the following analysis is structured in subsections, it does not imply that different access mechanisms act in isolation to each other. This builds on Ribot and Peluso's (2003) recognition that mechanisms of access – categorised as structural and relational- are interrelated. In particular, relational access mechanisms force attention on the internal workings of communities and their relational dimensions, which are important for enhancing SES resilience theory. The following subsections illustrate these points by linking the three properties of resilience with the structural and relational mechanisms of access.

Diversity through Access to Technology, Capital, Markets and Labour. Technology and capital, markets and labour have the potential to influence resilience, for example through shaping the diversity of options for community members to carry out their livelihoods. In the Cromer Crab fishery case study, improvements in technology (boat and fishing gear) have meant that access to fishing resources has become faster and requires less effort. It has led to two strategies, which have enabled fishing households to respond to social, regulatory and economic pressures. The first strategy has been to expand the fishing business purchasing larger boats and

employing crew. The second strategy has been downsizing to smaller boats with automated fishing gear, reducing costs by replacing the need for a crew. This strategy responds to a shortage of labour and increasing difficulties in earning an income sufficient for more than one wage. The tradeoff in this strategy is that it has reduced labour opportunities even further by reducing the number of crew. These two strategies are also linked to accessing markets. While the larger boats tend to focus on selling larger quantities to a fewer number of factories, the smaller boats add value to their smaller catch through processing and selling to a larger, more diverse range of customers, making use of different markets.

Historically, diverse and flexible labour opportunities in the wider economy were important for fishermen to maintain a stable income all year, enabling fishermen to be resilient to environmental or market fluctuations. However, increases to cost of living and an increasingly globalised economy mean that stability may be favoured over flexibility, especially for newer fishing households and families. While fishermen's agency and the type of livelihood strategy they have adopted depend on access to capital, it is also influenced by relational household characteristics and life-course. For instance an older and established fishermen will have very different motivations and needs shaping their livelihood choices compared to a younger fishermen new to the industry, with a family to support.

In the Mexican case study, technology may hinder resilience by reducing the diversity of certain SES elements. For instance, the introduction of GMOs and subsidised agricultural inputs is a type of technology that reduces the diversity of staple agricultural products. Corn varieties and other diverse products such as mushrooms and other non-timber products have specialised temporalities for commercialization. Those community members with the possibility to migrate seasonally and employ themselves outside the community can better resist the impacts of the

increasingly unprofitable agriculture and forest activities. On the other hand, community members with fewer sources of capital, and relying on single-product markets, or on monoculture and GMOs may be locked in an undesirable livelihood characterised by poverty and marginalisation.

Feedbacks through Access to Knowledge and Authority. By shaping governance processes, authority can play a key role in the resilience of the SES, which has knock-on effects or feedbacks on livelihoods, practices and on the deployment of local knowledge. For the case of San Francisco, although heavily dependent on their local traditional indigenous authorities, the lack of official recognition of their own ability to manage their resources forces community members to follow regional and national policies. Often these policies neither consider the local distribution of authority, nor the importance of the traditional knowledge encompassing their access to resources, ultimately resulting in an obstacle for SES resilience.

Similarly in Cromer, fishers learn where to fish and how to navigate at different times of year and in different conditions based on experiential and inherited local knowledge from other fishers. However, international and EU related health and safety requirements are perceived as an impediment to the process of recruitment younger men into fishing because they prematurely formalise access into fishing. The remoteness at which decision-making occurs heavily constrains fishermen's agency. Ultimately, structural and relational mechanisms severely limit local fishermen to influence regional, national and international institutions that govern the resources they depend on or feedback their practice-based and experiential knowledge.

Both cases illustrate specific feedbacks between people's ability to learn and share information including traditional knowledge and their responses to shocks. These types of feedbacks rely not

only on the local knowledge of the ecological characteristics of the resources, but also the governance and practices around their access. In Cromer, as boats have downsized, fewer young men are entering the fishing industry, inevitably resulting in less experience sharing. As this continues, the continuity of the fishing industry is threatened due to traditional knowledge loss (White 2015b). A similar process occurs in San Francisco, where the loss of the indigenous language accompanies the disappearance of traditional practices regarding the use of specific resources, such as the use of medicinal plants, or picking and selecting mushrooms according to their taste, use or seasonality (Calderón-Contreras 2011).

Connectivity through Access to Social relations and Identity. Social relations and identity form the basis for connectivity and social networks within a community, which shape SES resilience. For both cases, social support, usually through kinship and social relations, is crucial to the choice of livelihood strategy. However, the power dynamics and inequalities within communities influence the relational mechanisms of access, which determine who can derive benefits from resources, when and how. Connectivity, in this sense, may also be problematic for certain community members due to the concentration of power by specific individuals, or elite capture.

Fishing businesses rely on good working relationships and trust, particularly because of the risks involved, and the changing and uncertain weather conditions, which impact both on safety and access to fishing resources. A shared occupational identity, which connects different fishermen through sense of solidarity, acts as a key mechanism for ensuring safety at sea, regardless of the level of competition or rivalry that may also exist. Relationships within the wider community are also key to enabling, maintaining and controlling access to particular customers within markets. Newcomers to the fishing industry may find it difficult to establish their own customers– not

because the market is saturated but due to the dominant and monopolising strategic alliances certain community members have established.

As an indigenous community, the shared identity of members of San Francisco Oxtotilpan is the main trait of connectivity. Identity is an access mechanism enables local farmers to participate in communal work, make livelihood decisions as to how to face environmental hazards such as wildfires, droughts, or plagues, and how to support community members in need. Access to labour also heavily relies on social connections. For landless community members in San Francisco, social relations are often the only way by which they can access agricultural land, enabling gaining their subsistence and their contribution to the functionality of the whole SES. These illustrations support the notion that although sharing an indigenous identity, or a fishing identity, not all members of these communities are the same interests and have the same access to the resources. Patterns of access depend directly on the nature of social relations and how these enable them to connect to each other and cooperate or not.

As the two case studies show, gaining, maintaining and controlling access to resources is dependent on access through technology, capital, markets and labour. This access can enable or limit resilience processes. In particular, the availability and access to capital by community members, built up over generations, shapes options available for livelihood adaptation. For instance, access to capital often has an impact on the options particular households have to access technology, labour and markets. This shapes their vulnerability to shocks including environmental hazards or economic crisis in unequal ways. Access to markets, labour, technology - and indeed capital - are mediated by relational mechanisms including identity and social networks, which are, in turn, shaped by power and status within the community – for

instance belonging to a fishing family, or having members of the family that can diversify their income through migration.

Conclusion

As SES resilience has become increasingly popular in policy and academia, there is a growing literature highlighting its limitations in real-world empirical case studies due to its mainly theoretical and often normative nature. Researchers and practitioners have highlighted the dangers of the 'dark side' of resilience, particularly when considered as a final outcome or a 'desired' goal (Leach, 2008; Blythe et al., 2018). We have classified these criticisms into four theoretical gaps that represent obstacles for implementing resilience as an empirical framework for understanding the complex dynamics of social-ecological systems. Addressing these gaps might allow us to better understand how social-ecological transformations are followed by slow and incremental change, or fast and unexpected processes of destruction and reorganization.

The empirical cases used in this paper demonstrate that when a more socially disaggregated view of communities is taken, it leads to a re-examination of the importance of power in governing responses to change, and highlights the tradeoffs which inevitably occur as particular individuals or groups gain, lose or maintain control over resources in a community. We argue, along with other scholars (see Cote and Nightingale, 2012; Brown 2013 and 2015) that resilience theory requires a more grounded exploration of issues of dependency, the role of agency and the tradeoffs between winners and losers from social ecological change. Ribot and Peluso´s (2003) Theory of Access allows these gaps to be addressed, not by characterising communities as resilient or not, but rather by opening up the possibility of asking more meaningful questions

about the role of feedbacks, connectivity and diversity in social-ecological change through an examination of power and inequality.

We argue that SES resilience is a useful framework for understanding of how people respond to change. Nevertheless, we also recognise its need for theoretical complementarity regarding the inclusion of a better understanding of the importance of power dynamics, values and agency in the internal social dynamics of the system (Lebel et al. 2006; Leach, 2008, Brown 2013). To achieve this complementarity, we explored how the ToA can illuminate an understanding of the interplay of the three central properties of resilience (diversity, feedbacks and connectivity) at the local level. We illustrated, through two empirical cases, that Ribot and Peluso´s (2003) ToA offers insightful references to complement resilience theory by bridging the gaps identified and having a more nuanced focus on the importance of scale.

The ToA provides an insightful framework for recognising power relations of different stakeholders at different scales involved in the resilience of SES, and how these play out at the community level. Regarding this specific aspect, the ToA and SES may be regarded as complementary. While the ToA does not attempt to explain the role of scale when it comes to access, SES resilience is more sensitive to this, recognising that scale is paramount for understanding the different strategies put in place for dealing in responding to fast and slow shocks. Scientific approaches and real-world interventions based on SES resilience need to recognise the importance of the distribution of power relations and agency. The ToA deepens the notion that social-ecological transformations are contingent on the distribution of power and agency at different scales, and thus, produce socially differentiated outcomes. The analysis presented here highlights the need for further exploration as to how the social dynamics of SES are paramount for producing (or eroding) resilience, and the extent to which SES resilience may

be complemented for better understanding its role in a world characterised by uncertainty and change.

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