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Properties and projects: Reconciling resilience and transformation for adaptation and development

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ABSTRACT

Resilience has surged to the forefront of conversations in the increasingly intertwined development and adaptation communities of practice. However, their use of this concept lacks an implementable vision of the connection between resilience and the sorts of transformations that are central to their goals. Instead, these communities implicitly privilege stability and persistence, a framing that neither represents the current state of resilience thinking in the literature, nor addresses the substantial body of critique concerned with the lack of attention to agency, power, and difference in resilient systems. In this paper, I argue that this state of affairs is a symptom of an approach to transformation in practice that lacks an explicit theorization of agency, power, and difference in socio-ecological resilience. To address this issue, I offer one such theorization, framing resilience as the outcome of context-specific socio-ecological projects manifest in livelihoods and aimed at achieving safety and stability for the widest number of people. By employing the Livelihoods as Intimate Government approach, which makes power relations, social difference, and agency central to explanations of observed livelihoods decisions and outcomes, this theorization identifies dynamics of socio-ecological resilience distinct from those of purely ecological resilience. I illustrate these distinctions through various cases in the literature, including studies of development projects, agrarian livelihoods, and socio-ecological system dynamics, and from these illustrations suggest larger lessons about socio-ecological resilience. Among these lessons is a clear message for the development and adaptation communities of practice: the path to the transformative goals of these communities lies in a focus on alleviating shocks and stresses on socio-ecological projects, as opposed to merely addressing their material outcomes.

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1. Introduction

While resilience has been of long-standing interest among researchers studying ecological and socio-ecological systems, the concept has recently surged to the forefront of development and adaptation conversations (Sudmeier-Rieux, 2014). This *resilience turn* can be traced in part to the failure of development and humanitarian organizations to effectively anticipate and respond to the 2011 Horn of Africa Famine (e.g. Lautze, Bell, Alinovi, & Russo, 2012; Haan, Devereux, & Maxwell, 2012; Majid & McDowell, 2012; Hobbs, Gordon, & Bogart, 2012; Building Resilience, 2012). This famine and subsequent events that produced similar outcomes in the Sahel and South Sudan (e.g. Grist, Mosello, Roberts, & Hilker, 2014; Boyd et al., 2013), have opened conversations about how to avoid such poor outcomes. These conversations rest on long-standing questions about how to build back

better in the context of humanitarian response, efforts to reappraise risk reduction strategies that focus on a single driving stressor, and the connection between vulnerability reduction, adaptation, and development (e.g. Béné, Newsham, Davies, Ulrichs, & Godfrey-Wood, 2014; Boyd et al., 2008; Cannon & Muller-Mahn, 2010; Folke et al., 2002; Gaillard, 2010; Jerneck & Olsson, 2008; Kelman, Gaillard, Lewis, & Mercer, 2016; Kelman, Gaillard, & Mercer, 2015; O'Brien, 2012; O'Brien & Leichenko, 2000; Okpara, Stringer, & Dougill, 2016; Pelling, 2011; Schipper & Pelling, 2006).

This burgeoning interest in resilience has, at its heart, a desire to better understand the root causes of acute and chronic development/adaptation challenges. How researchers and practitioners frame resilience shapes this understanding. Is resilience an individual capacity, an inherent part of the lives and livelihoods of the global poor, or something the poorest and most vulnerable lack? Is it an emergent property of a complex system, the product of conscious agents' decision making and actions, or something

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in-between? The answers to these questions are critical, as they will shape future development and adaptation interventions employed to secure and enhance the well-being of poor and vulnerable populations.

Until now, the increasingly intertwined communities of practice in development and adaptation have taken up resilience in a metaphorical manner, drawing on broadly ecological framings that regard resilience as a measure of the persistence of a system state in the face of disturbance (e.g. Holling, 1973; Walker, Holling, Carpenter, & Kinzig, 2004; Standish et al., 2014; Carpenter, Westley, Turner, Carpenter, & Turner, 2005; Cumming, 2016; Gunderson, 2000). These communities define resilience as, for example, “the ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth” (USAID 2012:5), “the ability of systems to function in the face of disturbance” (Bahadur et al., 2015:5) or the “capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure while also maintaining the capacity for adaptation, learning and transformation” (Masson-Delmotte et al., 2018: 557).

In privileging persistence, these communities have perhaps unwittingly embraced a conservative framing of resilience, one that obscures the role of the social, economic, and political processes that shape resilience outcomes by “endogenizing the role of social institutions in the wider environment” (Adger, 2000: 351; see also MacKinnon & Derickson, 2013; Porter & Davoudi, 2012; Weichselgartner & Kelman, 2015). However, this framing of resilience is neither necessary nor inevitable (Joseph, 2013:52). First, within the context of both ecological and socio-ecological systems, discussions about what constitutes resilience have evolved considerably since Holling’s foundational work. No longer do researchers uncritically privilege stability and persistence. Instead, the field has broadly adopted Folke’s (2006:259) argument that “resilience is not only about being persistent or robust to disturbance. It is also about the opportunities that disturbance opens up in terms of recombination of evolved structures and processes, renewal of the system and emergence of new trajectories.” Second, a growing body of critique has focused on the relatively shallow theorization of the social in discussions of socio-ecological resilience (e.g. Armitage, Béné, Charles, Johnson, & Allison, 2012; Barrett & Constan, 2014; Béné et al., 2014; Beymer-Farris, Bassett, & Bryceson, 2012; Brown, 2014; Brown & Westaway, 2011; Cannon & Muller-Mahn, 2010; Cote & Nightingale, 2011; Cretney, 2014; Crona & Bodin, 2010; Davidson, 2010; Mendoza, Czerny, Pineda, & Rojas, 2015; O’Brien, 2012; Pelling & Manuel-Navarrete, 2011). Béné and his co-authors (2014: 606) define this challenge in stark terms, arguing that current framings of socio-ecological resilience are marked by an “inability to appropriately capture and reflect social dynamics in general and issues of agency and power in particular.” Relatively little work has answered these explicit and implicit calls for a more robust theorization of the social in resilience (c.f. Cote & Nightingale, 2011).

These two trends in contemporary resilience thinking, toward considerations of transformation as inherent to resilience, and toward a more robust framing of the social in resilience, are linked in that social factors are often seen as the catalysts of, or barriers to, transformation in resilient socio-ecologies. In the absence of explicit resilience theory that informs an approach to transformation in practice by providing, for example, “an entrée into the ‘social’...that moves beyond material assets, economic incentives, and individual rational behavior” (Armitage et al., 2012), the communities of practice around development and adaptation have been slow to take up the notions of transformation and new trajec-

tories in their framing of resilience. While guidance from organizations like USAID does not exclude or ignore transformation, in the policy and practice of development and adaptation, discussions of transformation emerge when resilience is seen to provide the “the enabling environment for systemic change” (Frankenberger, 2017: 5). What remains unsaid is how resilience might enable socio-ecological change: what is enabled, for whom, and how? This is a significant gap in conceptualization that leaves the role of resilience in both development and adaptation vague and uncertain.

In this article, I build on prior efforts to shift framings of the social in socio-ecological systems from often-functionalist constructions of social dynamics and institutions to one where questions of and struggles over who and what should be resilient, and to what they should be resilient, are integral to observed socio-ecological outcomes (e.g. Beymer-Farris et al., 2012; Brown, 2014; Cote & Nightingale, 2011; Duit, Galaz, Eckerberg, & Ebbesson, 2010; Forsyth, 2018; Matin, Forrester, & Ensor, 2018; Weichselgartner & Kelman, 2015). This paper offers an explicit theorization of resilience that, in its attention to the role of agency, power, and social difference, provides novel insights into the role of development and adaptation interventions in the transformation and stability of resilient socio-ecologies. Such theorization is possible when we disentangle two different resiliences conflated in development and adaptation practice. As noted above, the dominant framing of resilience in these communities of practice is one of a property of a complex system that emerges spontaneously from the interplay of components of that system,¹ often obscuring the role of human agency, power relations, and social difference in the dynamics of resilient socio-ecologies. Social resilience is fundamentally different, characterized by the persistence and stability of social structures and their associated power relations (see various perspectives on this framing from, for example, Beymer-Farris et al., 2012; Cannon & Muller-Mahn, 2010; Cote & Nightingale, 2011; Coulthard, Johnson, & Mcgregor, 2011; Cretney, 2014; Crona & Bodin, 2010; Davidson, 2010; Matin et al., 2018; Pelling & Manuel-Navarrete, 2011). Put another way, the ways in which the development and adaptation communities of practice have taken up resilience implicitly or explicitly treat it as a *property*. This obscures the ways in which socio-ecological resilience is a *project* of managing both social and natural processes to create and maintain particular socio-ecological states that further specific goals of those living in that system, particularly the goals of those whose authority provides them with privileges not enjoyed by others. Treating socio-ecological resilience as the outcome of a project governing the social and natural world to particular actor- and context-specific ends opens the intellectual space to explicitly and productively theorize the role of the social in resilience, addressing how and for whom it is constructed, maintained, and transformed in the context of development and adaptation interventions.

I begin with a brief review of the narrow framing of resilience, as a *property* of natural and socio-ecological systems, taken up by the development and adaptation communities of practice. I then turn to the literature critiquing this framing, identifying explicit theorizations of the social in socio-ecological resilience as a critical gap in theory inhibiting the uptake of transformation in the practices of both communities. Drawing on prior work on agrarian livelihoods in Ghana, Mali, Senegal, and Zambia, I demonstrate that the resilience of such livelihoods is a manifestation of a larger socio-ecological project aimed at achieving material safety and stability, a project that privileges the stability of existing social order

¹ An interesting question that lies beyond the scope of this article is that of why development and adaptation efforts have taken up this particular framing. One possible explanation is the high degree of convergence between this framing of resilience and the neoliberal emphasis on individual responsibility, as discussed by Jonathan Joseph (2013), MacKinnon and Derickson (2013), and Davoudi (2012).

as a means to this end. I then illustrate the ways in which this understanding of resilience explains observed outcomes of development and adaptation interventions, particularly why some can do lasting damage while others have little or no lasting effect. Finally, I discuss the implications of this framing of resilience in agrarian socio-ecological systems for future development, adaptation, and resilience interventions.

2. Resilience: From emergent property to socio-ecological outcome

The concept of resilience has animated conversations in the ecological sciences since the 1960s. Holling (1973) and other biophysical scientists have used this concept in an attempt to move beyond framings of natural systems that emphasized stability at the expense of understanding nonlinear systems in a state of non-equilibrium. Resilience provided a means of characterizing the persistence of system states despite evidence for the continuous variation of their constituent parts. Since then, ecologists have approached resilience from a number of perspectives (see, for example, the reviews in Davoudi, 2012; Folke, 2006; Folke, Carpenter, Walker, Scheffer, & Chapin, 2010; Gunderson, 2000; Peterson, Allen, & Holling, 2002). Of particular relevance to the adaptation and development communities of practice is the changing emphasis on transformation in this literature. Where in its earliest stages the literature privileged stability and persistence in its framing of resilience, today Folke's (2006) argument that resilience is not only persistence in the face of disturbance, but also about the opportunities for transformation that disturbance creates, is widely held (e.g. Allen & Holling, 2010; Folke et al., 2010; Gelcich et al., 2010). The source of transformation in such systems is often framed as exogenous to the system (Bene et al., 2011; Brown, 2014), and where endogenous transformation appears in this literature, such transformation is itself emergent, subject to thresholds, and therefore difficult to predict (e.g. Scheffer et al., 2012; Scheffer, Carpenter, Dakos, & van Nes, 2015; Scheffer, Carpenter, Foley, Folke, & Walker, 2001; Walker & Meyers, 2004; Suding & Hobbs, 2009; Hughes, Linares, Dakos, van de Leemput, & van Nes, 2013). Therefore, while the literature on ecological resilience is vast and contains significant ongoing debates around definitions and fundamental framings of system dynamics, discussions of transformation rest on a framing of resilience as an emergent *property* of a natural system determined by, for example, the complex and shifting relationships between predators and prey; fluctuations in drivers such as temperature, precipitation, and fire; and the impact of spatial heterogeneity on the decline and recovery of particular species and biotic relationships in the system.

As conversations around resilience expanded beyond natural systems into socio-ecological (or social-ecological) systems, researchers reframed their conceptual understanding of resilience to account for the impact of human agency (for reviews of these conceptual shifts, see MacKinnon & Derickson, 2013; Davoudi, 2012; Sudmeier-Rieux, 2014; Weichselgartner & Kelman, 2015; Kelman et al., 2016; Mitchell & Harris, 2012). Such work exhibits a tension between framing resilience as an emergent property of a complex system and the recognition that humans are “unique in having the capacity for foresight and deliberate action,” (Walker et al., 2006:3, see also Béné et al., 2014; Cote & Nightingale, 2011; Davidson, 2010; Duit et al., 2010). This tension led Walker et al. (2006: 3) to suggest that “self-organization in complex social-ecological systems is therefore somewhat different from that in ecological or physical systems,” which makes it “unclear whether a common framework of system dynamics can be used to examine and explain both social and ecological systems.” Cote and Nightingale (2011: 479) are more pessimistic,

arguing “the reliance on ecological principles to analyse social dynamics has led to a kind of social analysis that hides the possibility to ask important questions about the role of power and culture.”

A growing literature points to the critical gaps in our knowledge of social dynamics in socio-ecological systems that make it difficult to explain observed outcomes, including transformation. First, the literature expresses concern for the paucity of attention resilience thinking gives to power in particular socio-ecologies. Pelling and Manuel Navarrette (2011: 1182) observe “there is a lack of theory and few empirical cases with which to explore... the role of power in shaping when and how transformations occur, who the winners and losers are, and implications for adaptive capacity” (see also Cote & Nightingale, 2011; Cretney, 2014; Matin et al., 2018). Crona and Bodin (2010: 2) argue that this lack of attention to power persists “Despite its documented impact on social outcomes.” A second, and closely related, body of critique focuses on the question of agency in resilient socio-ecologies. Davidson (2010: 1142) suggests that the resilience literature has struggled with agency because it “defines an additional conceptual layer not present in ecological systems, and consequently not reflected in ecological theories of resilience” (see also Bene et al., 2011; Brown, 2014; Cretney, 2014). As a result, “although more recent analyses highlight the role of self-efficacy, articulated with respect to power/powerlessness and self-belief in one's own capacity or social identity in adaptive capacity, agency remains a “black box” in much environmental change literature” (Brown & Westaway, 2011: 326; see also Cote & Nightingale, 2011). A third body of critique focuses on the role of social difference in socio-ecologies, which is often obscured by the systems approach that characterizes resilience thinking (Brown, 2016; Forsyth, 2018; Matin et al., 2018). This need to understand the role of social difference in socio-ecologies is critical because, as Nelson and his co-authors (2007: 413) observe, a critical question for resilience and adaptation is how “diverse, and possibly incommensurable, values mediate social goals for adaptation.” Duit and his co-authors (2010: 365) argue that the “assessment of resilience in social-ecological systems should therefore not only consider the most general system level, but also take into account possible trade-offs and asymmetries in resilience between different groups and communities within the system.” Yet in a later review Brown (2014: 107), found “there is still relatively little analysis of social difference and resilience.”

Despite this growing body of critique, the role of identity, core values, worldviews, agency, institutions, and power relations persistently appears in the literature under “areas of explorative work” (Folke et al., 2010), with efforts to fill this gap forever receding to the horizon (with the notable exception of Cote & Nightingale, 2011). Armitage and his co-authors (2012: 11) argue that this situation has come about because “Resilience thinking is (or has been so far) principally influenced by ecological principles and operates essentially at system and subsystem levels” (see also Bene et al., 2011; Béné et al., 2014; Brown, 2014). Further, this framing tends to focus on socio-ecologies that are “disturbed by external or exogenous forces, so it underplays the internal, endogenous, and social dynamics of the system” (Brown, 2014: 109). It is therefore not surprising that “agency, values, and aspirations, which are of central importance in understanding human behavior in relation to the environment, are not yet fully integrated in current approaches” (Armitage et al., 2012: 10–11). The continuing treatment of the social as a site where knowledge gaps are identified but not addressed has produced a situation where, in the words of Barrett and Constan (2014:14628), “the least well understood features of system structure are the nonmaterial relations of solidarity, social exclusion, power, and other sociocultural phenomena.”

Given the pervasive framing of resilience as an emergent property of a system, and the very limited efforts to theorize and operationalize approaches to power, agency, and difference in the context of socio-ecological resilience, it is of little surprise that the development and adaptation communities of practice struggle to reconcile resilience with transformation. These communities of practice take as their fundamental framings the importance of human agency, and the need to mobilize it to make changes in the world that address particular problems. In the absence of explicit theory that links agency, power, and difference to transformation, these communities have implicitly adopted framings of the relationship between resilience and improvements in human well-being that privilege persistence and stability. For example, in a “Resilience Methodological Guide” produced for USAID, Frankenberg (2017) argues that the measurement of resilience requires understanding transformative capacity. To Frankenberg (2017:5), “Transformative capacity involves the governance mechanisms, policies/regulations, infrastructure, community networks, and formal and informal social protection mechanisms that constitute the enabling environment for systemic change.” This capacity is evaluated by metrics such as availability of/access to formal safety nets; availability of/access to communal natural resources; availability of/access to basic services; and the availability of/access to agricultural extension services. In this sense, resilience is linked to transformation when resilience provides “the enabling environment for systemic change” (Frankenberg, 2017: 5). However, this framing does not suggest a pathway to transformation, or any means of evaluating whether potential or ongoing transformations are furthering the development goals of individuals, communities, or organizations. Indeed, some parts of the development and adaptation communities of practice working on resilience are marked by a degree of pessimism with regard to the transformative potential of resilience programming. For example, Villanueva and her co-authors (2017:8), in a summary document for DfID’s Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) Program, observe that “when communities themselves are given the responsibility to define their own resilience priorities, some choose to only focus on building resilience capacities to deal with immediate threats” instead of focusing on longer term challenges that might require transformative change. Villanueva and her co-authors do not explain this particular focus or its sources, but at least implicitly seem to suggest that as a result of this tendency, community-defined resilience projects may not have produced outcomes as meaningful as other initiatives.

3. Reframing socio-ecological resilience for agrarian development and adaptation

Although socio-ecological systems are complex and subject to emergent properties, this complexity does not remove the possibility of agency shaping their dynamics and outcomes (Armitage et al., 2012; Bene et al., 2011; Béné et al., 2014; Brown & Westaway, 2011; Coulthard, 2012; Davidson, 2010). However, as Cote and Nightingale (2011) argue, recognizing and engaging with this agency requires a shift from the often-functional assumptions about the role of the social in complex socio-ecological systems to one that gives much greater attention to the role of power, social difference, and the production of socio-ecological subjects. To signal this shift in emphasis, I have been using the term “socio-ecologies” instead of socio-ecological systems. I do so to decenter the primacy of the system in the explanation of socio-ecological dynamics, instead placing emphasis on the ways in which these dynamics reflect the agency of different people with

different knowledge, authority, and experiences of that system as they negotiate its complexity through their everyday lives.

The need for such reframing is particularly apparent in agrarian contexts where the connection between the social and the ecological is particularly direct and pronounced. As I have argued elsewhere (Carr 2013, 2014), livelihoods decision-making in agrarian contexts involves the continuous negotiation of a wide range of factors and pressures, some better understood than others (Fig. 1). This framing of agrarian socio-ecology invokes Gunderson’s and Holling’s (2002) panarchy of connections and scales shaping socio-ecological systems. As complex and indeterminate as some of these socio-ecologies might be, this complexity must be navigable for those living in them, as agrarian populations make important decisions every day, ranging from selecting crops and establishing planting schedules, to deciding who is responsible for what activities. If those navigating this complexity fail to make these decisions appropriately, the result can be disaster, especially for individuals and populations with few financial or material assets. That these individuals and populations persist under such conditions of stress and uncertainty suggests that they are rendering this complexity navigable, and the manner in which they do so allows for reasonably effective decisions that produce outcomes that preserve human well-being. They have a “good enough” understanding of the critical factors and decisions that produce the observed properties and outcomes of their socio-ecologies to allow for such negotiation, a version of the *rule of hand* (Holling, 2001; Walker et al., 2006; Walker, Sayer, Andrew, & Campbell, 2010) seen in the socio-ecological resilience literature – they know which limited set of factors have the greatest impact on socio-ecological dynamics, or at least those dynamics which they care about most.

Where I depart from Gunderson and Holling, and join the critical literature interrogating constructions of the social in socio-ecological resilience, is in my understanding of the controlling variables in an agrarian socio-ecology. Several years ago, I noted that the livelihoods of agrarian communities in Ghana’s Central Region were extraordinarily resilient to economic and environmental shocks and stressors – indeed, perhaps overbuilt for such situations because failure could be so catastrophic (Carr, 2011). However, that resilience is marked by a balance between material goals, such as the secure access to subsistence, and social goals, especially the desire of the powerful to retain their privileges (Carr, 2008, 2011). Further, I presented evidence that above very, very low material thresholds (i.e., starvation), livelihoods decision-making prioritized social goals over material goals, providing structure to the panarchy of livelihoods that results in resilience which benefits particular activities and people more than others. This basic finding about the tension between material and social goals in livelihoods has since been observed across eleven livelihoods zones in diverse contexts including Mali (Carr and Owusu-Daaku, 2016; Carr and Onzere 2018), Senegal (Carr, et al., 2016), and Zambia (Carr, et al., 2015a). This tension suggests that in these socio-ecologies, environmental management is never just about the environment. It always implicates “the social”, and more often than not efforts to negotiate environment and ecology are principally decisions about how to manage society. Put another way, from the perspective of those living in a particular socio-ecology, “not all risks are exogenous to the system. Some of the risks most salient to the prospect of collapsing into chronic poverty are intrinsic to the structure of a community, especially to the institutions that confer differential power among people and enable some to benefit from others’ misfortune” (Barrett & Constan, 2014: 14628; see also Armitage & Johnson, 2006; Cote & Nightingale, 2011). The presence of this tension in diverse settings has significant implications for how we understand the sources of resilience in agrarian



Fig. 1. A conceptual map of the complex, panarchic landscape of livelihoods decision-making (after Carr 2014b). While such a map may appear to be analytically intractable from outside the socio-ecology at hand, individuals chart paths through this complexity every day with considerable success, suggesting the need to better understand their decisions if we are to understand their resilience.

socio-ecologies, as well as the opportunities and challenges that resilience presents those living in these contexts. However, we cannot see and address critical social dynamics that produce observed socio-ecological outcomes without a theorization of resilience that accounts for power, agency, and social difference (Cote & Nightingale, 2011).

3.1. An alternative framing: livelihoods as socio-ecological projects

One means of approaching the tension between the material and social goals that shape resilient agrarian contexts is through livelihoods. In the broadest sense, livelihoods are manifestations of fundamental framings of how people should live in particular places (Carr, 2013; Scoones, 2009). Seen in this light, livelihoods are more than efforts to obtain the material necessities of life; they invoke questions of meaning and identity that give order to the world (Bebbington, 1999). Thus understood, livelihoods are projects of what Agrawal (2005) calls intimate government – individual-, household-, and community-scale efforts to organize the diverse motivations and actions of a population such that the world is set on a path toward specific, if shifting and sometimes contradictory, goals. Agrarian livelihoods reflect the government of a world defined by the power-imbued socio-ecology of everyday life, and the goals that the world is set on a path toward are never fully social or ecological. This framing of livelihoods is a departure from that seen in recent literature on “resilient livelihoods” (e.g. Davies et al., 2013; Sallu, Twyman, & Stringer, 2010; Tanner et al., 2015; Perez, Jones, Kristjanson, & Cramer, 2015), which explicitly or implicitly frame livelihoods as “the capabilities, assets (stores, resources, claims and access) and activities required for a means of living” (Chambers, 1991:6). This framing of livelihoods separates meaning from materiality in livelihoods adoption and transformation, narrowing the analytic lens and obscure the wider social context of livelihoods decisions and outcomes. Instead, I use the Livelihoods as Intimate Government (LIG) approach (Carr,

2013, 2014), and its focus on power, difference, and agency, to interrogate livelihoods as socio-ecological projects of government (henceforth referred to as “socio-ecological projects”).

Drawing broadly on literatures on governmentality (e.g. Appadurai, 2002; Dean, 1999; Foucault, 1991, 2007; Rose, 1993) and the subsistence ethic in agrarian livelihoods (e.g. Becker, 2000; Chayanov, 1986; Grigsby, 2002; Scott, 1976), LIG frames livelihoods as manifestations of socio-ecological projects aimed at managing the world to provide safety and certainty to the largest number of people possible. Such projects emphasize stability, which tends to reinforce existing relations of power and the privileges they grant to those in positions of authority, especially when these projects, their attendant livelihoods, successfully navigate shocks and stresses over time. These projects and their attendant livelihoods take shape at the intersection of three spheres of everyday life (Fig. 2). The first of these are discourses of livelihoods, which represent the ways of talking about and performing particular activities. For example, in Bambara communities in southern Mali, livelihoods are organized around agriculture, specifically the cultivation of rain-fed grains. The goal of this activity is to feed the family or extended concession for the entire year. Only when enough grain has been harvested to meet this goal is it acceptable to sell the surplus. The crop mix, which emphasizes millet as a hardy grain that can withstand typical variations in precipitation, and even the mix of varieties of the different crops reflect this broad goal. The ways in which individuals talk about and conduct other activities also reflects this socio-ecological project. For example, in this context non-farm employment (NFE) is not accepted as a principle means of earning income and obtaining food. In part, this is because NFE carries with it a new set of risks, like fluctuations in local and national labor markets, and the introduction of new risks to the context is contrary to the project of providing safety and stability. However, such activity is acceptable as a means of reducing uncertainty around grain production, by providing capital for inputs and tools.

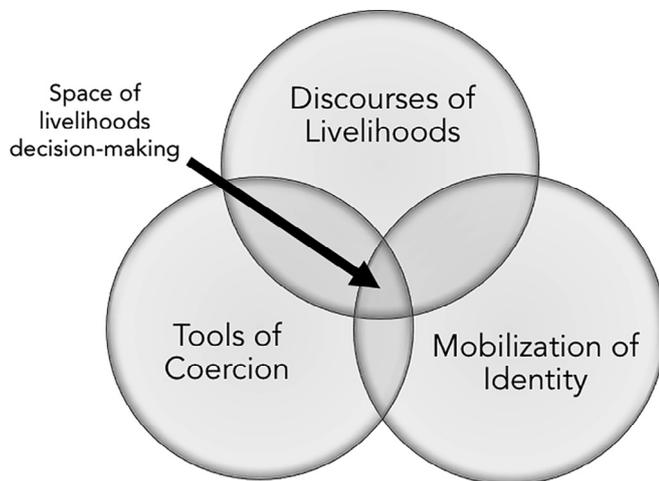


Fig. 2. Visualization of the space of livelihoods decision-making under LIG. These spheres of everyday life shift in their relationship to one another in different places and at different times, taking specific form in response to the risks and vulnerabilities the underlying socio-ecological project seeks to manage. Development, adaptation, and resilience interventions often place exogenous stresses on livelihoods, and their associated socio-ecological projects, reshaping their form.

The questions of what activities should be undertaken, and in what manner, invokes another question: who should undertake the activity? LIG's second sphere of everyday life, the mobilization of identity, answers this question. As has been well-established in various social scientific literatures, and has been taken up in both the adaptation and development literatures, identity is situational and intersectional (discussions in the context of climate change adaptation include Carr & Thompson, 2014; Warner & Kydd, 1997; Arora-Jonsson, 2011; Harris, 2006; Tschakert & Machado, 2012; Tschakert, 2013; Brouwer, Akter, Brander, & Haque, 2007; Bee, Biermann, & Tschakert, 2013; Sultana, 2013). However, discourses of livelihoods mobilize specific roles associated with particular identities, and define responsibilities associated with these roles. This mobilization essentializes otherwise intersectional, situational identities, producing subjects that understand themselves and others with reference to the underlying socio-ecological project. These solidified identities, in turn, reinforce discourses of livelihoods, answering who should be undertaking a specific activity, and who has the authority to decide how to conduct that activity. Drawing again from the short Bambara example above, among these farmers the senior man at the head of the concession or household is the individual most responsible for cultivating enough grain to feed the family for the entire year (Grigsby, 2004). While such a man might be a father, husband, head of family, farmer, teacher, and wage laborer, in the context of agriculture each of these becomes defined with reference to the socio-ecological project of safety and stability. As the head of a concession, he is responsible for feeding everyone in that concession. As a husband, he feeds his wife. As a father, he feeds his children.

These first two spheres of everyday life reinforce one another powerfully, such that the appropriate mix and conduct of activities and the aspects of identity these activities mobilize into specific roles and responsibilities become "social facts," taken-for-granted assumptions about how to live the world that often stand outside emic critical analysis or questioning. In this way, livelihoods are manifestations of socio-ecological projects, binding environmental management, identity-related roles and responsibilities, and local understandings of appropriate actions to one another, defining appropriate ways of living in particular places.

However, social facts are never enough to ensure the stability of any socio-ecological project. Discourses are human constructions

of the world that are incomplete and therefore subject to stress or even rupture when expected outcomes do not materialize (Carr and McCusker, 2009). Even small stresses on discourses of livelihoods can turn into major challenges to a socio-ecological project, as livelihoods produce uneven outcomes and opportunities within a population. Those with fewer opportunities and less desirable outcomes have an interest in changing the way they live, and thus can leverage even small discontinuities between the claims of discourses of livelihoods and actual outcomes to challenge the existing social order. Such social challenges are often interpreted as threats to the safety and stability provided by the socio-ecological project. Efforts to address such threats are visible in the third sphere of everyday life – tools of coercion. These are the locally legitimate means by which individuals who deviate from the activities or practices expected under discourses of livelihoods, or who do not live up to the roles and responsibilities associated with their identity as mobilized by those discourses of livelihoods, are disciplined such that they return to conforming behavior and the threat they pose to safety and stability is addressed. Should the senior Bambara man described above decide not to cultivate grain and instead take up wage labor as his principle source of food and income, he is subject to sanctions because such actions, insofar as they introduce new risks to the household, concession, or community, and might bring about changes in men's roles and responsibilities, would represent a shift away from the existing socio-ecological project and its demonstrated ability to provide safety and stability through the cultivation of rainfed grains. These sanctions, which draw legitimacy from their construction as efforts to ensure safety and stability, range from mild rebukes from his peers in the community to the loss of decision-making authority in the concession to, in extreme cases, expulsion from the concession and family (Carr, et al., 2015b).

In this way, livelihoods are manifestations of socio-ecological projects. In agrarian contexts, individuals participate in and reproduce this project only insofar as it serves to ensure an acceptable degree of well-being, a goal that is widely recognized to be in the interest of all living under that project. This outcome is therefore a goal toward which the diverse interests within households and communities can be aligned, producing subjects with shared understandings of appropriate activities, the appropriate conduct of those activities, and the roles and responsibilities of different people vis a vis these activities. The failure to achieve this goal calls livelihoods, and their underlying socio-ecological projects, into question. Thus, the resilience seen in different agrarian settings, for example to flood, drought, seasonal variation in precipitation, or market instability, is not a property emerging from a self-organizing system. It is instead an outcome of one or more efforts to govern the world, a product of a *project* that works to (re)order and (re)organize the ever-emerging properties of that socio-ecology to ensure safety and subsistence to the widest number of people possible, which in turn legitimizes that project and its attendant social order.

3.2. Livelihoods, resilience, and agrarian change

The framing of agrarian livelihoods as socio-ecological projects has significant implications for our understanding of resilience in such contexts, and for development and adaptation programming that seeks to leverage existing resilience or otherwise build resilience as a means to development and adaptation goals. First, as has been noted elsewhere (e.g. Béné et al., 2014; Cretney, 2014; Davidson, 2010; Jerneck & Olsson, 2008; Mitchell & Harris, 2012; Nadasdy, 2007; Nelson, Adger, & Brown, 2007; Sudmeier-Rieux, 2014; Tanner et al., 2015; Walker et al., 2006; Weichselgartner & Kelman, 2015), resilience in socio-ecological systems is not inherently positive. It comes with various costs, and can create stable

socio-ecologies around political structures like dictatorships. By framing resilience not as an emergent property of a complex system, but as a project aimed at the organization and management of the world and its ever-emerging properties toward specific ends, we enable two things. First, we can clearly analyze the different costs that emerge around specific forms of resilience. Second, we can explain the persistence of such costs, particularly when they are borne by some members of a population more than others.

For example, in Ghana's Central Region, men constrain their wives' agricultural production, only sanctioning levels needed to ensure the material reproduction of the household via subsistence. The result is a distribution of agricultural land that is far from Pareto-optimal and therefore limiting of total yields at the household level (Carr 2008, 2011, 2013). This distribution is a manifestation of a particular socio-ecological project in which men are responsible for the material well-being of their households in a manner that, while navigating the uncertain environment and economy of this context, also ensures that their income and contributions are significantly greater than those of their wives. Failure to meet the subsistence needs of the household in this specific manner produces challenges not only to men's identities as providers and respected members of the community, but also to the material well-being of the entire household. The clan lineages to which men belong determine the amount of land each man's household will cultivate for the year, and if a man decides to distribute his household land allocation such that his wife's production and income approaches or exceeds his own, the leadership of that lineage can and will constrain future landholding and thus future access to food and income for both husband and wife. In this situation, land tenure becomes a tool of coercion which ensures that men distribute future landholding in a manner compliant with expectations. This tool of coercion helps to explain the persistence of an agricultural strategy which, while aimed at safety and stability, preserves existing gendered relations of power and privilege in a manner that is not only unequal, but actually limiting of the material returns on agricultural assets at the level of the household.² This coercion, and the larger socio-ecological project to which it belongs, is legitimized by the fact that, by and large, local livelihoods work to ensure basic subsistence in even the worst conditions, and therefore deviations from these livelihoods are threats to safety and stability (Carr, 2011). In the uncertain environmental and economic context of rain-fed agriculture in coastal Ghana, ensuring a baseline of security is no small achievement. However, this example highlights a cost of this resilience, the lost economic opportunity for women, an issue which invokes larger questions of justice and, given the importance of women's empowerment to the achievement of many development goals, the likelihood of identifying pathways to a more secure future under these livelihoods.

While agrarian livelihoods in Ghana's Central Region are framed around the achievement of safety and stability in uncertain conditions, and the resilience that emerges from the livelihoods described above is a means of meeting that goal, the conscious decision by well-informed actors (the men heading these households) to limit their wives' production is one that makes the achievement of subsistence more challenging and less certain. It

is only when we examine how the roles and responsibilities associated with different identities in these villages produce a set of agricultural practices, and understand how the land tenure system can function as a tool of coercion that further compels men and women to conform to their roles, that we can see how the resilience of this livelihood is about much more than the management of exogenous risk and uncertainty in this human-dominated ecology. Instead, it is a project within which ecological properties are given meaning and value, acted on accordingly, and in which the social mobility of women becomes a risk that might limit the achievement of the larger goals of the socio-ecological project.

3.3. Projects and properties: implications for development and adaptation programming

As development and adaptation policy and programming increasingly embraces resilience, it is urgent we understand that when invoking the maxim "resilience of what, to what, and for whom" (Lebel et al., 2006) in the context of socio-ecological systems, we are always talking about a socio-ecological project. Thus, when we talk about the resilience of a Wolof household in Senegal's Kaffrine Region to variable precipitation, we are talking about more than the resilience of the agro-ecology under specific forms of agricultural management to this variability. As among the Bambara in Southern Mali, Wolof men who head households are expected to provide food for their dependents. This responsibility is so deeply ingrained in the roles and responsibilities associated with men that the Wolof word for men's dependents, *surge*, translates to "one who is filled up" (Perry, 2005: 211). In the village of Ngetou Malik in Senegal's Kaffrine Region, Wolof men are expected to "fill" their dependents by cultivating millet and maize (Carr, et al., 2016). Wolof women in this village are discouraged from growing these crops because they are so important to men's identities as providers. While women provide labor for men's rainfed cultivation, their own cultivation efforts are directed toward irrigated gardening. Thus, in Kaffrine, any discussion of the resilience of agriculture to variable rainfall is a discussion of the resilience of men's production of *maize and millet*, and therefore simultaneously is a discussion of the resilience of men's authority over their households. A woman who attempted to cultivate these crops, even if doing so might make the material achievement of subsistence more secure, would call men's authority into question and challenge the larger socio-ecological project that defines both the appropriate conduct of agriculture and the roles and responsibilities of individuals vis a vis this activity. Such a woman would face a set of escalating sanctions, including verbal abuse, the loss of responsibilities (and therefore identity) in the household, and eventually social isolation that can result on the loss of access to food and other assets necessary for survival (Carr, et al., 2016).

4. Resilience and transformation in agrarian socio-ecologies

Up to this point, the emphasis of this article has been on that aspect of resilience that leads to the persistence of agrarian socio-ecologies in the face of shocks and stressors, with emphasis on better understanding their social dimensions. However, if development and adaptation are fundamentally about (potentially) transformative changes in people's well-being and way of life (Pelling, 2011), understanding the dynamics of change in resilient socio-ecologies becomes important. The question for the development and adaptation communities of practice is how, in the context of a socio-ecological project, new trajectories might evolve. Approaching this question via LIG offers a counterintuitive, potentially novel answer for which there is empirical support.

² I thank Tony Stallins for the observation that this scenario sounds like a Nash equilibrium, stable not because of its optimality but because the participants have particular understandings of the strategies of others that remove their incentives to change strategies. It is possible that many, if not all, socio-ecological projects will produce resilience with the potential for similar equilibria. While a full exploration of this idea is outside the scope of this article, it suggests that the question for those studying resilience in socio-ecological systems is not which strategy is optimal, but which of a set of "suboptimal" strategies is best. This, in turn, requires an engagement with the question of who determines what is best, and on what terms, which returns us to the foregrounding of power and knowledge at the heart of this article's approach.

A central challenge for resilience-building is recognizing the existing patterns of resilience that proceed from particular agrarian socio-ecologies and the opportunities and challenges they present. Understanding what practices and resources are resilient to what shocks and stressors is a critical component of resilience-building, adaptation, and, one might argue, development in an era of climate change and global market integration. When an adaptation or development intervention is programmed, it intersects with the existing socio-ecological project in that agrarian context. If these interventions are to contribute to improved human well-being over time, they must walk a tightrope between two extremes. The first is to break up existing livelihoods to create opportunities for change in the socio-ecological project such that there is space for transformative action. This approach creates significant risks as it removes the benefits of existing resilience, often with little thought for or planning to manage resultant vulnerabilities. The second extreme is working too gently, or for too short a time, within existing livelihoods such that the socio-ecological project goes unchallenged. In such cases, when the intervention ends, the resilience of that project allows discourses, mobilized identities, and tools of coercion to revert to pre-intervention status.

The first of these approaches, an effort to significantly or totally rework existing lives and livelihoods, is very common in development practice and much critiqued in development scholarship, from a remarkable range of perspectives including classic critical texts (e.g. Escobar, 1995; Ferguson, 1994; Mitchell, 1995), the almost atheoretical work embodied in Robert Chambers' work (e.g. Chambers, 1997, 2008), and everything in between. The implementation of such development, adaptation, and resilience interventions often produces outcomes that are characterized as surprises. These include the limited uptake of seemingly beneficial interventions, negative outcomes from those interventions for some or all members of a population, or the emergence of new vulnerabilities related to the intervention itself, that are characterized as surprises.

LIG provides a more productive frame for understanding the often-problematic outcomes of interventions that seek to rework livelihoods and their underlying socio-ecological projects than that of "surprise". Such interventions tend to focus on problems to be addressed, whether identified by the population in question or outside expertise. This deficit framing of people, livelihoods, and their socio-ecologies generally downplays existing resilience, at best casting it as aimed at but inadequate in the face of exogenous shocks and stressors. As a result, such interventions fail to acknowledge the endogenous risks and vulnerabilities managed by the socio-ecological project at the heart of that resilience. When they ignore or minimize the value of existing resilience, such interventions elide the fact that at least some of the challenges faced by individuals and communities are rooted in the livelihoods and associated socio-ecological projects that produce existing resilience. The larger socio-ecological project at the heart of this resilience is shifted outside the analytic lens, and as a result these challenges are miscast as the symptoms of failed or inadequate resilience. Interventions introduce new activities or roles and responsibilities which weaken existing connections between discourses of livelihoods and the mobilization of identity, and in so doing generally weaken the legitimacy of tools of coercion. This process produces spaces of contestation as different actors mobilize opportunities for resistance or innovation in the wake of the weakening or even collapse of the previous socio-ecological project. In such situations, the achievement of safety and stability requires the realignment of interests within the population, community, and/or household toward goals that give structure and legitimacy to a new socio-ecological project. As a new project emerges around the risks and opportunities that mark the intervention-affected context, some groups enjoy new opportuni-

ties, but others (or perhaps all) are now exposed to new risks that can call into question the net impact and value of the intervention.

An example of such an intervention is documented in Carney's now-classic studies of agricultural development in the Gambia (e.g. Carney, 1996; Carney, 1998; Carney, 2004). The Jahaly-Pacharr pump irrigation project was an effort to boost rice production through the introduction of irrigation technology and a system of rice plot management that required payments (for the recovery of input and project costs) for plot use. This technically-focused project was implemented in a complex agrarian socio-ecology marked by gendered Mandinka land tenure and agricultural practices. Project interventions redefined rice as a cash crop and set off a series of struggles around the definition of land, land tenure, and the roles of different members of agrarian communities engaged by the project. For example, because there were significant consequences for not cultivating enough rice (at least initially, failure to make payments for plot use would result in lost access to land), senior men tried to mobilize newly-opened labor and land tenure categories to appropriate the labor of women and junior men to meet their rice production goals. In response, women banded together into previously unseen work groups, asserting control over their labor. The foment of this change and contestation compromised the rice production systems critical to the achievement of both project goals and subsistence in this area. The project failed, but its redefined land tenure and gender roles remained, with women's agricultural production more marginalized than before the intervention (Fig. 3).

In an incomplete intervention, a project works within a particular livelihood, augmenting one or more activities. While such an intervention inevitably places pressure on the connections between discourses of livelihoods, the mobilization of identity, and tools of coercion, it reshapes their relationship without disrupting the underlying socio-ecological project. This leads to more rapid and widespread uptake of the intervention and might lead to innovation and transformation over time as different members of the population take up new opportunities without risk of sanction. However, because such interventions leave socio-ecological projects intact, if those targeted by the intervention do not have their expectations met they can abandon it and return to their previous livelihoods as if nothing had ever been introduced.

Events that unfolded from 2004 to 2006 in Ghana's Central Region offer a case analogous to an incomplete intervention (Carr, 2011, 2013). In this case, a road construction project that reached the study area in April 2004 led men to reorient their livelihoods activities to take advantage of expected improvements in access to local wage labor markets. They believed this access would diversify and increase their incomes. While they expected to continue farming, they planned to let their wives (whose access to land they controlled) increase their agricultural production. Increased women's production was not seen as a threat to the social order associated with the local socio-ecological project because men expected to make much more money themselves through non-farm employment (NFE). These expectations were made material in the first agricultural season after road construction, when men reduced their average farmholdings by nearly half a hectare while increasing their wives' by more than a hectare. Represented visually (Fig. 4), the expectations associated with the arrival of the road shifted the discourses of livelihoods and the ways in which those discourses mobilized the identities of men and women in a manner that emphasized different roles and redefined responsibilities, creating space for new activities to be seen as legitimate and appropriate.

By 2006, it had become clear that men's expectations of diversified, enhanced incomes from NFE would not be forthcoming. Because the road did not provide the opportunities men expected, increased women's income challenged men's authority and status

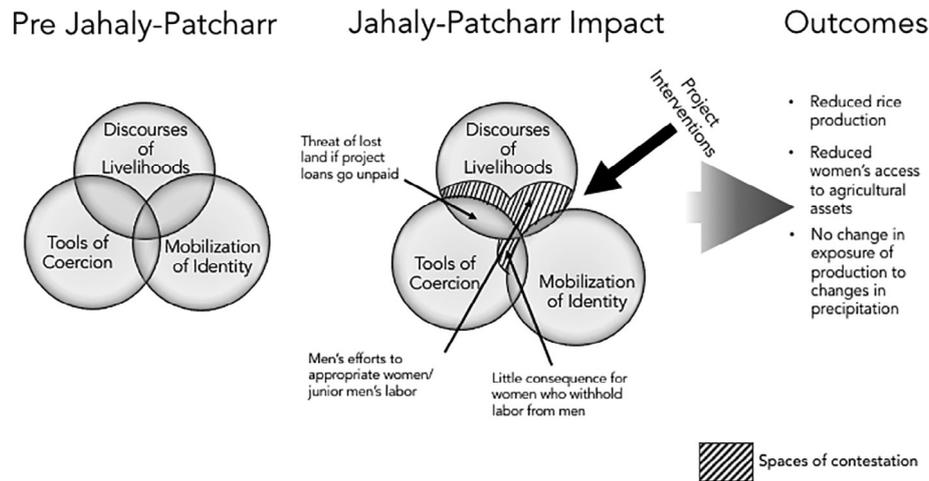


Fig. 3. The socio-ecology of a development intervention in Gambia. The interventions of the Jahaly- Patcharr project displaced the connection between gendered identities and accepted ways of using land and cultivating crops while introducing new tools of coercion, such as the threat of lost access to land if production goals were not met. This, in turn, opened up spaces of contestation around the redefinition of individual roles (for example, in men's effort to appropriate women's labor) and changes in land tenure (in the redefinition of different types of land and who could access it). The outcomes of this reorganization were a failed development project and a newly stable socio-ecology marked by reduced rice production and the further marginalization of women in agricultural production.

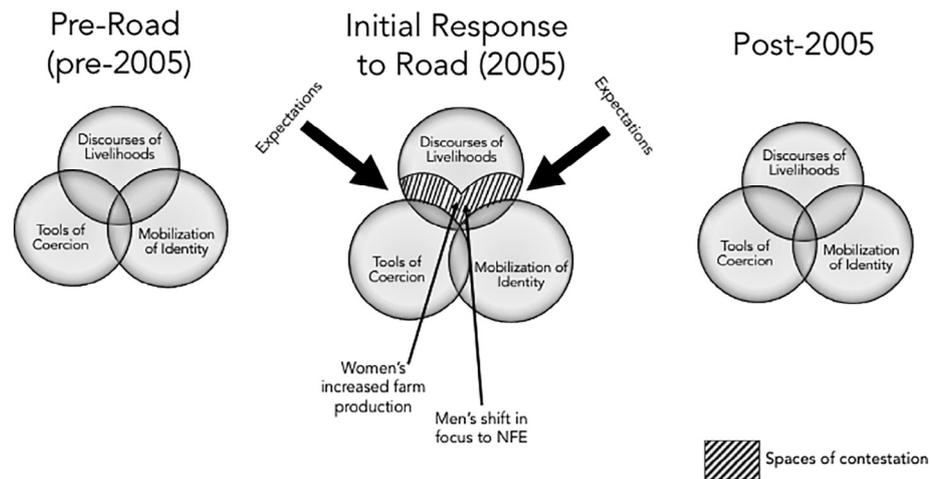


Fig. 4. The socio-ecology of a road construction intervention in Ghana as it intersected with existing resilient livelihoods (Pre-Road). Expectations of the impact of a new road (Initial Response to Road) loosened the connection between prior discourses of livelihoods and their mobilization of identity, for example by raising men's expectations for NFE, which led men to see agriculture as less central to their livelihoods and their role as provider for the household. This, in turn, created the space for women to increase their agricultural production, and effectively moved such increases outside the space of coercion. These shifts created new spaces of opportunity for women's agricultural production, such as expanding field sizes. However, when men's expectations of NFE were not met in the immediate wake of the intervention (Post-2005), they quickly reasserted the importance of agricultural production in their livelihoods and roles. This repositioned women's extra production as a threat to men's roles and responsibilities, and women's field sizes and production returned to pre-intervention levels as the project of government resumed its original shape.

and became a problem to be managed. As the livelihoods of these communities returned to emphasizing previous strategies of agricultural production, the use of that production to manage exogenous risk, and distributions of land to manage the endogenous risk that women's income poses to men's authority, men's and women's farms largely returned to pre-road sizes (Fig. 4). As in so many development projects, little trace of the impact of this road in the livelihoods of these communities remained two years after its construction.

5. Walking the line: promoting transformative resilience for development and adaptation

The framing of agrarian socio-ecological resilience described above explains the surprise outcomes and project failures that plague so many projects, both across the history of development and the emerging history of adaptation and resilience programming.

On one hand, there are sectoral policies, programs, and projects aimed at reworking and reordering the world into something more efficient or legible (Mitchell, 2002; Scott, 1998). Such efforts tend to break up existing livelihoods and their attendant forms of resilience. In so doing, they create opportunities for radical socio-economic and socio-ecological transformations. However, the outcomes of such transformation are highly uncertain and fraught with risk, as they can introduce new vulnerabilities or remove existing sources of resilience, exposing individuals or groups within a population to new risks (Cote & Nightingale, 2011). These new risks, and the livelihoods that emerge to manage them, can produce highly inequitable outcomes, and even lead populations to abandon interventions and other efforts as they grapple with the new risks they must negotiate (such as in the case of Jahaly-Patcharr).

On the other hand, projects that align too closely with existing livelihoods are unlikely to induce any change at all. Instead, they

might reinforce the existing socio-ecological project that produces existing resilience in these livelihoods. Such projects are problematic because they can reinforce prevailing inequalities, limiting opportunities for transformative change in the context of significant and rapid economic, environmental, and social change that will likely challenge existing resilience in the future. In the Ghanaian case study, the reversion of the socio-ecological project of government to pre-intervention status will, in the short term, preserve the material security of residents in the face of current economic and environmental shocks and stresses. However, this reversion also represents a lost opportunity for transformation. New opportunities for significant income had begun to open for women, which would have likely contributed to two sorts of change over the medium term. First, these households would have seen increased access to food and income, improving their material well-being. Second, as has been well-established across contexts in the Global South, as women gain income and economic opportunity, several corollary development benefits occur, including improvements in household nutrition, educational attainment, and gender equality. It is this line – between inadvertent harm and the reinforcement of problematic structures of opportunity and equity – that development, adaptation, and resilience programming must walk to catalyze locally-appropriate and locally-owned transformational change.

The framing of resilience and livelihoods described above, however, offers an important insight into how transformational adaptation can arise in a resilient socio-ecology. A common assumption about resilient socio-ecological systems is that disturbance, often in the form of exogenous shocks and stressors, creates opportunities for systemic change (e.g. Adger, 2000; Allen & Holling, 2010; Folke, 2006; Holling, 2001). However, the framing of resilience presented in this article suggests something quite different: shocks and stressors tend to reinforce the socio-ecological project at the heart of resilient agrarian livelihoods until they produce catastrophic failures. Agrarian livelihoods are socio-ecological projects through which the achievement of safety and security is made secure from various shocks and stressors. The resilience which proceeds from those projects justifies the normalization of particular identity-based roles and responsibilities that are carefully policed to ensure the achievement of these goals. When the material well-being of the individual, household, or community is under threat, the socio-ecological project is legitimized by the safety and security it provides. In such situations, who does what and why becomes of more intense social interest, is subject to greater policing in the name of safety and subsistence, and the tools of coercion used to ensure that everyone plays their role and lives up to these responsibilities gain legitimacy. Initially, then, deviation from expectations is squeezed out of livelihoods, limiting opportunities for innovation (the left side of Fig. 5). This is broadly consistent with Armitage's and Johnson's (2006: 2) observation that adaptive cycles in resilient socio-ecological systems build structures, and over time the “persistence of the system becomes dependent on this organization, making it increasingly rigid and vulnerable to exogenous and/or endogenous disturbance.”

In a changing world where the increasing variability of precipitation will challenge rainfed production, where primary producers receive the least economic value for their labor and production, and where agricultural markets are increasingly and more complexly integrated, efforts to simply reinforce current livelihoods and their attendant resilience are not likely to provide safety and security over the medium- to long-term. Further, given the tendency of these livelihoods to tighten up roles, responsibilities, and activities in the face of stresses that challenge the goals of the socio-ecological project, it is unlikely that transitions to new ways of living in particular places will be smooth and gradual. Instead, many such socio-ecologies are likely to persist with minor

adjustments that do not challenge the fundamental ordering of the world at the heart of existing livelihoods, producing an increasingly precarious state until livelihoods (and their associated socio-ecological projects) fail. Such failure could be sudden, in the face of a wide-reaching, deep shock like an extended famine, which opens space for renewal and transformation while simultaneously leaving those living under that project in a less resilient state until they can reconstruct livelihoods more appropriate for their context.³ However, in most cases the failure of the socio-ecological project will be prolonged and complex as the uneven impacts of these pressures play out across a population. Those who are most precarious are likely to experience the failure of the project first, while those who were once secure will find themselves stressed, and their livelihoods increasingly rigid and vulnerable to the subsequent failure of the socio-ecological project if the stress persists. For example, in the case of Mali, after a period of prolonged drought and attendant drops in access to food and income, men in the most vulnerable and precarious households could decide to take up NFE as their principle activity, and even choose to move out of the community to a town or city. Such an action would represent the abandonment of the discourse of livelihoods that privileges rainfed grain production as a path to safety and stability. Meanwhile, once-secure households will likely experience significant stress as their access to food begins to decline, leading to the closer policing of activities, roles, and responsibilities, making livelihoods rigid and closing off spaces of innovation, leaving these once-secure households open to the failure of the socio-ecological project in the face of further stress.

This framing of livelihoods and resilience also suggests an explanation for the “poverty traps” in socio-ecological systems observed by Holling (2001) and others (e.g. Walker et al., 2006; Haider, Quinlan, & Peterson, 2012; Walker et al., 2010; Holling, Gunderson, & Peterson, 2002). As Lade and his co-authors (2017) note, much of the work on poverty traps focuses on a single dimension of poverty, such as asset access (e.g. Walker et al., 2006), and generally does not address the complex dynamics that characterize society in a particular socio-ecology. When resilience is framed as a socio-ecological project, such traps are no longer represented as functions of access to resources, a framing that has long haunted development, producing failed projects and programs from the big push arguments of Rostow (e.g. Rostow, 1959) to the more recent Millennium Village Projects (MVP) championed by Jeffrey Sachs (e.g. Sachs & McArthur, 2005; Sachs et al., 2004; Sachs, 2005). Instead, poverty traps are the outcomes of the constriction of the socio-ecological project at the heart of any livelihoods under stress. In such situations, stress squeezes out diversity and variation in the name of ensuring safety and subsistence. As those associated with the MVP learned, merely providing assets to a stressed population is not likely to result in lasting changes to their quality of life (see Clemens & Demombynes, 2010; Michelson & Tully, 2018; Pronyk et al., 2012; Wanjala & Muradian, 2013). LIG suggests that this is because these assets only speak to material situations and not the socio-ecological projects that shape their meaning and use.

On the other hand, if both subsistence and the accepted means of achieving subsistence are secure, the socio-ecological project can relax (the right side of Fig. 5). It is not enough to merely secure subsistence. For example, providing grain to Bambara households in southern Mali might meet the dietary needs of those households, but greatly stress these livelihoods by undermining men's role as provider for their households and concessions. In such a sit-

³ This broad observation suggests that this framing of resilience might serve as a productive reframing of the risk of societal collapse (e.g. Diamond, 2011; Orlove, 2005) in the face of environmental pressure by reasserting the importance of the social in such outcomes.

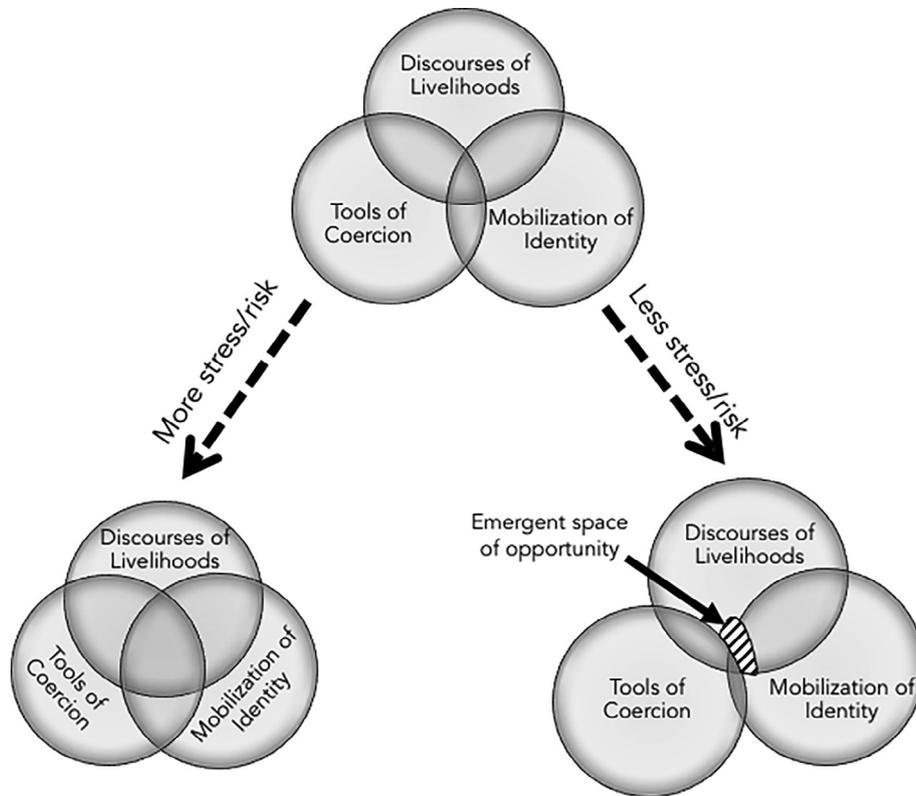


Fig. 5. Illustrative view of the ways in which stress operates on agrarian livelihoods. These livelihoods, as socio-ecological projects, become more rigid and controlling when the achievement of safety and subsistence is threatened by stress or shock (as seen on the left). However, mitigating threats to subsistence (as seen on the right) allows opportunities to emerge for different activities conducted by different actors, which can lead to further locally-appropriate change over time.

uation, we might expect to see roles and responsibilities tighten as the intervention stresses the socio-ecological project manifest in livelihoods. However, if interventions can relax stress on that socio-ecological project, those so inclined can find space to experiment, taking up new activities, earning new or extra income, or otherwise departing from expectations. This is not to say that such actions will be encouraged as much as they will be tolerated, as they will not present obvious threats to safety and stability. A project relaxes when deviation and variation are not threats to the goals of safety and stability. In such contexts, vigilance around roles and responsibilities eases, creating the space for innovation. Some of these initiatives will likely fail, but others may become enduring incremental changes in the socio-ecological project that eventually catalyze transformations in the way people live in that place without generating periods of collapse and renewal in which some or all of the population is placed at greater risk.

Various LIG-based projects conducted in different agrarian contexts in sub-Saharan Africa provide empirical support for this framing of resilience in agrarian socio-ecologies. For example, the Ghana case described above illustrates that when residents of the research area felt that the new road would secure their subsistence and even bolster their incomes, the need to control women's farm sizes eased and women's agricultural production increased. While the spaces of opportunity that might have produced new trajectories within this socio-ecology quickly closed when men did not realize the expected benefits of the new road, there is clear evidence that when residents perceived an increase in their security the project of government in this context relaxed, opening up such spaces, however temporarily.

Further evidence comes from research that captures the different ways in which a local socio-ecological project plays out across a community at a single point in time. For example, in southern Mali, different households in the same community often take up

livelihoods in different ways (Carr and Onzere, 2018). Historically, observed differences in livelihoods strategies and outcomes in the same population have been explained most often as a product of differential access to agricultural and other livelihoods resources. However, the patterns of activity and identity in these households suggest that the sources of these different strategies and outcomes are more than material. In wealthier, more secure households women have more freedom to choose their activities without attracting concern from men. This is because 1) those activities and their material outcomes are not a threat to achieving subsistence and 2) men leading those households and concessions are confident in their status and identity since they know they are able to not only meet their subsistence responsibilities, but also generate a surplus beyond it in all but the most challenging situations. On the other hand, in more stressed and vulnerable households and concessions in the same communities, there is no evidence of deviation from expected roles, responsibilities, and activities. Constrained access to material resources may limit the opportunities for innovation in these households. However, the fact the members of these households are conforming closely to expectations, while at least some in more secure households in the same community are deviating from expectations without apparent consequence, strongly suggests that this pattern is *also* tied to men's precarious achievement of their roles and responsibilities. Put another way: in this context, if men know where their food and income are coming from, they tend to be less worried about challenges to their status. If they are not sure they can achieve subsistence through their own labor on their own fields, they are worried not only about food but about their identity and status. In such a situation, all deviations from expectation could threaten both food/income and their status, and therefore must be controlled and eliminated to ensure that livelihoods remain resilient enough to achieve subsistence and legitimize their authority.

These descriptions of socio-ecological projects, and what causes them to relax or become more rigid, are not universal descriptions of socio-ecological outcomes. The examples presented in this article are based on evidence from several agrarian contexts, principally in West Africa, and therefore speak to practices and processes in this part of the world. The socio-ecological project manifest in livelihoods will vary in different contexts, and therefore what is seen as acceptable with regard to activities and their conduct, who conducts those activities, and what is to be done with those who do not conform to expectations will vary. However, by seeing livelihoods as manifestations of socio-ecological projects, we gain an approach to the processes that enable or hinder transformation in many socio-ecologies. A few cases in the literature provide support for this broad framing of how socio-ecological dynamics result in rigidity or transformation, but do so through other, locally-specific pathways. For example, [Armitage and Johnson \(2006\)](#) compare the interplay of globalization and resilience in two coastal regions, one in India and the other in Indonesia. While both regions have experienced significant change, and both socio-ecologies are under significant stress and threat, the ways in which these socio-ecologies and their inhabitants are responding to this stress and change is different and dependent on, among other things, local social structures and arrangements. In the Indian case, increasing dependence on international export markets produced stresses on existing socio-ecological structures and arrangements, resulting in destructive competition and overfishing without an obvious end, such that “all that has been resilient in Gujarat are conditions exacerbating the open-access tragedy that seems to have settled on the fishery.” ([Armitage & Johnson, 2006: 12](#)). [Pelling and Manuel-Navarrete \(2011\)](#), in their examination of resilience in Mexican urban centers along the Caribbean coast to climate change, also found a tendency toward rigidity in resilient socio-political systems, arguing “The contradiction in resilience that generated rigidity and made transformation difficult in these social systems is likely to be common to many such systems” ([Pelling & Manuel-Navarrete, 2011: 10](#)).

6. Conclusion: projects that (re)organize properties

Framing agrarian resilience as a socio-ecological project provides a theoretical frame that coherently connects various suggestions and observations about resilience and development that have emerged over the past twenty years of research and practice. Approaching resilience as the outcome of a socio-ecological project suggests that development and adaptation programming most effectively work together to transform human well-being when they reduce stresses on livelihoods, offering further support for an observation that occasionally surfaces in the adaptation literature (e.g. [Downing, Ringius, Hulme, & Waughray, 1997](#); [Schipper, 2007](#)). Specifically, framing resilience as a project evokes a need to shift toward risk reduction and decision-support in development and adaptation portfolios, not as means of creating better enabling environments for other, more sectoral interventions, but as targeted projects aimed at creating spaces of transformation within these socio-ecological projects for specific groups and people.

Targeting particular populations and addressing their needs in the context of resilient livelihoods is challenging. It is not merely a question of augmenting the assets or information available to a population or sensitizing individuals to the capabilities and potentials of more marginal community members. Instead, it is about lifting stress from livelihoods to allow for spaces of innovation and transformation to emerge. On one hand, this means attending to the concerns of the powerful. For example, in the case of the Ghanaian road, when men were secure in their incomes, the local

socio-ecological project relaxed and they allowed their wives to take new actions (such as cultivating larger plots). This, in turn, created new spaces of opportunity and innovation for women. Had the intervention been durable, it might have served as the foundation for lasting change in this socio-ecology that resulted in locally-defined improvements in well-being. Similarly, efforts to build a climate service in Mali to boost agricultural production by targeting decisions about rainfed staple grain cultivation ended up supporting the decisions, production, and incomes of already-wealthy and powerful senior men, while eliding the very different information needs of women ([Carr, et al., 2016](#)). However, when this service meets the needs of these men, their need to control their wives' decisions and activities eases, creating spaces for potential innovation and change. While more research in a greater diversity of sites is needed to confirm this potential approach to catalyzing transformation, both cases suggest that addressing the security of the powerful is a critical precondition to work aimed at significant long-term transformative impacts on society.

On the other hand, we have much to learn about the short-term aspirations and transformational capabilities of people who occupy marginal roles and positions within resilient livelihoods. As noted above, research in Mali identified women who were not “playing their role”, undertaking activities, owning assets, or making decisions that were otherwise seen as in the domain of men. Further, these women were not disciplined for these apparent transgressions. They had identified spaces in which they could innovate without attracting discipline, enabling them to chart their own paths through the complex livelihoods landscape represented in [Fig. 1](#). The behaviors of these women are broadly consonant with observations from [Pelling and Manuel-Navarrete \(2011:10\)](#) work in Mexico, where they saw that actions which might challenge, rather than reinforce, existing institutional structures “unfolded in marginalized or closed and temporary systems spaces always at a distance from centers of power.” As these women were only identified in the analysis of large datasets after fieldwork was complete, there was no opportunity to explore their knowledge, goals, and aspirations. Whether in the context of research projects or development/adaptation implementation, as we seek to understand and build transformative resilience we should devote significant effort to identifying and learning about those who deviate from expectations in a manner that is permitted – if not sanctioned – by those who enjoy the privileges of authority in a community or household. Such work is likely not only to uncover long-term pathways of change unseen to those outside a socio-ecological project and the livelihoods in which it is manifest, but also to identify locally-appropriate and effective means of addressing the current inequalities that exist in those livelihoods.

However, even with greater understandings of both existing projects that shape socio-ecological resilience and those who find ways to behave in potentially transformative ways within those projects, work on resilience and transformation as framed here will struggle with the indeterminacy of the outcomes associated with particular interventions. While the reduction of stress on a given livelihood will likely open up spaces for transformation and innovation, we cannot always predict who will innovate, what these innovations will look like, which will succeed and endure, and what their impact will be. I am reminded of my late Ghanaian field team member Samuel Mensah, who was an agricultural tinkerer. Samuel was well-known to be one of the best, if not *the* best, farmer in the area. He was also a curious individual who would plant many extra crops in test plots to see what would happen (the typical man in these villages planted about eight crops on his farm. Samuel planted as many as 16, though many of his additional crops were in 20 square meter test plots). One year, when I was surveying his farm, I came upon a test plot of onions. I asked why he planted onions, expecting a detailed logic for this choice

(as such logic existed for most of the crops he planted). He shrugged and said “I like onions.” He was very successful with these onions – he grew more than he could eat and was able to market those extra onions and make some additional income. The next year, when I started re-surveying the fields in the study area, I noticed a new crop on several farms: onions. I cannot yet say that onions have transformed agriculture in these communities, but this is an example of a secure individual taking a small risk on a crop that, when it paid off, started to transform the practices of others. From this idiosyncratic choice of a crop from a single agricultural tinkerer, a change in local socio-ecology started to emerge. The long-term persistence of that change will depend on the ways in which it plays into the existing socio-ecological project in this context, and its long-term impact remains unclear. But if it does persist, it will be on the basis of much better information than goes into much contemporary development and adaptation programming, and a much wider set of considerations than captured under programs that view resilience as a property of complex socio-ecological systems, and not the outcome of a deeply power-laden project.

Declaration of Competing Interest

None.

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