



Private adaptation in semi-arid lands: A tailored approach to 'leave no one behind'

LSE Research Online URL for this paper: <http://eprints.lse.ac.uk/102537/>

Version: Accepted Version

Article:

Gannon, Kate, Crick, Florence, Atela, Joanes, Babagaliyeva, Shanna, Batool, Samavia, Bedelian, Claire, Conway, Declan, Diop, Mamadou, Fankhauser, Samuel, Jobbins, Guy, Ludi, Eva, Qaisrani, Ayesha, Rouhaud, Estelle, Simonet, Catherine, Suleri, Abid and Wade, Cheikh (2019) Private adaptation in semi-arid lands: A tailored approach to 'leave no one behind'. *Global Sustainability*. ISSN 2059-4798 (In Press)

Reuse

Items deposited in LSE Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the LSE Research Online record for the item.

**Private adaptation in semi-arid lands: A tailored approach
to 'leave no one behind'**

Journal:	<i>Global Sustainability</i>
Manuscript ID	GSUS-IB-2019-0002.R1
Manuscript Type:	Intelligence Briefing
Date Submitted by the Author:	n/a
Complete List of Authors:	<p>Gannon, Kate; London School of Economics and Political Science, Grantham Research Institute on Climate Change and the Environment Crick, Florence ; London School of Economics and Political Science, Grantham Research Institute on Climate Change and the Environment; International Institute for Environment and Development, Climate Change Research Group Atela, Joanes; African Centre for Technology Studies, African Centre for Technology Studies Babagaliyeva, Zhanna; Regional Environment Center for Central Asia , Regional Environmental Centre for Central Asia Batool, Samavia; Sustainable Development Policy Institute, Sustainable Development Policy Institute Bedelian, Claire; Overseas Development Institute, Overseas Development Institute Carabine, Elizabeth; Overseas Development Institute, Overseas Development Institute Conway, Declan; London School of Economics and Political Science, Grantham Research Institute on Climate Change and the Environment Diop, Mamadou; Innovations Environnement Développement en Afrique, Innovations Environnement Développement en Afrique Fankhauser, Samuel; London School of Economics and Political Science, Grantham Research Institute Jobbins, Guy; Overseas Development Institute, Overseas Development Institute Ludi, Eva; Overseas Development Institute, Overseas Development Institute Qaisrani, Ayesha; Sustainable Development Policy Institute, Sustainable Development Policy Institute; University of Oxford, University of Oxford Rouhaud, Estelle; London School of Economics and Political Science, Grantham Research Institute on Climate Change and the Environment Simonet, Catherine; Overseas Development Institute, Overseas Development Institute Suleri, Abid ; Sustainable Development Policy Institute, Sustainable Development Policy Institute Wade, Cheikh; Innovations Environnement Développement en Afrique, Innovations Environnement Développement en Afrique</p>
Keywords:	Adaptation and mitigation, Policies, politics and governance

1 Private adaptation in semi-arid lands: A tailored approach to ‘leave no one 2 behind’

3 4 Non-Technical Summary

5 Globally, semi-arid lands (SALs) are home to approximately one billion people, including some of the
6 poorest and least food secure. These regions will be among the hardest hit by the impacts of climate
7 change. This article urges governments and their development partners to put SAL inhabitants and
8 their activities at the heart of efforts to support adaptation and climate resilient development,
9 identifying opportunities to capitalise on the knowledge, institutions, resources and practices of SAL
10 populations in adaptation action.

11 12 Technical Summary

13 Semi-arid lands (SALs) in developing countries are climate change ‘hotspots’ where climate hazards
14 will affect poor populations disproportionately. This represents a major threat to the 2030 Sustainable
15 Development Agenda pledge to ‘leave no one behind’. In this paper we argue that national
16 governments have underestimated opportunities to support climate resilient development in SALs
17 and highlight ways in which the resilience of SAL populations has been undermined by current top-
18 down approaches to adaptation and development. We argue a radical shift in national policy
19 landscapes is required that refocuses on leveraging the existing adaptive capacities of private actors
20 – women, farmers, cooperatives and firms – to cope with and respond to prevailing environmental
21 shocks and weather extremes. This, we argue, requires providing enabling business environments that
22 are tailored to the diverse and specific needs of the private sector in SALs and which support the full
23 range of private sector actors in SALs to meet the challenges and opportunities of climate change. In
24 doing this, we identify opportunities to overcome structural weaknesses that currently contribute to
25 a lack of private investment, undermine important resilience strategies and limit opportunities to
26 unlock broader resilience in SALs through the private sector.

27 28 Social Media Summary

29 Unlocking the existing adaptive capacities of women, farmers and businesses in semi-arid areas is key
30 to realising the SDGs.

31 32 33 Introduction

34 Semi-arid lands (SALs) in developing countries are high-risk climate change ‘hotspots’ (De Souza et al.,
35 2015; Huang et al., 2016; Tucker et al., 2015). They occupy over 15% of the earth’s land surface (Safriel
36 et al., 2005) and are home to approximately one billion people, including some of the poorest and
37 least food secure (Middleton et al., 2011; Tucker et al., 2015). In Africa and Asia, these populations
38 rely heavily on rain-fed agriculture, pastoralism and agricultural processing for their livelihoods,
39 making them particularly exposed to climate and environmental variability. In addition, SALs in these
40 regions are often remote, politically and economically marginalised areas that have limited access to
41 markets, infrastructure and services (Middleton et al., 2011; Thorpe and Maestre, 2015; Tucker et al.,
42 2015). Formal institutions and legal frameworks are typically underdeveloped, with land, water and
43 other resource rights often insecure and unequally distributed.

44
45 Climate change will exacerbate the challenges faced by SALs, as global warming trends are expected
46 to be particularly intense in these regions (Huang et al., 2016; IPCC, 2014), with droughts and floods
47 already becoming more severe. This confluence of climate and non-climate risks, combined with
48 broader socio-economic inequalities, means climate hazards will affect poor populations in SALs
49 disproportionately. Yet to date SALs have been given limited attention in international climate policy.
50 This represents a major threat to the pledge within the 2030 Sustainable Development Agenda to

51 'leave no one behind', and the Paris Agreement commitment to take into account the urgent and
52 immediate needs of those that are particularly vulnerable to climate change.

53

54 In this paper we argue that national governments have underestimated opportunities for climate
55 resilient development in SALs and we revisit and update literatures which highlight ways in which the
56 adaptive capacity of SAL populations has been undermined by current adaptation and development
57 policy and practice. In response, we call for a refocusing on approaches to supporting climate
58 resilience in SALs that build on the opportunities of SALs and concentrate on leveraging the inherent
59 adaptive capacities and flexibility of private actors – women, families, farmers and firms – to cope
60 with and respond to prevailing environmental shocks and weather extremes. This, we argue, requires
61 public provision of business enabling environments that support the full range of private sector actors
62 in SALs to meet the challenges and opportunities of climate change.

63

64 Challenging existing development and adaptation policy and practice, we highlight opportunities to
65 pursue a tailored approach to SAL adaptation, to open up more inclusive avenues of development (c.f.
66 Manuel-Navarrete and Pelling, 2015; Pelling et al., 2015b). In so doing we identify opportunities to
67 overcome some of the structural weaknesses that currently contribute to a lack of private investment,
68 undermine important resilience strategies, hinder efforts to develop enabling conditions for private
69 adaptation and limit opportunities to unlock broader resilience in SALs through the private sector.

70

71 Our analysis draws on five years of research conducted through the Pathways for Resilience in Semi-
72 arid Economies (PRISE) programme in seven developing countries across West and East Africa, and
73 South and Central Asia, as well as on broader engagement with literatures on climate change
74 adaptation and development policy and practice in SALs.

75

76

77 **Existing resilience and adaptive capacity in SALs**

78 SALs are sites of dynamic social, as well as environmental, change. They are characterised by existing
79 adaptive capacities and flexibility within the strategies that households and businesses adopt in the
80 context of climatic and environmental variability, to manage their exposure to risk and maximise their
81 own welfare (de Jode, 2009; Hesse, 2011; Hesse et al., 2013; Mortimore et al., 2009; Mortimore and
82 Adams, 1999). This flexibility in autonomous adaptation behavior (c.f. Fankhauser, 2016; Mendelsohn,
83 2012) can be seen in people adjusting and diversifying their livelihood strategies in response to the
84 marked wet and dry seasons and the shifting availability of resources (Krätli, 2015). It can be seen in
85 the heterogeneity of agricultural production systems and the prevalence of mixed farming systems.
86 And it is frequently shaped by mobility and migration of humans and livestock and wildlife herds
87 (Augustine, 2010; Behnke et al., 2011; Opiyo et al., 2015; Rain, 1999).

88

89 Pastoralists particularly have developed a diverse range of institutions and networks, as well as long-
90 standing traditional strategies, characterised by mobility, flexibility and reciprocity, to manage the
91 variability of resources in drylands and gain access to pasture and water (Bedelian and Ogotu, 2017;
92 Hesse, 2011; Scoones, 1995). Indeed there is increasing evidence that, under the same conditions in
93 climatically variable dryland environments, mobile and communal pastoralist systems may be more
94 productive and resilient than sedentary and commercial ranch-based systems of livestock production
95 (Behnke and Kerven, 2013; Behnke and Muthami, 2011; de Jode, 2009; Hesse et al., 2013; Hesse and
96 Macgregor, 2009; Little et al., 2008; Rodriguez, 2008; Scoones, 1992). Other forms of internal or
97 international and temporary or permanent human migration common to SALs, meanwhile, can make
98 an important contribution to individual and societal adaptation. Migration may increase, as well as
99 reduce, vulnerabilities (Hasan and Raza, 2009; Newborne and Gansaonré, 2017; Stapleton et al., 2017;
100 Waldinger and Fankhauser, 2015). Yet, recent literatures reiterate the understanding that well
101 planned migration can improve the resilience of rural households through livelihood diversification,

102 inflow of remittances, transfer of knowledge and skills, promotion of innovation and expansion of
103 social networks (Hagen-Zanker et al., 2018; Krishnamurthy, 2012; Qaisrani et al., 2018; Salik et al.,
104 2017; Scheffran et al., 2012; Sward and Codjoe, 2012; Wilkinson et al., 2018).

105
106 Recent research on the private sector in SALs has demonstrated ways in which micro, small and
107 medium enterprises (MSMEs) are actively responding to climate risks, for example, by diversifying into
108 different activities and taking up insurance or loans from financial institutions (Carabine and Simonet,
109 2018; Crick et al., 2018a; Eskander et al., 2018; Gannon et al., 2018a). Indeed, this research has shown
110 that SAL businesses are not only highly aware of the current climate risks they face, but also, in some
111 cases, are taking steps to prepare for future climate change (Crick et al., 2018a).

112
113

114 **Top-down development policies and erosion of SAL resilience**

115 Much of the economic and social dynamism and ingrained resilience that has evolved in SAL societies
116 has been widely and continuously documented in academic and civil society literatures (Behnke et al.,
117 1993; Catley et al., 2012; Hesse and MacGregor, 2006; Mortimore, 1989, 1998; Mortimore et al., 2009;
118 Mortimore and Adams, 1999; Rain, 1999; Scoones, 1995). However, driven by typically centralised and
119 top-down approaches to adaptation and development policy, national governments in developing
120 countries have almost invariably failed to capitalise on the knowledge, institutions, skills and practices
121 which underpin these existing adaptive capacities in SALs. Indeed, in many cases, the traditional
122 institutions and livelihoods that have evolved to not only cope with, but also often to harness
123 opportunities from, the climatic and environmental variability of SALs, have been actively undermined
124 and destabilised by these policies.

125

126 As stated by Hesse, (2011), drylands policies in developing countries have tended to focus on bringing
127 'stability' and 'order' to environments viewed as unstable and disorganised and have sought to replace
128 traditional land use and resource management practices with techniques seen as more 'modern'.
129 Narratives of resource scarcity and degradation, linked to conventional ecological equilibrium theory
130 and notions of carrying capacity, for example have dominated policy and practice in SALs (Hesse, 2011;
131 Mortimore et al., 2009; Scoones, 1995; Tiffen et al., 1994). This has led to popular misconceptions of
132 pastoralism as backward, irrational and unproductive (Hesse and MacGregor, 2006; Jenet et al., 2016;
133 Leach and Mearns, 1996; Swift, 2003). In addition, policy development in Africa's SALs has had a long
134 history of favouring agriculture over pastoralism and encouraging sedentarisation and the
135 privatisation and commercialisation of pastoral land.

136

137 Opportunities for broader forms of human migration to function as resilience strategies have also
138 been curtailed in SALs, by a tendency for national governments to continue to consider internal
139 migration as a developmental concern that needs to be restricted. Pakistan, for example, has no
140 domestic migration policy, exacerbating many of the structural barriers and vulnerabilities faced by
141 SAL migrants (Saeed et al., 2016), and its climate change policy advocates limiting rural-urban
142 population flows (Qaisrani and Salik, 2018). Other examples of large scale, centrally managed
143 development strategies that have eroded or failed to recognise traditional resource management
144 institutions and created new vulnerabilities and exacerbated degradation and conflict, have been
145 widely documented in SALs, including in areas such as irrigation, forestry, land reform, livestock
146 ranching, transportation infrastructure and natural resource extraction investments (e.g. Houdret,
147 2012; Mdee et al., 2014; Sandford, 2013; Söderbaum and Taylor, 2001; Weng et al., 2013, see also
148 Hesse, 2011; Scoones and Wolmer, 2003).

149

150

151

152

153 **An under-recognised private sector in SALs**

154 Widespread missed opportunities for climate resilient economic development in SALs, have also been
 155 underpinned by failure to recognize the full range of economic actors and their economic potential
 156 within SALs.

157
 158 At national levels, the dominant framing of SAL economies has been one of low productivity,
 159 vulnerability and unsustainable livelihoods. This framing has emphasised the aridity and climatic
 160 variability that characterises SALs, alongside limited access to 'blue water' in rivers and lakes to
 161 support irrigation, as major constraints to productivity (Jobbins et al., 2018). Representation of SALs
 162 as resource scarce, remote, landlocked and sparsely populated regions, with limited access to
 163 markets, has further enhanced the 'bad geography' narrative attached to SALs (ibid; Lemma et al.,
 164 2015). While these features are pertinent, they are not the whole story.

165
 166 SAL economies make major contributions to national livelihoods and present significant additional
 167 opportunities for the development of national economies¹. Agricultural producers and pastoralists,
 168 are linked to large, and sometimes highly competitive, value chains spread across formal and informal
 169 sectors, incorporating a range of different sized businesses within and outside of SALs and exporting
 170 to domestic and international markets (Carabine and Simonet, 2018). There are opportunities across
 171 these key value chains to upgrade processing activities and to provide additional benefits to SAL and
 172 national economies, including enhanced employment opportunities (Bedelian et al., 2019; Carabine
 173 and Simonet, 2018). There is also increasing evidence that key value chains in SAL economies, such as
 174 the livestock sector in East Africa, have been grossly undervalued in terms of their contribution to
 175 national GDP (see for example Rodriguez, 2008; de Jode, 2009; Hesse and Macgregor, 2009; Behnke
 176 and Muthami, 2011; ICPALD, 2013; Carabine *et al.*, 2017). Indeed, GDP itself may be a poor indicator
 177 of the potential and productivity found in drylands, where wealth is often held in assets, such as
 178 livestock.

179
 180 The dominant discourse of SALs as unproductive has partly been able to dominate national
 181 development and adaptation policies, as the economic role and potential of the households,
 182 producers, and businesses – and their activities – in SALs have traditionally not been well recognised.
 183 This is mainly because: (1) economic actors operate largely at the level of agricultural producers and
 184 micro and small enterprises in the informal (unregistered) sector (Dougherty-Choux et al., 2015;
 185 International Labour Organisation, 2015); and (2) businesses, households and producers are often not
 186 clearly defined, static units, as producers businesses and households often engage in and move in and
 187 out of a range of different livelihood activities (Carabine and Simonet, 2018; Gannon et al., 2018b).

188
 189 Within this landscape, SALs have suffered from long-term and disproportionate under-investment and
 190 political and economic marginalisation within national development agendas (Hesse, 2011; Jobbins et
 191 al., 2016; Mortimore et al., 2009), which in turn has broadly contributed to a lack of private
 192 investment. Where increasing investment has emerged in SALs, for example through foreign capital
 193 from countries such as China, it has often been focused on resource extraction and large-scale
 194 infrastructure and agriculture investments, which are typically detached from local livelihoods, have
 195 not produced the 'trickle down' benefits they purported to achieve and have often been accompanied
 196 by large-scale land grabs (Baxter et al., 2017; Borrás et al., 2011; Deininger and Byerlee, 2011;
 197 Dzumbira et al., 2017).

198

199

200

¹ The textile sector in Pakistan, for example, based on cotton produced in the country's SALs, is the largest industrial sector and accounts for around 40% of the country's industrial labour force. Indeed, ten million people in Pakistan rely on the textile industry for employment (Batoool and Saeed, 2018).

201 **An under-provided for private sector in SALs**

202 Where investments and policies have been made to support the private sector in SALs, a failure to
203 recognize and account for the full range of private sector actors (and their multiple livelihood
204 pathways) within their design, has also compromised opportunities to capitalize on the autonomous
205 adaptation potential of SAL populations.

206
207 As described by Fankhauser, (2016: 10), the underlying paradigm of autonomous private sector
208 adaptation “is of economic agents that maximize their profits or welfare in the light of climatic risk”.
209 However, while Hesse (2011: 2) is undoubtedly right when he argues that “dryland people have much
210 to teach us about living in an increasingly uncertain world”, SAL populations face very real structural
211 and resource constraints which limit adaptive capacity (c.f. Cleaver, 2009, 1999). Existing adaptation
212 strategies and behaviours employed to cope with immediate shocks and stresses in SALs are
213 accordingly not all sustainable and will not all be sufficient to buffer against current or future shocks
214 and stresses (see also Chambwera *et al.*, 2015). Indeed, some autonomous adaptation strategies
215 observed in SALs, such as diversification into environmentally destructive practices (e.g. deforestation
216 linked to charcoal production), distress sales of land and other assets and the scaling back of
217 production and workforces, are likely to reduce future adaptive capacity, result in private actors being
218 drawn into risky activities that increase their vulnerability, degrade natural resource bases or transfer
219 vulnerabilities along value chains (Atela *et al.*, 2018; Batool and Saeed, 2018; Carabine and Simonet,
220 2018; Crick *et al.*, 2018a; Rao *et al.*, 2017). Current responses also do not necessarily take *future*
221 climate risk into account, for example in the selection of new crops and production methods. And in
222 some cases, changing climate parameters may undermine the viability of current livelihood strategies
223 in more fundamental and perhaps inescapable ways.

224
225 Signaling a clear and strong role for public policy to support private actors to manage climate risk,
226 research has nevertheless demonstrated that the ability of private sector actors to adapt effectively
227 and sustainably to climate risk is strongly influenced by the external business enabling environment,
228 in areas which are often lacking in SALs. Lack of access to finance, inappropriate incentive structures
229 and limited access to markets and technologies (including climate smart inputs) are all factors that
230 decrease the probability of firms engaging in sustainable adaptation actions, such as changing to
231 climate resilient product mixes (Crick *et al.*, 2018a). While access to tailored climate information
232 services, information about adaptation options and general business support from public sources all
233 increase the probability that businesses will engage in sustainable adaptation (ibid, see also Agrawala
234 *et al.*, 2011; Averchenkova *et al.*, 2016; Chaudhury, 2018; Conway *et al.*, 2019; Crawford and Seidel,
235 2013; Crick *et al.*, 2018b; Davies, 2018; Dougherty-Choux *et al.*, 2015; Stenek *et al.*, 2013).

236
237 Sustainable private sector adaptation and climate-resilient development therefore requires many
238 structural deficits within general business environments (such as limited access to markets, finance
239 and transport and communication infrastructure) to be addressed, alongside conditions that support
240 climate specific adaptive capacity (Carter *et al.*, 2019; Crick *et al.*, 2018a, 2018b). Such a holistic and
241 multi-sectoral approach to supporting private sector adaptation is in itself a challenge since
242 adaptation policy is often embedded within environment ministries (Pardoe *et al.*, 2018), typically
243 resulting in limited integration of (and capacity for) adaptation planning for the private sector within
244 local and national development agencies.

245
246 Where climate change adaptation policies have given some consideration to private sector needs,
247 they have generally promoted and recognized only a limited range of business and production models.
248 Most notably, private sector adaptation policies have tended to focus primarily on the needs of larger
249 and formal businesses, with less consideration given to smaller businesses, operating in the informal
250 sector, which dominate the enterprise landscapes in SALs. Yet, informal enterprises, and those with
251 more restricted access to formal land ownership, including women, mobile pastoralists and other

252 producers who farm land that is either communally owned or allocated through informal tenure (and
 253 thus who have little or no collateral), particularly struggle to access the support and especially the
 254 credit they require through formal channels (Atela et al., 2018; Batool and Saeed, 2018; Carabine and
 255 Simonet, 2018; Stein et al., 2013)². Female entrepreneurs often face notable additional barriers to
 256 resource access and economic participation, shaped by strong sociocultural orientations around
 257 gender roles and resource use and access. However, the specific needs of women as economic actors
 258 have similarly often been overlooked, through blanket approaches to the design of enabling policies
 259 and programmes, hinged on linear assumptions of readily transferable technology that fail to reflect
 260 the context, motivations, and power structures in which actors take adaptation decisions (e.g. Atela
 261 et al., 2018 c.f. Agarwal, 1994)

262

263

264 **Missed opportunities for building resilience in SALs through the private sector**

265 The failure to tailor public provision of enabling conditions for private sector adaptation and
 266 development to the diversity of private sector actors also risks further undermining adaptive
 267 capacities in SALs and means national governments and their development partners are likely to miss
 268 out on important opportunities to build and support SAL resilience.

269

270 Informality in the private sector in SALs, for example, reflects the heterogeneity of livelihood activities
 271 in SALs, as private actors move in and out of different market activities and adjust their livelihood
 272 strategies in response to stressors and the variability in drylands. In this way, despite structural
 273 disadvantages for informal businesses, including restricted access to new market opportunities and
 274 public-sector services, informality has even been described as “a key adaptive characteristic” to
 275 manage risks and variable resources in SALs (Carabine and Simonet, 2018: 24).

276

277 Smaller, informal and often women-led enterprises are also being overlooked in the dominant neo-
 278 liberal agenda on development via market-based interventions. Yet these actors too have the
 279 potential to make important and wide-ranging contributions to building resilience along key value
 280 chains and within communities. Formal and informal enterprises in SALs can, for example, support
 281 increased access to new inputs, technologies and services (including those which are climate smart),
 282 create new markets and provide local and non-agricultural employment opportunities (Carabine and
 283 Simonet, 2018; Gannon et al., 2018b).

284

285 Women involved in entrepreneurship are understood to make relatively higher contributions to family
 286 and social welfare, by more efficiently allocating returns from MSMEs and other employment
 287 opportunities to the most critical household assets, including health, education and food security,
 288 which themselves shape resilience in SALs³. Preliminary findings from PRISE research also suggest that
 289 female entrepreneurs may be more likely to engage in sustainable adaptation than men (Crick et al.,
 290 2018a), while wider literatures emphasise that women’s responsibilities in households and
 291 communities position them well to find solutions to changing climate risks and to adapt livelihood
 292 strategies (UN WomenWatch, 2009; Wedeman and Petruney, 2018).

² Even among formal enterprises, climate and business development finance opportunities are often limited. While microenterprises may be able to access finance through microfinance initiatives, and larger enterprises find it easier to access bank loans, these credit sources are often not suited to the more established, yet still vulnerable, enterprises that fall outside of micro-industry and within the larger ‘small’ and ‘medium’ enterprise classifications. This often creates a ‘missing middle’ when it comes to accessing finance for businesses (Fjose et al., 2010).

³ At macro-scales, the development economics literature over the last several decades, has similarly supported this narrative, associating gender equality and factors facilitating female inclusion within human capital accumulation and skill demanding economic activities with progress in macro development indicators, such as GDP growth (Baten and de Pleijt, 2018; Klasen and Lamanna, 2009).

293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342

There are also examples of table banking groups and other women’s groups and farmer cooperatives undertaking a range of other activities with potential to overcome barriers in business enabling environments and increase resilience in SALs. These include sharing knowledge, for example about new markets, technologies and production techniques and requirements (e.g. certification standards) and initiating cooperatives and other common pool resource management initiatives, such as reforestation and greenhouse farming. Producer groups and other forms of MSME aggregation are also mechanisms that have been used to reduce costs of trading (for example through group purchase of climate smart inputs, such as drought-resilient seeds) and to increase the lobbying power of small businesses in respect to both government programming and accessing new markets at better rates (Atela et al., 2018; Lemma et al., 2015; Tripathi et al., 2012). In any agenda that seeks to mobilise the private sector for equitable adaptation and climate resilient development, these diverse actors need to be accounted for.

Delivering transformative adaptation in SALs

For reasons outlined above, ‘development-as-usual’ pathways are likely to continue undermining resilience strategies among SAL populations, restricting development and limiting the ability of private actors to adapt to climate change. Continuing on current pathways risks prolonging the marginalisation of the poorest and most vulnerable groups, including informal enterprises, women, and pastoralists. While the exclusion of these private actors from public support services that enable business development and adaptation to climate change also undermines the potential to unlock opportunities to build broader resilience in SALs *through* the private sector.

We argue a radical shift in national policy landscapes is required that refocuses on leveraging the inherent adaptive capacities and flexibility of private actors in SALs and provides enabling business environments that support the full range of private sector actors in SALs to meet the challenges and opportunities of climate change.

Delivering on this agenda will be not be an easy task. Meaningful change will require a break from longstanding and entrenched national development trajectories. Moreover, policies and institutions deployed ostensibly to enhance SAL resilience have frequently had unanticipated consequences: Community-based adaptation and development strategies have often been deployed in ways that reinforce local power structures, with opportunities for capture of processes by local elites, government officials and private players (Bersaglio and Cleaver, 2018; Cleaver, 2012; Cleaver and Hamada, 2010; Galvin et al., 2018; Leach et al., 1999). Decentralisation often leads to recentralized control and has rarely been accompanied by transfer of sufficient funds to enable local government to fulfill their mandates (Hesse et al., 2013; Ribot, 2011; Scoones and Wolmer, 2003). Liberalisation agendas have often entrenched marginalization, by prioritising certain modes of doing business and failing to tackle barriers to market participation for the most vulnerable (Scoones and Wolmer, 2003). Similarly, climate responses that have been defined through short-term, projectised, single-sector responses have so often failed to recognise and respond to social context and build resilience over time (LDC Group, 2019).

Drawing on emerging strategies and novel mechanisms for supporting private adaptation that are showing signs of success within SALs, below we nevertheless propose key principals that we believe should be embedded within efforts to support development and adaptation within SALs.

343 **Recommendation 1: Elevate the role of SALs and their inhabitants as key priority areas for**
 344 **appropriate investment and support within national and international development agendas**

345
 346 SALs have been neglected within development and adaptation landscapes for too long. National
 347 governments and their development partners need to recognise the importance of supporting
 348 adaptation in SALs for achieving climate-resilient development and the pledge within the 2030 Agenda
 349 for Sustainable Development to 'leave no one behind', and upscale support for adaptation in these
 350 areas. In order to meet the objectives under the Paris Agreement to make climate finance flows
 351 consistent with demand and needs, national representatives ('focal points') to the UNFCCC, should
 352 position SALs, and the private actors within them, as priority areas for investment and support.
 353 Developed countries and other development partners, meanwhile, should support SAL governments
 354 in this aim through institutional capacity-building and increasing the share of their funding
 355 commitments directed towards supporting adaptation within SALs.

356
 357 **Recommendation 2: Reorient SAL policy landscapes to focus on the public provision of enabling**
 358 **environments for private sector adaptation and climate resilient development**

359
 360 Maximising the opportunities of SALs requires a policy environment that capitalises on the existing
 361 adaptive capacities within SALs and puts private actors at the center of development and adaptation
 362 action. To do this, national governments, supported by development partners, will need to pursue a
 363 holistic approach to developing enabling environments for private adaptation and climate-resilient
 364 development. This will require supporting climate-specific adaptive capacity, for example through
 365 increasing access to climate-smart technologies and inputs, supporting the development of innovative
 366 climate tools and building capacity for climate information providers and private actors to translate
 367 climate information into useable formats that can inform adaptation options suited to SAL
 368 environments (Carter et al., 2019; Conway et al., 2019). But it will also require addressing the broader
 369 structural and development deficits that limit general business growth and development and shape
 370 underlying vulnerabilities, such as access to finance, transportation, water, energy, health, education
 371 and communication infrastructure.

372
 373 These enabling conditions are not themselves specific to SALs, representing conditions required to
 374 support private adaptation and climate resilient business development more broadly. Yet they all
 375 deserve explicit consideration in public efforts to support private adaptation and climate-resilient
 376 development in SALs, where many of these elements are currently missing and where people are often
 377 acutely vulnerable⁴. Since many of the factors required to enable adaptation in SALs are cross-cutting,
 378 spilling over the traditional remits and capabilities of any single sector, institution or actor, enabling
 379 conditions to support private adaptation will also require significant coordination across sectors and
 380 scales. To achieve this, policies and institutions targeting private sector development and climate
 381 change adaptation – which have to date been typically developed independently and remain
 382 disconnected – need to be aligned.

383
 384 **Recommendation 3: Tailor support for businesses to grow and adapt to climate change to the**
 385 **diverse and specific needs of the private sector in SALs.**

386
 387 To avoid entrenching existing inequalities and to maximize opportunities for inclusive adaptation and
 388 growth, investments designed to deliver enabling environments for private adaptation in SALs need

⁴ This is especially important in light of Tol and Yohe's (2007) "weakest link" hypothesis, which suggests that adaptive capacity may be disproportionately influenced by the least developed aspects of enabling environments. This means that underinvestment in generic as well as climate-specific determinants of adaptive capacity could lead to fundamental gaps that could disproportionately limit people's ability to adapt, despite additional public investment to support adaptation.

389 to be designed in ways that reflect the flexibility, heterogeneity, informality and mobility that are
390 inherent to SAL socioeconomic systems and to the way in which private actors manage variability,
391 buffer shocks and capitalise on opportunities. Specifically, this will require policies, products and
392 services, that are flexible enough to support the diverse nature of actors and their activities and which
393 support different adaptation responses, modes of production and ways of doing business within the
394 same overall system.

395

396 The development of lightweight bee hives that women can carry from one geographical region to
397 another in response to shifting climate pressures (Atela et al., 2018) is an example of the way in which
398 even fairly simple inputs and technologies can be designed in ways that are more responsive to the
399 needs of a wider range of economic actors in SALs. To avoid maladaptation and to support the
400 sustainability of investments, the design and development of these products needs to be informed by
401 climate information tailored to SAL environments and uncertainties (Conway et al., 2019; Vincent et
402 al., 2018) and which support sustainable management of crucial natural resources: For example
403 prioritizing green water management and avoiding blue water investments that threaten off-farm
404 ecosystem services (Keys and Falkenmark, 2018).

405

406 Business finance opportunities especially need to be broadened to more inclusively target the range
407 of private actors in SALs and their varied requirements, including Sharia-compliance in areas where
408 Muslim populations live. These need to be made accessible to informal enterprise, individual
409 producers, mobile pastoralists, women's collectives and producer cooperatives, as well as to private
410 actors that experience more restricted access to formal land ownership. International climate funds
411 such as the Green Climate Fund, the Global Environment Facility and the Adaptation Fund, similarly
412 need to be made more accessible to the private sector in SALs, by recognising the diversity in type,
413 size and formality. For example, smallholder farmers should be recognised as 'producers' rather than
414 simply 'households', to make them eligible for new streams of international climate finance for the
415 private sector (Carabine and Simonet, 2018).

416

417 **Recommendation 4: Unlock broader resilience by building on productive sectors and driving**
418 **innovation along value chains**

419

420 National governments and their development partners have a responsibility to ensure that all
421 members of SAL societies have the ability to manage climate risk, engage in sustainable growth and
422 adaptation and avoid transferring vulnerabilities along value chains. However, notwithstanding the
423 need to mitigate the many challenges that underpin market-based development paradigms (see, for
424 example, Scoones and Wolmer, 2003), opportunities to build adaptive capacity and unlock climate-
425 resilient development through the private sector should be thoughtfully and critically scaled up in
426 SALs.

427

428 Novel risk sharing mechanisms, mobilised through public private partnerships and multi-stakeholder
429 partnerships⁵, have highlighted ways in which governments and their development partners can
430 remove barriers to private sector investment in adaptation in SALs. For example, action and
431 investments in areas such as infrastructure, research, data access, policy change and subsidies can
432 help facilitate a business case for the private sector to develop new products, services or markets that
433 build resilience and support local capacities in adaptation. These can and should include more
434 vulnerable groups, in more marginalised regions, that would otherwise fall outside of market
435 inclusion. In Senegal, for example, the national agricultural insurance fund, Compagnie Nationale
436 d'Assurance Agricole du Sénégal (CNAAS), is a multi-stakeholder partnership that has brought

⁵ Multi-stakeholder partnerships are typically partnerships that bring together actors from the three main social sectors: Government (national, regional and international), the private sector and civil society, including NGOs, research organisations, faith and grass-roots organisations (Dyer et al., 2013; Pauw and Chan, 2018a).

437 together the government of Senegal, insurance companies, farmer organisations and the private
 438 sector, including Senegal's Agricultural Bank (La Banque Agricole⁶), to develop agricultural insurance
 439 products, including weather-index crop insurance products for smallholder farmers in remote areas.
 440 This has involved, among other things, investments in new rainfall stations, new crop production and
 441 climate databases and increased use of satellite data, to enhance data quality and improve the
 442 reliability of the weather indexes that expand the commercial viability of weather-index crop
 443 insurance products (MAER Sénégal, 2018).

444

445 Value chain and market analyses are approaches that can help identify risks, weaknesses and
 446 opportunities within and along SAL value chains and identify and broker linkages between private
 447 actors that help maximise opportunities for the full range of private sector actors to contribute to
 448 resilience in SALs (Batool and Saeed, 2018; Bedelian et al., *in press.*; Carabine and Simonet, 2018).
 449 Creating a closer link between actors along the value chain, for example, can support the development
 450 of new products based on more climate-resilient crops: This is seen in Kenya where East African
 451 Breweries Limited (EABL) has developed a new low-cost beer which has provided smallholder cereal
 452 producers in Kenya's eastern regions with access to a direct market for more climate resilient crops
 453 (Business Daily, 2018). Value chain analysis has also identified opportunities to increase the resilience
 454 of beef and milk value chains in the SALs of East and West Africa through the development of new
 455 market linkages with local processing and cold storage facilities (Carabine and Simonet, 2018).

456

457 Partnership, value chain and cooperative approaches, which depend on often uncertain market forces
 458 for their viability and which are embedded within formal and informal power structures that shape
 459 what decisions are taken and by whom (Eriksen et al., 2015), present their own challenges as models
 460 for structuring adaptation action. They require sensitive implementation and monitoring and
 461 evaluation – including of the distribution of risk and value added across the full range of economic
 462 actors – if they are to avoid further entrenching marginalisation and creating new vulnerabilities for
 463 SAL communities (Bulkeley and Newell, 2010; Schoonhoven-Speijer and Ruben, 2015; Selsky and
 464 Parker, 2005; Thorpe, 2018; Thorpe and Maestre, 2015; Tripathi et al., 2012). Nevertheless, building
 465 on productive SAL sectors and mobilising private sector investment in adaptation will likely be
 466 fundamental to plugging gaps in adaptation and development finance. Reflecting a need to broaden
 467 what Pauw and Pegels, (2013: 258) describe as “the private sector *for* adaptation”⁷, in SALs attention
 468 needs to turn to supporting the full range of private sector actors to contribute to equitable national
 469 development agendas, as drivers of inclusive sustainable development and climate resilience. Women
 470 and informal enterprise in particular need to be better supported and incorporated into the economy
 471 to fulfil their potential to become key agents of change. Within this agenda, innovation is required to
 472 identify and support business models that encourage private sector actors to develop equitable
 473 business linkages and partnerships with a wider range of other businesses, including those that don't
 474 have the formal land entitlements that larger companies, seeking legislative protection and resource
 475 security, often require.

476

477 **Recommendation 5: Reorient government policies to value and support human and livestock** 478 **mobility**

479

480 National and local governments need to support the mobility of people and livestock across borders
 481 by removing policies that seek to limit migration and population return and developing regulatory
 482 frameworks and legal instruments that support migrants' rights and freedom of movement. For
 483 example, national and local governments need to think carefully about how to introduce social

⁶ Formerly known as the Caisse Nationale du Crédit Agricole au Sénégal

⁷ International and national adaptation policy processes have typically focused on the role of large domestic and transnational companies in resourcing adaptation and driving innovation, with limited inclusion of MSMEs or recognition of their role (Averchenkova et al., 2016; Pauw and Chan, 2018b).

484 protection measures and labour laws that reduce the opportunity for exploitation of migrants and
 485 reduce their vulnerability (Newborne and Gansaonré, 2017; Wade et al., 2017). National governments
 486 also need to provide supportive infrastructure and financial services for effective migration, including
 487 for safe remittance transfers (Stapleton et al., 2017). These need to account for the heterogeneous
 488 nature of migrants, as well as the diverse forms of temporary and permanent migration that they may
 489 engage in and should be supported through the integration of migration planning across rural and
 490 urban scales, to avoid migrants falling between the cracks (Qaisrani et al., 2018; Qaisrani and Salik,
 491 2018). Similarly, national and county governments need to develop an institutional framework that
 492 supports sharing of grazing resources and develop land use plans that transcend administrative
 493 boundaries and maintain and protect livestock corridors and migratory routes to facilitate the mobility
 494 of livestock across subnational or national borders. This will require creating and preserving corridors
 495 that enable livestock and wildlife movement between private lands and around infrastructure
 496 investments. And, in many regions, this will entail protecting communal landholdings from land
 497 subdivision (see also IPBES, 2018a, 2018b).

498

499 **Recommendation 6: Invest in inclusive bottom-up adaptation planning**

500

501 Fundamentally, the failure to account for the diverse and specific characteristics and needs of SAL
 502 populations – and to build on the strengths, dynamics and characteristics of dryland systems – has
 503 arisen from adaptation and development policy and practice too often ignoring local knowledges,
 504 practices and power structures and failing to give SAL businesses and households the power to shape
 505 development and adaptation provision according to their own specific needs and realities (c.f.
 506 Agrawal, 2011; Cleaver, 2012; Eriksen et al., 2015; Ferguson, 1990; Leach et al., 2010; Scott, 1999;
 507 Tanner and Allouche, 2011). It is therefore increasingly recognized that effectively supporting
 508 equitable and inclusive adaptation and climate-resilient development requires adaptation decisions
 509 to be made at the local level by local actors (e.g. Soanes et al., 2017).

510

511 The Devolved Climate Finance (DCF) mechanism that has been piloted in the drylands of Senegal, Mali,
 512 Kenya and Tanzania has grown from this school of thought, seeking to increase the adaptation funds
 513 that reach the local level⁸ and to support local actors and local institutions to make decisions about
 514 how and where to allocate these funds. The DCF mechanism is anchored within devolution and is
 515 designed to facilitate the flow of climate finance to local governments, while at the same time
 516 empowering local communities by strengthening their participation in the management and use of
 517 these funds (Crick et al., 2019; DCF Alliance, 2019; Odhengo et al., 2019; Orindi et al., 2017).

518

519 Ecosystem-based adaptation (EbA) approaches, that use biodiversity and ecosystem services to help
 520 people adapt to climate change, have similarly evolved around a commitment to co-produce
 521 adaptation solutions by combining local knowledges with evolving information about climate change
 522 (Reid et al., 2019b, 2019a). EbA currently receives a small proportion of adaptation finance compared
 523 to hard infrastructure options (Chong, 2014). Yet with increasing recognition of the parallel threat of
 524 biodiversity loss to the world's poorest (Archer et al., 2018; Karki et al., 2018), nature-based solutions
 525 are gaining increasing political traction (Carrington, 2019; UN News, 2019; United Nations Secretary
 526 General, 2019). EbA can be integrated with devolved climate finance, multi-stakeholder partnership
 527 and value chain approaches to supporting adaptation (see for example Reid and Orindi, 2018). It offers
 528 a lens to ensure fundamental environmental and biodiversity safeguards are integrated into
 529 adaptation investments (Seddon et al., 2016a, 2016b). It has also shown some important potential to
 530 support cost-effective and equitable social resilience to climate change among SAL populations so
 531 dependent upon natural resources. Reid et al., (2019b), for example identifies a range of economic

⁸ Soanes et al (2017) estimate that only US\$1 in every US\$10 committed from global climate funds between 2003 and 2016 was for local-level climate action.

532 benefits of EbA interventions for private sector actors, such as avoided costs (e.g. from reduced
533 dependence on agricultural inputs) decreased losses (e.g. fewer animal deaths from improved pasture
534 and reduced crop losses due to diversification on farms) and new market opportunities (e.g. from
535 tourism).

536
537 Building on such emergent approaches that support the principles of community-driven bottom up
538 planning and inclusion of climate-vulnerable people in decision making is likely critical. Indeed, this is
539 a key assumption underpinning rising interest in the multi-stakeholder partnership, value chain and
540 cooperative models for supporting adaptation, previously discussed. Yet if we are to achieve the 2030
541 Agenda for Sustainable Development pledge to 'leave no one behind', their development needs to
542 draw on the lessons of literatures which have highlighted the challenges of ensuring equitable
543 participation in local institutional arrangements and the potential for localised adaptation and
544 development planning responses to reproduce existing politics of exclusion, subordination and
545 vulnerability (e.g. Eriksen et al., 2015; Sovacool et al., 2015; Tanner and Allouche, 2011).

546
547 For governments, non-governmental organisations and other development partners supporting the
548 design and delivery of adaptation projects, market integration initiatives and new climate
549 partnerships, this is going to require a more critical engagement with the norms and forums of
550 decision making. What decisions get taken, by whom, and to what extent embedded arrangements of
551 authority reproduce social inequalities or create space to challenge them, require deep scrutiny
552 (Cleaver, 2012, 1999; Scoones, 2015, 2009)⁹. So too do the framings that justify specific sets of actions
553 to support adaptation and which are used to define what transformational adaptation looks like for
554 different actors (Adger et al., 2009; Eriksen et al., 2015; Tanner and Allouche, 2011). Development of
555 productive mechanisms for bridging global and local scientific and traditional knowledges and co-
556 producing locally tailored solutions, based on the aspirations and social and political realities of the
557 communities they seek to target, within the context of changing climatic parameters, are therefore
558 an urgent priority. This suggests the importance of broadening the research agenda focused on
559 identifying models of defining and co-designing inclusive adaptation institutions and modes of
560 participation with the diverse range of SAL actors they seek to target. Remodeling of monitoring and
561 evaluation frameworks to support this agenda will likely also be required.

562
563

564 **Momentum for change**

565 The need for a reorientation in SAL policy that mobilises local knowledges, experiences and practices
566 in action to support adaptation and development, as has been proposed in this paper, is not in itself
567 a novel assertion within academic development and adaptation literatures. Moreover, many of our
568 assertions are strongly reminiscent of the livelihood agenda that emerged with such force in the 1990s
569 (see for example, Scoones and Wolmer, 2003). However, progress towards these goals to date has
570 remained inadequate. This paper, reflecting on practical experience with supporting climate change
571 adaptation in SALs, has grown from a belief that the time to move beyond routine and incremental
572 policy changes in current development pathways (cf. Few et al., 2017; Kates et al., 2012) and to drive
573 innovation within the adaptation and development of SALs through refocusing on the role of private
574 actors, is now.

575
576 Earlier iterations in development policy reform, can reassure us of the potential to reshape prevailing
577 methods, frameworks, funding commitments and resource flows in line with evolutions in

⁹ Scoones (2015: 82), drawing on earlier work of Henry Bernstein, poses some key questions that communities, development practitioners and researchers should be asking, which provide a helpful entry point into the reflexivity required. These are: Who owns what (or who has access to what)? Who does what? Who gets what? What do they do with it? How do social classes and groups in society and within the state interact with each other? How do changes in politics get shaped by dynamic ecologies and vice versa?.

578 development theory (Scoones, 2009). Meanwhile, globally, political will for transformative adaptation
579 action is higher than it has ever been before. Alongside commitments under the United Nations 2030
580 Agenda for Sustainable Development and the Paris Agreement, are a range of other initiatives at
581 international levels, designed to support innovation in adaptation planning and upscale adaptation
582 action, consistent with local demand and needs and through participatory mechanisms. These include
583 the ‘empowering locally led action’ track from the Global Commission on Adaptation
584 (<https://gca.org/global-commission-on-adaptation/action-tracks>), as well as the LDC Initiative for
585 Effective Adaptation and Resilience (LIFE-AR), being led by the Least Developed Countries (LDC) Group
586 (<http://www ldc-climate.org/about-us/long-term-initiatives/>), which itself recognises the need to go
587 beyond business as usual and to develop transformative strategies in adaptation planning.

588
589 Momentum created at international and national levels by these agendas should provide a positive
590 force for tackling historical and current drivers of marginalisation, for giving voice to this critical
591 agenda and for challenging intransigent political barriers to inclusive development in SALs. Delay will
592 be more costly than action now (Stern, 2007). With developing countries under pressure to prepare
593 their Nationally Determined Contributions (NDCs) ahead of the 2020 update deadline, national
594 governments have an important window of time to rethink the ways in which they have approached
595 development and adaptation in SALs to date, to clearly articulate their priorities, and to request the
596 necessary international support.

597

598

599 **Acknowledgements**

600 This perspectives article is the product of a collective effort and is based on the results of five years of
601 stakeholder-driven research carried out under the consortium for Pathways to Resilience in Semi-Arid
602 Economies (PRISE) in Senegal, Burkina Faso, Kenya, Tanzania, Ethiopia, Pakistan, Tajikistan and
603 Kyrgyzstan. Much of the empirical basis for this briefing is provided by research from across PRISE,
604 produced by the Grantham Research Institute on Climate Change and the Environment at the London
605 School of Economics and Political Science, Innovation Environnement Développement (IED) Afrique,
606 Kenya Markets Trust (KMT), Mountain Societies Research Institute (MSRI), Overseas Development
607 Institute (ODI), Sustainable Development Policy Institute (SDPI), Regional Environment Centre for
608 Central Asia (CAREC) and the University of Ouagadougou (UO). We would like to particularly
609 acknowledge the following individuals from PRISE, and from PRISE’s CARIAA research consortium
610 partner Adaptation at Scale in Semi-Arid Regions (ASSAR), who shared invaluable additional insights
611 from their research to inform this perspectives article and/or who provided valuable feedback and
612 logistical support during the design and writing process: From SDPI: Ahmed Khaver and Imran Khalid;
613 from IED Afrique: Assane Bèye, Bara Guèye and Lancelot Ehode; from ODI: Rajeshree Sisodia, Peter
614 Newbourn, Helen Mountfort and Nathalie Nathe; from the Grantham Research Institute: Judith Rees,
615 Abbie Clare, Shaikh Eskander, Patrick Curran and Swenja Surminski; from KMT: Robina Abuya and
616 Joseph Muhwanga; from the Indian Institute for Human Settlements: Chandni Singh; from the
617 University of Cape Town: Dian Spear; and from the University of East Anglia: Mark Tebboth. The
618 authors are also grateful to two anonymous reviewers for their clear and constructive feedback.

619

620

621 **Author contributions**

622 K.E.G. and F.C. led the analysis and manuscript writing. All authors contributed to the ideas and
623 discussed and reviewed the manuscript.

624

625

626 **Financial Support.**

627 This work was carried out under the Collaborative Adaptation Research Initiative in Africa and Asia
628 (CARIAA), with financial support from the UK Government’s Department for International

629 Development (DfID) and the International Development Research Centre (IDRC), Canada. Financial
 630 support from the Grantham Foundation for the Protection of the Environment, and the UK Economic
 631 and Social Research Council (ESRC) through the Centre for Climate Change Economics and Policy is
 632 also acknowledged.

633

634

635 **Conflict of interest**

636 The authors declare no conflict of interest.

637

638

639 **References**

640 Adger, W.N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D.R., Otto, L., Johanna, N.,
 641 Anita, W., 2009. Are there social limits to adaptation to climate change? *Climatic Change* 93,
 642 335–354. doi:10.1007/s10584-008-9520-z

643 Agarwal, B., 1994. *A field of ones own: Gender and land rights in South Asia*. Cambridge University
 644 Press, Cambridge, UK.

645 Agrawal, B., 2011. *Food Crises and Gender Inequality*, Working Papers 107. Department of Economic
 646 and Social Affairs, United Nations.

647 Agrawala, S., Carraro, M., Kingsmill, N., Lanzi, E., Prudent-Richard, G., 2011. *Private Sector
 648 Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks*. OECD
 649 Environment Working Paper No 39. doi:10.1787/5kg221jfk1g7-en

650 Archer, E., Dziba, L., Mulongoy, K.J., Maoela, M.A., Walters, M., 2018. *The IPBES regional assessment
 651 report on biodiversity and ecosystem services for Africa*. Secretariat of the Intergovernmental
 652 Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), Bonn, Germany.

653 Atela, J., Gannon, K.E., Crick, F., 2018. Climate change adaptation among female-led micro, small and
 654 medium enterprises in semi- arid areas: A case study from Kenya, in: Leal Filho, W. (Ed.),
 655 *Handbook of Climate Change Resilience*. Springer, Cham, pp. 1–18.
 656 doi:https://doi.org/10.1007/978-3-319-71025-9_97-1

657 Augustine, D.J., 2010. Response of native ungulates to drought in semi-arid Kenyan rangeland.
 658 *African Journal of Ecology* 48, 1009–1020. doi:10.1111/j.1365-2028.2010.01207.x

659 Averchenkova, A., Crick, F., Kocornik-Mina, A., Leck, H., Surminski, S., 2016. Multinational and large
 660 national corporations and climate adaptation: are we asking the right questions? A review of
 661 current knowledge and a new research perspective. *Wiley Interdisciplinary Reviews: Climate
 662 Change* 7, 517–536. doi:10.1002/wcc.402

663 Baten, J., de Pleijt, A., 2018. *Female autonomy generates superstars in long-term development:
 664 Evidence from 15th to 19th century Europe*, Centre for Economic Policy Research. London, UK.

665 Batool, S., Saeed, F., 2018. *Towards a climate resilient cotton value chain in Pakistan: Understanding
 666 key risks, vulnerabilities and adaptive capacities*, Pathways to Resilience in Semi-Arid
 667 Economies (PRISE) Working Paper. Overseas Development Institute, London, UK.

668 Baxter, J., Howard, A., Mills, T., Rickard, S., Macey, S., 2017. *The Extractive Industries and Society A
 669 bumpy road : Maximising the value of a resource corridor*. The Extractive Industries and Society
 670 4, 439–442.

671 Bedelian, C., Moiko, S., Said, M.Y., 2019. *Harnessing opportunities for climate-resilient economic*

- 672 development in the semi-arid lands: The Kenya Southern Rangelands Beef Value Chain.
673 Working Paper. Kenya Markets Trust.
- 674 Bedelian, C., Ogutu, J., 2017. Trade-offs for climate-resilient pastoral livelihoods in wildlife
675 conservancies in the Mara Ecosystem, Kenya: Small Grants Programme. *Pastoralism: Research,*
676 *Policy and Practice* 7. doi:10.13140/RG.2.1.3625.1127
- 677 Behnke, R., Scoones, I., Kerven, C., 1993. Range ecology at disequilibrium: new models of natural
678 variability and pastoral adaptation in African savannahs. Overseas Development
679 Institute/International Institute for Environment and Development, London, UK.
- 680 Behnke, R., Fernandez-Gimenez, M.E., Turner, M.D., Stammler, F., 2011. Pastoral migration: mobile
681 systems of livestock husbandry, in: Milner-Gulland, E.J., Fryxell, J.M., Sinclair, A.R.E. (Eds.),
682 *Animal Migration: A Synthesis*. Oxford Scholarship Online, pp. 144–171.
- 683 Behnke, R., Kerven, C., 2013. Counting the costs: Replacing pastoralism with irrigated agriculture in
684 the Awash Valley, north-eastern Ethiopia. *Climate Change Working Paper No.4*. International
685 Institute for Environment and Development (IIED), London, UK. doi:10.4324/9780203105979
- 686 Behnke, R., Muthami, D., 2011. The contribution of livestock to the Kenyan economy. IGAP LPI
687 Working Paper No.03-11. IGAD Center for Pastoral Areas & Livestock Development.
- 688 Bersaglio, B., Cleaver, F., 2018. Green Grab by Bricolage – The Institutional Workings of Community
689 Conservancies in Kenya. *Conservation and Society* 16, 467–80.
- 690 Borras, S.M., Hall, R., Scoones, I., White, B., Wolford, W., 2011. Towards a better understanding of
691 global land grabbing: An editorial introduction. *Journal of Peasant Studies* 38, 209–216.
692 doi:10.1080/03066150.2011.559005
- 693 Bulkeley, H., Newell, P., 2010. *Governing Climate Change*. Routledge, New York, NY.
- 694 Business Daily, 2018. EABL pays sorghum farmers Sh1.5bn. *Business Daily Africa* September 1st 2018
695 [https://www.businessdailyafricacom/corporate/companies/EABL-pays-sorghum-](https://www.businessdailyafricacom/corporate/companies/EABL-pays-sorghum-farmers/4003102-4738494-unmf24z/indexhtml)
696 [farmers/4003102-4738494-unmf24z/indexhtml](https://www.businessdailyafricacom/corporate/companies/EABL-pays-sorghum-farmers/4003102-4738494-unmf24z/indexhtml).
- 697 Carabine, E., Lwasa, S., Buyinza, A., Nabaasa, B., 2017. Enhancing climate change development
698 programmes in Uganda: Karamoja livestock value chain analysis for resilience in drylands, ODI
699 Working Paper. Overseas Development Institute, London, UK.
- 700 Carabine, E., Simonet, C., 2018. Value Chain Analysis for Resilience in Drylands (VC-ARID):
701 Identification of adaptation options in key sectors. VC-ARID synthesis report, Pathways to
702 Resilience in Semi-Arid Economies (PRISE) Working Paper. London, UK.
- 703 Carrington, D., 2019. Greta Thunberg: ‘We are ignoring natural climate solutions’. *The Guardian*.
704 19th September. [https://www.theguardian.com/environment/2019/sep/19/greta-thunberg-](https://www.theguardian.com/environment/2019/sep/19/greta-thunberg-we-are-ignoring-natural-climate-solutions)
705 [we-are-ignoring-natural-climate-solutions](https://www.theguardian.com/environment/2019/sep/19/greta-thunberg-we-are-ignoring-natural-climate-solutions).
- 706 Carter, S., Steynor, A., Vincent, K., Visman, E., Waagsaether, K.L., 2019. *Co-production in African
707 weather and climate services: Manual*. WISER and FCFA.
- 708 Catley, A., Lind, J., Scoones, I., 2012. *Pastoralism and Development in Africa: Dynamic change at the
709 margins*. Routledge, New York, NY.
- 710 Chambwera, M., Heal, G., Dubeux, C., Hallegatte, S., Leclerc, L., Markandya, A., McCarl, B.A.,
711 Mechler, R., Neumann, J.E., 2015. Economics of adaptation, in: *Climate Change 2014 Impacts,*

- 712 Adaptation and Vulnerability: Part A: Global and Sectoral Aspects. Contribution of Working
713 Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
714 Cambridge University Press, Cambridge, UK, pp. 945–978.
715 doi:10.1017/CBO9781107415379.022
- 716 Chaudhury, M., 2018. Conceptualizing micro, small and medium enterprise engagement in climate
717 change adaptation, in: Schaer, C., Kuruppu, N. (Eds.), *Private-Sector Action in Adaptation:
718 Perspectives on the Role of Micro, Small and Medium Size Enterprises*. UNEP DTU Partnership,
719 Copenhagen, Denmark, pp. 29–37.
- 720 Chong, J., 2014. Ecosystem-based approaches to climate change adaptation: progress and
721 challenges. *International Environmental Agreements: Politics, Law and Economics* 14, 391–405.
722 doi:10.1007/s10784-014-9242-9
- 723 Cleaver, F., 2012. *Development Through Bricolage: Rethinking Institutions for Natural Resource
724 Management, Development Through Bricolage*. Routledge, London, UK.
725 doi:10.4324/9781315094915
- 726 Cleaver, F., 1999. Paradoxes of participation: questioning participatory approaches to development.
727 *Journal of International Development* 11, 597–612.
- 728 Cleaver, F., Hamada, K., 2010. “Good” water governance and gender equity: a troubled relationship.
729 *Gender and Development* 18, 27–41.
- 730 Conway, D., Nicholls, R.J., Brown, S., Tebboth, M.G.L., Adger, W.N., Ahmad, B., Biemans, H., Crick, F.,
731 Lutz, A.F., De Campos, R.S., Said, M., Singh, C., Zaroug, M.A.H., Ludi, E., New, M., Wester, P.,
732 2019. The need for bottom-up assessments of climate risks and adaptation in climate-sensitive
733 regions. *Nature Climate Change* 9, 503–511. doi:10.1038/s41558-019-0502-0
- 734 Crawford, M., Seidel, S., 2013. *Weathering the Storm: Building Business Resilience to Climate
735 Change*. Centre for Climate and Energy Solutions, Arlington, VA.
- 736 Crick, F., Eskander, S., Fankhauser, S., Diop, M., 2018a. How do African SMEs respond to climate
737 risks? Evidence from Kenya and Senegal. *World Development* 108, 157–168.
- 738 Crick, F., Gannon, K.E., Diop, M., Sow, M., 2018b. Enabling private sector adaptation in sub-Saharan
739 Africa. *WIREs Climate Change* 9, e505.
- 740 Crick, F., Hesse, C., Orindi, V., Bonaya, M., Kiiru, J., 2019. Delivering climate finance at local level to
741 support adaptation: experiences of County Climate Change Funds in Kenya. Ada Consortium,
742 Nairobi.
- 743 Davies, J., 2018. *Barriers and Enablers to Climate Change Adaptation in North - Central Namibia.
744 ASSAR (Adaptation at Scale in Semi-Arid Regions)*.
- 745 DCF Alliance, 2019. *The Devolved Climate Finance mechanism: Principles, implementation and
746 lessons from four semi-arid countries*. The DCF Alliance.
- 747 de Jode, H., 2009. *Modern and mobile. The future of livestock production in Africa’s drylands*. IIED
748 and SOS Sahel UK, London, UK.
- 749 De Souza, K., Kituyi, E., Harvey, B., Leone, M., Murali, K.S., Ford, J.D., 2015. Vulnerability to climate
750 change in three hot spots in Africa and Asia: key issues for policy-relevant adaptation and
751 resilience-building research. *Regional Environmental Change* 15, 747–753. doi:10.1007/s10113-
752 015-0755-8

- 753 Deininger, K., Byerlee, D., 2011. Rising Global Interest in Farmland: Can It Yield Sustainable and
754 Equitable Benefits?, *Rising Global Interest in Farmland*. World Bank, Washington DC.
755 doi:10.1596/978-0-8213-8591-3
- 756 Dougherty-Choux, L., Terpstra, P., Kammila, S., Kurukulasuriya, P., 2015. Adapting from the ground
757 up. Enabling small businesses in developing countries to adapt to climate change, World
758 Resources Institute and United Nations Development Programme. Washington DC.
- 759 Dyer, J., Leventon, J., Stringer, L., Dougill, A., Syampungani, S., Nshimbi, M., Chama, F., Kafwifwi, A.,
760 2013. Partnership Models for Climate Compatible Development: Experiences from Zambia.
761 *Resources* 2, 1–25. doi:10.3390/resources2010001
- 762 Dzumbira, W., Jr, H.S.G., Geyer, H.S., 2017. Measuring the spatial economic impact of the Maputo
763 Development Corridor. *Development Southern Africa* 34, 635–651.
764 doi:10.1080/0376835X.2017.1318699
- 765 Eriksen, S.H., Nightingale, A.J., Eakin, H., 2015. Reframing adaptation : The political nature of climate
766 change adaptation. *Global Environmental Change* 35, 523–533.
767 doi:10.1016/j.gloenvcha.2015.09.014
- 768 Eskander, S., Fankhauser, S., Jha, S., Batool, S., Qaisrani, A., 2018. Do natural disasters change
769 savings and employment choices? Evidence from Pakistan., Grantham Research Institute
770 Working Paper No. 293. Grantham Research Institute on Climate Change and the Environment,
771 London School of Economics and Political Science, London, UK.
- 772 Fankhauser, S., 2016. Adaptation to Climate Change, Working Paper No. 255. Grantham Research
773 Institute on Climate Change and the Environment, London School of Economics and Political
774 Science, London, UK.
- 775 Ferguson, J., 1990. *The Anti-Politics Machine: Development, Depoliticization, and Bureaucratic
776 Power in Lesotho*. Cambridge University Press, Cambridge, UK.
- 777 Few, R., Morchain, D., Spear, D., Mensah, A., Bendapudi, R., 2017. Transformation, adaptation and
778 development: relating concepts to practice. Palgrave Communications.
779 doi:10.1057/palcomms.2017.92
- 780 Fjose, S., Grünfeld, Leo, A., Green, C., 2010. SMEs and growth in Sub-Saharan Africa: Identifying SME
781 roles and obstacles to SME growth. MENON Business Economics Publication no. 14/2010.
- 782 Galvin, K.A., Beeton, T.A., Luizza, M.W., 2018. African community-based conservation: a systematic
783 review of social and ecological outcomes. *Ecology and Society* 23. doi:10.5751/ES-10217-
784 230339
- 785 Gannon, K.E., Conway, D., Pardoe, J., Batisani, N., Ndiyoi, M., Odada, E., Olago, D., Opere, A.,
786 Kgosietsile, S., Nyambe, M., Omukuti, J., Siderius, C., 2018a. Business experience of El Niño
787 associated floods and drought in three cities in in sub-Saharan Africa. *Global Sustainability* 1.
788 doi:https://doi.org/10.1017/sus.2018.14
- 789 Gannon, K.E., Crick, F., Rouhaud, E., Conway, D., Fankhauser, S., 2018b. Supporting private
790 adaptation to climate change in semi-arid lands in developing countries. Pathways to Resilience
791 in Semi-Arid Economies Briefing. Grantham Research Institute on Climate Change and the
792 Environment, London, UK.
- 793 Hagen-Zanker, J., Postel, H., Mosler Vidal, E., 2018. Poverty, migration and the 2030 Agenda for
794 Sustainable Development, in: *Migration and the 2030 Agenda for Sustainable Development*.

- 795 Overseas Development Institute, London, UK, pp. 15–32.
- 796 Hasan, A., Raza, M., 2009. Migration and small towns in Pakistan. IIED Working Paper Series on
797 Rural-Urban Interactions and Livelihood Strategies. No. 15. International Institute for
798 Environment and Development (IIED), London, UK.
- 799 Hesse, C., 2011. Ecology, equity and economics: reframing dryland policy, iied Opinion: Lessons from
800 adaptation in practice. International Institute for Environment and Development (IIED),
801 London, UK.
- 802 Hesse, C., Anderson, S., Cotula, L., Skinner, J., Toulmin, C., 2013. Managing the boom and bust:
803 Supporting Climate Resilient Livelihoods in the Sahel, IIED Issue Paper. International Institute
804 for Environment and Development (IIED), London, UK.
- 805 Hesse, C., Macgregor, J., 2009. Arid waste? Reassessing the value of dryland pastoralism. IIED
806 Briefing. June 2009. International Institute for Environment and Development (IIED), London,
807 UK.
- 808 Hesse, C., MacGregor, J., 2006. Pastoralism: drylands' invisible asset? IIED Drylands Issue Paper No.
809 142. International Institute for Environment and Development (IIED), London, UK.
- 810 Houdret, A., 2012. The water connection: Irrigation, water grabbing and politics in southern
811 Morocco. *Water Alternatives* 5, 284–303.
- 812 Huang, J., Ji, M., Xie, Y., Wang, S., He, Y., Ran, J., 2016. Global semi-arid climate change over last 60
813 years. *Climate Dynamics* 46, 1131–1150. doi:10.1007/s00382-015-2636-8
- 814 IGAD Center for Pastoral Areas & Livestock Development (ICPALD), 2013. The Contribution of
815 Livestock to the Ethiopian Economy. IGAD Center for Pastoral Areas & Livestock Development
816 Policy Brief Series, Nairobi, Kenya.
- 817 IPCC (Intergovernmental Panel on Climate Change), 2014. Climate change 2014: Impacts, adaptation
818 and vulnerability. Part A: Global and sectoral aspects, in: Field, C.B., Barros, V.R., Dokken, D.J.,
819 Mach, K.J., Mastrandrea, M.D., Bilir, T.E., M.Chatterjee, K.L. Chatterjee, Ebi, K.L., Estrada, Y.O.,
820 Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R., White, L.L.
821 (Eds.), Contribution of Working Group II to the Fifth Assessment Report of the IPCC. Cambridge
822 University Press, Cambridge, UK.
- 823 Jenet, A., Buono, N., Lello, S. Di, Gomarasca, M., Heine, C., Mason, S., Nori, M., Saavedra, R., Van
824 Troos, K., 2016. The path to greener pastures. Pastoralism, the backbone of the world's
825 drylands. *Vétérinaires Sans Frontières International (VSF-International)*, Brussels, Belgium.
- 826 Jobbins, G., Conway, D., Fankhauser, S., Gueye, B., Liwenga, E., Ludi, E., Mitchell, T., Mountfort, H.,
827 Suleri, A., 2016. Resilience, equity and growth in semi-arid economies: a research agenda,
828 Pathways to Resilience in Semi-Arid Economies (PRISE) Working Paper. Overseas Development
829 Institute, London, UK.
- 830 Jobbins, G., Ludi, E., Calderone, M., Sisodia, R., Sarwar, M.B., 2018. 'Leaving no one behind' through
831 enabling climate-resilient economic development in dryland regions, Pathways to Resilience in
832 Semi-Arid Economies (PRISE) Policy Brief. Overseas Development Institute, London, UK.
- 833 Karki, M., Senaratna Sellamuttu, S., Okayasu, S., Suzuki, W., 2018. The IPBES regional assessment
834 report on biodiversity and ecosystem services for Asia and the Pacific. Secretariat of the
835 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES),
836 Bonn, Germany.

- 837 Kates, R.W., Travis, W.R., Wilbanks, T.J., 2012. Transformational adaptation when incremental
838 adaptations to climate change are insufficient. *Proceedings of the National Academy of*
839 *Sciences* 109, 7156–7161. doi:10.1073/pnas.1115521109
- 840 Keys, P.W., Falkenmark, M., 2018. Green water and African sustainability. *Food Security* 10, 537–
841 548. doi:10.1007/s12571-018-0790-7
- 842 Klasen, S., Lamanna, F., 2009. The Impact of Gender Inequality in Education and Employment on
843 Economic Growth: New Evidence for a Panel of Countries. *Feminist Economics* 15, 91–132.
844 doi:10.1080/13545700902893106
- 845 Krätli, S., 2015. Valuing variability: New Perspectives on climate resilient drylands development.
846 International Institute for Environment and Development (IIED), London, UK.
- 847 Krishnamurthy, P.K., 2012. Disaster-induced migration: Assessing the impact of extreme weather
848 events on livelihoods. *Environmental Hazards* 11, 96–111. doi:10.1080/17477891.2011.609879
- 849 LDC Group, 2019. Delivering our Climate-Resilient Future: Lessons from a global evidence review.
850 LDC Climate Change 2050 Vision. LIFE-AR LDC Initiative for Effective Adaptation and Resilience.
- 851 Leach, M., Mearns, R., 1996. *Lie of the Land: Challenging Received Wisdom on the African*
852 *Environment*. James Currey, Oxford, UK.
- 853 Leach, M., Mearns, R., Scoones, I., 1999. Environmental Entitlements: Dynamics and Institutions in
854 Community-Based Natural Resource Management. *World Development* 27, 225–247.
855 doi:https://doi.org/10.1016/S0305-750X(98)00141-7
- 856 Leach, M., Scoones, I., Stirling, A., 2010. *Dynamic sustainabilities: technology, environment, social*
857 *justice*. Earthscan Publications, London, UK.
- 858 Lemma, A., Jouanjean, M., Darko, E., 2015. Climate change, private sector and value chains:
859 Constraints and adaptation strategies, Pathways to Resilience in Semi-Arid Economies (PRISE)
860 Working Paper. Overseas Development Institute, London, UK.
- 861 Little, P.D., McPeak, J., Barrett, C.B., Kristjanson, P., 2008. Challenging Orthodoxies: Understanding
862 Poverty in Pastoral Areas of East Africa. *Development and Change* 39, 587–611.
863 doi:10.1111/j.1467-7660.2008.00497.x
- 864 MAER Sénégal, 2018. Feed the Future Senegal Project D'Appui aux Politiques Agricoles. Série Note
865 d'Information 004. Ministère de l'Agriculture et de l'Équipement Rural
866 [http://www.papa.gouv.sn/wp-content/uploads/2018/02/PAPA-Note-dinformation-sur-](http://www.papa.gouv.sn/wp-content/uploads/2018/02/PAPA-Note-dinformation-sur-lassurance-agricole-au-Sénégal)
867 [lassurance-agricole-au-Sénégal](http://www.papa.gouv.sn/wp-content/uploads/2018/02/PAPA-Note-dinformation-sur-lassurance-agricole-au-Sénégal).
- 868 Manuel-Navarrete, D., Pelling, M., 2015. Subjectivity and the politics of transformation in response
869 to development and environmental change. *Global Environmental Change* 35, 558–569.
- 870 Mdee, A., Harrison, E., Mdee, C., Mdee, E., Bahati, E., 2014. The politics of small-scale irrigation in
871 Tanzania: Making sense of failed expectations, Future Agriculture Working Paper. University of
872 Sussex, UK.
- 873 Mendelsohn, R., 2012. The Economics of Adaptation To Climate Change in Developing Countries.
874 *Climate Change Economics* 3, 1250006–1–21. doi:10.1142/S2010007812500066
- 875 Middleton, N., Stringer, L., Goudie, A., Thomas, D., 2011. THE FORGOTTEN BILLION: MDG
876 Achievement in the Drylands. United Nations Development Programme & United Nations

- 877 Convention to Combat Desertification, New York, NY.
- 878 Mortimore, M., 1998. *Roots in the African dust: sustaining the Sub-Saharan drylands*. Cambridge
879 University Press, Cambridge, UK.
- 880 Mortimore, M., 1989. *Adapting to drought : farmers, famines, and desertification in West Africa*.
881 Cambridge University Press, Cambridge, UK.
- 882 Mortimore, M., Adams, W., 1999. *Working the Sahel: environment and society in northern Nigeria*.
883 Routledge, London, UK.
- 884 Mortimore, M., Anderson, S., Cotula, L., Davies, J., Facer, K., Hesse, C., Morton, J., Nyangena, W.,
885 Skinner, J., Wolfangel, C., 2009. *Dryland Opportunities: A new paradigm for people, ecosystems
886 and development*. International Union for Conservation of Nature (IUCN), London, UK.
- 887 Newborne, P., Gansaonré, N.R., 2017. *Agriculture, Water, Climate and Migration in semi-arid lands
888 in Burkina Faso, Pathways to Resilience in Semi-Arid Economies (PRISE) Working Paper*.
889 London, UK.
- 890 Odhengo, P., Atela, J., Steele, P., Orindi, V., Imbali, F., 2019. *Climate Finance in Kenya: Review and
891 Future Outlook*. Discussion Paper. ADA Consortium, Nairobi, Kenya.
- 892 Opiyo, F., Wasonga, O., Nyangito, M., Schilling, J., Munang, R., 2015. *Drought Adaptation and Coping
893 Strategies Among the Turkana Pastoralists of Northern Kenya*. *International Journal of Disaster
894 Risk Science* 6, 295–309. doi:10.1007/s13753-015-0063-4
- 895 Orindi, V., Elhadi, Y., Hesse, C., 2017. *Democratising climate finance at local levels*, in: Ninan, K.N.,
896 Inoue, M. (Eds.), *Building a Climate Resilient Economy and Society: Challenges and
897 Opportunities*. Elgar, pp. 250–264. doi:https://doi.org/10.4337/9781785368455.00028
- 898 Pardoe, J., Vincent, K., Conway, D., 2018. *How do staff motivation and workplace environment affect
899 capacity of governments to adapt to climate change in developing countries?* *Environmental
900 Science and Policy* 90, 46–53. doi:10.1016/j.envsci.2018.09.020
- 901 Pauw, P., Chan, S., 2018a. *Multistakeholder partnerships for adaptation: the role of micro, small and
902 medium enterprises*, in: Schaer, C., Kuruppu, N. (Eds.), *Private-Sector Action in Adaptation:
903 Perspectives on the Role of Micro, Small and Medium Size Enterprises*. *UDP Perspectives
904 Series*, UNEP DTU Partnership, pp. 98–109.
- 905 Pauw, P., Chan, S., 2018b. *Private-sector action in adaptation: Perspectives on the role of micro,
906 small and medium size enterprises*, in: Schaer, C., Kuruppu, N. (Eds.), *Private-Sector Action in
907 Adaptation: Perspectives on the Role of Micro, Small and Medium Size Enterprises*. *UNEP DTU
908 Partnership*, Copenhagen., pp. 99–108.
- 909 Pauw, P., Pegels, A., 2013. *Private sector engagement in climate change adaptation in least
910 developed countries: an exploration*. *Climate and Development* 5, 257–267.
911 doi:10.1080/17565529.2013.826130
- 912 Pelling, M., O'Brien, K., Matyas, D., 2015. *Adaptation and transformation*. *Climatic Change* 133, 113–
913 127. doi:10.1007/s10584-014-1303-0
- 914 Qaisrani, A., Salik, K., 2018. *The road to climate resilience: migration as an adaptation strategy.*, in:
915 *Pathways to Resilience in Semi-Arid Economies (PRISE) Policy Brief*. Sustainable Development
916 Policy Institute (SDPI), Pakistan.

- 917 Qaisrani, A., Umar, M.A., Siyal, G. e A., Salik, K.M., 2018. Rural Livelihood Vulnerability and Scope of
 918 Migration as an Adaptation Strategy in Semi-Arid Pakistan, in: Pathways to Resilience in Semi-
 919 Arid Economies (PRISE) Working Paper. Sustainable Development Policy Institute (SDPI),
 920 Pakistan.
- 921 Rain, D., 1999. Eaters of the dry season: circular labor migration in the West African Sahel.
 922 Routledge, New York, NY.
- 923 Rao, N., Lawson, E.T., Raditloaneng, W.N., Solomon, D., Angula, M.N., 2017. Gendered vulnerabilities
 924 to climate change: insights from the semi-arid regions of Africa and Asia. *Climate and*
 925 *Development* 1–13. doi:10.1080/17565529.2017.1372266
- 926 Reid, H., Hicks, C., Jones, X.H., Kapos, V., Rizvi, A.R., Wicander, S., 2019a. Nature-based solutions to
 927 climate change adaptation. International Institute for Environment and Development (IIED),
 928 London, UK.
- 929 Reid, H., Jones, X.H., Porras, I., Hicks, C., Wicander, S., Seddon, N., Kapos, V., Rizvi, A.R., Roe, D.,
 930 2019b. Is ecosystem-based adaptation effective? Perceptions and lessons learned from 13
 931 project sites. International Institute for Environment and Development (IIED), London, UK.
- 932 Reid, H., Orindi, V., 2018. Ecosystem-based approaches to adaptation: strengthening the evidence
 933 and informing policy: Research results from the Supporting Counties in Kenya to Mainstream
 934 Climate Change in Development and Access Climate Finance project, Kenya. International
 935 Institute for Environment and Development (IIED), London, UK.
- 936 Ribot, J., 2011. Choice, recognition and the democracy effects of decentralisation. Working Paper
 937 N°5, Swedish International Centre for Local Democracy, Sweden.
- 938 Rodriguez, L., 2008. A Global Perspective on the Total Economic Value of Pastoralism: Global
 939 synthesis report based on six country valuations. The International Livestock research Institute
 940 / World Initiative for Sustainable Pastoralism (WISP), Nairobi, Kenya.
- 941 Saeed, F., Salik, K.M., Ishfaq, S., 2016. Climate Change and Heat Waves: Rural to Urban Migration in
 942 Pakistan. A Silent Looming Crisis. Sustainable Development Policy Institute, Islamabad,
 943 Pakistan.
- 944 Safriel, U., Adeel, Z., Niemeijer, D., Puigdefabregas, J., White, R., Lal, R., Winslow, M., Ziedler, J.,
 945 Prince, S., Archer, E., King, C., 2005. Chapter 22: Dryland systems, in: Hassan, R., Scholes, R.,
 946 Ash, N. (Eds.), *Millennium Ecosystem Assessment. Vol. 1. Ecosystems and Human Well-Being:*
 947 *Current State and Trends.* World Resources Institute, Washington, DC, pp. 623–662.
- 948 Salik, K.M., Qaisrani, A., Umar, M.A., Ali, S.M., 2017. Migration futures in Asia and Africa : economic
 949 opportunities and distributional effects – the case of Pakistan, Pathways to Resilience in Semi-
 950 Arid Economies (PRISE) Working Paper. Sustainable Development Policy Institute (SDPI),
 951 Islamabad, Pakistan.
- 952 Sandford, S., 2013. Pastoralists and irrigation in the Horn of Africa: time for a rethink?, in: Catley, A.,
 953 Lind, J., Scoones, I. (Eds.), *Pastoralism and Development in Africa: Dynamic Change at the*
 954 *Margins.* Routledge, Abingdon, Oxon, pp. 47–56.
- 955 Scheffran, J., Marmer, E., Sow, P., 2012. Migration as a contribution to resilience and innovation in
 956 climate adaptation: Social networks and co-development in Northwest Africa. *Applied*
 957 *Geography* 33, 119–127. doi:10.1016/j.apgeog.2011.10.002
- 958 Schoonhoven-Speijer, M., Ruben, R., 2015. Maintaining a sustainable livelihood: effects of Utz

- 959 Certification on market access, risk reduction and income strategies of Kenyan coffee farmers,
 960 in: Ruben, R., Hoebink, P. (Eds.), *Coffee Certification in East Africa: Impact on Farms, Families*
 961 *and Cooperatives*. Wageningen Academic Publishers, Wageningen, Holland, pp. 149–173.
 962 doi:10.3920/978-90-8686-805-6
- 963 Scoones, I., 2015. *Sustainable rural livelihoods and rural development*. Practical Action Publishing,
 964 UK.
- 965 Scoones, I., 2009. Livelihoods perspectives and rural development. *The Journal of Peasant Studies*
 966 36, 171–196. doi:10.1080/03066150902820503
- 967 Scoones, I., 1995. *Living with uncertainty: new directions in pastoral development in Africa*.
 968 Intermediate Technology Publications, London, UK.
- 969 Scoones, I., 1992. The economic value of livestock in the communal areas of southern Zimbabwe.
 970 *Agricultural Systems* 39, 339–359. doi:https://doi.org/10.1016/0308-521X(92)90074-X
- 971 Scoones, I., Wolmer, W., 2003. Introduction: Livelihoods in crisis: Challenges for rural development
 972 in Southern Africa. *IDS Bulletin* 34, 1–14. doi:10.1111/j.1759-5436.2003.tb00073.x
- 973 Scott, J.C., 1999. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have*
 974 *Failed*. Yale University Press, US.
- 975 Seddon, N., Hou-Jones, X., Pye, T., Reid, H., Roe, D., Mountain, D., Rizvi, A.R., 2016a. Ecosystem-
 976 based adaptation: a win–win formula for sustainability in a warming world? International
 977 Institute for Environment and Development (IIED), London, UK.
- 978 Seddon, N., Reid, H., Barrow, E., Hicks, C., Hou-Jones, X., Kapos, V., Rizvi, A.R., Roe, D., 2016b.
 979 Ecosystem-based approaches to adaptation: strengthening the evidence and informing policy
 980 Research overview and overarching questions. International Institute for Environment and
 981 Development (IIED), London, UK.
- 982 Selsky, J.W., Parker, B., 2005. Cross-Sector Partnerships to Address Social Issues: Challenges to
 983 Theory and Practice. *Journal of Management* 31, 849–873. doi:10.1177/0149206305279601
- 984 Soanes, M., Rai, N., Steele, P., Shakya, C., MacGregor, J., 2017. *Delivering real change: getting*
 985 *international climate finance to the local level*. IIED, London. <http://pubs.iied.org/10178IIED>.
- 986 Söderbaum, F., Taylor, I., 2001. Transmission Belt for Transnational Capital or Facilitator for
 987 Development ? Problematising the Role of the State in the Maputo Development Corridor. *The*
 988 *Journal of Modern African Studies* 39, 675–695.
- 989 Sovacool, B.K., Linnér, B.-O., Goodsite, M.E., 2015. The political economy of climate adaptation.
 990 *Nature Climate Change* 5, 616–618.
- 991 Stapleton, S.O., Nadin, R., Watson, C., Kellett, J., 2017. Climate change, migration, and displacement:
 992 The need for a risk-informed and coherent approach. Overseas Development Institute, London,
 993 UK. doi:10.1002/9781444351071
- 994 Stein, P., Hommes, M., Pinar Ardic, O., 2013. *Closing the credit gap for formal and informal micro,*
 995 *small and medium enterprises*. International Finance Corporation, Washington DC.
- 996 Stenek, V., Amado, J.-C., Greenall, D., 2013. *Enabling Environment for Private Sector Adaptation - An*
 997 *Index Assessment Framework*, International Finance Corporation. International Finance
 998 Corporation.

- 999 Stern, N., 2007. *The Economics of Climate Change: The Stern Review*. HM Treasury, Cambridge
1000 University Press, UK.
- 1001 Sward, J., Codjoe, S., 2012. *Human Mobility and Climate Change Adaptation Policy: A Review of*
1002 *Migration in National Adaptation Programmes of Action (NAPAs)*. Migrating Out of Poverty,
1003 Research Programme Consortium, Working Paper 6. UK Department for International
1004 Development, London, UK.
- 1005 Swift, J., 2003. *The global drylands imperative: pastoralism and mobility in the drylands*. UNDP
1006 Drylands Development Centre.
- 1007 Tanner, T., Allouche, J., 2011. *Towards a New Political Economy of Climate Change and*
1008 *Development*. IDS bulletin 42, 1–14.
- 1009 Thorpe, J., 2018. *Procedural Justice in Value Chains Through Public–private Partnerships*. *World*
1010 *Development* 103, 162–175. doi:10.1016/j.worlddev.2017.10.004
- 1011 Thorpe, J., Maestre, M., 2015. *Brokering Development: Enabling Factors for Public-Private-Producer*
1012 *Partnerships in Agricultural Value Chains*. International Fund for Agricultural Development,
1013 Rome, Italy.
- 1014 Tiffen, M., Mortimore, M., Gichuki, F., 1994. *More People, Less Erosion*. African Centre for
1015 Technology Studies (ACTS) Press and Overseas Development Institute (ODI), London, UK.
- 1016 Tol, R.S.J., Yohe, G.W., 2007. *The weakest link hypothesis for adaptive capacity: An empirical test*.
1017 *Global Environmental Change* 17, 218–227. doi:10.1016/j.gloenvcha.2006.08.001
- 1018 Tripathi, R., Chung, Y.B., Deering, K., Saracini, N., Willoughby, R., Wills, O., Mikhail, M., Warburton,
1019 H., Jayasinghe, D., Rafanomezana, J., Churm, M., 2012. *What Works for Women: Proven*
1020 *approaches for empowering women smallholders and achieving food security*. OXFAM,
1021 London.
- 1022 Tucker, J., Daoud, M., Oates, N., Few, R., Conway, D., Mtisi, S., Matheson, S., 2015. *Social*
1023 *vulnerability in three high-poverty climate change hot spots: What does the climate change*
1024 *literature tell us?* *Regional Environmental Change* 15, 783–800. doi:10.1007/s10113-014-0741-
1025 6
- 1026 UN News, 2019. *Actions not words: what was promised at the UN’s landmark climate summit?* 23rd
1027 September 2019. UN News. <https://news.un.org/en/story/2019/09/1047112>.
- 1028 UN WomenWatch, 2009. *Women, Gender Equality and Climate Change The Need for Gender*
1029 *Sensitive Responses to the Effects of Climate Change*. The UN Internet Gateway on Gender
1030 Equality and Empowerment of Women.
- 1031 United Nations Secretary General, 2019. *Deputy Secretary-General’s remarks at the Nature Based*
1032 *Solutions Momentum High-level Event at the UN Climate Action Summit [as prepared for*
1033 *delivery]*. 22nd September 2019. United Nations High-level Event at the UN Climate Action
1034 Summit, New York, US. [https://www.un.org/sg/en/content/dsg/statement/2019-09-
1035 22/deputy-secretary-generals-remarks-the-nature-based-solutions-momentum-high-level-
1036 event-the-un-climate-action-summit-prepared-for-delivery](https://www.un.org/sg/en/content/dsg/statement/2019-09-22/deputy-secretary-generals-remarks-the-nature-based-solutions-momentum-high-level-event-the-un-climate-action-summit-prepared-for-delivery).
- 1037 Vincent, K., Daly, M., Scannell, C., Leathes, B., 2018. *What can climate services learn from theory and*
1038 *practice of co-production?* *Climate Services* 12, 48–58. doi:10.1016/j.cliser.2018.11.001
- 1039 Wade, C., Dime, M., Tandian, A., Ehode, L., 2017. *État des lieux des liens entre migration, transferts*

- 1040 et résilience au changement climatique au Sénégal. Pathways to Resilience in Semi-Arid
1041 Economies (PRISE) Working Paper. Innovation, Environnement Développement en Afrique (IED
1042 Afrique), Dakar, Senegal.
- 1043 Waldinger, M., Fankhauser, S., 2015. Climate Change and Migration in Developing Countries:
1044 Evidence and Implications for PRISE Countries, Pathways to Resilience in Semi-Arid Economies
1045 (PRISE) Working Paper. Grantham Research Institute, London School of Economics, London, UK.
- 1046 Wedeman, N., Petruney, T., 2018. Invest in Girls and Women to Tackle Climate Change and Conserve
1047 the Environment. WomenDeliver.org.
- 1048 Weng, L., Klintuni, A., Dirks, P.H.G.M., Dixon, J., Irfansyah, M., Sayer, J.A., 2013. Mineral industries ,
1049 growth corridors and agricultural development in Africa. *Global Food Security* 2, 195–202.
- 1050 Wilkinson, E., Schipper, L., Simonet, C., Kubik, Z., 2018. Climate change, migration and the 2030
1051 Agenda for Sustainable Development, in: *Migration and the 2030 Agenda for Sustainable*
1052 *Development*. Overseas Development Institute, London, UK, pp. 201–215.
1053 doi:10.1016/j.tripleo.2005.08.041
- 1054