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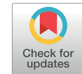
Resilient livelihoods in an era of global transformation



Edward R. Carr

International Development, Community, and Environment Department (IDCE), Clark University, 950 Main St, Worcester, MA 01610, USA
Humanitarian Response and Development Lab (HURDL), George Perkins Marsh Institute, Clark University, 950 Main St, Worcester, MA 01610, USA

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ABSTRACT

Much as development's understanding of livelihoods became intertwined with notions of sustainability in the late 1990s, today livelihoods analysis is taking up the rise of resilience in the development and climate change adaptation communities of practice. The emergent concept of resilient livelihoods risks perpetuating problematic framings of both socio-ecological and livelihoods dynamics that limit the effectiveness of development and adaptation interventions. In this paper, I connect recent contributions to the livelihoods and socio-ecological resilience literatures to define resilient livelihoods as projects aimed at the achievement of well-being in a manner that preserves existing systems of meaning, order, and privilege. These projects (re)produce socio-ecologies, deeply human assemblages of socio-cultural and biotic elements. So framed, the idea of resilient livelihoods centers meaning, power, difference, and agency in both livelihoods and socio-ecological dynamics. It opens up new understandings of the character, sources, and importance of resilience in livelihoods, allows for the identification of new indicators of livelihoods fragility, points to previously-overlooked sources of potential livelihoods transformation and change, and suggests sites of productive engagement between development and adaptation interventions and transformation and change.

1. Introduction

Following a trend seen in many other parts of the development and adaptation communities of practice, livelihoods analysis has begun to embrace resilience as a framing concept (e.g. Davies et al., 2013; Perez et al., 2015; Sallu et al., 2010; Tanner et al., 2015; Twine, 2013). For many who use livelihoods approaches, incorporating resilience is relatively easy. The resilience literature is marked by a systems approach to socio-ecological relations that foregrounds exogenous events and forces when explaining of change (Davidson, 2010; Duit et al., 2010; Cote and Nightingale, 2012; Béné et al., 2014). This resonates strongly with a similar emphasis on external shocks, stressors, and interventions as drivers of change in, for example, sustainable livelihoods frameworks (Carr, 2015). Therefore, insofar as it mobilizes the idea that resilience is the ability to cope with and recover from shocks and stresses, the contemporary framing of resilient livelihoods is something between an extension and a rebranding of sustainable livelihoods.

This version of resilient livelihoods sheds little new light on either livelihoods or socio-ecological dynamics. For example, it does not offer productive explanations for observations of continuity in the livelihoods and socio-ecological systems of places where people are under substantial and increasing economic, environmental, and development pressure that otherwise would be expected to drive change. This suggests that there remain substantial gaps between the explanatory value of resilient livelihoods and the processes this concept might illuminate. The implications of such gaps are significant, and include the design and implementation of development and adaptation interventions that overlook critical challenges and needs while eroding existing sources of safety and certainty for vulnerable populations.

However, the idea of resilient livelihoods can be mobilized to fill those gaps and further our understanding of both livelihoods and socio-ecological dynamics. In this article, I frame resilient livelihoods as projects, groupings of people and resources brought together to achieve one or more goals. Resilient livelihoods are projects aimed at achieving material well-being in a manner that preserves existing structures of meaning, society, and authority. These projects (re)produce deeply human socio-ecologies, assemblages of socio-cultural and biotic elements whose dynamics (including resilience) are intimately shaped by questions of power, difference, and agency. This framing of resilient livelihoods simultaneously answers appeals to elevate attention to the ways in which livelihoods make meaning in the world (e.g. Bebbington, 1999; de Haan and Zoomers, 2005; Carr, 2008, 2013; Jakimow, 2012, 2013; Sakdapolrak, 2014) and calls to center power, difference, and agency in our understanding of socio-ecological dynamics (e.g. Crona and Bodin, 2010; Béné et al., 2011; Cote and Nightingale, 2012; Brown, 2014; Cretney, 2014; Forsyth, 2018; Matin, Forrester and Ensor, 2018;

E-mail address: edcarr@clarku.edu.

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Carr, 2019). The analytic lens it enables focuses not only on drivers of change, an approach that appears to have diminishing returns when applied to the explanation of observed events in the world, but also the sources of stability and continuity that are often characterized as surprises in an era of increasing and intensifying pressures on livelihoods and their socio-ecologies.

I begin with a discussion of the current use of resilient livelihoods, highlighting its explanatory limitations in the context of both livelihoods and socio-ecological dynamics. I then present a reframing of this nascent concept that centers meaning, agency, power, and social difference in both livelihoods and socio-ecological dynamics. I apply this reframing of resilient livelihoods to a number of empirical examples where observed livelihoods decisions appear resistant to otherwise obvious drivers of change, illustrating the implications of this theorization for our understanding of adaptation, resilience, and transformation in an era of global change. I close with a research agenda that emerges from these observations, and a discussion of the urgency with which we should be pursuing it.

2. Resilient livelihoods

In contemporary development policy, resilience has seen a rapid growth in popularity matched only by the speed with which it has been hollowed out of meaning. Therefore, it is not surprising to see the term applied to a wide range of development concerns, including resilient food systems (e.g. Schipanski et al., 2016; Tendall et al., 2015; Toth et al., 2016), resilient seeds (e.g. Cairns and Prasanna, 2018; D'Agostino and Sovacool, 2011; Sreenivasulu et al., 2015), and relevant to this article, resilient livelihoods (e.g. Davies et al., 2013; Perez et al., 2015; Sallu et al., 2010; Tanner et al., 2015; Twine, 2013). Resilient livelihoods have emerged in this milieu as a logical extension (if not a rebranding) of the sustainable livelihoods approaches that have dominated rural development for more than two decades. Such approaches deem a livelihood to be sustainable when “it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base” (Carney, 1998: 4). Thus, sustainable livelihoods approaches have long mobilized the framing of resilience most prevalent in contemporary development and adaptation communities of practice, one which privileges persistence of and recovery to an initial state without deeply interrogating their sources in a world of increasing and intensifying change (Carr, 2019). Drawing heavily upon this understanding of resilience, current framings of resilient livelihoods are little more than sustainable livelihoods in new clothes, and therefore do little to advance our understanding of observed livelihoods decisions and outcomes.

The emerging use of resilient livelihoods also adds little to our knowledge of socio-ecological dynamics. This has much do to with the ways in which the resilience literature approaches the social in socio-ecological systems. This literature recognizes transformation and the emergence of new pathways as an essential component of resilience (e.g. Folke, 2006; Folke et al., 2010), thus moving beyond the simplistic “bounce-back” framing described above (for discussion, see Davoudi, 2012; Folke, 2006; Gunderson, 2000). However, the systems approach which dominates the resilience literature generally constructs the sources of transformation as either exogenous to the system in question or, if recognized as endogenous to the system, emergent properties that are hard to predict and direct (e.g. Hughes et al., 2013; Scheffer et al., 2012; Suding and Hobbs, 2009; Walker and Meyers, 2004). As a result, this literature tends to seek drivers of change in shocks and stressors that originate outside the system in question, backgrounding endogenous sources of change. Stability and continuity become natural outcomes of a socio-ecological system that emerge from the interplay of its constituent parts, not things to be explained in their own right.

A growing critical literature on socio-ecological resilience challenges this framing of the social and its role in system dynamics, pointing out the ways in which it elides questions of power (Crona and Bodin, 2010; Pelling and Manuel-Navarrete, 2011; Cote and Nightingale, 2012; Cretney, 2014; Matin, Forrester and Ensor, 2018; Carr, 2019), agency (Davidson, 2010; Béné et al., 2011; Brown and Westaway, 2011; Cote and Nightingale, 2012; Brown, 2014; Cretney, 2014; Carr, 2019), and social difference (Brown, 2016; Forsyth, 2018; Matin, Forrester and Ensor, 2018; Carr, 2019). This powerful body of conceptual critique is given urgency by empirically-observed trends that challenge existing (implicit) assumptions about stability and change in livelihoods and socio-ecological dynamics. For example, agrarian livelihoods have faced increasing pressures, including the impacts of climate change (Morton, 2007; Sietz, Choque and Lüdeke, 2012; Harvey et al., 2014; Rurinda et al., 2014; Cohn et al., 2017; Williams et al., 2018) and the unintended consequences of intensifying market integration within the global food system (Eakin, Winkels and Sendzimir, 2009; Humphrey, 2019). However, they remain a critical part of the global economy, particularly the global food system. Indeed, there is evidence that the fraction of agricultural land cultivated by smallholders in the Global South is increasing (Hazell et al., 2010). If these livelihoods and socio-ecological systems are stable until disturbed by outside shocks and stressors, understanding the sources of their continuity and stability in the face of significant and increasing disturbance becomes at least as interesting as the search for drivers of change.

Thus, the current framing of resilient livelihoods leaves issues of meaning, power, difference, and agency outside the analytic lens on both livelihoods *and* socio-ecological dynamics at a time when there is growing empirical evidence for their importance in both. This problem is not inherent to either resilience or livelihoods. Instead, it is a product of how this particular approach to of resilient livelihoods defines and connects them. Engaging with the contemporary literature on livelihoods offers an opportunity to center the social in both livelihoods and socio-ecological dynamics, thereby deepening our understanding of the processes producing continuity and change in the world today.

3. Recovering resilient livelihoods

The materially-focused framing of livelihoods that dominates contemporary literature and practice is the outcome of a narrowing of definition and focus tied at least in part to the instrumental use of the sustainable livelihoods framework in the late 1990s and early 2000s (Scoones, 2009). The explanatory limits of this framing have driven a line of livelihoods research seeking to more seriously elevate the social in livelihoods analysis (e.g. Bebbington, 1999; de Haan and Zoomers, 2005; Carr, 2008, 2013; Sakdapolrak, 2014). This literature emphasizes the ways in which the act of living in a place implicates not only the material, but also the making of meaning in the world. This trend in the livelihoods literature parallels work in other literatures seeking to explain empirical patterns of continuity and change in livelihoods. For example, in agrarian studies an effort has emerged to explain what many see as the surprising stability of agrarian livelihoods under conditions of stress (Chinigò, 2016; Rigg, Salamanca and Thompson, 2016; van den Berg et al., 2018a). For example, Hebinck et al. (2018) argue that the rigorous interpretation of measurements that capture whether individuals are farming more or less requires understanding whether the meaning of farming has changed over time. Such an approach allows for a more productive understanding of circumstances where, for example, individuals diversify their livelihoods but continue to farm because of the ways in which that activity occupies a symbolically important space in their lives (see also Dressler et al., 2018; van den Berg et al., 2018b). Borras (2009) characterizes this work as an effort to understand everyday peasant politics as drivers of agrarian change.

Generally speaking, this livelihoods literature connects meaning to the material by embedding livelihoods activities and decisions in social relations and their associated meanings, for example by treating them as “serious games” (Jakimow, 2012) or approaching them through

various applications of Bourdieu's theory of practice (e.g. de Haan and Zoomers, 2005; Sakdapolrak, 2014). In this article, I draw on prior empirical and theoretical work arguing that the production of meaning in livelihoods emerges through a process of balancing material needs and goals with a desire to preserve existing systems of meaning and order that grant those in positions of authority specific privileges (Carr, 2013). In this way, livelihoods are projects (re)producing socio-ecologies, which we can understand as "locally specific outcome[s] of the interaction and mutual shaping of the socio-cultural, institutional and biotic elements that constitute the landscape" (Hebinck et al., 2018: 325). These socio-ecologies are deeply human, shaped by and inexplicable outside systems of meaning, power and the structures of social difference they (re)produce. Thus, I argue that resilient livelihoods are those in which the (emerging) properties of a socio-ecology are continuously managed to achieve material safety and well-being in a manner that renders change and new situations legible through existing systems of meaning, thus diffusing threats to existing power relations and social orders.

This reconceptualization of resilient livelihoods, which draws upon an extensive set of empirical observations and conceptual discussions (e.g. Carr, 2008, 2013; Carr and Owusu-Daaku, 2016; Carr, Fleming and Kalala, 2016; Carr and Onzere, 2018), shifts our analytic focus from potential drivers of change, which are everywhere and intensifying, to stability and continuity in the face of such pressures. This allows us to open up new understandings of the sources of observed continuity and regularity in livelihoods, how livelihoods transformation and change take place, and the place of development and adaptation interventions in that transformation and change.

4. Implications: Resilient livelihoods, development, and adaptation

The concept of resilient livelihoods elaborated above challenges our understandings of livelihoods and their socio-ecologies in three broad ways. First, it collapses the exogenous driver/endogenous driver binary, illustrating *why* we must move meaning, social difference, agency, and power to the fore in livelihoods and socio-ecological dynamics. Second, it suggests that in the face of economic, environmental, and development pressures, livelihoods stability and continuity is more likely than substantial change, at least in the short to medium term. Third, this framing of resilient livelihoods points to sources of transformation beyond catastrophic change, particularly indigenously- or locally-defined and driven transformations that emerge when stress on a socio-ecology is reduced. I discuss each of these below, illustrating them with short cases.

4.1. Collapsing the exogenous/endogenous driver binary

As discussed above, the distinction between exogenous and endogenous shocks and stressors is foundational to the notion of livelihoods and socio-ecological systems as tending toward stability unless disturbed. However, as has long been understood by the literature on hazards and vulnerability, events we view as exogenous shocks and stresses only become problems to those experiencing them when they challenge specific ways of living in particular places (e.g. Comfort et al., 1999; Gaillard et al., 2007; Wisner et al., 2004). Different people will come to different interpretations of the same event or process depending on the activities, assets, and individuals impacted, and the degree to which they are impacted. Therefore, knowing levels of asset ownership and diversification of activities associated with groups or individuals is not enough to assess their experience of a particular event. Different assets and activities will have different meanings as well as material values, and those meanings will contribute to the maintenance of the social order in different ways.

For example, the literature on agrarian livelihoods in Mali (e.g. Assé and Lassoie, 2011; Becker, 2000; Förster, 1998; Grigsby, 2004) and Senegal (e.g. Perry, 2005; Venema, 1986; Venema and van Eijk, 2004) demonstrates that in this part of West Africa, rainfed staple agricultural production is a central component of the definition of what it is to be a man. While this production has a direct impact on the material well-being of a man and his household or concession, successfully harvesting enough food to feed the family also justifies his authority and privileges in society. In short, the meaning of rainfed agriculture, and the authority it confers on the men responsible for it, extends beyond the mere provision of food and income. It mobilizes wider understandings of gender roles and ways of living in the world such that in this context a man is unlikely to diversify his crops or his activities away from rainfed production. To do so would result in a loss of status and privilege, even under conditions of declining precipitation in which such diversification might be the safest way to ensure material well-being.

While livelihoods are often able to manage a wide range of shocks and stressors such that the character of the socio-ecology is preserved, their legitimacy and that of their attendant social orders rests on the ability to do so. Therefore, an event such as a drought is more than a material challenge. It can allow long-standing arguments against the current order of things to gain traction and threaten the privileges of those in authority.Thus, an exogenous stress (a drought) gains force in the context of endogenous contestation, while what might otherwise be characterized as endogenous stresses (long-standing contestations of authority) often only become significant issues in the context of wider events and processes. With the division between endogenous and exogenous drivers of change collapsed in this manner, our attention must shift to meaning, social difference, agency, and power, which shape how people perceive events in the world and define the ways in which they are most likely to respond. If livelihoods are projects seeking to meet material needs in a manner that renders stresses and novelty legible through existing systems of meaning that diffuse threats to existing relations of power and difference, we should expect local/indigenous efforts to address change and surprise in the world to produce definitions and actions that allow for the continuity of the existing socio-ecology, or transformations of that socio-ecology that maintain the existing social order. Therefore, continuity in livelihoods in the face of external shocks and stressors reflects the goals of the underlying socio-ecological project and should not be characterized as surprises. However, as discussed below, there are limits to the maintenance of socio-ecological continuity.

Case: Flooding in Kazungula District, Zambia:

In southern Zambia, parts of the Kazungula District near the Zambezi river are subject to seasonal flooding which can range from nuisances to events where up to two meters of water wash over a community. Work conducted in Kasaya, a village in this district, found that despite a broadly shared exposure to these larger floods, the interest in flood early warning varied greatly across the community (Carr et al., 2015a). Roughly half of the community felt that flood early warning was of no use to them. Among those who expressed that flood early warning was of value, there were differences of opinion as to the timescale of warnings that would be most useful. In some cases, the connection between the desired early warning and material situations was straightforward. For example, warnings delivered hours or days in advance appeared to be of greatest interest for the poorest and most asset-challenged members of the community because their assets were limited and relatively easy to move out of harm's way. However, in the details of what provoked different demands for flood early warning was evidence for livelihoods decisions that could not be reduced to the materiality of asset ownership. For example the wealthiest men in the community, despite sharing exposure to floods with everyone else, cared little for warnings on the order of hours or days. This was because major floods required these individuals to negotiate for access to land at higher elevations for the livestock in which most of their assets were invested. Losing these animals in a flood would not only represent a loss of material assets, but also a loss of status, both in the community and their household. Therefore, if they could not save these animals by moving, some of these men would risk their lives to try to save them in the flood. Red Cross colleagues confirmed that some of these individuals refused to leave in the face of an imminent flood, risking and sometimes losing their lives in an effort to save their doomed cattle. From a material perspective, this is an illogical choice as surely death is a greater loss than the value of one's cattle. However, from a broader understanding of livelihoods as efforts to give meaning

and order to the world, it is clear that these men were trying to save their way of life as much as their assets. They took what they saw as an acceptable risk in the face of their potential losses, suggesting that even at the peril of death the preservation of the social order was a powerful imperative on the order of, if not more important than, material safety. Thus, constructing these floods as exogenous shocks makes little sense, as their interpretation as shocks, and peoples' responses to these shocks, emerge from the local socio-ecology and its categories of social difference and power relations.

4.2. What are the sources of observed continuity and stability?

Once we move beyond a focus on exogenous drivers to examine the role of meaning, social difference, agency, and power in observed livelihoods and socio-ecological dynamics, the durability and stability of both in the face of substantial pressure, and the failure of many development projects to generate lasting change, shift from surprises that require explanation to manifestations of the normal functions of livelihoods and their attendant socio-ecologies. As noted above, events such as price shocks, drought, or even development interventions do not directly drive change in a socio-ecology. They gain meaning in the context of that socio-ecology, and the livelihoods that (re)produce and govern it, which in turn frames observed responses. Most such events are of a sort manageable within existing efforts to govern the emergent properties of that socio-ecology. In that situation, material well-being is maintained despite the impacts of the event, the impact of the event fades, and livelihoods revert to their prior state. This reinforces and legitimizes the ways in which people understand the world to work, including existing social orders, however unequal and problematic they might be (Carr, 2019). Thus, many events that we might characterize as shocks or stressors become sources of observed continuities and regularities in livelihoods activities, dynamics, and outcomes.

This goes some way toward explaining observed continuities and regularities in both livelihoods and socio-ecological dynamics under significant pressure, including pressures created by development and adaptation projects. As such, it has important implications for development and adaptation programming. First, the dynamics of resilient livelihoods run contrary to the understanding of change that undergirds such programs. In the typical three-to-five-year project cycle, an intervention aimed at creating a particular change by altering existing activities and assets will often become a stress to be managed through the local socio-ecology. When the threat such an intervention poses to material well-being and/or meaning and order is managed, the outcome will not be change, but a reinforced set of meanings, livelihoods, and their attendant social structures. In this way, many development interventions work against the change they seek to generate.

Second, this explanation of stability and continuity in livelihoods has significant implications for how they will play out over periods of prolonged stress, such as in the context of climate variability and change. Under such conditions, which develop gradually, their socio-ecologies will allow for the management of impacts for some time, thus reinforcing existing understandings of the world and their attendant social orders. Over time, the legitimacy and maintenance of that socio-ecology will take on greater and greater stress as events in the world increasingly challenge claims about how the world works, and how best to manage that world to specific ends (Carr and McCusker, 2009). This will likely manifest in a growing disjoint between the goal of maintaining social order (and the privileges of those in authority) and the goal of providing material safety and certainty to the widest possible set of people. At some point, the costs to safety and certainty created by the need to maintain social order will cross a threshold and delegitimize that order, and this balancing act will break down. The breakdown of livelihoods and their attendant socio-ecology will remove much of the safety and certainty that they provided, while the stressor(s) in question will likely continue to present challenges until such time as the population can construct new livelihoods, and therefore a new socio-ecology better suited to current conditions. That socio-ecology will have its own structures of meaning, authority, and inequality justified by the management of existing conditions.

Case: Resilient Livelihoods and Road Construction in Ghana's Central Region: A study of development and change in the livelihoods of two communities in coastal Ghana illustrates how how observed continuities in agrarian livelihoods can emerge from a desire to maintain existing social order (Carr, 2008, 2011, 2013). Dominase and Ponkrum are two agrarian communities in Ghana's Central Region. Between 1969 and 2004, they had no improved road connecting them to what were otherwise nearby markets for their products and labor in Cape Coast and Elmina. In 2004, the Government of Ghana graded a long-defunct road through these villages. Men in these communities immediately saw an opportunity to diversify their livelihoods away from agriculture through access to local labor markets. They perceived these opportunities to be so significant that the average man reduced the area he was cultivating by roughly 0.2 ha, while allowing his wife to increase her cultivated area by roughly 0.75 ha. This was an important shift, as agricultural strategy in these communities typically treated women's production as for the domestic reproduction of the household, whether through subsistence production or the sale of that production to purchase needed goods. If women produced a surplus beyond these needs, they were allowed to sell it and do what they wanted with this income. Women were often quite efficient with such surpluses, leveraging them into petty trading opportunities that could generate significant income and threaten men's status as primary providers and decision-makers for their households. In these communities, if women's income surpassed that of men, the men of the husband's family, who controlled access to land, would demand a redistribution of household land such that the woman's production no longer posed a threat to the husband's authority, or by extension a threat to the wider patriarchy of the village. The family could enforce such a distribution by reducing the allocation of land to that household if the husband refused to make such changes himself. Therefore, when men reduced the size of their farms in the wake of road construction while increasing the cultivated areas of their wives, this did not signal a change in local understandings of how to live in this community. Instead, it represented a reconfiguration of activities under the same roles and responsibilities. Men believed that their non-farm incomes would more than make up for the lost agricultural income, while their wives' production would ensure additional agricultural income and food for the household. Women's production and incomes rose steeply in the next agricultural season, demonstrating that they were capable of contributing to greater household incomes, safety, and certainty. However, in that same season men found that the nonfarm labor market offered far fewer opportunities than they had hoped. The gap between women's incomes and men's incomes shrank. Therefore, it was of little surprise that in subsequent seasons men gave up on their diversification strategy and returned to their farms. When they did, household land distributions reverted to patterns seen before the road construction. Though women had demonstrated greater per-hectare production than men, even when given larger areas to cultivate, the threat this production posed to local understandings of identity, roles, and responsibilities, and therefore to men's authority in the household and the community, resulted in decisions to forego this income and food. Thus, an intervention seen as an opportunity to change the material situations of the residents of this community, in that it introduced opportunities for the diversification of activities and market access, did not generate any significant change in the livelihoods of these communities. Instead, it produced some pressure that generated initial changes, but when those changes mobilized existing contestations over identity and roles (lack of nonfarm opportunities resulting in a narrowing gendered income gap, which was a threat to the social order) the livelihoods of these communities reverted to their initial state. Two years after the road was improved, the only enduring impact of this intervention was a reinforced socio-ecology.

4.3. Where does transformation come from?

If events generally characterized as exogenous shocks and stressors cannot be assumed to drive change in livelihoods and their socio-ecologies, where might change and transformation come from? The first source is relatively obvious. While, as discussed above, many events that impinge upon people's wellbeing are manageable within existing livelihoods, some are so significant or persistent as to create a material crisis for which these socio-ecological projects have no response. In that situation, livelihoods not only fail to meet the material needs of those living under them, but also lose the ability to provide plausible meaning for events, outcomes, and people's place in them. In such a situation, inequalities can no longer be justified by the provision of safety and certainty. Livelihoods and their attendant socio-ecological orders break down, opening a space for change and transformation, but at a

considerable cost and with great risk to those experiencing the change.

This observation is critical for development and adaptation programming, which are themselves sources of stress on the ways people live in particular places. While the disjoint between the competing goals of meeting material needs and maintaining the social order often grows wider over many seasons or years, the introduction of a development intervention can greatly accelerate this process. This is particularly true if the project facilitates new behaviors and expectations for previously-constrained or marginal individuals (e.g. Carney, 1996; Schroeder, 1997). Such interventions rarely see themselves as stressors, or consider the thresholds over which they might push existing livelihoods and socio-ecologies in their design and implementation. However, when they push a population past a threshold, such efforts often result in perverse outcomes where human well-being declines after the intervention as existing sources of safety and certainty fall away. If the framing of livelihoods as projects balancing material and social goals explains many of the "surprising" cases of low uptake or limited long-term impact associated with many development interventions, the brittle character of these projects when put under extreme stress explains the unwanted and problematic changes that many other interventions have induced when they have been more draconian and far-reaching.

However, collapse and reconstruction is not the only pathway to change in a world of resilient livelihoods. The dynamics of livelihoods resilience described above suggest that, perhaps counterintuitively, a key opportunity for change and transformation is the reduction or removal of stress on their socio-ecologies. Successful efforts to provide safety and certainty in the face of various shocks and stressors legitimize livelihoods, and the associations between different identities/individuals and specific roles and responsibilities that take shape in their socio-ecologies. Under conditions of stress, what people do, and how they do it, comes under increasing scrutiny to ensure each individual plays their part in the achievement of safety and certainty, and does so in a manner that preserves the existing social order (Carr, 2019). This is particularly true if the stress or shock threatens the privileges of those in authority, for example by hindering their ability to meet the expectations of their role in providing safety and certainty to their household, family, or community. In such a situation, a wife withholding her labor from her husband's farm is a substantial challenge to his authority and his ability to fulfill the expectations of his role in the eyes of others. He is therefore likely to employ whatever means are legitimate to compel her labor and compliance. In this way, increasing stress on these livelihoods will squeeze out opportunities for innovation, change, and transformation.

This dynamic suggests that development and adaptation interventions can be effective tools for transformation if they are focused on the reduction of risk and uncertainty for the populations with which they are working. Such efforts will yield greater safety and certainty within the population, and thus remove some of the impetus to tightly police and control who does what and how. In such situations, individuals with deep understandings of their context can identify opportunities to push boundaries and gradually take on new roles and responsibilities (Carr, 2019). For example, in a secure household the wife who withholds some of her labor from her husband might be treated as an annoyance and ignored, rather than disciplined as an existential threat. While not all of these efforts will succeed, behaviors which push boundaries, provide greater opportunity, and do not attract sanction will draw the attention of similarly-positioned individuals who can take on this same strategy. As more individuals take on new roles, responsibilities, and behaviors, expectations can be subtly redefined such that what was once a transgressive behavior becomes expected.

Reducing stress on livelihoods can produce opportunities for transformation. However, those living under such livelihoods are best positioned to identify and realize locally-appropriate opportunities and their potential to produce durable changes in livelihoods activities, identity-based roles and responsibilities, and material measures of well-being. Efforts to reduce stress on livelihoods cannot be instrumentalized to interventions that identify and ameliorate externally-identified material stresses. An intervention that boosts women's agricultural productivity for a chronically food-insecure community might produce a greater supply of food and income, but might also stress the role of men as providers for their households. Such a stress is likely to lead to increasing rigidity in livelihoods, not transformation. Therefore, any effort to address a material stress must also fit into existing structures of authority such that it relieves social pressure on those in authority. Under such circumstances, vigilance over the activities of women is likely to relax, and women will begin to engage in locally-effective "transgressions" that, over time, might become generative of new livelihoods discourses and mobilizations of identity that transform these resilient livelihoods without first passing through a catastrophic phase.

Case: Opportunities for Agrarian Transformation in Mali:

In southern Mali, livelihoods are organized around the management of various stressors, particularly uncertain and sometimes-inadequate rainfall and variable markets for agricultural products (Dixon and Holt, 2010). These livelihoods are heavily patriarchal, usually structured around concessions comprised of households of the same family headed by the eldest man in that family. These livelihoods exhibit a clearly gendered division of agricultural roles and responsibilities, with men responsible for the cultivation of rain-fed grains such that they can feed their family for the entire year (e.g. Assé and Lassoie, 2011; Becker, 2000; Carr et al., 2015b). Women work on these fields, but they have no control over rainfed agricultural decisions or the use of the products of this labor. Some rainfed crops, such as millet, are widely identified as men's crops, and therefore inappropriate for women's cultivation. This construction of identity, roles, and crops is so pervasive that, during fieldwork in this area, some women admitted they had never even thought to plant their own millet (Carr and Onzere, 2018). In this way, discourses of livelihoods (what activities should be undertaken, by whom, and how) have mobilized aspects of the identities of men and women, essentializing them into providers (men) and obedient supporters for providers (women). At the same time, while this structure of livelihoods provides a great deal of safety and certainty in an environment characterized by economic and environmental uncertainty, the benefits of these strategies are distributed unevenly in households, concessions, and communities. For example, there are seasons in which men's agricultural decisions and labor do not result in expected amounts of food or income. In such situations, women and junior men might challenge the authority and privileges of senior men. These threats are addressed through locally-legitimate forms of discipline that coerce individuals to adhere to expectations of activities, roles, and responsibilities. A woman who, during a challenging season, emphasized her own rainfed production over that of her husband would be subject to various forms of discipline ranging from verbal "correction" to the loss of access to assets, domestic violence, or even expulsion from the household and family if the transgression is persistent and significant enough. The need for tools of discipline demonstrates that the default state of either livelihoods or their associated socio-ecologies does not exist in a discursively-determined (or implicitly functionalist) stasis. These livelihoods are projects aimed at the maintenance of order in the face of both a changing natural and economic world *and* efforts to change that order from within the community and household. This order is constantly challenged, but not all challenges are quickly disciplined out of existence. During fieldwork in southern Mali, we found examples of individuals conducting activities "inappropriate" for their identity and associated roles and responsibilities, such as women cultivating millet (Carr et al., 2015a). These women did not appear to be experiencing any form of discipline. The women involved in this particular transgression all belonged to the wealthiest, most secure households in the community. In these households, the male heads were able to ensure safety and certainty for the members of the household, and thus live up to their roles and responsibilities. They did not need to worry about all members of the household playing their roles to ensure safety and certainty. Further, as these men were very successful providers, their identity and authority were not under stress. Thus, they did not carefully police the activities of their wives. When we looked at households in these communities that frequently experienced existential stresses, we found no examples of similar transgressions. Instead, women were working on their husband's farms and cultivating irrigated vegetables, as expected. In these households, men were deeply materially stressed, and therefore needed every member of the household to play their role to achieve a degree of material security. Further, their role as provider was frequently called into question, and therefore household members taking up new activities, particularly activities that might threaten the status of the household head, were strongly discouraged.

5. Advancing resilient livelihoods: A research agenda

When applied to observed livelihoods and socio-ecological dynamics, as well as the outcomes of development and adaptation interventions, the framing of resilient livelihoods presented in this paper has substantial explanatory value. At the same time, there are avenues by which we might test and refine this conceptualization. The first is through a deeper engagement with the behavioral sciences. The second rests on using this framing of resilient livelihoods to identify indicators of rigidity and stress whose accuracy can be tested through empirical study.

Framing resilient livelihoods as projects that manage the sociocultural, institutional, and biotic in a manner that balances material needs and social goals is potentially coarse: both material needs and social goals are very broad categories containing a wide range of activities, processes, and meanings. It is worth exploring the value of more nuanced understandings of this tradeoff. This suggests not only a need for greater social scientific exploration of the structure of resilient livelihoods, but also for an engagement with the behavioral aspects of decision-making within those structures. One potentially useful line of research would be to examine how specific components of each of these broad categories are weighted in individual perceptions and decisions to see if this yields better explanations of specific livelihoods decisions and outcomes. Further, examining how this weighting changes over time, as conditions and outcomes change, might result in more specific understandings of the observed trend toward rigidity in livelihoods as stress increases. This, in turn, could yield clearer points of intervention that can avert socio-ecological collapse. Another potentially useful area of inquiry lies in understanding the importance of individual tolerance for deviance on overall trends toward rigidity or innovation. There will be individual, personality-level variations in the perception of the threat or opportunity associated with deviations from expectations. To what extent does this individual variability interact with structural framings of how to live in the world to produce observed innovations or rigidities? Finally, this framing of resilient livelihoods assumes that individuals will know what deviations present the greatest opportunities for change and innovation in their context. However, most deviations have not yet been tested, and therefore even local knowledge of likely pathways to innovation and change may be imperfect. Certainly, those living under particular livelihoods will likely know opportunities and costs associated with a particular deviation from expectations better than those living elsewhere. However, this is not the same thing as having perfect knowledge of these opportunities and costs. Further examinations of the extent to which different deviations from expectations persist and produce enduring change might nuance our understanding of the value of local knowledge and its ability to catalyze transformative change.

A parallel approach to testing and refining the theorization of resilient livelihoods presented in this article lies in the hypothesis that increased stress on ways of living in particular places produces increased rigidity and lower rates of deviation from accepted and expected decisions and behaviors. The stresses that might bring down the livelihoods in a community emerge through the interplay of material practice, shocks and stressors, and the sociocultural meanings and orders through which people make sense of the world. While it is unlikely that challenges to meaning and order will be easily identified from outside the community or population in question, one means of testing this hypothesis lies in identifying indicators of the relative rigidity of livelihoods, and measuring changes in those indicators over time to identify places where livelihoods appear to be increasingly stressed. For example, in southern Mali one might use extension data, rapid surveys, or even remotely-sensed data to look for places where the diversity of non-staple rainfed crops cultivated over time is declining. Studies of livelihoods in this part of the world suggest that this trend likely reflects growing stress on agricultural production and livelihoods, stress that is often managed through increased attention to men's rainfed crop production and policing of all deviations from expected activities that might draw attention and effort from such production (Carr and Owusu-Daaku, 2016; Carr and Onzere, 2018). In Ghana's Central Region, shrinking women's farm sizes in situations where land shortage cannot explain the trend likely reflects an effort to limit women's production so it does not produce a threat to the authority of men, an indicator of greater rigidity in roles, responsibilities, and activities. In both contexts, these efforts will generate increasing tension between social and material goals, and likely render livelihoods increasingly brittle as they experience greater and greater material and social challenges. Trends in such indicators that appear to suggest increased rigidity can be tested empirically through rapid qualitative and participatory approaches. These tests will inform the theorization presented above, refining its assumptions and enhancing our understanding of the structural aspects of the socio-ecological projects which produced these observed outcomes.

Each of these lines of inquiry are likely to contribute useful knowledge to our understanding of livelihoods and socio-ecological dynamics. Further, approaching the questions raised by this approach to resilient livelihoods through parallel lines of inquiry operating at different levels and using different methods also offers the opportunity to triangulate findings and thus improve both the rigor with which we interpret livelihoods decisions and trends and the validity of those interpretations.

6. Conclusion: Continuity and stability as early warnings

Livelihoods are inherently resilient, but the development and adaptation communities of practice need to better understand the sources and dynamics of that resilience to achieve their goals. Introducing resilient livelihoods into the discourse as lightly rebranded sustainable livelihoods does not provide a pathway to new understandings. Instead, it risks serving as means of perpetuating problematic framings of both livelihoods and socio-ecological dynamics that limit the effectiveness of development and adaptation interventions.

To address this problem, this paper argued for a reframing of resilient livelihoods that, while effectively explaining observed patterns of change and continuity in livelihoods, challenges our understanding of livelihoods trajectories under a changing climate, an ever-shifting global economy, and ongoing development and adaptation initiatives. Resilient livelihoods are projects aimed at achieving material well-being while preserving existing systems of meaning and social order. They (re)produce socio-ecologies, deeply human assemblages of sociocultural, institutional, and biotic elements whose properties are managed to specific ends, centering meaning, power, difference, and agency in their dynamics. This explains why so many development and adaptation efforts to encourage apparently simple and logical shifts in crops or activities encounter such resistance and failure. Such efforts shift the roles, responsibilities, identities, and meanings at the heart of existing understandings of how to live in particular places and thus become stressors to be managed. It is not surprising that livelihoods and their attendant socio-ecologies have persisted in the context of substantial economic, environmental, and development stress, but this only becomes clear through the theorization of resilient livelihoods presented in this article.

While opening new analytical opportunities, this theorization of resilient livelihoods offers a potentially dire picture of the situation in many places. For example, while agrarian livelihoods have proven durable in the face of various pressures, many are likely becoming more brittle and approaching thresholds beyond which they are not viable. The treatment of continuity as a sign of stability that did not require attention, accompanied by a focus on exogenous drivers of change, may have masked a long, problematic trend toward riskier, more fragile lives. In many places, the increasing pressure on livelihoods is likely producing mismatches between goals associated with material safety and certainty and the maintenence of existing social orders and the

privileges they convey to those in authority. These mismatches will yield increasing rigidity, visible as the stability of particular ways of living in the face of increasing challenges. However, such stability comes at the cost of lost innovation and opportunities for transformation, likely resulting in ways of living marked by increasing fragility and precarity. This interpretation, which has empirical support from livelihoods studies across twelve livelihoods zones in Senegal, Mali, Ghana, Rwanda, and Zambia (see Carr, 2019 for discussion), should be a cause for substantial concern.

This is why, even as this article suggests avenues for testing and refining this theorization of resilient livelihoods and their socio-ecological projects, it also presents a means of immediately reframing our approach to adaptation and development programs and projects. Such immediacy is necessary as adaptation implementation moves forward with increasing speed and scope. The theorization of resilient livelihoods presented here, and the ways in which it aligns with and explains observed decisions and outcomes, points to the need to shift the often-implicit theories of change that undergird most development and adaptation projects away from disruption and reconstruction to one where change and transformation are catalyzed through efforts to reduce stress and risk. Such a shift in assumptions will address current trends toward fragility and precarity, producing projects and interventions that better meet the needs of vulnerable populations in an era of global change. This paper demonstrates the utility of this resilient livelihoods approach to the achievement of this goal, even as we move forward in our efforts to better understand these needs and how best to address them.

7. Data statement

This is a synthesis article, and therefore does not draw heavily on primary data analysis. The studies referenced in this article have, where appropriate and possible, made substantial portions of the data public or otherwise open to scrutiny.

Declaration of Competing Interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

Assé, R., Lassoie, J.P., 2011. Household decision-making in agroforestry parklands of Sudano-Sahelian Mali. Agrofor. Syst. 82, 247–261.
Bebbington, A., 1999. Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty. World Dev. 27, 2021–2044.
Becker, L.C., 2000. Garden money buys grain: food procurement patterns in a Malian Village. Hum. Ecol. 28, 219–250.
Béné, C., Evans, L., Mills, D., Ovie, S., Raji, A., Tafida, A., Kodio, A., Sinaba, F., Morand, P., Lemoalle, J., Andrew, N., 2011. Testing resilience thinking in a poverty context : experience from the Niger River basin. Glob. Environ. Change. 21, 1173–1184.
Béné, C., Newsham, A., Davies, M., Ulrichs, M., Godfrey-Wood, R., 2014. Review article: resilience, poverty, and development. J. Int. Dev. 26, 598–623.
Borras, S.M., 2009. Agrarian change and peasant studies: changes, continuities and challenges - an introduction. J. Peasant Stud. 36, 5–31.
Brown, K., 2016. Resilience, Development, and Global Change. Routledge, Abingdon.
Brown, K., 2014. Global environmental change I: a social turn for resilience ? Prog. Hum. Geogr. 38, 107–117.
Brown, K., Westaway, E., 2011. Agency, capacity, and resilience to environmental change: lessons from human and disasters. Annu. Rev. Environ. Resour. 36, 321–342.
Cairns, J.E., Prasanna, B.M., 2018. Developing and deploying climate-resilient maize varieties in the developing world. Curr. Opin. Plant Biol. 45, 226–230.
Carney, D., 1998. Sustainable Rural Livelihoods: What Contribution Can We Make? Department for International Development, London.
Carney, J.A., 1996. Converting the Wetlands, Engendering the Environment: the Intersection of Gender with Agrarian Change in The Gambia. In: Peet, R., Watts, M. (Eds.), Liberation Ecologies: Environment, Development, Social Movements. Routledge, London, pp. 220–234.
Carr, E.R., 2019. Properties and projects: reconciling resilience and transformation for adaptation and development. World Dev. 122, 70–84.
Carr, E.R., 2015. Political Ecology and Livelihoods. In: Perrault, T., Bridge, G., McCarthy, J. (Eds.), The Routledge Handbook of Political Ecology. Routledge, New York, pp. 332–342.
Carr, E.R., 2013. Livelihoods as Intimate Government: Reframing the logic of livelihoods for development. Third World Q. 34, 77–108.
Carr, E.R., 2011. Delivering Development: Globalization’s Shoreline and the Road to a Sustainable Future. Palgrave Macmillan, New York.
Carr, E.R., 2008. between structure and agency: livelihoods and adaptation in Ghana’s Central Region. Glob. Environ. Chang. 18, 689–699.
Carr, E.R., Abrahams, D., De la Poterie, A.T., Suarez, P., Koelle, B., 2015. Vulnerability assessments, identity and spatial scale challenges in disaster-risk reduction. Jàmbá J. Disaster Risk Stud. 7, 1–17.
Carr, E.R., Fleming, G., Kalala, T., 2016. Understanding women’s needs for weather and climate information in agrarian settings: the case of Ngetou Maleck, Senegal. Weather. Clim. Soc. 8, 247–264.
Carr, E.R., McCusker, B., 2009. The co-production of land use and livelihoods change: Implications for development interventions. Geoforum 40, 568–579.
Carr, E.R., Onzere, S., Kalala, T., Owusu-Daaku, K.N., Rosko, H., 2015. Assessing Mali’s l’Agence Nationale de la Météorologie’s (Mali Meteo) Agrometeorological Advisory Program: Final Report on the Farmer Use of Advisories and the Implications for Climate Service Design. USAID, Washington, DC.
Carr, E.R., Onzere, S.N., 2018. Really effective (for 15% of the men): lessons in understanding and addressing user needs in climate services from Mali. Clim. Risk Manage. 22, 82–95.
Carr, E.R., Owusu-Daaku, K.N., 2016. The shifting epistemologies of vulnerability in climate services for development: the case of Mali’s agrometeorological advisory programme. Area 48, 7–17.
Chinigò, D., 2016. Re-peasantization and land reclamation movements in malawi. Afr. Aff. (Lond) 115, 97–118.
Cohn, A.S., Newton, P., Gil, J.D.B., Kuhl, L., Samberg, L., Ricciardi, V., Manly, J.R., Northrop, S., 2017. Smallholder Agriculture and Climate Change. Annu. Rev. Environ. Resour. 42, 347–375.
Comfort, L., Wisner, B., Cutter, S., Pulwarty, R., Hewitt, K., Oliversmith, A., Wiener, J., Fordham, M., Peacock, W., Krimgold, F., 1999. Reframing disaster policy: the global evolution of vulnerable communities. Glob. Environ. Chang. Part B Environ. Hazards 1, 39–44.
Cote, M., Nightingale, A.J., 2012. Resilience thinking meets social theory. Prog. Hum. Geogr. 36, 475–489.
Cretney, R., 2014. Resilience for whom? Emerging critical geographies of socio-ecological resilience. Geogr. Compass 8, 627–640.
Crona, B., Bodin, O., 2010. Power Asymmetries in Small-Scale Fisheries: a Barrier to Governance Transformability? Ecol. Soc. 15, 32.
D’Agostino, A.L., Sovacool, B.K., 2011. Sewing climate-resilient seeds: Implementing climate change adaptation best practices in rural Cambodia. Mitig. Adapt. Strateg. Glob. Chang. 16, 699–720.
Davidson, D.J., 2010. The applicability of the concept of resilience to social systems: some sources of optimism and nagging doubts. Soc. Nat. Resour. 23, 1135–1149.
Davies, M., Béné, C., Arnall, A., Tanner, T., Newsham, A., Coirolo, C., 2013. Promoting Resilient Livelihoods through Adaptive Social Protection: Lessons from 124 programmes in South Asia. Dev. Policy Rev. 31, 27–58.
Davoudi, S., 2012. Resilience: A Bridging Concept or a Dead End? Plan. Theory Pract. 13, 299–307.
de Haan, L.J., Zoomers, A., 2005. Exploring the Frontier of Livelihoods Research. Dev. Change 36, 27–47.
Dixon, S., Holt, J., 2010. Livelihood Zoning and Profiling Report: Mali. Famine Early

Warning System, Washington, DC.
Dressler, W.H., Smith, W., Montefrio, M.J.F., 2018. Ungovernable? The vital natures of swidden assemblages in an upland frontier. J. Rural Stud. 61, 343–354. https://doi.org/10.1016/j.jrurstud.2017.12.007.
Duit, A., Galaz, V., Eckerberg, K., Ebbesson, J., 2010. Governance, complexity, and resilience. Glob. Environ. Change. 20, 363–368.
Eakin, H., Winkels, A., Sendzimir, J., 2009. Nested vulnerability: exploring cross-scale linkages and vulnerability teleconnections in Mexican and Vietnamese coffee systems. Environ. Sci. Policy 12, 398–412.
Folke, C., 2006. Resilience: the emergence of a perspective for social-ecological systems analyses. Glob. Environ. Chang. 16, 253–267.
Folke, C., Carpenter, S.R., Walker, B., Scheffer, M., Chapin, T., 2010. Resilience thinking: integrating resilience, adaptability and transformability. Ecol. Soc. 15, 20.
Förster, T., 1998. Land use and land rights in the West African savannah: the Senufo in northern Côte d'Ivoire. GeoJournal 46, 101–111.
Forsyth, T., 2018. Is resilience to climate change socially inclusive? Investigating theories of change processes in Myanmar. World Dev. 111, 13–26.
Gaillard, J., Liamzon, C., Villanueva, J., 2007. 'Natural' disaster? A retrospect into the causes of the late-2004 typhoon disaster in Eastern Luzon, Philippines. Environ. Hazards 7, 257–270.
Grigsby, W.J., 2004. The gendered nature of subsistence and its effect on customary land tenure. Soc. Nat. Resour. 17, 207–222.
Gunderson, L.H., 2000. Ecological resilience-in theory and application. Annu. Rev. Ecol. Syst. 31, 425–439.
Harvey, C.A., Rakotobe, Z.L., Rao, N.S., Dave, R., Razafimahatratra, H., Rabarijohn, R.H., Rajaofara, H., MacKinnon, J.L., 2014. Extreme vulnerability of smallholder farmers to agricultural risks and climate change in Madagascar. Philos. Trans. R. Soc. B Biol. Sci. 369.
Hazell, P., Poulton, C., Wiggins, S., Dorward, A., 2010. The future of small farms: trajectories and policy priorities. World Dev. 38, 1349–1361.
Hebinck, P., Mtati, N., Shackleton, C., 2018. More than just fields: REFRAMING deagrarianisation in landscapes and livelihoods. J. Rural Stud. 61, 323–334.
Hughes, T.P., Linares, C., Dakos, V., van de Leemput, I.A., van Nes, E.H., 2013. Living dangerously on borrowed time during slow, unrecognized regime shifts. Trends Ecol. Evol. 28, 149–155.
Humphrey, J., 2019. Food safety, trade, standards and the integration of smallholders into value chains: A review of the literature. IFAD Research Series 11, Rome.
Jakimow, T., 2013. Unlocking the Black Box of Institutions in Livelihoods Analysis: Case Study from Andhra Pradesh, India. Oxford Dev. Stud. 41, 493–516.
Jakimow, T., 2012. Serious games in livelihood analysis: reflections from the case of agricultural wage labourers in Andhra Pradesh. J. Dev. Stud. 48, 1274–1287.
Matin, N., Forrester, J., Ensor, J., 2018. What is equitable resilience? World Dev. 109, 197–205.
Morton, J.F., 2007. The impact of climate change on smallholder and subsistence agriculture. Proc. Natl. Acad. Sci. U. S. A. 104, 19680–19685.
Pelling, M., Manuel-Navarrete, D., 2011. From resilience to transformation: the adaptive cycle in two mexican urban centers. Ecol. Soc. 16, 11.
Perez, C., Jones, E.M., Kristjanson, P., Cramer, L., Thornton, P.K., Förch, W., Barahona, C., 2015. How resilient are farming households and communities to a changing climate in Africa? A gender-based perspective. Glob. Environ. Chang. 34, 95–107.
Perry, D.L., 2005. Wolof women, economic liberalization, and the crisis of masculinity in rural Senegal. Ethnology 44, 207–226.
Rigg, J., Salamanca, A., Thompson, E.C., 2016. The puzzle of East and Southeast Asia's persistent smallholder. J. Rural Stud. 43, 118–133.
Rurinda, J., Mapfumo, P., van Wijk, M.T., Mtambanengwe, F., Rufino, M.C., Chikowo, R., Giller, K.E., 2014. Sources of vulnerability to a variable and changing climate among smallholder households in Zimbabwe: a participatory analysis. Clim. Risk Manage. 3, 65–78.
Sakdapolrak, P., 2014. Livelihoods as social practices - re-energising livelihoods research with bourdieu's theory of practice. Geogr. Helv. 69, 19–28.
Sallu, S.M., Twyman, C., Stringer, L.C., 2010. Resilient or vulnerable livelihoods? Assessing livelihood dynamics and trajectories in rural Botswana. Ecol. Soc. 15, 3–27.
Scheffer, M., Carpenter, S.R., Lenton, T.M., Bascompte, J., Brock, W., Dakos, V., van de Koppel, J., van de Leemput, I.A., Levin, S.A., van Nes, E.H., Pascual, M., Vandermeer, J., 2012. Anticipating Critical Transitions. Science (80-.). 338, 344–348.
Schipanski, M.E., MacDonald, G.K., Rosenzweig, S., Chappell, M.J., Bennett, E.M., Kerr, R.B., Blesh, J., Crews, T., Drinkwater, L., Lundgren, J.G., Schnarr, C., 2016. Realizing resilient food systems. Bioscience 66, 600–610.
Schroeder, R.A., 1997. "'Re-claiming'" land in the Gambia: Gendered property rights and environmental intervention. Ann. Assoc. Am. Geogr. 87, 487–508.
Scoones, I., 2009. Livelihoods perspectives and rural development. J. Peasant Stud. 36, 171–196.
Sietz, D., Choque, S.E.M., Lüdeke, M.K.B., 2012. Typical patterns of smallholder vulnerability to weather extremes with regard to food security in the Peruvian Altiplano. Reg. Environ. Chang. 12, 489–505.
Sreenivasulu, N., Butardo, V.M., Misra, G., Cuevas, R.P., Anacleto, R., Kishor, P.B.K., 2015. Designing climate-resilient rice with ideal grain quality suited for high-temperature stress. J. Exp. Bot. 66, 1737–1748.
Suding, K.N., Hobbs, R.J., 2009. Threshold models in restoration and conservation: a developing framework. Trends Ecol. Evol. 24, 271–279.
Tanner, T., Lewis, D., Wrathall, D., Bronen, R., Cradock-Henry, N., Huq, S., Lawless, C., Nawrotzki, R., Prasad, V., Rahman, M.A., Alaniz, R., King, K., McNamara, K., Nadiruzzaman, M., Henly-Shepard, S., Thomalla, F., 2015. Livelihood resilience in the face of climate change. Nat. Clim. Chang. 5, 23–26.
Tendall, D.M., Joerin, J., Kopainsky, B., Edwards, P., Shreck, A., Le, Q.B., Kruetli, P., Grant, M., Six, J., 2015. Food system resilience: Defining the concept. Glob. Food Sec. 6, 17–23.
Toth, A., Rendall, S., Reitsma, F., 2016. Resilient food systems: a qualitative tool for measuring food resilience. Urban Ecosyst. 19, 19–43.
Twine, W., 2013. Multiple strategies for resilient livelihoods in communal areas of South Africa. African J. Range Forage Sci. 30, 39–43.
van den Berg, L., Hebinck, P., Roep, D., 2018a. 'We go back to the land': processes of repeasantisation in Araponga, Brazil. J. Peasant Stud. 45, 653–675.
van den Berg, L., Roep, D., Hebinck, P., Teixeira, H.M., 2018b. Reassembling nature and culture: Resourceful farming in Araponga, Brazil. J. Rural Stud. 61, 314–322.
Venema, B., 1986. The changing role of women in Sahelian Agriculture. In: Creevey, L.E. (Ed.), Women Farmers in Africa: Rural Development in Mali and the Sahel. Syracuse University Press, Syracuse, NY, pp. 81–94.
Venema, B., van Eijk, J., 2004. Livelihood strategies compared: private initiatives and collective efforts of Wolof women in Senegal. Afr. Stud. 63, 51–71.
Walker, B., Meyers, J.A., 2004. Thresholds in ecological and social – ecological systems : a developing database. Ecol. Soc. 9.
Williams, P.A., Crespo, O., Abu, M., Simpson, N.P., 2018. A systematic review of how vulnerability of smallholder agricultural systems to changing climate is assessed in Africa. Environ. Res. Lett. 13.
Wisner, B., Blakie, P., Cannon, T., Davis, I., 2004. At risk: Natural Hazards, People's Vulnerability and Disasters, 2nd ed. Routledge, London.