



Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance?



Siri Eriksen^{a,*}, E. Lisa F. Schipper^b, Morgan Scoville-Simonds^{c,d}, Katharine Vincent^{e,f}, Hans Nicolai Adam^g, Nick Brooks^{h,i}, Brian Harding^j, Dil Khatri^k, Lutgart Lenaerts^{l,n}, Diana Liverman^m, Megan Mills-Novoa^m, Marianne Mosbergⁿ, Synne Movik^o, Benard Muok^p, Andrea Nightingale^{q,r}, Hemant Ojha^{s,t}, Linda Sygna^u, Marcus Taylor^v, Coleen Vogel^w, Jennifer Joy West^x

^a Department of Public Health Science, Norwegian University of Life Sciences, Norway

^b Environmental Change Institute, University of Oxford, UK

^c Department of Global Development and Planning, University of Agder, Norway

^d Graduate Institute of International and Development Studies, Geneva, Switzerland

^e Kulima Integrated Development Solutions, Pietermaritzburg, South Africa

^f School of Architecture and Planning, University of the Witwatersrand, Johannesburg, South Africa

^g Section for Water and Society, Norwegian Institute for Water Research (NIVA), Oslo, Norway

^h Garama 3C Ltd., Norwich, UK

ⁱ Climatic Research Unit, University of East Anglia, Norwich, UK

^j Center for Governance and Sustainability, University of Massachusetts Boston, United States

^k Southasia Institute of Advanced Studies (SIAS), Kathmandu, Nepal

^l Department of Plant Sciences, Norwegian University of Life Sciences, Norway

^m School of Geography, Development and Environment, University of Arizona, USA

ⁿ Department of International Environment and Development Studies, Norwegian University of Life Sciences, Norway

^o Department of Urban and Regional Planning, Norwegian University of Life Sciences, Norway

^p Centre for Research Innovation and Technology, Jaramogi Oginga Odinga University of Science and Technology (JOUUST), Kenya

^q Department of Sociology and Human Geography, University of Oslo, Norway

^r Department of Urban and Rural Development, Swedish University of Agricultural Sciences

^s Centre for Deliberative Democracy and Global Governance, University of Canberra, Australia

^t Institute for Study and Development Worldwide, Sydney, Australia

^u cCHANGE Transformation in a Changing Climate, Oslo, Norway

^v Global Development Studies, Queen's University, Canada

^w Global Change Institute, University of the Witwatersrand, Johannesburg, South Africa

^x CICERO Centre for International Climate Research, Oslo, Norway

ARTICLE INFO

Article history:

Accepted 23 December 2020

Available online 22 January 2021

Keywords:

Climate change adaptation

Vulnerability

Climate resilient development

Maladaptation

Post-adaptation

Development interventions

ABSTRACT

This paper critically reviews the outcomes of internationally-funded interventions aimed at climate change adaptation and vulnerability reduction. It highlights how some interventions inadvertently reinforce, redistribute or create new sources of vulnerability. Four mechanisms drive these maladaptive outcomes: (i) shallow understanding of the vulnerability context; (ii) inequitable stakeholder participation in both design and implementation; (iii) a retrofitting of adaptation into existing development agendas; and (iv) a lack of critical engagement with how 'adaptation success' is defined. Emerging literature shows potential avenues for overcoming the current failure of adaptation interventions to reduce vulnerability: first, shifting the terms of engagement between adaptation practitioners and the local populations participating in adaptation interventions; and second, expanding the understanding of 'local' vulnerability to encompass global contexts and drivers of vulnerability. An important lesson from past adaptation interventions is that within current adaptation *cum* development paradigms, inequitable terms of engagement with 'vulnerable' populations are reproduced and the multi-scalar processes driving vulnerability remain largely ignored. In particular, instead of designing projects to change the practices of

* Corresponding author.

E-mail addresses: siri.eriksen@nmbu.no (S. Eriksen), lisa.schipper@ouce.ox.ac.uk (E. Lisa F. Schipper), morganss@uia.no (M. Scoville-Simonds), katharine@kulima.com (K. Vincent), hans.adam@niva.no (H.N. Adam), nb@garama.co.uk (N. Brooks), bharding@gcfund.org (B. Harding), dil@sias-southasia.org (D. Khatri), lutgart.lenaerts@nmbu.no (L. Lenaerts), liverman@email.arizona.edu (D. Liverman), mmillsnovoa@email.arizona.edu (M. Mills-Novoa), marianne.mosberg@nmbu.no (M. Mosberg), synne.movik@nmbu.no (S. Movik), bmuk@yahoo.com (B. Muok), andrea.nightingale@sosgeo.uio.no (A. Nightingale), hemant.ojha@ifsd.com.au (H. Ojha), linda.sygna@cchange.no (L. Sygna), taylor@queensu.ca (M. Taylor), coleen.vogel@wits.ac.za (C. Vogel), j.j.west@cicero.oslo.no (J.J. West).

<https://doi.org/10.1016/j.worlddev.2020.105383>

0305-750X/© 2021 The Authors. Published by Elsevier Ltd.

This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

marginalised populations, learning processes *within* organisations and *with* marginalised populations must be placed at the centre of adaptation objectives. We pose the question of whether scholarship and practice need to take a post-adaptation turn akin to post-development, by seeking a pluralism of ideas about adaptation while critically interrogating how these ideas form part of the politics of adaptation and potentially the processes (re)producing vulnerability. We caution that unless the politics of framing and of scale are explicitly tackled, transformational interventions risk having even more adverse effects on marginalised populations than current adaptation.

© 2021 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction: The cause for concern

Inequalities in climate change adaptation have long been on the radar of international institutions. The 1994 United Nations Framework Convention on Climate Change, for example, recognised the inequity underlying climate change causes and effects, subsequently enshrining mechanisms of financial support and technology transfer to developing countries to enable adaptation. Notwithstanding such measures, Archbishop Emeritus Desmond Tutu warned over a decade later of an 'adaptation apartheid' in which those in the developing world who are most exposed to stark new climatic challenges would not have the resources to adapt (UNDP, 2007). The broader 2030 agenda and associated Sustainable Development Goals now highlight the need to 'leave no one behind', yet studies continue to warn of the risk of unintended negative consequences stemming from adaptation interventions for poverty and other goals (Magan et al., 2016; Work et al., 2019). A large body of literature now documents how social divisions on the basis of gender, race, age, (dis)ability or class determine who is vulnerable to climate change and who has greater ability to adapt (Pearse, 2017; Vincent et al., 2014). As a consequence of entrenched discrimination in society, one person's adaptation may be accomplished at the cost of another's increased vulnerability (Taylor, 2015; Thomas et al., 2019). In short, inequality shapes climate change adaptation and, if it is not accounted for in adaptation design, implementation or evaluation, interventions may either be ineffectual or – worse – increase the vulnerability of those they seek to aid (Ireland and McKinnon, 2013; Shackleton et al., 2015; Schipper et al., 2020).

Identifying the mechanisms through which negative effects can unfold in adaptation interventions must inform future adaptation policy. So far, however, examinations of adaptation interventions have either focused on a narrow range of technical or economic objectives or assessed the adaptation approaches or design, rather than the wider social impacts of interventions on the drivers of vulnerability (Kuhl et al., 2020). Hence, to date there has been no independent review of the impacts on social vulnerability of international or bilateral funded interventions. However, a large number of theoretical developments and individual empirical case studies are emerging that provide a basis to identify systemic features of the framing, financing, planning, implementation, monitoring and evaluation of adaptation interventions.

In addition to this literature, there is also growing interest in transformative adaptation, which looks beyond a programmatic approach to adaptation and views it instead as an opportunity 'to reconfigure the meaning and trajectory of development' (Pelling, 2011: 167; Pelling et al., 2015). Transformation is thus distinct from incremental adaptation in 'the extent of change, in practice manifesting either in the maintenance of an incumbent system or process, or in the creation of a fundamentally new system or process' (Park et al., 2012, p. 119). This distinction between 'incremental' adaptation and 'transformative' adaptation is reminiscent of the debates between the 'natural hazards' school that located risk in the hazard itself, in contrast to the political economists

who instead emphasised the underlying sources of vulnerability located in a wide range of social stressors, as well as the biophysical ones (Bassett and Fogelman, 2013). Transformative adaptation requires shifting inequitable socio-political relations as well as the worldviews and paradigms within which they are (re)produced (O'Brien, 2018; Tschakert, van Oort, St. Clair, & LaMadrid, 2013). In this paper, we see vulnerability as a fundamentally relational state. Rather than referring to 'vulnerable people', a term that constitutes a common but problematic categorisation of groups such as women as inherently vulnerable (Arora-Jonsson, 2011), we refer to 'marginalised people' in order to direct attention to the socio-political relations, such as gender and race relations, that produce socially differentiated vulnerability (Eriksen et al., 2015).

In surveying the adaptation literature, we review past and current interventions to highlight the specific mechanisms that increase the risk of maladaptive outcomes. This review paper originated as a request by the Norwegian Minister for Development Cooperation to document how adaptation policy and programmes are affecting vulnerability, including both positive and negative impacts. In response, we gathered a large number of adaptation and development scholar-practitioners to examine empirical case studies of adaptation across the developing world. These were identified through keyword searches and snowballing from reference lists, encompassing both scholarly and grey literature, beginning with interventions familiar to the authors. In total 34 empirical studies of adaptation interventions were reviewed¹. The cases were selected on the criteria that actual adaptation actions were implemented through programmes and projects all nominally labelled 'adaptation' in their objectives. The selected interventions were either funded directly through multilateral organisations or mechanisms, or through national or local actions supported by bilateral or multilateral aid. The cases were iteratively analysed to distinguish impacts of the actions on different groups within a vulnerability context, on the socio-environmental conditions comprising a vulnerability context, and on the processes and inequitable relations generating socially differentiated vulnerability. Findings from this analysis were situated in the broader adaptation and critical development literature, including reviews and conceptual development. Evidence of how different ways of planning and implementation contributed to the impacts of the interventions on vulnerability was then examined. For the second component, we complemented our analysis of empirical case studies with a review of a broader set of past studies that describe the mechanisms

¹ As examined in section 2: Abbink et al. (2014), Artur and Hilhorst (2012), Barrett (2014), Beckman (2011), Bergius et al. (2018), Buggy and McNamara (2016), Camargo and Ojeda (2017), Carr & Owusu-Daaku, 2016, Dodman and Mitlin (2015), Donner and Webber (2014), Ferdous et al. (2020), Haji and Legesse (2017), Kita (2019), Kothari (2014), Magan et al. (2016), Mehta et al. (2019), Mikulewicz (2020a), Milman and Arsano (2014), Murtinho et al. (2013), Nightingale (2017), Murtinho, Eakin, López-Carr, & Hayes, 2013, Nelson and Finan (2009), Ojwang et al. (2017), Omukuti (2020a), Pak-Uthai and Faysse (2018), Paprocki (2018), Tänzler, Maas, & Carius, 2010, Taylor and Bhasme (2020), Thomas and Warner (2019), Tschakert et al. (2016), Warner and Kuzdas (2016), West et al. (2018), Yates (2012), Karlsson, Naess, Nightingale & Thompson (2018). The analysis in sections 3 and 4 drew on further empirical studies as referenced in the text.

through which adaptation interventions are implemented, including planning, assessment, monitoring, evaluation, knowledge and participation processes.

Our examination was carried out acknowledging that internationally-funded interventions are only a sub-set of adaptation actions. Such actions range from daily decision-making by individuals, to collective action and formal adaptation policy making, and together make up the processes of adaptation to climatic uncertainty and change by societies (Pelling, 2011; Wang et al., 2013; Eriksen et al., 2015). Our focus was nonetheless on the proliferation of programmes and projects, taking place as part of national and local adaptation planning, that collectively frame climate interventions on the ground.

An independent, critical review of adaptation interventions is timely as the global stocktake of the Paris Agreement requires countries to measure progress on climate adaptation. However, in order for adaptation interventions to contribute to equitable and sustainable vulnerability reduction, and to measure progress in this endeavour, the structures around financing, planning, implementation, monitoring and evaluation of interventions that frame climate intervention processes may need to be redesigned. In particular, our findings suggest that adaptation knowledge within interventions, and within the adaptation-development funding apparatus itself, may need to change towards more reflexive, multi-scalar and inclusive learning and evaluation processes.

The paper is divided into four sections. In section two, we explore how adaptation interventions have impacted vulnerability in both intended and unintended ways, illustrating how they can reinforce, redistribute or create new sources of vulnerability. In section three we synthesise the literature to identify the primary reasons that some adaptation interventions have inequitable impacts. We highlight four features: namely, (i) the failure to comprehensively consider the vulnerability context; (ii) the lack of inclusive and equitable participation in the design and implementation of interventions; (iii) the retrofitting of adaptation project goals to match existing development efforts; and (iv) pervading the three first features, the tendency of interventions to insufficiently conceptualise what 'adaptation success' comprises. Little attention is paid to how the meaning of such success varies and is contested between different groups. As a result, dominant development discourses implicitly define such success, contributing to a conserving of the status quo rather than imagining more transformative measures required in the face of climate change and inequity. In section four we explore how better linking of adaptation research, policy and programming could help overcome these challenges by first, shifting the terms of engagement between adaptation practitioners and the local populations participating in adaptation interventions; and second, expanding an understanding of 'local' vulnerability to encompass global contexts and drivers of vulnerability.

2. Evidence of the effect of adaptation interventions on vulnerability

Despite assertions in policy, practice and academia of adaptation reducing vulnerability to climate change, we found clear evidence to the contrary. In particular, three features emerge. First, some interventions reinforce existing vulnerability; second, others simply redistribute vulnerability; and third, some measures introduce new sources of vulnerability. In this section we elaborate on these three features. In all cases, it is worth noting that the reinforcement, redistribution or creation of new vulnerability tends to follow the same social cleavages that create differential vulnerability and equality in the first place – such as gender, race, age (dis)ability and class. Consequently it is typically those who are most marginalised and to whom society accords the least socio-

political power that end up with compounded vulnerability. The idea that an adaptation intervention can result in vulnerability is embodied in the notion of *maladaptation* (Antwi-Agyei, Dougill, Stringer, & Codjoe, 2018; Juhola, Glaas, Linnér, & Neset, 2016; Magnan et al., 2016). While many of the examples described below can be considered maladaptive, rather than label them as such, we are seeking to unpack the reason why they are increasing vulnerability rather than reducing it.

2.1. Reinforcing existing vulnerability

Despite aiming to meet the needs of disadvantaged socio-economic groups and those who are most vulnerable to climatic shocks and stresses, adaptation interventions are prone to elite capture, a long-standing problem in development whereby powerful people expropriate funds, resulting in interventions that reinforce existing power relations (Artur & Hilhorst, 2012; Dasgupta & Beard, 2007; Kita, 2019; Rusca, Schwartz, Hadzovic, & Ahlers, 2015). Our review indicates that goals and priorities for adaptation interventions are often set in a top-down manner by relatively privileged groups rather than being framed by the intended beneficiaries, leading to a skewed distribution of benefits in favour of local elites.

Evidence for elite capture and manipulation exists from around the world. A process of reliance on privileged insiders for implementation has been observed in adaptation interventions in Nepal, India and Tanzania, where the relatively wealthy and influential community members monopolise benefits and manipulate new projects for political ends (Yates, 2012; Nightingale, 2017; Taylor and Bhasme, 2020; Omukuti, 2020a). Sometimes this process is explicitly political, wherein national-level resources are directed for the specific purposes of patronage and obtaining political support within target constituencies, as observed in Brazil and Mozambique (Nelson and Finan, 2009; Artur and Hilhorst, 2012). In other instances, people's vulnerability is used explicitly as an excuse for not including them in projects. Examining cases around the world, Thomas and Warner (2019) identify a tendency to 'weaponise vulnerability' where vulnerable groups are seen as potential security threats, legitimising measures aimed at protecting the elite from these marginalised people. In northern Colombia, an Adaptation Fund project selected beneficiaries for post-disaster housing from the national registry, yet the most vulnerable were largely unable to navigate the bureaucratic processes involved to register, resulting in exacerbation of existing social exclusions and increased out-migration (Camargo and Ojeda, 2017).

Elite capture may also emerge inadvertently through poor intervention design. As a precondition for participation, projects often require investments such as commitments of land, time, labour or material inputs, which the poorest and disadvantaged frequently lack (Camargo and Ojeda, 2017; Nagoda and Nightingale, 2017; Mikulewicz, 2020a). Adaptation measures may support particular agricultural practices or livelihood changes that disproportionately benefit those with land, while penalising the land-poor, as exemplified for the case of Vietnam (Chapman et al., 2016). Similarly, adaptation measures in São Tomé and Príncipe were found to exacerbate inequitable labour relations, pushing small-scale farmers into casual labour for larger landowners (Mikulewicz, 2020a).

Exclusion of marginalised groups from adaptation interventions may also take place due to geographical constraints, particularly when intervention design and participatory processes take place in locations that are convenient to funding and/or implementing agencies, agendas and well-connected groups (typically, those living near administrative centres and well-maintained roads) yet distant from the most marginalised communities. Similarly, to ensure rapid success of interventions, implementing agencies often

return to communities and networks where established institutional capacity exists while remote and marginalised areas remain excluded (Barrett, 2014; Pak-Uthai and Faysse, 2018). For example, a study of 27 bilateral and multilateral donors to Malawi found that proportionately less adaptation finance arrived in the areas of highest need, with the poorest receiving the least (Barrett, 2014). This occurred despite the stated commitment of multilateral (World Bank, African Development Bank) and bilateral (Norway, Japan, UK) development agencies working in the country to design interventions targeting the needs of the most vulnerable. Actual distribution of funding nevertheless reflected donor utility – such as pre-existing aid activities in the area and ease of access – and the ability to absorb capital. The latter has sometimes been an explicit selection criterion for receiving support (Climate Investment Funds, 2009). While organising interventions through local intermediaries already known to agency staff can fast-track implementation of activities, it also risks making the project reliant on established power relations and processes of elite capture (Artur and Hilhorst, 2012; West et al., 2018; Taylor and Bhasme, 2020). In addition to potential duplication of efforts, this also opens opportunities for political manipulation, which was observed in the case of adaptation to water scarcity in Colombia (Murtinho, Eakin, López-Carr, & Hayes, 2013). Here, funding was overly distributed to least-affected regions, while regions with severe water scarcity received less, in part due to pre-existing development activities but also due to political connections in the more favoured regions.

In cases of both deliberate and inadvertent elite capture, a monopolisation of project resources can lead to a form of 'accumulation by adaptation' that widens inequality and undermines broader adaptation goals. In addition and related to such an 'accumulation by adaptation', adaptation interventions can also reinforce existing inequalities in the distribution of decision-making authority. For example, Mikulewicz (2020a) shows that in São Tomé and Príncipe, adaptation interventions are only offered to those who have land, ignoring the landless. On a broader level, adaptation policies often fail to alter the social and political dynamics that have produced vulnerability patterns in the first place (Pelling et al., 2015; Nagoda and Nightingale, 2017). It has been demonstrated that even adaptation processes specifically aiming to foster participation and social inclusion can entrench, rather than challenge, existing power relations (Buggy and McNamara, 2016). For example, a study by Karlsson et al. (2018) of Climate-Smart Agriculture (CSA), an approach that seeks to address mitigation, adaptation, and enhanced food security, illustrates that interventions have implications for both asset distribution and decision-making. CSA may unjustly shift the burden of responsibility for mitigation to marginalised producers and resource managers (a problem of distributive equity, or "who gets what"). At the same time, CSA often fails to overcome existing power relations (a problem of procedural equity, or "who decides"). The political nature of change is seldom acknowledged, resulting in lost opportunities for enhancing institutions that underpin the bargaining power of marginalised groups (Karlsson et al., 2018).

The tendency of interventions to reinforce inequitable socio-political relations is particularly acute in the context of conflict. Some adaptation efforts take place in violent settings, where conflict is a major cause of vulnerability to climate change, and violence and insecurity may stall or delay implementation of interventions (Peters et al., 2019). However, climate change interventions seldom tackle inequitable power relations head-on, and often assume that adaptation takes place in peaceful, non-conflictual settings. As a result, adaptation measures are often seen as purely technical interventions and implemented without properly considering conflict dynamics or political contexts (Tänzler,

Maas, & Carius, 2010; Levine et al., 2014). Climate change and conflict resolution/peacebuilding efforts also have traditionally operated as two entirely separate sectors with very limited engagement between them (Matthew, 2014). This means that synergies are largely ignored, although there are some recent attempts to bring them together within the field of environmental peacebuilding (Schilling et al., 2017; Ide, 2020).

Furthermore, there are increasing concerns that climate change interventions may not only reinforce inequitable power relations, but also serve to exacerbate existing political tensions or conflict dynamics – especially in situations where interventions reinforce particular livelihood activities, alter power relations and institutions of environmental governance, or shift patterns of authority over natural resources that are already highly contested (Corbera et al., 2017; Nightingale, 2017). As highlighted by a growing number of scholars, such as Abrahams & Carr, 2017; Tänzler, Maas, & Carius, 2010, and Work (2019), conflicts may not necessarily emerge as a direct result of climate change, but instead as a consequence of climate change interventions implemented 'in the name of climate change'. These dynamics are illustrated by the case of Gambella, Ethiopia, where Milman and Arsano (2014) found that climate change adaptation efforts served to increase rather than decrease tensions in the region, due to their differentiated impacts on human security. The Villagisation Programme targeting pastoralists and the Ethiopian Agricultural Development Led Industrialisation (ADLI) strategies were intended to reduce vulnerability. However, by creating areas that were off-limits to local populations, these strategies effectively reduced these people's access to land and resources traditionally relied upon during periods of stress like floods and droughts, thereby increasing vulnerability for some groups and exacerbating socio-political tensions in the region (Milman and Arsano, 2014). Of particular concern is how interventions operating in (semi-)authoritarian contexts may end up avoiding topics considered too sensitive for the government – but which are root causes of vulnerability – such as widespread discrimination of minority ethnic- and religious groups, intra-state conflict and violence, or violations of human rights. This has been a particular concern within the humanitarian arena (del Valle and Healy, 2013; Décobert, 2020) extending Dodman and Mitlin's (2015) observation that local and national political contexts matter greatly for the effectiveness of development interventions, and in particular their ability to reach the most vulnerable groups of people.

There is thus an expanding literature that shows that the climate change adaptation process itself – as any societal change – takes place through convergence and tensions between different interests, as well as contestations over who has the authority to make decisions (Taylor, 2015; Tschakert et al., 2016). Adaptation takes place through socio-political and environmental disruptions and turbulence; indeed, adaptation itself may need to be disruptive or transformative in order to overcome a status quo that produces vulnerability (Wilson, 2014). Power here is conceptualised as fundamentally relational with the focus on its exercise through authority, knowledges and subjectivities (Eriksen et al., 2015; Ahlborg and Nightingale, 2018). Social actors exercise power as they attempt to shape the institutional and discursive contexts through which programmes are designed, enacted, legitimatised and contested (Nightingale, 2017). At the same time, such efforts to shape adaptation processes always contain an element of uncertainty and resistance. Successfully influencing how planning proceeds, including shaping the official and informal aims of projects, the ways in which funds and contracts are distributed, the forums and mechanisms for participation and decision making, and the discursive parameters that shape the identities assumed by subjects within adaptation practices bolsters authority. In contrast, the inability to assert authority over such parameters rein-

forces subordinate social and political relations, serving to further marginalise those without influence (Mosse, 2010; Taylor, 2015). The exercise of power is therefore inherently relational: it is simultaneously enabling or facilitating for some and constraining or disabling for others in ways that strongly influence the distribution of authority, resources and risks across adaptation projects.

Climate change policies and interventions are therefore nested in existing power relations and political contestations. At the core of these contestations, we find struggles connected to identity and belonging (Nightingale, 2017). Questions such as 'who are the rightful owners of this environment and resources?' and 'who should make decisions about how we use this environment in the face of climate change?' are essentially political questions that cannot be addressed only through technocratic climate change interventions. In bypassing such discussions and effectively depoliticising climate change efforts, development actors may reproduce rather than challenge the political and social status quo, and unintentionally contribute to further marginalise the interests and needs of the least powerful people. They may also serve to ultimately entrench systems and behaviours that are unsustainable in the face of climate change, particularly where adaptation actions are manipulated to support existing priorities and interests (Atteridge & Remling, 2018; Levine et al., 2014).

2.2. Measures that redistribute vulnerability

Alongside reinforcing existing inequalities and vulnerability, there is a risk with some interventions that there may be offsite effects that lead to a redistribution of vulnerability over a broader spatial area or among other groups (Atteridge & Remling, 2018; Thomas & Warner, 2019).

Interventions related to water and coastal areas are common examples of spatially shifting vulnerability and risk and failing to recognise how infrastructural and technical interventions reshape power relations. In Vietnam, hydroelectric dam and forest protection policies may contribute to regulating floods in lowlands and thus at first appear beneficial for reducing vulnerability to specific hazards there (Beckman, 2011). However, at the same time, these policies undermine access to land and forest resources for mountain peoples (who are already socio-politically marginalised), which directly interferes with their abilities to exercise power in relation to who controls their resources and what knowledges and practices they use to govern them, reducing their adaptive capacity. Other examples include how flood embankments protecting one community can increase the vulnerability of downstream communities, and how coastal infrastructure designed to reduce risk can negatively affect neighbouring coastal areas or the local ecology (Donner and Webber, 2014; Ferdous et al., 2020). Also in Vietnam, the Ecopark housing development in Hanoi is described as a sustainable living environment, yet it required the eviction of 4000 families who had previously been living on the land (Thomas and Warner, 2019). Similar processes can occur at any scale (cases reviewed in Atteridge & Remling, 2018). Adaptation in one area may also alter regional or global market conditions. For example, increased use of expensive and sophisticated agrotechnologies as a response to drought by politically and economically advantaged social actors introduces new risks through diverting resources away from agrarian development programmes intended to target the rural poor (Warner and Kuzdas, 2016).

2.3. Introducing new risks and sources of vulnerability

In addition to the danger of interventions reinforcing or redistributing existing inequalities and vulnerability, empirical studies of adaptation interventions suggest that some adaptation efforts introduce new risks and sources of vulnerability. For example,

the IPCC Special Report on the impacts of 1.5 °C warming identified several ways in which adaptation efforts can increase economic, social and environmental costs, or undermine existing local adaptation strategies: increased (unregulated) fertiliser and pesticide use can create risks to both human health and ecological systems; increased irrigation in agriculture may reduce water availability for domestic and other purposes; and some adaptation measures increase workloads, economic costs or debt to farmers (IPCC, 2018).

A first type of risk that can be introduced by adaptation efforts results from implementing measures that address short term concerns but inadvertently introduce longer-term risks. A particular form of risk arises when a moral hazard known as a 'safe development paradox' is promoted, such as building dykes to protect from flooding (Burby, 2006). These efforts can create a false sense of security in a location that encourages high-risk activities. Evidence of this is found in many places, including in Bangladesh, where a large project that focused on upgrading coastal infrastructure to protect it from tropical cyclones, storm surges, floods and sea-level rise, served to encourage people to remain in these high-risk areas, thus resulting in maladaptation (Magnan et al., 2016). This case illustrates what can happen when decision making focuses on the trade-off between avoiding near-term disruption and reducing future risk, in which the preference is for incremental adaptation that protects and preserves existing systems and behaviours, over transformative adaptation that will disrupt them or require their abandonment or displacement. Policymakers often see incremental adaptation and its infrastructural fixes as the only option. This failure to imagine more transformative adaptation options by thinking more holistically about the overall problem may introduce new risks in the long term.

In addition, initiatives that do not consider long-term projected climate impacts may be unsustainable or produce negative path dependencies in the long term. 'Reactive' adaptation initiatives – which might also be described as 'coping' – are commonplace. These are responses to existing and well-known recurrent impacts over the short term such as infrastructure to combat flooding or efforts to increase agricultural productivity in areas that see increasing drought, observed both at household and policy level (Ojwang et al., 2017; Antwi-Agyei et al., 2018). While addressing vulnerability to current climate variability and impacts is important, it is rarely enough to adapt to future climate change (Dilling et al., 2015; Mikulewicz and Taylor, 2020). A review of 31 adaptation case studies across the world found evidence of temporal 'rebound' effects: for example, hard seawall infrastructure that decreases flexibility of future options; redirecting traditional livelihoods to (over)specialized options that may only be effective in the short run; and irrigation and water management interventions with negative impacts on the environment as well as on longer term adaptive capacity (Juhola, Glaas, Linnér, & Neset, 2016). These temporal rebound effects constitute a risk given uncertainty regarding the future manifestations and impacts of climate change (Levin et al., 2012; IPCC, 2018), combined with the preference for technical adaptation solutions, for example infrastructure, which have long lifespans and cause lock-in (UNEP, 2017). Managing uncertainties through more flexible, inclusive, and locally appropriate technologies, knowledge and assessments is thus key towards achieving more transformative adaptation pathways (Mehta et al., 2019).

Second, several studies have documented cases of climate initiatives undermining local adaptation strategies through (often unintended) negative consequences on resource access and land rights critical to local populations' livelihoods and environmental governance systems. In a case study of municipal funding of adaptation to water scarcity by 111 rural water associations in Colombia, top-down interventions (i.e. fund distribution decisions taken

by actors external to the community) were associated with clientelism and control and were less effective than locally-driven initiatives by community water organisations, which were ‘crowded out’ by external interventions (Murtinho, Eakin, López-Carr, & Hayes, 2013).

The most extreme cases of top-down interventions introducing vulnerability come from (re)settlement policies. Pastoralists in the peripheral lowlands of Ethiopia have recently been forced to settle as part of the country’s Climate Resilient Green Economy Strategy. While the resettlement aims to build climate resilience, current and past settlement programmes in Ethiopia’s peripheral lowlands have led to further marginalisation, decreased food security, and exacerbated vulnerability for pastoralists (Abbink et al., 2014; Haji and Legesse, 2017). In the lower Zambezi valley of Mozambique, international climate adaptation finance has played an inadvertent role in supporting the government’s controversial relocation policies. These relocations, focusing on some of the most politically and economically marginalised groups in Mozambique, have been accomplished through persuasion, threat of military force or arrest, and the withdrawal of basic services (e.g. schools and clinics) from villages that refuse to relocate. While donors and donor-funded NGOs may not explicitly support or participate in relocations, the promotion by such actors of increased focus on climate change hazards can provide governments with spurious justifications for policies involving relocation and coercive livelihood transformations (Arnall, 2014; Artur and Hilhorst, 2012; Kothari, 2014).

As these cases emphasise, adaptation measures imposed from above often lead to disruptive changes – with short-sighted goals – that cannot easily be reversed. This lock-in effect, whereby communities become wedded to potentially negative pathways of change, has been observed in diverse contexts (Wilson, 2014). Bergius et al. (2018) describe how ‘green economy’-oriented public-private partnerships in Tanzania supported by the Norwegian Fund for International Development (Norfund), including investments in agriculture, conservation, and climate measures, entailed the forced replacement of small-scale farming and livestock herding with wetland conservation and commercial farming. This transformation of land use and production systems has increased the vulnerability of many households, in addition to undermining the economic sustainability of agricultural production. In Bangladesh, Paprocki (2018) found that local elites and donors used projects supported by adaptation finance to move vulnerable populations out of agrarian livelihoods and into urban livelihoods, such as factory labour, further marginalising agrarian communities and promoting the developmental priorities of elites. Together, these examples of top-down interventions or efforts to enforce livelihood transformations raise the concern that adaptation interventions can become a means of increasing government and elite control over marginalised people’s livelihoods, natural resource management, and autonomous adaptation strategies, further disempowering them and creating new sources of vulnerability.

3. Mechanisms undermining equitable vulnerability reduction

As our examination of past adaptation case studies and reviews has revealed, interventions—despite good intentions and positive effects on some groups—can contribute to reinforcing, redistributing or creating new sources of vulnerability. In this section, we draw on the empirical cases examined above, as well as a growing body of literature on adaptation processes and the practical experience of the authors, in order to identify the mechanisms through which such unintended consequences occur. Four such key mechanisms emerge from this analysis: (i) insufficient understanding of contextual vulnerability by interventions planners and implementers, including socio-political relations of gender, race, age

(dis)ability and class; (ii) inequitable participation by vulnerable and affected groups in planning and implementation, leading to top-down processes and poor representation of marginalised groups’ perspectives; (iii) retrofitting adaptation into existing development ideas, projects, and forms of assistance; and (iv) insufficient engagement with what ‘adaptation success’ constitutes, dominant development discourses implicitly defining such success.

3.1. Insufficient understanding of contextual vulnerability

Reducing the vulnerability of the most marginalised requires a deep understanding of the history of past and current socio-politics of vulnerability and adaptation processes, including how the resilience and incomes of some groups is related to the vulnerability of others through resource access, distribution and power relations (Taylor, 2015). Alas, these uneven socio-political economic relations are often overlooked (Bassett and Fogelman, 2013), with most studies focusing on adjusting to impacts. Vulnerability reduction also requires attention to the exercise of power in relation to knowledge across scales. Interventions need to support shifting actions and learning processes as new knowledge arises and as adaptation and vulnerability patterns unfold. Yet, vulnerability assessments carried out as part of project development are often structured by predetermined indicators and approaches developed elsewhere, reflecting the exercise of power within the entire process. Thus, they do not adequately capture the social and environmental processes that produce specific distributions of vulnerability in a given place, such as the socio-political relations and processes through which particular groups are marginalised, including gender, race, age (dis)ability and class (Tschakert et al., 2013; Nyborg and Nawab, 2017). In particular, vulnerability assessments are often gender-blind, and thus run a high risk of vulnerability being redistributed or unequally exacerbated (Morchain et al., 2015), as outlined in Section 2. Despite the prevalence of gender strategies in various funding streams such as the Green Climate Fund, the Adaptation Fund, and Global Environment Facility mechanisms, for example, gender sensitivity often takes the form of disaggregating data by gender, but not actually designing interventions to account for how gender shapes the exercise of power (Persson & Remling, 2014). A recent review of the Adaptation Fund also showed that less than half of surveyed Implementing Entities, board members, Designated Authorities and NGOs thought that policies and programmes sufficiently take into account gender considerations (Adaptation Fund, 2019).

A further, underlying reason for the failure to understand and monitor the evolution of vulnerability is insufficient knowledge and capacity at the various levels of project implementation. Adaptation is still a relatively new field and its context- and scale-specificity makes it difficult for governments and NGOs to have sufficient dedicated expertise (Ojwang et al., 2017). Inadequate understanding and an ignoring of the local vulnerability context and drivers of vulnerability often pervade governmental, non-governmental and development organisations tasked with funding, planning and implementing adaptation interventions. This gap is, in turn, both reflected in and reinforced by the projectisation of adaptation initiatives, both by bilateral and multilateral donors and through international adaptation finance (Mikulewicz, 2020b; Mikulewicz and Taylor, 2020). Outsourcing of different components of project design, implementation and evaluation – all taking place on different timeframes and with limited allocations – impedes optimal learning and rarely involves local and international research expertise. The short time frames and the (perceived) limited expertise within developing countries means adaptation planning is often done as short-term consultancies, with a high reliance on external experts and insufficient local

involvement. Complicated application and evaluation procedures also increase the reliance on external experts who know how to negotiate the application process, but who may not have a deep knowledge about the vulnerability context.

There is often little opportunity for critical analysis of how an intervention may affect (or has affected) vulnerability, nor to integrate lessons from past development successes and failures (Horstmann, 2011; Remling and Persson, 2015). The competitive project-based nature of funding exacerbates this problem: conducting a comprehensive vulnerability assessment can be resource-intensive, but is typically not budgeted, and incentives to share information between organisations are almost nonexistent. A political commitment to fund particular technical and infrastructural interventions (such as climate services or reforestation) persists in the absence of compelling evidence for the positive impacts of these interventions on vulnerability reduction, sustainability, and institutionalisation. Climate change adaptation interventions would benefit from compiling and integrating the lessons learned of previous projects, to enable improvement (West et al., 2018).

The subsequent monitoring and evaluation (M&E) frameworks through which adaptation interventions are assessed are often similarly ill equipped to assess whether or not vulnerability is reinforced or redistributed by adaptation interventions. Rather than interrogating the underlying drivers of vulnerability and the longer-term qualitative dimensions of building resilience, assessments and monitoring frameworks are often focused on outputs (goods and services delivered; number of people targeted) and value for money (Kaika, 2017). While the language around adaptation interventions increasingly emphasises monitoring, evaluation and learning (MEL), the focus of M&E/MEL remains on single-loop learning and assessing how well adaptation activities are being implemented, rather than double- or triple-loop learning, which questions the appropriateness of those activities in the first place and encompasses iterative, participatory and action learning interactions (Argyris and Schön, 1978). A focus on beneficiaries reached and the delivery and uptake of intervention outputs means that M&E frameworks usually pay little attention to longer-term outcomes or impacts as reflected in the subsequent socio-political relations, resilience or well-being of beneficiary populations, or indeed the impacts on non-beneficiary populations.

This is due to a combination of factors. First, the fact that M&E is overwhelmingly specific to individual interventions means that it is carried out over timescales that are generally too short to interrogate adaptation success in terms of longer-term outcomes and impacts. Second, the normative and contested nature of what 'successful' adaptation looks like (Dilling et al., 2019) means that there is no agreement on what metrics to use to evaluate success. Some have argued that ultimate purpose of adaptation is a normative one: to sustain and enhance development performance and human well-being in the face of climate change. In this view, adaptation success ultimately should be measured – at the impact level – using development and well-being metrics contextualised using climate information (Barrett et al., 2020; Brooks et al., 2019). However, we follow others who have argued that indicators of success in adaptation cannot be universal nor neutral, as success is historically contingent, normative and context specific (Moser and Boykoff, 2014). Like vulnerability itself, what constitutes enhanced development and well-being is bound up in the exercise of power in contestations over authority, knowledges and identities. As such, social and process-oriented indicators, which would be required to dynamically monitor changes in vulnerability or resilience, are complex, context-specific and therefore resource-intensive to attempt to define and measure (Eriksen and Kelly, 2007; Brooks and Fisher, 2014).

Finally, M&E frameworks tend not to fully interrogate any negative or unwanted outcomes of adaptation interventions. Reporting templates for adaptation M&E typically focus on effective management of the planned activities, rather than identifying potential negative impacts on areas, socio-political relations and groups outside the sphere of control of the intervention (Atteridge & Remling, 2018). Even at a technical level, tools do not always fit the climate context: for example, the Environmental and Social Management Framework used by the World Bank and Green Climate Fund aims to provide guidelines for screening projects to identify risk, but does not necessarily account for the longer-term nature of climate risk. Maladaptation and the extent to which measures fit adaptation needs are key gaps in M&E frameworks (Bours et al., 2013), along with the evaluation of how adaptation activities affect socio-political relations, resilience, development performance and human well-being in the longer term (Brooks et al., 2019).

3.2. Inequitable participation in planning and implementation of interventions

A second key mechanism that weakens the way that vulnerability is addressed is insufficient participation by a range of marginalised groups in the design, planning and implementation of adaptation interventions. Inclusive and representative participation is important to ground interventions in a sound understanding of how multiple causes of vulnerability affect groups differently (Forsyth, 2018). Equally important, political marginalisation shapes vulnerability (and *vice versa*); hence the process of planning and implementing adaptation measures needs to give space to socio-politically marginalised and often invisible groups and their needs in deliberating adaptation alternatives, in order to avoid exacerbating marginalisation (Tschakert et al., 2013; Taylor, 2015; Nightingale, 2017).

Despite good intentions and provisions for participation, project planning and management is often top-down, risking the generation of measures that exacerbate inequalities. Community-level participation in planning, although often required, is frequently problematic (Omukuti, 2020b). At worst, adaptation interventions are legitimised through seemingly 'participatory processes', while local communities and marginalised people have limited say over the process through which the adaptation responses are framed and defined (Khatri, 2018; Mikulewicz, 2020b). When consultations do take place, the pressure to deliver quick results encourages a reliance on existing governance institutions and following established power relations, such that marginalized voices remain unheard and existing inequalities are reinforced, including on the basis of gender, literacy and caste (Nightingale, 2017; Mosberg et al., 2017). Hence, many participatory climate change adaptation policies and action plans exclude the most marginalised as a result of their inherent power relations (Khatri, 2018; McNamara et al., 2020; Omukuti, 2020b).

Experiences with learning in adaptation suggests that in order for initiatives to foster real engagement, they must be designed for openness to listen and learn from stakeholders as well as being adaptive to distinct local contexts (Tschakert et al., 2016). Climate interventions have often struggled to address the complexities and power relations involved in ensuring participation and engagement of marginalised groups, however. For example, NGO facilitators of participatory processes are often aware of how power relations inhibit active participation of the most marginalised, but do not have the mandate to address these at the local or broader levels, nor the tools to identify the causes of exclusion in these interactions (Nagoda and Nightingale, 2017). Widely-used participatory methodologies are similarly inadequate for overcoming entrenched power relations at district level (Regmi et al., 2016).

Importantly, an uncritical focus on participation may disguise that local actors are unable to ensure the meaningful inclusion of the most marginalised.

3.3. Retrofitting adaptation into development assistance

As a consequence of insufficient capacity, learning and participation processes in adaptation funding – as well as interests vested in ongoing development agendas – there is a tendency to ‘retrofit’ or ‘rebrand’ existing development projects as adaptation efforts. The complementary aims of adaptation and development, and the rapid increase in funding available for the former, encourages retrofitting of adaptation activities to fit existing development agendas. However, whilst related, adaptation and development are not the same, with a major difference being that the former addresses current and future climate risk and the socio-environmental causes of vulnerability, which often demands a rethink of how current development may in fact be producing vulnerability relations.

Finance intended for climate change adaptation often ends up funding existing development activities that are simply rebranded because they address climate-sensitive sectors or livelihoods (Schipper et al., 2020a). As a result, they are not typically designed with an emphasis on reducing vulnerability, or it is a secondary goal overshadowed by a different environmental or development goal. ‘Mainstreaming’, whereby adaptation needs are integrated into an existing development portfolio, has been shown also to have detrimental effects, as adaptation is often co-opted to support existing development agendas rather than genuinely addressing climate change risks (Scoville-Simonds et al., 2020). The two processes hence dovetail as a form of retrofitting; existing development activities are rebranded as adaptation and new adaptation projects are co-opted to support existing development agendas. Such retrofitting hinders addressing the root causes of vulnerability, including changing those development paradigms, discourses, interventions and related socio-political relations that produce vulnerability.

Where existing development activities are simply rebranded as adaptation, funding may serve to entrench unsustainable practices, increasing vulnerability to climate change. The largest Public Works Programme in the world, India’s Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), is one example of development being rebranded as adaptation. Adam (2015) found that the scheme provides an important ‘lifeline’ to livelihoods at the margins, but misses opportunities to promote longer lasting, transformative adaptation. For this to happen, the scheme’s procedures and mechanisms would need to be tailored explicitly towards adaptation, and not limited to the design of traditional social security programmes. Such a reform has to be informed through empirical research (e.g. contextual vulnerability assessments), in addition to promoting awareness within departments, and incorporating the climate-development interface at various scales from local to national (Adam, 2015).

Retrofitting tends to lead to a focus on the ‘adaptation deficit’ (the gap between current practices and the practices that would be well adapted to existing climate hazards (Burton, 2004)) or perceived immediate development needs rather than on what is needed to address anticipated future risks or the social and environmental causes of vulnerability. This means the vulnerability context and the gravity of future climate risks may be underestimated, potentially undermining adaptation to future climate change (Dilling et al., 2015; Ojwang et al., 2017). Eriksen et al. (2015) note that adaptation interventions have often taken the form of supporting activities that largely deal with *current* climate variability such as disaster risk reduction, social safety nets, water management, ecosystems management, agricultural practices,

improved meteorological services and forecasting, micro-finance, and index-based insurance. For example, a review of 56 activities supported by the DFID StARCK+ programme in Kenya concluded that some two thirds focused principally on familiar, existing risks, and only a handful could be said to be explicitly and deliberately targeting the (already observed) impacts of climate change (Brooks, 2017).

Various institutional factors also act to impede the modification of development intentions into effective adaptation. The preoccupation of donors with avoiding ‘double dipping’ of development projects in adaptation funds means that they typically apply the logic of additionality, whereby the adaptation finance covers the additional costs of ‘climate proofing’ a project (Stadelmann et al., 2011). This approach is likely to favour incremental approaches to adaptation that seek to protect and preserve existing systems and practices, and inhibit the transformative adaptation that might be required where current institutions and socio-political relations are likely to be unviable in future and need to be radically modified, replaced with alternatives, or abandoned altogether (Brooks et al., 2019). At the same time, the longer-term viability of projects is impeded by artificially drawn boundaries between activities within climate change adaptation, disaster risk reduction and achieving sustainable development goals. Although these fields are closely linked, they are usually addressed by different local to national level (government) departments and in particular through different funding instruments, which means that the synergies between activities are rarely maximized (Schipper et al., 2016). A lack of communication and collaboration across organisations, projects and initiatives that are implementing adaptation activities in similar regions may lead to duplication of adaptation efforts as well as reducing the overall effectiveness of interventions and undermining the potential for cross-sectoral and cross-institutional learning.

3.4. ‘Adaptation success’ implicitly defined by dominant development agendas

Pervading all these three mechanisms is the tendency of projects to insufficiently conceptualise and evaluate what constitutes ‘adaptation success’ and how the meaning of such success varies and is contested between different groups. The insufficient engagement with what ‘adaptation success’ looks like for a given intervention is in part due to a lack of contextual understanding and narrowly framed project-based monitoring and evaluation that is more concerned with ensuring the project delivered what it intended than with its broader impacts on vulnerability. But this failure also reflects inequitable power relations and participation processes in planning and implementation and how such skewed processes come to make normative judgements of what constitutes ‘good’ adaptation. Employing a social justice interpretation of adaptation, this paper highlights how adaptation actions are always embedded within the exercise of power in socio-environmental contexts. This interpretation suggests that the focus needs to be on reducing climate related risks and their social production and unequal outcomes across groups, and shifting socio-political relations that marginalise groups in decision-making.

The space for real local participation in defining ‘adaptation success’ is often limited by the politics of funding and prevailing development discourses, as well as an exclusion of local knowledges. A fundamental challenge for participation is the fact that dominant views within funding and implementing organisations regarding what constitutes ‘good development’ implicitly or explicitly frame the objectives of adaptation measures. These pre-existing views and the organisational mandates of development actors can limit real participation in deciding on project

objectives and design. For instance, Conservation Agriculture is promoted as an environmentally and socially sustainable agricultural development strategy in Zambia. However, in practice, environmental and participation concerns are side-lined, and a new green revolution is promoted with a focus on private sector-led agricultural development (Westengen et al., 2018). Particular development agendas are also reflected in the priorities of funding mechanisms. For example, although 130 civil society organisations participated in the design and development of the Green Climate Fund, their values of civic environmentalism, which focused on human rights and pro-poor climate finance, were undermined by an overall emphasis on financial and economic calculation (Bruun, 2018). These examples reflect dominant preoccupations with economic growth, efficiency and private sector commercialisation. More fundamentally, the retrofitting of adaptation to serve existing development agendas implicitly defines adaptation success in relation to those agendas. The paradigm out of which adaptation is defined – performed through planning, implementation, monitoring and evaluation – determines what is justified as ‘good adaptation’ within decision-making, which actors and interests are heard, and which groups or options are silenced (Mikulewicz, 2020b).

The examples of top-down interventions and coercive livelihood transformations described in Section 2.3 draw attention to the dangers of enrolling adaptation into dominant development discourses framed by ideas about modernity and progress. For example, views that pastoralists need to undergo sedentarisation because they are ‘backward’ and therefore need to modernise, as expressed in the context of the Gambella case study discussed above (Milman and Arsano, 2014), can be located firmly within models of progressive social evolution rooted in Enlightenment philosophical traditions originating in Western Europe and North America. These models, involving the universal, progressive ‘advancement’ of human societies through a series of fixed stages, from hunting and gathering, through mobile pastoralism, to settled societies and finally to cities and states (Sanderson, 1990), were propagated through European colonialism (Olroyd, 1983; Cooper, 1997), and have been reproduced, modified and extended in the fields of economics and development (Balakrishan et al., 2003). Development models based on transitions from subsistence to commercialisation, and transitions from ‘traditional’ to ‘modern’, market-based, services-driven, consumer societies, represent an extension of these ideas (Cooper, 1997; Balakrishan et al., 2003). While policies based on transitions to commercial farming can benefit smallholders if they address climate risks, protect tenure and genuinely enhance livelihoods (see, for example, some of the interventions under the StARCK+ programme described by Brooks (2017)), they may also result in the further marginalisation of vulnerable groups, for example if they favour the expansion of larger commercial growers at the expense of smallholders, as observed in Section 2.1.

In being co-opted by existing development agendas, adaptation risks entrenching ideologically driven development models whose core assumptions might be fundamentally at odds with vulnerability reduction and support for marginalised groups. A key function of adaptation should be to interrogate whether existing development agendas involving the commercialisation of agriculture, the expansion of certain services, the sedentarisation of pastoralists, and other land use, land rights and livelihood transformations are likely to reduce or enhance vulnerability (Mikulewicz, 2020a; Webber & Donner, 2017). More fundamentally, adaptation interventions need to critically examine the validity of the implicit (and sometimes explicit) assumptions about relationships between development, modernity and progress. For example, while mobile pastoralism is often seen as inimical to modernity, it evolved and was propagated in Africa as a pragmatic response to rapid and sev-

ere climate change (Kuper & Kröpelin, 2006), and continues to provide an effective means of navigating climatic uncertainty and variability (Krätli et al., 2013). With appropriate policies that facilitate mobility and allow pastoralists access to key resources, pastoralism has the potential to play a key role in adaptation, and could replace sedentary agriculture in marginal areas where climate change makes the latter less viable in the future (Jones and Thornton, 2009). In contrast, adaptation policies that result in the involuntary sedentarisation of pastoralists, or the displacement or loss of livelihoods of other marginalized groups, directly threaten people’s tangible and intangible heritage and may exacerbate vulnerability (Brooks, Clarke, Ngaruiya, & Wangui, 2020).

4. Avenues for strengthening vulnerability reduction in adaptation efforts

The previous sections have identified how many current adaptation interventions reinforce, redistribute or create new vulnerability as a result of (i) failing to understand the complexity of the vulnerability context; (ii) inequitable stakeholder participation in the design and implementation; (iii) retrofitting adaptation into development assistance; and (iv) insufficient conceptualisation and evaluation of ‘adaptation success’. These shortcomings together point to the multi-scalar nature of adaptation, combined with how power and politics define adaptation practices, as significant factors in the failure of many adaptation interventions to reduce vulnerability. Whether vulnerability is reinforced, redistributed or created depends on the object and scale of analysis. However, the issue of scale and knowledge is not just one of whether location-specific project monitoring and evaluation captures negative effects elsewhere or at other spatial or time scales. As we have shown in the previous section, the effects of adaptation interventions are related to questions of adaptation for whom, who is authorised to decide, whose problem framings and understandings count, who decides whether adaptation is successful using what criteria, and who is responsible for carrying out adaptation activities in practice. Ideas of ‘adaptation success’ are normative, contextual, and socially contingent; that is, they depend on whose vulnerability and which risks are deemed acceptable or unacceptable and are therefore nested in the politics of definitional power which are distinctly uneven between adaptation actors. These actors – whether making adaptation decisions or being the target of them – operate at different scales, as does their knowledge (Ahlborg and Nightingale, 2018). Adaptation interventions are imbued with the exercise of power in participation, definition, scale and knowledge, often embodying a skewed politics that contradicts the very goal of vulnerability reduction. For example, top-down projects that authorize actors at international or national levels (organisations or consultants) to govern adaptation or other climate actions, while placing responsibility for carrying out such actions at the local level (for example with small-scale farmers) may both disempower and marginalise actors, exacerbating their vulnerability (Arora-Jonsson et al., 2016; Schilling et al., 2017; Scoville-Simonds et al., 2020). Here we review emerging literature showing potential avenues for overcoming these challenges.

4.1. Shifting the terms of engagement with ‘local’ socio-political vulnerability contexts

Over the course of the last decade, scholars and practitioners have reflected on how the terms of engagement for vulnerability reduction and adaptation intervention design can be shifted. In particular, they emphasise the importance of: rethinking the notion of ‘participatory’ design (i.e. addressing what participation really means); ensuring that all relevant actors’ knowledge and

experience genuinely are as valued as those of so-called 'experts'; that all those engaged are respectful of 'ownership' to the process; and, above all, of considering power relations – particularly in regard to those who are at the receiving end of adaptation funding (Ludi et al., 2014). Emerging literature explores tools such as deliberative dialogues and M&E (Ojha et al., 2020), underscoring that until the diversity of worldviews and aspirations, including those of science and local knowledge interactions (Jasanoff, 2003) are taken into consideration, progress on adaptation will be limited.

An expanding literature shows the importance of recognising a diversity in ways of understanding the world – *ontological pluralism* – for shifting the terms of engagement with local vulnerability contexts (Klenk et al., 2017; Goldman et al., 2018; Nightingale et al., 2020). This reflects the diverse interests, values, visions, desired futures, and knowledges that shape who decides, and whose values count, in making adaptation decisions, and how these lead to differential effects of interventions. A key challenge for efforts to shift socio-political relations is the tendency, as described in Sections 3.2 and 3.3, for interventions to be increasingly framed by the way that global actors, including consultants, 'experts' and development organisations, understand the problems, needs and solutions as part of adaptation, while the adaptation knowledge and needs of the most marginalised is rendered invisible (Mikulewicz, 2020b). This biased valuing of knowledge, and the privileging of certain cultural frameworks and norms as if they are axiomatic, is a problem for developing effective measures, but more importantly, the process itself reinforces the social and political exclusion that drive vulnerability to climate change in the first place.

Several authors highlight the transformative potential of knowledge and learning processes as part of the adaptation process (Tschakert et al., 2016; Ziervogel et al., 2016; Tran et al., 2020). Ontological pluralism and justice in adaptation entails processes of negotiation and contestation of development goals, knowledges and norms between diverse actors and interests (Klenk et al., 2017; Ziervogel et al., 2017). Engaging directly with contested and diverse knowledges, and tackling the power dynamics inherent in knowledge processes such as co-production, are identified as key to building resilience. An expanding literature argues that it is only through deliberating adaptation alternatives and opening up space for the contestation of predominant development choices and inequitable knowledge and authority relations that the socio-political relations driving vulnerability can be transformed (Taylor, 2015; Eriksen et al., 2015; Nightingale, 2017; Kaika, 2017). Taking an explicitly deliberative approach to adaptation means involving a broader set of people than 'experts', 'policy-makers' and 'local leaders' in decision making, strengthening the role of marginalised people in defining problems and solutions (Mees et al., 2014; Goldman et al., 2018; Ojha et al., 2020). More fundamentally, deliberation involves going beyond stakeholder engagement to explicitly explore differential understandings, knowledges, values, and political interests between groups related to what the causes of vulnerability are and what constitutes 'good development', 'adaptation' or 'transformation' (Forsyth, 2019; Klenk et al., 2017). In particular, challenging rather than perpetuating development agendas and paradigms that marginalise populations is critical for effective adaptation to take place (Mikulewicz and Taylor, 2020). Some promising examples exist: Ziervogel et al. (2016) demonstrates how shifting from 'strengthening the science-policy interface to the knowledge-policy interface' helped integrate diverse knowledge forms and development interests within municipal adaptation planning in South Africa (p. 455). Studying the case of Little Andaman, Blackburn (2018) found that community-based, rights-oriented education and advocacy programmes were potentially transformative for the ways local people interact with the state because of their role in opening up space for

communities to critically reflect on state responsibilities, capacities, and weaknesses.

Importantly, 'marginalised people' are not a homogeneous group: people's interests, sources of vulnerability, and adaptation knowledges differ (Lade et al., 2017). Hence shifting the terms of engagement through ontological pluralism and learning spaces entails engaging actively with this heterogeneity and the related socio-political dynamics. Paying attention to the *social* context means taking seriously the values, priorities, and worldviews of marginalised groups. However, equally importantly, attention to the social and *political* context means realising that the values, priorities and worldviews will vary – and are continuously negotiated – between (sub)groups of stakeholders affected by a given intervention (Arifeen and Eriksen, 2020). This heterogeneity as well as socio-political dynamics highlight why the common practice of identifying 'vulnerable groups' and assuming that 'communities' are homogeneous entities when targeting adaptation investments is deeply problematic (Titz et al., 2018). Specifically, intersectionality – the way in which multiple subjectivities that divide social groups interact to reinforce each other (including gender, race, class and (dis)ability) – needs to be acknowledged and studied (Nightingale, 2017). Thus, exploring gender or caste issues independently of understanding how they come to reinforce each other, can give a false understanding of the causes of vulnerability (Carr & Owusu-Daaku, 2016; Ray-Bennett, 2009).

A specific entry point for operationalising the shifting of terms of engagement with the vulnerability context is to ensure that all stages of planning and implementation of interventions consistently approach communities as heterogeneous in terms of values, worldviews, priorities, power relations and livelihoods. This involves, for example, M&E frameworks that use indicators that are differentiated between groups, reflecting differences between them in priorities, risks and impacts (rather than a uniform set of indicators for all groups). Similarly, the social heterogeneity of communities is critical in learning and deliberation processes, such as how the power relations, institutional structures and cultural norms that perpetuate gender, class, caste and ethnic discrimination in turn shape who has access to decision-making fora, whose interests and values are represented, and whose voices are heard and taken seriously (Figueiredo & Perkins, 2012; Tschakert et al., 2016).

4.2. Broadening the focus from 'local' vulnerability to the global context and multi-scalar processes producing vulnerability

Many of the shortcomings in efforts to reduce vulnerability identified in this review relate to the fact that adaptation initiatives address the observed symptoms of vulnerability, rather than the cause (Scoville-Simonds et al., 2020). Moreover, they typically take a spatially-restricted approach which further increases the risk that reduction of vulnerability within that location may end up redistributing it or reinforcing it elsewhere. Broadening the focus from local vulnerability to the global context and multi-scalar processes that drive and reinforce vulnerability opens up opportunities for identifying and addressing the root causes.

Taking a broader approach that considers how cultural and socio-political contexts are entangled in processes across scales is one way of making visible potential impacts that reinforce or redistribute vulnerability beyond a project's boundaries (Symons, 2014). In the context of agriculture, for example, Vermeulen et al. (2018) have highlighted that there can be many opportunities for transformation of practices, but these require an expansion of the focus of adaptation planning in order to take the multi-functionality of agriculture into account, as well as a system-wide view of food production and consumption.

A key question, then, is how these proposed changes that shift the terms of engagement with 'local' socio-political vulnerability contexts and broaden the focus from 'local' vulnerability to the global context and multi-scalar processes producing vulnerability can take place? Adaptation has been highlighted as an opportunity to rethink how we 'do development' in order to support more equitable and sustainable 'climate resilient development pathways' and confront, rather than sidestep, difficult development issues (Denton et al., 2014; Schipper et al., 2020b). However, to date, adaptation has not altered the way that societies plan for the future, but instead (at best) integrated a set of climate-related risks into traditional planning approaches, often retrofitting existing development interventions, as observed in Section 3. This suggests that changes 'at home' and within existing development paradigms may be required to engender transformation of the unjust development pathways that produce climate change as well as inequality and vulnerability (Lade et al., 2017). A critical implication of these observations is that adaptation does not necessarily entail the need for more expert knowledge to direct how marginalised groups should transform their practices or knowledge; instead, it entails shifting the knowledge and learning processes that take place *within* implementing organisations, funding structures, and research. Simply put: it is the adaptation organisations and experts – rather than the marginalised people and their livelihoods – that need to transform.

Recent literature suggests that an entry point for shifting how organisations 'do adaptation' is to generate processes for learning and reflection *within* aid organisations themselves, addressing fundamental barriers to learning such as lack of feedback and accountability. Rarely do we connect the critique of adaptation to asking how learning takes place within organisations responsible for planning and implementing adaptation. Such learning spaces are instrumental for enabling transformative measures (Tschakert et al., 2016; Matin et al., 2018; Ojha et al., 2020). Fundamentally, learning requires processes for obtaining feedback on the results of actions taken, such as adaptation outcomes, as well as institutional structures for ensuring accountability for those actions. Development aid is particularly fraught with mechanisms and uneven relations that impede feedback and accountability, and thus learning (Eyben, 2005). Learning spaces are important because, in the absence of a profound understanding of vulnerability, resilience-building efforts run the risk of perpetuating problematic assumptions and marginalising the least entitled in terms of assets and social relations (MacKinnon and Derickson, 2013).

Adaptation interventions are often focussed on achieving specific targets and impacts in the short term (Mikulewicz, 2020a, 2020b). Far less time is spent reflecting on how projects are framed and how expectations around outcomes are developed and how we can Monitor, Evaluate and Learn (MEL) from approaches and projects. Creating mechanisms and spaces for reflection and questioning within implementing organisations regarding their own assumptions around questions such as who is vulnerable and why, what constitutes 'good development', what adaptation interventions are needed, and who can best make decisions about and implement them, is a key vehicle for tuning in to the complexity of climate adaptation and vulnerability reduction. An important implication of the need for ontological pluralism and engaging with marginalised groups as socially heterogeneous is the need for adaptation processes to hold tensions and conflicting interests – and to be transparent and just in decision-making. Are current planning, implementation and MEL instruments designed to do this?

However, learning and reflection need to go even further, and question many of the fundamental and often unacknowledged assumptions that underpin development. Pelling (2011) asks

whether development institutions, which are embedded in existing power relations and development logics, can address development problems (including climate change) they have played a role in creating. How can we address the fact that adaptation is embedded in and largely supportive of existing power relations that have caused the very problems adaptation ostensibly seeks to address? Can the adaptation machinery step outside of, and challenge, these relations? The above discussion suggests some possible entry points for deeper reflection. For example, in academic circles, there is a growing focus on transformative adaptation as the radical restructuring, replacement or abandonment of systems and practices whose viability climate change throws into question. This thinking is yet to penetrate into development practice, and raises a number of very difficult questions for development practitioners. Nonetheless, it provides an entry point for challenging the widespread assumption in practice that adaptation is about protecting and preserving existing systems and enabling the continuation of existing practices (IPCC, 2018; Brooks et al., 2019), and thus represents one avenue for addressing the retrofitting of adaptation to existing development priorities. O'Brien (2018) argues that questioning predominant assumptions, beliefs and worldviews is a key leverage point for transforming power relations and practices. Adaptation practitioners might interrogate how dogmas of growth and progress frame and drive actions that increase vulnerability, and challenge the validity of such frameworks and their universal application through a critical examination of their origins and impacts on marginalised people (Brooks, Clarke, Ngaruiya, & Wangui, 2020).

5. Conclusion: A post-adaptation turn?

The proliferation of adaptation projects around the world – and the focus on marginalised groups that they represent – should be a cause for celebration. Yet our review of climate change adaptation interventions reveals that, contrary to common rhetoric, adaptation does not necessarily reduce vulnerability. Indeed, there are multiple ways in which adaptation efforts may instead increase, redistribute or create new sources of vulnerability. We have categorised the underlying mechanisms through which adaptation efforts end up exacerbating vulnerability as relating to: the shallow understanding of the vulnerability context; the inequitable nature of stakeholder participation in the design and implementation of adaptation; the retrofitting of adaptation into existing development agendas; and lack of critical engagement with how 'adaptation success' is defined. A retrofitting hinders addressing the socio-political causes of vulnerability; in addition, elite capture and an 'accumulation by adaptation' can widen inequalities. Our review concludes that addressing these mechanisms demands a rethink of how adaptation and development are done. In particular, instead of designing projects to change the practices of marginalised populations, placing learning processes *within* organisations and *with* marginalised populations at the centre of adaptation objectives is key to shifting the terms of engagement and broadening the focus for successful and inclusive adaptation.

Our findings resonate with Thomas and Warner's (2019) framework of how people are made more vulnerable through climate change adaptation, and reinforces the growing volume of work on maladaptation (Antwi-Agyei, Dougill, Stringer, & Codjoe, 2018; Juhola, Glaas, Linnér, & Neset, 2016; Magnan et al., 2016; Work, Rong, Song, & Scheidel, 2019). However, our findings go beyond a maladaptation focus on unintended negative consequences of adaptation measures, to suggest that adaptation interventions risk becoming tools for marginalisation and instruments of abuse.

We argue that climate change adaptation has often repeated the same patterns behind the principal failings of development assistance since the end of the colonial era (Ferguson, 1990; Escobar, 1995; Ireland and McKinnon, 2013). This so-called *post-development* critique is centred on the notion that a Western model of development, especially development as ‘progress’ emerges as a form of domination that repeats many of the patterns of colonialism (Sultana, 2019). Yet, post-development as a movement has been unable to reverse the unequal structures and institutions that make up development assistance. Calls have been made for the next generation of adaptation measures to move from incremental and technical adaptation to transformation, where adaptation is seen as a social change process which also entails transforming systems and structures. Such adaptation requires paying close attention to the paradigms we are in and addressing the underlying causes of vulnerability and climate change (Pelling, 2011; Denton et al., 2014; O’Brien, 2018). Our review echoes previous findings that there are latent risks associated with decision-makers translating the concept of transformation into policies and practices if such processes are viewed as “apolitical, inevitable, or universally beneficial” (Blythe et al., 2018, p. 13). If stuck within the same development paradigm that is in part generating vulnerability, interventions aimed at transformation risk having even more adverse effects on marginalised populations than current adaptation, such as through coercive transformation of people’s livelihoods. Within such a conception of ‘transformation’, the marginalised become responsible for adapting to a climate change problem created by others, adding insult to injury. Awareness of these latent risks are therefore necessary along with recognition of the political, social, cultural, and spiritual dimensions of transformative adaptation (Blythe et al., 2018). Adaptation is increasingly being scrutinized through a post-development lens, emphasising that the mechanisms leading to the current failure of adaptation interventions to reduce vulnerability need to be addressed (Ireland and McKinnon, 2013; Mikulewicz and Taylor, 2020). Within current adaptation *cum* development paradigms, inequitable terms of engagement with ‘vulnerable’ populations are reproduced and the multi-scalar processes driving vulnerability remain largely ignored. As a consequence, we pose the question of whether scholarship and practice need to take a *post-adaptation* turn akin to post-development, by seeking a pluralism of ideas about adaptation while critically interrogating how these ideas form part of the politics of adaptation and the processes (re)producing vulnerability. Post-adaptation is an appropriate term because it mirrors the situation whereby development was shown to be perpetuating colonialism – in this case post-adaptation refers to the reproduction of power relations and poverty caused by development projects, and reflects that we now have sufficient experience on the ground with adaptation to warrant a fresh start with a different and more informed approach. First introduced by Webber (2016), post-adaptation is a concept that has potential to point to the risks of overly technocratic and Western-driven models of adaptation.

Such a post-adaptation turn has several implications for how formal adaptation interventions are planned, implemented and funded. First, vulnerability reduction cannot take place through formal projects alone. A premise of this review, as mentioned at the outset, is that planned adaptation interventions are only one of many types of action – from daily livelihood actions, to corporate business decisions, civil society actions, and international trade policy reform – that form part of the adaptation process. A key issue, which the current COVID-19 pandemic has further highlighted, is how our collective futures are governed by a wide set of shifts and disruptions, policies and decision-making processes, beyond those concerning climate change. Hence adaptation includes but is not contained within the realm – and the responsi-

bility – of government and aid organisations. However, adaptation projects, despite their worrying track record to date, at the very least provide some important lessons regarding how vulnerability reduction can (or cannot) take place. The evidence suggests that they may play a useful role in the adaptation process as arenas for rethinking what good adaptation is, for whom, and how it can be done differently to transform inequitable socio-political relations and address marginalisation processes. If experimentation, collaboration, and deeper learning among adaptation actors become a central goal of adaptation projects rather than delivering measurable material outputs according to ‘development as usual’ standards, more equitable and lasting vulnerability reduction may be possible.

Second, ontological pluralism and opening up the ownership of adaptation knowledge to *effectively* include marginalised groups, deliberation of conflicting interests and assumptions behind what is legitimised as ‘good adaptation’ within currently dominant ideological frameworks, as well as a close integration of learning, research and practice within adaptation projects are key to achieving more inclusive and innovative adaptation interventions. This observation, however, directs attention to the limits to radical rethinking and redesigning that are possible within the current adaptation-development apparatus. A key question is how funding structures, power relations, and the organisation and implementation of adaptation interventions may open up or close down space for reflective learning processes within organisations as well as deliberative processes within projects.

Much of the research reviewed in this paper points out that supporting adaptation in developing countries is anything but a quick and easy fix. This observation does not mean that adaptation policy and interventions should not be carried out – they are critical to address the global inequality inherent in climate change pointed out at the outset of this paper. Climate and adaptation funding have led to much-needed investment in a number of critical sectors in developing countries, such as agriculture, infrastructure and health. There has, however, been little holistic or connected understanding and learning about how such investment may reduce, enhance, or redistribute vulnerability across scales. It is our hope that the post-adaptation turn we call for can generate renewed critical engagement – based on robust empirical insights – with the multi-scalar politics of vulnerability and adaptation interventions.

CRediT authorship contribution statement

Siri Eriksen: Conceptualization (main); Methodology (main); Writing – original draft (main); Writing – review and editing (main); Project administration (main). **Lisa Schipper:** Conceptualization (main); Methodology (main); Writing – original draft (main); Writing – review and editing (main). **Morgan Scoville-Simonds:** Conceptualization (main); Methodology (main); Writing – original draft (main); Writing – review and editing (main). **Katharine Vincent:** Conceptualization (main); Writing – original draft (main); Writing – review and editing (main). **Hans Nicolai Adam:** Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting). **Nick Brooks:** Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting). **Brian Harding:** Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting). **Dil Khatri:** Writing – review and editing (supporting). **Lutgart Lenaerts:** Methodology (main); Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting). **Diana Liverman:** Writing – review and editing (supporting). **Megan Mills-Novoa:** Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting).

ing). **Marianne Mosberg**: Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing. **Synne Movik**: Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting). **Benard Muok**: Writing – review and editing (supporting). **Andrea Nightingale**: Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting). **Hemant Ojha**: Writing – review and editing (supporting). **Linda Sygna**: Conceptualisation (supporting); Writing – original draft (supporting). **Marcus Taylor**: Conceptualisation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting). **Coleen Vogel**: Writing – original draft (supporting); Writing – review and editing (supporting). **Jennifer Joy West**: Writing – original draft (supporting); Writing – review and editing (supporting).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

An earlier version of this manuscript was submitted to the Norwegian Ministry of Foreign Affairs in December 2018 as a background paper in response to a request by the Norwegian Minister of International Development to document how adaptation policy and programmes are affecting vulnerability, including both positive and negative impacts. The considerable time and effort contributed by 20 authors representing 24 institutions around the world draw on the experiences and knowledge generated by diverse research as well as adaptation interventions in which the authors have been involved, either in design, implementation or evaluation. While the writing largely took place through authors volunteering their free time, our joint expertise emerges from a multitude of past and present research projects, such as those funded by the following grants: the Swedish Research Council Development grant (#2015-03323) “Conflict, Violence and Environmental Change: Investigating resource governance and legitimacy in transitional societies”; the Swiss National Science Foundation grant (#168266) “Adapting to a changing discursive climate”; the Research Council of Norway grant (#289957) “Transformation as Praxis: Exploring Socially Just and Transdisciplinary Pathways to Sustainability in Marginal Environments’ (TAPESTRY)”; the Research Council of Norway grant (#244551) “CiXPAG – Interaction of Climate Extremes, Air Pollution and Agro-ecosystems”; the University of Arizona, US, Office of Research grant (#2107534); the National Science Foundation Geography and Spatial Sciences Program – Doctoral Dissertation Research Improvement Awards (#2002829); the Swedish Research Council (VR) Sustainability and Resilience grant (#2018-05866) “Governing Climate Resilient Futures: gender, justice and conflict resolution in resource management (JUSTCLIME)”; the Research Council of Norway grant (#250434/F10) “Adaptation: Combining Old and New Knowledge to Enable Conscious Transformation to Sustainability (AdaptationCONNECTS)”; and the Research Council of Canada grant (#1232014-435). We would like to thank two anonymous reviewers for their useful comments. The views and perspectives presented in this publication remain the responsibility of the authors, however.

References

Abbinck, J., Askew, K., Dori, F.D., Fratkin, E., Gabbert, E.C., Galaty, J., Tosky, S.L., Lydall, J., Mahmoud, H.A., Markakis, J., Schlee, G., Strecker, I., and Turton, D. (2014). Lands of the future: transforming pastoral lands and livelihoods in Eastern

- Africa. Max Planck Institute for Social Anthropology Working Paper No. 154. <http://hdl.handle.net/1887/27586>.
- Abrahams, D., & Carr, E. R. (2017). Understanding the connections between climate change and conflict: Contributions from geography and political ecology. *Current Climate Change Reports*, 3(4), 233–242. <https://doi.org/10.1007/s40641-017-0080-z>.
- Adam, H. N. (2015). Mainstreaming adaptation in India – the Mahatma Gandhi National Rural Employment Guarantee Act and climate change. *Climate and Development*, 7(2), 142–152. <https://doi.org/10.1080/17565529.2014.934772>.
- Adaptation Fund. (2019). Assessment report on the progress in the implementation of the Adaptation Fund’s Gender Policy and Gender Action Plan. AFB/B.34/Inf.9, 43p.
- Ahlgren, H., & Nightingale, A. J. (2018). Theorizing power in political ecology: The where of power in resource governance projects. *Journal of Political Ecology*, 25(1), 1–25.
- Antwi-Agyei, P., Dougill, A. J., Stringer, L. C., & Codjoe, S. N. A. (2018). Adaptation opportunities and maladaptive outcomes in climate vulnerability hotspots of northern Ghana. *Climate Risk Management*, 19, 83–93. <https://doi.org/10.1016/j.crm.2017.11.003>.
- Argyris, C., & Schön, D. (1978). *Organizational learning: A theory of action perspective*. Reading, Mass: Addison Wesley.
- Arifeen, A., & Eriksen, S. (2020). The politics of disaster vulnerability: Flooding, post-disaster interventions and water governance in Baltistan, Pakistan. *Environment and Planning E: Nature and Space*, 3(4), 1137–1157. <https://doi.org/10.1177/25148486198880899>.
- Arnall, A. (2014). A climate of control: Flooding, displacement and planned resettlement in the Lower Zambezi River valley, Mozambique. *The Geographical Journal*, 180(2), 141–150. <https://doi.org/10.1111/geoj.12036>.
- Arora-Jonsson, S. (2011). Virtue and vulnerability: Discourses on women, gender and climate change. *Global Environmental Change*, 21(2), 744–751. <https://doi.org/10.1016/j.gloenvcha.2011.01.005>.
- Arora-Jonsson, S., Westholm, L., Temu, B. J., & Pettit, A. (2016). Carbon and Cash in Climate Assemblages: The Making of a New Global Citizenship. *Antipode*, 48(1), 74–96. <https://doi.org/10.1111/anti.12170>.
- Artur, L., & Hilhorst, D. (2012). Everyday realities of climate change adaptation in Mozambique. *Global Environmental Change*, 22(2), 529–536. <https://doi.org/10.1016/j.gloenvcha.2011.11.013>.
- Atteridge, A., & Remling, E. (2018). Is adaptation reducing vulnerability or redistributing it? *WIREs Climate Change*, 9(1), e500. <https://doi.org/10.1002/wcc.500>.
- Balakrishnan, U., Duvall, T., & Primeaux, P. (2003). Rewriting the bases of capitalism: Reflexive modernity and ecological sustainability as the foundations of a new normative framework. *Journal of Business Ethics*, 47, 299–314. <https://doi.org/10.1023/A:1027309918415>.
- Barrett, S. (2014). Subnational climate justice? Adaptation finance distribution and climate vulnerability. *World Development*, 58, 130–142. <https://doi.org/10.1016/j.worlddev.2014.01.014>.
- Barrett, S., Brooks, N., Quadrianto, N., Anderson, S., & Nebsu, B. (2020). Measuring climate resilience by linking shocks to development outcomes. *Climate and Development*, 12(7), 677–688. <https://doi.org/10.1080/17565529.2019.1676689>.
- Bassett, T. J., & Fogelman, C. (2013). Déjà vu or something new? The adaptation concept in the climate change literature. *Geoforum*, 48, 42–53. <https://doi.org/10.1016/j.geoforum.2013.04.010>.
- Beckman, M. (2011). Converging and conflicting interests in adaptation to environmental change in central Vietnam. *Climate and Development*, 3(1), 32–41. <https://doi.org/10.3763/cdev.2010.0065>.
- Bergius, M., Benjaminsen, T. A., & Widgren, M. (2018). Green economy, scandinavian investments and agricultural modernization in Tanzania. *The Journal of Peasant Studies*, 45(4), 825–852. <https://doi.org/10.1080/03066150.2016.1260554>.
- Blackburn, S. (2018). What does transformation look like? Post-disaster politics and the case for progressive rehabilitation. *Sustainability*, 10(7), 2317. <https://doi.org/10.3390/su10072317>.
- Blythe, J., Silver, J., Evans, L., Armitage, D., Bennett, N. J., Moore, M.-L., Morrison, T. H., & Brown, K. (2018). The dark side of transformation: latent risks in contemporary sustainability discourse. *Antipode*, 50(5), 1206–1223. <https://doi.org/10.1111/anti.12405>.
- Bours, D., McGinn, C., and Pringle, P. (2013). Monitoring & evaluation for climate change adaptation: A synthesis of tools, frameworks and approaches. SEA Change CoP, Phnom Penh and UKCIP, Oxford. <https://ora.ox.ac.uk/objects/uuid:8a5b5ca6-aeb6-494f-98e5-371f08659008>.
- Brooks, N., Anderson, S., Aragon, I., Smith, B., Kajumba, T., Beauchamp, E., et al. (2019). *Framing and tracking 21st century climate adaptation (Working Paper), monitoring, evaluation and learning: Climate change*. London, UK: International Institute for Environment and Development.
- Brooks, N., Clarke, J., Ngaruiya, G. W., & Wangui, E. E. (2020). African heritage in a changing climate. *Azania: Archaeological Research in Africa*, 55(3), 297–328. <https://doi.org/10.1080/0067270X.2020.1792177>.
- Brooks, N., & Fisher, S. (2014). *Tracking adaptation and measuring development: A step-by-step guide*. London, UK: International Institute for Environment and Development.
- Brooks, N. (2017). Adaptation and Resilience Learning from the Kenya. Starck+ Programme. DFID/Starck+, Nairobi, Kenya. <http://www.starckplus.com/index.php/starck-results-against-icf-kpis/learning-reports>.
- Bruun, J.A. (2018). Climate changing civil society: the role of value and knowledge in designing the Green Climate Fund, in S. Bracking, A. Fredriksen, S. Sullivan, P.

- Woodhouse (eds). Valuing Development, Environment and Conservation. Creating Values that Matter. Routledge, London, pp. <https://doi.org/10.4324/9781315113463>.
- Buggy, L., & McNamara, K. E. (2016). The need to reinterpret "community" for climate change adaptation: A case study of Pele Island, Vanuatu. *Climate and Development*, 8(3), 270–280. <https://doi.org/10.1080/17565529.2015.1041445>.
- Burby, R. J. (2006). Hurricane Katrina and the paradoxes of government disaster policy: Bringing about wise governmental decisions for hazardous areas. *The Annals of the American Academy of Political and Social Science*, 604(1), 171–191. <https://doi.org/10.1177/0002716205284676>.
- Burton, I. (2004). Climate Change and the Adaptation Deficit. Adaptation and Impacts Research Group (AIG) Occasional Paper 1, Environment Canada.
- Camargo, A., & Ojeda, D. (2017). Ambivalent desires: State formation and dispossession in the face of climate crisis. *Political Geography*, 60, 57–65. <https://doi.org/10.1016/j.polgeo.2017.04.003>.
- 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 Program. *Area*, 48(1), 7–17. <https://doi.org/10.1111/area.12179>.
- Chapman, A. D., Darby, S. E., H ng, H. M., Tompkins, E. L., & Van, T. P. D. (2016). Adaptation and development trade-offs: Fluvial sediment deposition and the sustainability of rice-cropping in An Giang Province, Mekong Delta. *Climatic Change*, 137(3–4), 593–608. <https://doi.org/10.1007/s10584-016-1684-3>.
- Climate Investment Funds (2009). *The selection of countries to participate in the pilot program for climate resilience (PPCR): Report of the expert group to the subcommittee of the PPCR*. Washington, DC: World Bank.
- Cooper, F. (1997). Modernizing bureaucrats, backward africans, and the development concept. In F. Cooper & R. Packard (Eds.), *International Development and the Social Sciences: Essays on the History and Politics of Knowledge* (pp. 64–92). Berkeley and Los Angeles, California: University of California Press.
- Corbera, E., Hunsberger, C., & Vaddhanaphuti, C. (2017). Climate change policies, land grabbing and conflict: Perspectives from Southeast Asia. *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, 38(3), 297–304. <https://doi.org/10.1080/02255189.2017.1343413>.
- Dasgupta, A., & Beard, V. A. (2007). Community driven development, collective action and elite capture in Indonesia. *Development & Change*, 38(2), 229–249. <https://doi.org/10.1111/j.1467-7660.2007.00410.x>.
- Décobert, A. (2020). 'The struggle isn't over': Shifting aid paradigms and redefining 'development' in eastern Myanmar. *World Development*, 127, 104768. <https://doi.org/10.1016/j.worlddev.2019.104768>.
- del Valle, H., & Healy, S. (2013). Humanitarian agencies and authoritarian states: A symbiotic relationship? *Disasters*, 37, S188–S201.
- Denton, F., T.J. Wilbanks, A.C. Abeysinghe, I. Burton, Q. Gao, M.C. Lemos, T. Masui, K. L., O'Brien, and K. Warner. (2014). 'Climate-resilient pathways: adaptation, mitigation, and sustainable development' In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1101–1131.
- Dilling, L., Daly, M. E., Travis, W. R., Wilhelmi, O. V., & Klein, R. A. (2015). The dynamics of vulnerability: Why adapting to climate variability will not always prepare us for climate change: Dynamics of vulnerability. *WIREs Clim Change*, 6(4), 413–425. <https://doi.org/10.1002/wcc.341>.
- Dilling, L., Prakash, A., Zommers, Z., Ahmad, F., Singh, N., de Wit, S., Nalau, J., Daly, M., & Bowman, K. (2019). Is adaptation success a flawed concept? *Nature Climate Change*, 9(8), 572–574. <https://doi.org/10.1038/s41558-019-0539-0>.
- Dodman, D., & Mitlin, D. (2015). The national and local politics of climate change adaptation in Zimbabwe. *Climate and Development*, 7(3), 223–234. <https://doi.org/10.1080/17565529.2014.934777>.
- Donner, S. D., & Webber, S. (2014). Obstacles to climate change adaptation decisions: A case study of sea-level rise and coastal protection measures in Kiribati. *Sustainable Science*, 9(3), 331–345. <https://doi.org/10.1007/s11625-014-0242-z>.
- Eriksen, S. H., & Kelly, P. M. (2007). Developing credible vulnerability indicators for climate adaptation policy assessment. *Mitigation and Adaptation Strategies for Global Change*, 12(4), 495–524. <https://doi.org/10.1007/s11027-006-3460-6>.
- Eriksen, S. H., Nightingale, A. J., & Eakin, H. (2015). Reframing adaptation: The political nature of climate change adaptation. *Global Environmental Change*, 35, 523–533. <https://doi.org/10.1016/j.gloenvcha.2015.09.014>.
- Escobar, A. (1995). *Encountering Development: The Making and Unmaking of the Third World*. Princeton University Press.
- Eyben, R. (2005). Donors' Learning Difficulties: results, relationships and responsibilities. *IDS Bulletin*, Vol. 36(3): 98–107. <https://doi.org/10.1111/j.1759-5436.2005.tb00227.x>
- Ferdous, M. R., Di Baldassarre, G., Brandimarte, L., & Wessselink, A. (2020). The interplay between structural flood protection, population density, and flood mortality along the Jamuna River, Bangladesh. *Regional Environmental Change*, 20(1). <https://doi.org/10.1007/s10113-020-01600-1>.
- Ferguson, J. (1990). *The anti-politics machine. development, depoliticization, and bureaucratic power in Lesotho*. Cambridge University Press.
- Figueiredo, P., & Perkins, P. E. (2012). Women and water management in times of climate change: Participatory and inclusive processes. *Journal of Cleaner Production*, 60(1), 188–194. <https://doi.org/10.1016/j.jclepro.2012.02.025>.
- Forsyth, T. (2018). Is resilience to climate change socially inclusive? Investigating theories of change processes in Myanmar. *World Development*, 111, 13–26. <https://doi.org/10.1016/j.worlddev.2018.06.023>.
- Forsyth, T. (2019). Beyond narratives: Civic epistemologies and the coproduction of environmental knowledge and popular environmentalism in Thailand. *Annals of the American Association of Geographers*, 109(2), 593–612. <https://doi.org/10.1080/24694452.2018.1549470>.
- Goldman, M. J., Turner, M. D., & Daly, M. (2018). A critical ecology of human dimensions of climate change: Epistemology, ontology, and ethics. *Climate Change*, 9(4). <https://doi.org/10.1002/wcc.526>.
- Haji, J., & Legesse, B. (2017). Impact of sedentarization program on the livelihood and food security of Ethiopian pastoralists. *Journal of Arid Environments*, 13, 45–53. <https://doi.org/10.1016/j.jaridenv.2016.10.007>.
- Horstmann, B. (2011). Operationalizing the adaptation fund: Challenges in allocating funds to the vulnerable. *Climate Policy*, 11(4), 1086–1096. <https://doi.org/10.1080/14693062.2011.579392>.
- Ide, T. (2020). The dark side of environmental peacebuilding. *World Development*, 127, 104777. <https://doi.org/10.1016/j.worlddev.2019.104777>.
- IPCC. (2018). Summary for Policymakers. In Masson-Delmotte, V., Zhai, P., Pörtner, H.O., Roberts, D., Skea, J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., Connors, S., Matthews, J.B.R., Chen, Y., Zhou, X., Gomis, M.I., Lonnoy, E., Maycock, T., Tignor, M., and Waterfield, T. (Eds.) Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, World Meteorological Organization, Geneva, Switzerland, 32 pp.
- Ireland, P., & McKinnon, K. (2013). Strategic localism for an uncertain world: A postdevelopment approach to climate change adaptation. *Geoforum*, 47, 158–166. <https://doi.org/10.1016/j.geoforum.2013.01.005>.
- Jasanoff, S. (2003). Technologies of humility: Citizen participation in governing science. *Minerva*, 41, 223–244. <https://doi.org/10.1023/A:1025557512320>.
- Jones, P. G., & Thornton, P. K. (2009). Croppers to livestock keepers: Livelihood transitions to 2050 in Africa due to climate change. *Environmental Science & Policy*, 12(4), 427–437. <https://doi.org/10.1016/j.envsci.2008.08.006>.
- Juhola, S., Glaas, E., Linnér, B. O., & Neset, T. S. (2016). Redefining maladaptation. *Environmental Science & Policy*, 55, 135–140. <https://doi.org/10.1016/j.envsci.2015.09.014>.
- Kaika, M. (2017). "Don't call me resilient again!": The New Urban Agenda as immunology ... or ... what happens when communities refuse to be vaccinated with "smart cities" and indicators. *Environment and Urbanization*, 29(1), 89–102. <https://doi.org/10.1177/0956247816684763>.
- Karlsson, L., Naess, L. O., Nightingale, A., & Thompson, J. (2018). 'Triple wins' or 'triple faults'? Analysing the equity implications of policy discourses on climate-smart agriculture (CSA). *The Journal of Peasant Studies*, 45(1), 150–174. <https://doi.org/10.1080/03066150.2017.1351433>.
- Khatri, D.B. (2018). Climate and development at the third pole: Dynamics of power and knowledge reshaping community forest governance in Nepal. PhD dissertation, Swedish University of Agricultural Sciences, Sweden. <https://pub.epsilon.slu.se/15564/>.
- Kita, S. M. (2019). Barriers or enablers? Chiefs, elite capture, disasters, and resettlement in rural Malawi. *Disasters*, 43(1), 135–156. <https://doi.org/10.1111/disa.12295>.
- Klenk, N., Fiume, A., Meehan, K., & Gibbes, C. (2017). Local knowledge in climate adaptation research: Moving knowledge frameworks from extraction to coproduction. *WIREs Climate Change*, 8(5). <https://doi.org/10.1002/wcc.475>.
- Kothari, U. (2014). Political discourses of climate change and migration: Resettlement policies in the Maldives: Political discourses of climate change and migration. *The Geographical Journal*, 180(2), 130–140. <https://doi.org/10.1111/geoj.12032>.
- Krätli, S., Huelsebusch, C., Brooks, S., and Kaufmann, B. (2013). Pastoralism: A critical asset for food security under global climate change. *Animal Frontiers*, Vol.3: 42–50. <https://doi.org/10.2527/af.2013-0007>.
- Kuhl, L., Van Maanen, K., & Scyphers, S. (2020). An analysis of UNFCCC-financed coastal adaptation projects: Assessing patterns of project design and contributions to adaptive capacity. *World Development*, 127, 104748. <https://doi.org/10.1016/j.worlddev.2019.104748>.
- Kuper, R., & Kröpelin, S. (2006). Climate-controlled Holocene occupation in the Sahara: Motor of Africa's evolution. *Science*, 313, 803–807. <https://doi.org/10.1126/science.1130989>.
- Lade, S. J., Haider, L. J., Engström, G., & Schlüter, M. (2017). Resilience offers escape from trapped thinking on poverty alleviation. *Science Advances*, 3(5), e1603043. <https://doi.org/10.1126/sciadv.1603043>.
- Levin, K., Cashore, B., Bernstein, S., & Auld, G. (2012). Overcoming the tragedy of super wicked problems: Constraining our future selves to ameliorate global climate change. *Policy Science*, 45(2), 123–152. <https://doi.org/10.1007/s11077-012-9151-0>.
- Levine, S., Peters, K. and Fan, L. (2014). Conflict, climate change and politics – Why a techno-centric approach fails the resilience challenge. London, UK: Humanitarian Policy Group (HPG), ODI.
- Ludi, E., Wiggings, S., Jones, L., Lofthouse, J., & Levine, L. (2014). Adapting development: How wider development interventions can support adaptive

- capacity at the community level. In E. L. F. Schipper (Ed.), *Community Based Adaptation: Scaling it Up* (pp. 36–52). Routledge.
- MacKinnon, D., & Derickson, K. D. (2013). From resilience to resourcefulness: A critique of resilience policy and activism. *Progress in Human Geography*, 37(2), 253–270. <https://doi.org/10.1177/0309132512454775>.
- Magnan, A. K., Schipper, E. L. F., Burkett, M., Bharwani, S., Burton, I., Eriksen, S., & Ziervogel, G. (2016). Addressing the risk of maladaptation to climate change. *WIREs Climate Change*, 7(5), 646–665. <https://doi.org/10.1002/wcc.409>.
- Martin, N., Forrester, J., & Ensor, J. (2018). What is equitable resilience? *World Development*, 109, 197–205. <https://doi.org/10.1016/j.worlddev.2018.04.020>.
- Matthew, R. (2014). Integrating climate change into peacebuilding. *Climatic Change*, 123(1), 83–93. <https://doi.org/10.1007/s10584-013-0894-1>.
- McNamara, K. E., Clissold, R., Westoby, R., Piggott-McKellar, A. E., Kumar, R., Clarke, T., Namoumou, F., Areki, F., Joseph, E., Warrick, O., & Nunn, P. D. (2020). An assessment of community-based adaptation initiatives in the Pacific Islands. *Nature Climate Change*, 10(7), 628–639. <https://doi.org/10.1038/s41558-020-0813-1>.
- Mees, H. L. P., Dijk, J., van Soest, D., Driessen, P. P. J., van Rijswijk, M. H. F. M. W., & Runhaar, H. (2014). A method for the deliberate and deliberative selection of policy instrument mixes for climate change adaptation. *Ecology and Society*, 19(2), 58. <https://doi.org/10.5751/ES-06639-190258>.
- Mehta, L., Srivastava, S., Adam, H. N., Alankar Bose, S., Ghosh, U., & Kumar, V. V. (2019). Climate change and uncertainty from 'above' and 'below': Perspectives from India. *Regional Environmental Change*, 19(6), 1533–1547. <https://doi.org/10.1007/s10113-019-01479-7>.
- Mikulewicz, M. (2020a). Disintegrating labor relations and depoliticized adaptation to climate change in rural São Tomé and Príncipe. *Area*, 00, 1–9. <https://doi.org/10.1111/area.12630>.
- Mikulewicz, M. (2020b). The discursive politics of adaptation to climate change. *Annals of the American Association of Geographers*, 110(6), 1807–1830. <https://doi.org/10.1080/24694452.2020.1736981>.
- Mikulewicz, M., & Taylor, M. (2020). Getting the resilience right: climate change and development policy in the 'African Age'. *New Political Economy*, 25(4), 626–641. <https://doi.org/10.1080/101616j.gloenvcha.2019.1625317>.
- Milman, A., & Arsano, Y. (2014). Climate adaptation and development: Contradictions for human security in Gambella, Ethiopia. *Global Environmental Change*, 29, 349–359. <https://doi.org/10.1016/j.gloenvcha.2013.11.017>.
- Morchain, D., Prati, G., Kelsey, F., & Ravon, L. (2015). What if gender became an essential, standard element of Vulnerability Assessments? *Gender & Development*, 23(3), 481–496. <https://doi.org/10.1080/13552074.2015.1096620>.
- Mosberg, M., Nyukuri, E., and Næss, L.O. (2017). The power of 'know-who': Adaptation to climate change in a changing humanitarian landscape in Isiolo, Kenya. *IDS Bulletin*. Vol. 48(4):79–92. <https://doi.org/10.19088/1968-2017.154>.
- Moser, S., & Boykoff, M. (2014). Climate change and adaptation success: The scope of the challenge. In S. Moser & M. Boykoff (Eds.), *Successful Adaptation to Climate Change: Linking Science and Policy in a Rapidly Changing World* (pp. 1–33). London, UK: Routledge.
- Mosse, D. (2010). A Relational approach to durable poverty, inequality and power. *Journal of Development Studies*, 46(7), 1156–1178. <https://doi.org/10.1080/00220388.2010.487095>.
- Murtinho, F., Eakin, H., López-Carr, D., & Hayes, T. M. (2013). Does external funding help adaptation? Evidence from community-based water management in the Colombian Andes. *Environmental Management*, 52(5), 1103–1114. <https://doi.org/10.1007/s00267-013-0156-z>.
- Nagoda, S., & Nightingale, A. J. (2017). Participation and power in climate change adaptation policies: Vulnerability in food security programs in Nepal. *World Development*, 100, 85–93. <https://doi.org/10.1016/j.worlddev.2017.07.022>.
- Nelson, D. and Finan, T. (2009). Praying for Drought: Persistent Vulnerability and the Politics of Patronage in Ceará, Northeast Brazil. *American Anthropologist*. Vol. 111(3): 302–316. <https://doi.org/10.1111/j.1548-1433.2009.01134.x>.
- Nightingale, A. J. (2017). Power and politics in climate change adaptation efforts: Struggles over authority and recognition in the context of political instability. *Geoforum*, 84, 11–20. <https://doi.org/10.1016/j.geoforum.2017.05.011>.
- Nightingale, A. J., Eriksen, S., Taylor, M., Forsyth, T., Pelling, M., Newsham, A., Boyd, E., Brown, K., Harvey, B., Jones, L., Bezner Kerr, R., Mehta, L., Naess, L. O., Ockwell, D., Scoones, I., Tanner, T., & Whitfield, S. (2020). Beyond technical fixes: Climate solutions and the great derangement. *Climate and Development*, 12(4), 343–352. <https://doi.org/10.1080/17565529.2019.1624495>.
- Nyborg, I., and Nawab, B. (2017). Social Vulnerability and Local Adaptation in Humanitarian Response: The Case of Pakistan. *IDS Bulletin*. Vol.48(4): 63–78. <https://doi.org/10.19088/1968-2017.153>.
- O'Brien, K. (2018). Is the 1.5°C target possible? Exploring the three spheres of transformation. *Current Opinion in Environmental Sustainability*, 31, 153–160. <https://doi.org/10.1016/j.cosust.2018.04.010>.
- Ojha, H., Regmi, U., Shrestha, K. K., Paudel, N. S., Amatya, S. M., Zwi, A. B., Nuberg, I., Cedamon, E., & Banjade, M. R. (2020). Improving science-policy interface: Lessons from the policy lab methodology in Nepal's community forest governance. *Forest Policy and Economics*, 114, 101997. <https://doi.org/10.1016/j.forpol.2019.101997>.
- Ojwang, L., Rosendo, S., Celliers, L., Obura, D., Muiti, A., Kamula, J., & Mwangi, M. (2017). Assessment of coastal governance for climate change adaptation in Kenya: Local coastal governance in KENYA. *Earth's Future*, 5(11), 1119–1132. <https://doi.org/10.1002/2017EF000595>.
- Olroyd, D. R. (1983). *Darwinian impacts: An introduction to the Darwinian revolution* (2nd Edn. ed.). Milton Keynes, England: Open University Press.
- Omukuti, J. (2020a). Challenging the obsession with local level institutions in country ownership of climate change adaptation. *Land Use Policy*, 94, 104525. <https://doi.org/10.1016/j.landusepol.2020.104525>.
- Omukuti, J. (2020b). Country ownership of adaptation: Stakeholder influence or government control?. *Geoforum*, 113, 26–38. <https://doi.org/10.1016/j.geoforum.2020.04.019>.
- Pak-Uthai, S., & Faysse, N. (2018). The risk of second-best adaptive measures: Farmers facing drought in Thailand. *International Journal of Disaster Risk Reduction*, 28, 711–719. <https://doi.org/10.1016/j.ijdrr.2018.01.032>.
- Paprocki, K. (2018). Threatening dystopias: Development and adaptation regimes in Bangladesh. *Annals of the American Association of Geographers*, 108(4), 955–973. <https://doi.org/10.1080/24694452.2017.1406330>.
- Park, S. E., Marshall, N. A., Jakku, E., Dowd, A. M., Howden, S. M., Mendham, E., et al. (2012). Informing adaptation responses to climate change through theories of transformation. *Global Environmental Change*, 22(1), 115–126.
- Pearse, R. (2017). Gender and climate change: Gender and climate change. *WIREs Climate Change*, 8(2), e451. <https://doi.org/10.1002/wcc.451>.
- Pelling, M. (2011). *Adaptation to climate change: From resilience to transformation*. London: Routledge.
- Pelling, M., O'Brien, K., & Matyas, D. (2015). Adaptation and transformation. *Climatic Change*, 133(1), 113–127. <https://doi.org/10.1007/s10584-014-1303-0>.
- Persson, Å., & Remling, E. (2014). Equity and efficiency in adaptation finance: Initial experiences of the Adaptation Fund. *Climate Policy*, 14(4), 488–506. <https://doi.org/10.1080/14693062.2013.879514>.
- Peters, K., Mayhew, L., Slim, H., van Aalst, M., & Arrighi, J. (2019). Double vulnerability: The humanitarian implications of intersecting climate and conflict risk. London, UK: ODI, ICRC and the Red Cross/Red Crescent Climate Centre.
- Ray-Bennett, N. S. (2009). The influence of caste, class and gender in surviving multiple disasters: A case study from Orissa, India. *Environmental Hazards*, 8(1), 5–22. <https://doi.org/10.3763/ehaz.2009.0001>.
- Regmi, B. R., Star, C., & Leal Filho, W. (2016). An overview of the opportunities and challenges of promoting climate change adaptation at the local level: A case study from a community adaptation planning in Nepal. *Climatic Change*, 138(3–4), 537–550. <https://doi.org/10.1007/s10584-016-1765-3>.
- Remling, E., & Persson, Å. (2015). Who is adaptation for? Vulnerability and adaptation benefits in proposals approved by the UNFCCC Adaptation Fund. *Climate and Development*, 7(1), 16–34. <https://doi.org/10.1080/17565529.2014.886992>.
- Rusca, M., Schwartz, K., Hadzovic, L., & Ahlers, R. (2015). Adapting generic models through bricolage: Elite capture of water users associations in peri-urban Lilongwe. *European Journal of Development Research*, 27(5), 777–792. <https://doi.org/10.1057/ejdr.2014.58>.
- Sanderson, S. K. (1990). *Social evolutionism: A critical history*. Cambridge, USA: Blackwell.
- Schilling, J., Nash, S. L., Ide, T., Scheffran, J., Froese, R., & von Prondzinski, P. (2017). Resilience and environmental security: Towards joint application in peacebuilding. *Global Change, Peace & Security*, 29(2), 107–127. <https://doi.org/10.1080/14781158.2017.1305347>.
- Schipper, L., Eriksen, S., Fernandez-Caril, L., Glavovic, B., & Shawoo, Z. (2020). Turbulent Transformation: Abrupt societal disruption and climate resilient development. *Climate and Development*. <https://doi.org/10.1080/17565529.2020.1799738>.
- Schipper, E. L. F., Tanner, T., Dube, O. P., Adams, K. M., & Huq, S. (2020). The debate: Is global development adapting to climate change? *World Development Perspectives*, 18, 100205. <https://doi.org/10.1016/j.wdp.2020.100205>.
- Schipper, E. L. F., Thomalla, F., Vulturius, G., Davis, M., & Johnson, K. (2016). Linking disaster risk reduction, climate change and development. *IJDRBE*, 7(2), 216–228. <https://doi.org/10.1108/IJDRBE-03-2015-0014>.
- Scoville-Simonds, M., Jamali, H., & Hufty, M. (2020). The hazards of mainstreaming: Climate change adaptation politics in three dimensions. *World Development*, 125, 104683. <https://doi.org/10.1016/j.worlddev.2019.104683>.
- Shackleton, S., Ziervogel, G., Sallu, S., Gill, T., & Tschakert, P. (2015). Why is socially-just climate change adaptation in sub-Saharan Africa so challenging? A review of barriers identified from empirical cases: Barriers to adaptation in SSA. *WIREs Climate Change*, 6(3), 321–344. <https://doi.org/10.1002/wcc.335>.
- Stadelmann, M., Roberts, J. T., & Michaelowa, A. (2011). New and additional to what? Assessing options for baselines to assess climate finance pledges. *Climate and Development*, 3(3), 175–192. <https://doi.org/10.1080/17565529.2011.599550>.
- Sultana, F. (2019). Decolonizing development education and the pursuit of social justice. *Human Geography*, 12(3), 31–46.
- Symons, K. (2014). Anti-politics, apocalypse and adaptation in Kenya's national climate change response strategy. *Scottish Geographical Journal*, 130(4), 266–278. <https://doi.org/10.1080/14702541.2014.907442>.
- Tänzler, D., Maas, A., & Carius, A. (2010). Climate change adaptation and peace. *WIREs Climate Change*, 1(5), 741–750. <https://doi.org/10.1002/wcc.66>.
- Taylor, M. (2015). *The political ecology of climate change adaptation: Livelihoods, agrarian change and the conflicts of development*. London, UK: Routledge.
- Taylor, M., & Bhasme, S. (2020). Between deficit rains and surplus populations: The political ecology of a climate-resilient village in South India. *Geoforum*. <https://doi.org/10.1016/j.geoforum.2020.01.007>.
- Thomas, K., Hardy, R. D., Lazrus, H., Mendez, M., Orlove, B., Rivera-Collazo, I., Roberts, J. T., Rockman, M., Warner, B. P., & Winthrop, R. (2019). Explaining differential vulnerability to climate change: A social science review. *WIREs Climate Change*, 10(2). <https://doi.org/10.1002/wcc.565>.

- Thomas, K. A., & Warner, B. P. (2019). Weaponizing vulnerability to climate change. *Global Environmental Change*, 57, 101928. <https://doi.org/10.1016/j.gloenvcha.2019.101928>.
- Titz, A., Cannon, T., & Kruger, F. (2018). Uncovering 'community': Challenging an elusive concept in development and disaster related work. *Societies*, 8(71), 1–28. <https://doi.org/10.3390/soc8030071>.
- Tran, T. A., Pittcock, J., & Tran, D. D. (2020). Adaptive flood governance in the vietnamese mekong delta: A policy innovation of the North Vam Nao scheme, An Giang Province. *Environmental Science & Policy*, 108, 45–55. <https://doi.org/10.1016/j.envsci.2020.03.004>.
- Tschakert, P., Das, P. J., Shrestha Pradhan, N., Machado, M., Lamadrid, A., Buragohain, M., & Hazarika, M. A. (2016). Micropolitics in collective learning spaces for adaptive decision making. *Global Environmental Change*, 40, 182–194. <https://doi.org/10.1016/j.gloenvcha.2016.07.004>.
- Tschakert, P., van Oort, B., St. Clair, A. L., & LaMadrid, A. (2013). Inequality and transformation analyses: A complementary lens for addressing vulnerability to climate change. *Climate and Development*, 5(4), 340–350. <https://doi.org/10.1080/17565529.2013.828583>.
- UNDP (2007). Human Development Report 2007/2008. Fighting Climate Change: Human Solidarity in a Divided World. Palgrave Macmillan, Basingstoke/New York.
- UNEP. (2017). Adaptation gap report 2017, Nairobi, Kenya: United Nations Environment Programme (UNEP). <http://www.unenvironment.org/resources/report/adaptation-gap-report-2017>.
- Vermeulen, S. J., Dinesh, D., Howden, S. M., Cramer, L., & Thornton, P. K. (2018). Transformation in practice: A review of empirical cases of transformational adaptation in agriculture under climate change. *Frontiers in Sustainable Food Systems*, 10. <https://doi.org/10.3389/fsufs.2018.00065>.
- Vincent, K.E., Tschakert, P., Barnett, J., Rivera-Ferre, M., and Woodward, A. (2014). Cross-chapter box on gender and climate change. In *Climate Change 2014: Impacts, Adaptation and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., Barros, V.R., Dokken, D. J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R., and White, L.L. (eds)]. Cambridge University Press, Cambridge, UK and NY, USA, pp. 105–107.
- Wang, J., Brown, D. G., & Agrawal, A. (2013). Climate adaptation, local institutions, and rural livelihoods: A comparative study of herder communities in Mongolia and Inner Mongolia, China. *Global Environmental Change*, 23(6), 1673–1683. <https://doi.org/10.1016/j.gloenvcha.2013.08.014>.
- Warner, B. P., & Kuzdas, C. (2016). Manufactured global-change risk pathways in industrial-based agrarian development. *Climate and Development*, 8(5), 385–396. <https://doi.org/10.1080/17565529.2015.1085359>.
- Webber, S. (2016). Climate change adaptation as a growing development priority: Towards critical adaptation scholarship. *Geography Compass*, 10(10), 401–413. <https://doi.org/10.1111/gec3.12278>.
- Webber, S., & Donner, S. D. (2017). Climate service warnings: Cautions about commercializing climate science for adaptation in the developing world. *WIREs Climate Change*, 8(1), e424. <https://doi.org/10.1002/wcc.424>.
- West, J.J., Daly, M.E., and Yanda, P.Z. (2018). Evaluating User Satisfaction with Climate Services in Tanzania 2014–2016. Summary Report to the Global Framework for Climate Services Adaptation Programme in Africa. CICERO Report No.7. Oslo, Norway.
- Westengen, O. T., Nyanga, P., Chibamba, D., Guillen-Royo, M., & Banik, D. (2018). A climate for commerce: The political agronomy of conservation agriculture in Zambia. *Agriculture and Human Values*, 35(1), 255–268. <https://doi.org/10.1007/s10460-017-9820-x>.
- Wilson, G.A. (2014). Community resilience: Path dependency, lock-in effects and transitional ruptures. *Journal of Environmental Planning and Management*. Vol.57(1): 1–26. <https://doi.org/10.1080/09640568.2012.741519>.
- Work, C. (2019). Climate change and conflict: Global insecurity and the road less traveled. *Geoforum*, 102, 222–225. <https://doi.org/10.1016/j.geoforum.2018.11.004>.
- Work, C., Rong, V., Song, D., & Scheidel, A. (2019). Maladaptation and development as usual? Investigating climate change mitigation and adaptation projects in Cambodia. *Climate Policy*, 19(sup1), S47–S62. <https://doi.org/10.1080/14693062.2018.1527677>.
- Yates, J. S. (2012). Uneven interventions and the scalar politics of governing livelihood adaptation in rural Nepal. *Global Environmental Change*, 22(2), 537–546. <https://doi.org/10.1016/j.gloenvcha.2012.01.007>.
- Ziervogel, G., Archer van Garderen, E., & Price, P. (2016). Strengthening the knowledge–policy interface through co-production of a climate adaptation plan: Leveraging opportunities in Bergrivier Municipality, South Africa. *Environment and Urbanization*, 28(2), 455–474. <https://doi.org/10.1177/0956247816647340>.
- Ziervogel, G., Pelling, M., Cartwright, A., Chu, E., Deshpande, T., Harris, L., Hyams, K., Kaunda, J., Klaus, B., Michael, K., Pasquini, L., Pharoah, R., Rodina, L., Scott, D., & Zweig, P. (2017). Inserting rights and justice into urban resilience: A focus on everyday risk. *Environment and Urbanization*, 29(1), 123–138. <https://doi.org/10.1177/0956247816686905>.