

1 Climate change and non-migration – exploring the role of place relations in 2 rural and coastal Bangladesh

3 Author preprint. Final version forthcoming in *Population and Environment*.

4
5 M. M. Golam Rabbani*, Department of Environment and Geography, University of York,
6 UK

7 Matthew Cotton, School of Humanities and Social Sciences, Teesside University, UK

8 Richard Friend, Department of Environment and Geography, University of York, UK

9

10 *Corresponding author. mr1260@york.ac.uk

11

12 ABSTRACT

13 Of growing research and policy interest are the experiences of people living under conditions of climate
14 change-induced environmental stress, that are either unable to migrate (sometimes described as a
15 ‘trapped population’) or are seemingly unwilling to do so (sometimes described as the ‘voluntarily
16 immobile’). This paper problematises and expands upon these binary categories: examining the
17 complex dimensionality of non-migration as a form of place relations, explored through qualitative
18 study of rural and coastal Bangladeshi communities. Through 60 semi-structured interviews of
19 individuals from four communities in the Kalapara region, the analysis proffers four qualitatively
20 derived and inter-related dimensions of voluntary and involuntary migration framed as a form of place
21 relations. These four dimensions concern: (1) livelihood opportunities, (2) place obduracy, (3) risk
22 perceptions, and (4) social-structural constraints; with the interplay between these elements explaining
23 diverse non-migratory experiences. In our analysis ‘place obduracy’ is introduced as a concept to
24 describe the differential speed of environmental change and socio-cultural adaptation responses to
25 explain non-migratory experiences. Our discussion provides insight into how to best support non-
26 migrant people’s adaptive capacity in the face of growing climate emergency.

27

28 **KEYWORDS:** Place relations, place obduracy, non-migration, climate adaptation,
29 Bangladesh.

30

31 1. Introduction – climate change, migration, and non-migration

32 Of growing concern for migration scholars and adaptation practitioners are the intensifying
33 challenges of forced migration resulting from global conflict, social unrest and environmental
34 change (UNFCCC, 2017; Owain and Maslin, 2018; Miller, 2019). The United Nations High
35 Commissioner for Refugees reports that the number of people forced to migrate worldwide has
36 almost doubled in the past decade, reaching a current estimate of 79.5m; forced migration now
37 affects more than one per cent of humanity (UNHCR, 2020; IPCC PSB AR6, 2021). With the
38 escalating threat of climate emergency, *environmental stress* factors are of growing global
39 research and policy concern. It behoves policy authorities to respond to migratory pressures
40 driven by environmental stress, including those that arise as a result of sea level rise,
41 encroaching salination, extreme weather events, temperature and precipitation changes (Hugo,
42 1996; Hunter, 2005; McLeman, 2009; Black et al., 2011; Kniveton, Smith and Wood, 2011;
43 Chen and Mueller, 2019), fire (Paton, Bürgelt and Prior, 2008), biodiversity loss, flood, and
44 disruption to ecosystem services (Vaske and Kobrin, 2001; Adams and Neil Adger, 2013;
45 Bonaiuto et al., 2016; Adie, 2020). The World Bank estimates that up to 143 million *climate*
46 *migrants* could emerge in three regions (Latin America, sub-Saharan Africa, and Southeast
47 Asia) in response to these myriad threats by 2050 (Rigaud et al., 2018). However, it must be
48 noted that it is difficult to delineate climate-related drivers of migration from other socio-

49 political and economic factors. As such, predictions and population estimates have become
50 contentious issues in debates over environmental migration (Gemenne, 2011).

51
52 Despite difficulties in establishing precise population estimates and drivers of environmental
53 migration, clearly coastal and rural communities within developing nations are at growing risk
54 of a migratory response to the climate change impacts that threaten social welfare and regional
55 economic and political security. Migration is often framed as an adaptive response to
56 environmental stress (Singh and Basu, 2020) – in essence a coping strategy to reduce mortality,
57 morbidity, and livelihood loss associated with climate change. Migration, however, receives
58 significantly more attention than *non-migration* in academic and policy circles. The so-called
59 ‘stayers’ (non-migrants) require much greater research scrutiny (Hjälml, 2013). There is an
60 emergent research agenda exploring the experiences of those that are labelled as either
61 *voluntarily immobile* (Wiegel et al., 2021) or *involuntarily immobile* in response to climate-
62 induced risks (Zickgraf, 2019; Ayeb-Karlsson, Smith and Kniveton, 2018; Mallick and
63 Schanze, 2020). The latter are often described as a ‘trapped’ population (Black and Collyer,
64 2014).

65
66 The seemingly binary categories of voluntary and involuntary non-migration belie the
67 complexity of socio-environmental and economic conditions, cultural ties, household
68 livelihood strategies and other internal and external factors that lead to non-migratory
69 responses. Non-migration is a complex area of social research, embedded within a matrix of
70 socio-cultural values, expectations and place-relations that inform individual, household and
71 community-scale migratory decisions (Wiegel et al., 2021). This matrix links migratory and
72 non-migratory decision-making with a host of related socio-cultural and physical
73 environmental factors including: cultural conditions, economic structures, livelihood
74 opportunities (Adams, 2016; Logan, Issar and Xu, 2016; Ayeb-Karlsson, Smith and Kniveton,
75 2018; Zickgraff 2019; Mallick 2019;), community histories, oral traditions (Nunn and
76 Campbell, 2020), religious and spiritual beliefs and practices, economic opportunities, family
77 ties and social responsibilities (Cohen and Sirkeci, 2011), adaptive capacity and perceptions of
78 environmental threat. Non-migration research therefore necessitates an understanding of social
79 complexity, sense-making and place-making.

80
81 In this paper, we aim to problematise and explore the experiences of non-migrants living under
82 conditions of both acute and long-term climate-induced environmental stress through
83 qualitative exploration of at-risk communities in Bangladesh. We examine the features and
84 processes of local sense-making that occur towards climate induced threats and migratory
85 opportunities (Nawrotzki and DeWaard, 2018), including locally-specific social
86 representations of nature and human-nature relations (Wiegel et al., 2021), attachments to
87 family and work (Kelman et al., 2019), and how these translate into migratory and non-
88 migratory conditions for at-risk communities (Farbotko, Stratford and Lazrus, 2016). Through
89 qualitative analysis we explore the dialectic of voluntary and involuntary non-migration
90 phenomena through the lens of *place relations* – contributing to the emerging literatures on the
91 social and economic geography of climate change adaption responses within vulnerable
92 communities.

93

94 **2. Human-place relations and migration/non-migration**

95 Much of the existing research on non-migratory decision-making falls within the discipline of
96 social psychology – exploring the push and pull factors that influence the range of social
97 choices available to migrating/non-migrating peoples. However, critics have argued that

98 reducing migration/non-migration to *decision-making* as a form of rational choice obscures the
 99 broader social-structural, cultural, aspirational, and adaptive capacity factors that influence
 100 migratory outcomes and experiences (Farbotko and McMichael, 2019; Diener and Hagen,
 101 2020). Though environmental stress is an important factor, environmental risks alone are a
 102 weak predictor of migratory responses (Massey, Axinn and Ghimire, 2010). It is the interaction
 103 between environmental conditions and issues such as land ownership, inheritance and
 104 household wealth, land use rights, the strength of social networks, ties of social capital, as well
 105 as identities of *translocality* (Sakdapolrak et al., 2016) – including mobility, circulation and
 106 spatial interconnectedness – that provide context and significance to environmental risk
 107 responses (Mallick, Rogers and Sultana, 2021).

108
 109 Environmental push factors interact with social structures and relations, and so migratory/non-
 110 migratory decisions can be understood as outcomes from complex livelihood strategies that
 111 households adopt in order to increase their coping capacity with change and uncertainty (De
 112 Haas, 2010; Logan, Issar and Xu, 2016; Maxmillan, 2016; Aniah, Kaunza-Nu-Dem and
 113 Ayembilla, 2019; Biswas and Mallick, 2020). Multiple environmental factors influence this
 114 capacity (Rustad, Rosvold and Buhaug, 2019; Jackson, McNamara and Witt, 2020), but the
 115 deeper dynamics between concurrent environmental, economic, demographic, political, and
 116 social changes are necessarily place-based, temporal and interactive (De Haas, 2014; Jahan,
 117 Mamun-ur-Rashid and Wahab, 2015; Hoogendoorn, Sütterlin and Siegrist, 2020). Place and
 118 place-making are therefore essential socio-material conditions of migratory/non-migratory
 119 outcomes (Brehm, Eisenhauer and Stedman, 2013; Simoni and Floress, 2015).

120
 121 Place and place-making appear across multiple academic literatures. There are five primary
 122 concepts discussed in the literatures of geography, environmental psychology, urban studies
 123 and sociology that encompass individual and community relations with place. We summarise
 124 the key concepts here as:

- 125 1. *Place dependence* - the functional provision of particular resources that support human
 126 activities (Williams and Vaske, 2003).
- 127 2. *Place attachment* – a psychological process (Vaske and Kobrin, 2001; Devine-Wright,
 128 2013; De Dominicis et al., 2015; Adams, 2016) that posits an emotional place-bond
 129 between individuals and their environment (Tuan, 1974; Adie, 2020).
- 130 3. *Place identity* – an affective counterpart to place dependence, through which sentiments
 131 around self-identification are formed (Farnum, Hall and Kruger, 2005).
- 132 4. *Place utility* (Baker, 1982; Adams and Neil Adger, 2013) which in a migration context
 133 focuses on satisfaction/dissatisfaction as a component of migration decision-making
 134 processes (Baker, 1982; Haer et al., 2017).
- 135 5. *Sense of place* (Tapsuwan, Leviston and Tucker, 2011) is a spatial and subjective
 136 phenomenon that encompasses the emotional and spiritual aspects of human-place
 137 relations. This sense of place evolves over time (Nicolosi and Corbett, 2018).

138 In this paper we also posit a novel sixth component of place relations – *place obduracy* – to
 139 describe the conditions under which the rate and scale of sociocultural and socioeconomic
 140 change lags behind concurrent changes in environmental conditions. We explain place
 141 obduracy as a type of maladaptation, in which local place relations create a barrier to migration,
 142 and as such, increase the associated risks to people experiencing environmental stress. The
 143 *place obduracy* concept is a new theoretical framework for studying non-migration emerging
 144 from our qualitative data analysis and is thus discussed in greater detail in section 6 below.

145

146 From a research perspective, we embrace holistic, inclusive, and intersectional understandings
147 of the relationship between place, capacity and aspiration (Nicolosi and Corbett, 2018) that cut
148 across the six conceptual categories mentioned above. Thus, we use the terminology of *place*
149 *relations* throughout. *Place relations* conceptually embodies a multidimensional approach:
150 accommodating a range of both voluntary and non-voluntary relationships, including
151 attachments, cultural barriers and resource constraints (Adams, 2016). Place relations form the
152 primary conceptual framework within this paper and our empirical study uses this framework
153 to synthesise new insight into the combination of environmental, social, economic,
154 psychological and place-based components of non-migratory decision-making under
155 conditions of escalating environmental risks from climate change (Staller, 2008; Ardoin, Schuh
156 and Gould, 2012; O'Donnell, 2019). In doing so, we draw upon qualitative community
157 stakeholder interviews in the critical case of rural and coastal Bangladesh, as residents of this
158 country experience both acute and chronic climatic change-induced environmental stress, and
159 complex community adaptive and migratory/non-migratory responses.

160

161 **3. Country background – environmental migration and non-migration in Bangladesh**

162 Over the last decade, Bangladesh has undergone substantial economic and structural
163 development. Exports of ready-made garments, remittances, and agricultural produce,
164 alongside digital technology growth (including internet access and mobile banking) have
165 accelerated Bangladeshi citizen access to financial markets and global investment
166 (Khatun, Mitra and Sarker, 2021). Though the national picture shows a positive story of
167 economic modernisation and growth, this is unevenly geographically distributed. For primarily
168 rural and coastal climate-vulnerable regions and communities, current and future disaster
169 impacts severely reduce economic potential, and this perpetuates a vicious cycle of poverty
170 (Monirul Alam et al., 2017; Rigaud et al., 2018; Matin, Forrester and Ensor, 2018).

171

172 The differential economic and environmental risk experiences of urban and rural/coastal
173 Bangladeshi peoples, make the country a critical case of early observable evidence of forced
174 climate-induced migration and non-migration (Kelman, 2018). The risks of river and coastal
175 erosion, repeatedly inundated homes and farmlands, food scarcity, and economic and non-
176 economic losses create an urgent environmental and development crisis. It is estimated that
177 80% of farmers reported that crop and livestock production are suffering from unseasonable
178 rain, limited availability of surface water, and depletion of groundwater (Aryal et al., 2020).
179 Summer temperatures are also rising above levels for productive rice cultivation (Ministry of
180 Foreign Affairs of the Netherlands, 2018; Mojid, 2020). Collectively, these changes will
181 negatively impact agricultural GDP by an estimated 3.1% each year (World Bank, 2010),
182 threatening the food security of subsistence farmers most keenly. Coastal fisheries in
183 Bangladesh are also affected (Khanam, 2017; Rahman et al., 2020). Low-lying lands in the
184 tidal flood-prone regions are becoming increasingly saline, forcing the disappearance of native
185 fish species (Miah et al., 2020), alongside growing vulnerability of aquaculture infrastructure.

186

187 The potential adaptive responses to climate impacts from farmers and coastal fishers in the Bay
188 of Bengal are further stymied by other pollution factors and inadequate resource management
189 (Habib, Ullah and Duy, 2014). These collective factors lead to estimated economic losses of
190 1.7 billion USD by 2050 (Das et al., 2020). For fishers, staying longer onshore due to the
191 increased frequency and magnitudes of extreme weather events reduces their earning capacity
192 and increases reliance upon local money lenders (Uddin et al., 2019), compounding the
193 financial vulnerability of small-scale food producers while deepening their dependence on

194 exploitative patron-client relations (Wood, 2003). Disaster-affected farmers and fishers move
195 towards non-farm employment as a coping strategy to tackle short-term reductions in total
196 household income (Eskander, Fankhauser and Jha, 2016). Non-farm livelihoods in the context
197 of coastal Bangladesh are small enterprises such as corner shops, pop-up stalls, and carts in the
198 coastal markets, or for those with no other viable assets, selling labour in the form of pulling
199 vans, driving rickshaws, and bike-cabbing. Though changes in livelihood strategy locally
200 provide a short-term solution to environmental stress-induced vulnerability, factors such as
201 coastal erosion force markets to move further inland, and storm surges demolish road and retail
202 infrastructure for long periods. Moving merchandise to safety during cyclones is therefore a
203 challenge for entrepreneurs. These short-term changes in livelihood strategy are therefore
204 unlikely to reduce long-term climate vulnerability. Sadly, multi-hazard maps for coastal
205 Bangladesh warn that the existing vulnerabilities of coastal communities are likely to increase
206 by 2050 and beyond (Jahan, Kabir and Chowdhury, 2016; Ministry of Foreign Affairs of the
207 Netherlands, 2018; Kirezci et al., 2020). These growing challenges to the life and livelihoods
208 of coastal Bangladeshis have direct impacts on human-place relationships. Many regions of
209 Bangladesh have become critical case studies for understanding migratory and non-migratory
210 responses under environmental, economic, and social stress; and such case studies have
211 additional global significance for similarly climate vulnerable parts of the world where local
212 economies are dominated by small-scale farming and fishing livelihoods.

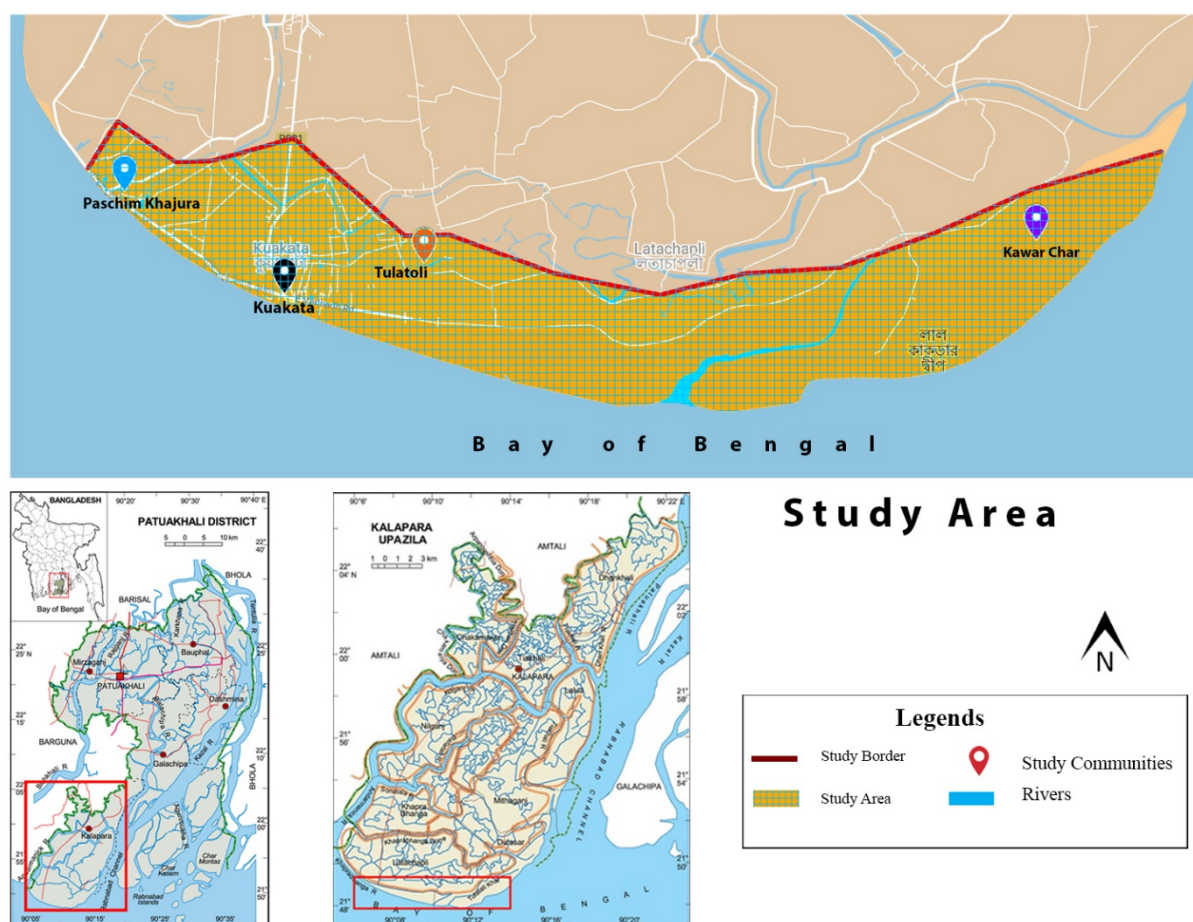
213

214 **4. Case study - Kalapara region**

215 In exploring migratory and non-migratory conditions in Bangladesh, our empirical study uses
216 a place-based strategy for participant sampling, examining individuals' experiences and
217 responses to environmental stress, migratory and livelihood decisions through qualitative
218 interviews with 60 participants in the sub-district (Upazila) coastal town, Kalapara, in
219 Bangladesh, as shown in figure 1.

220

221

222 **Figure 1: Study site in Kalapara, Patuakhali, Bangladesh**

223

224

225 Kalapara Upazila was selected as a case region due to its diverse coastal economy, including
 226 farming paddy, fishing, and tourism-based businesses; combined with growing environmental
 227 stress related to cyclones, storm surges, fluvial-tide flooding, coastal erosion, and encroaching
 228 salinity (Ahamed, Rahman and Faisal, 2012; CEGIS and GoB, 2013; Hasan and Akter, 2019).
 229 Recent regional evaluation also shows the growing number of environmentally-induced
 230 displaced people living there (Shamsuddoha et al., 2012; Bernzen, Jenkins and Braun, 2019).
 231 Together, these factors make Kalapara a place of research importance for environmental
 232 migration/non-migration conditions and experiences.

233

234 Geographically, the region lies approximately 200 miles south of Dhaka and includes Kuakata
 235 – a long sandy beach along the Bay of Bengal. The 2011 Bangladesh census shows Kalapara
 236 has 31,324 households and a population of 174,921. Four communities were selected across
 237 the coastal area to provide a sample of 60 interviewees with backgrounds across a range of
 238 livelihood sources (farming, fishing, and small businesses - see table 1).

239

240 **Table 1: Community sites, participant numbers and dominant livelihoods**

241

Community Name	Number of Participants	Major Livelihood Sources
Paschim Khajura	3 couples, 10 males, and 1 female	Fishermen and Farmers
Tulatoli	4 couples, 9 males and 3 females	Farmers and Daily Labourers
Kavar Char	2 couples, 10 males and 3 females	Fishermen and Farmers

Kuakata	15 males	Businessmen and Farmers
----------------	----------	-------------------------

242

243 **5. Methods**

244 The researchers used in-depth semi-structured interviews to explore local experiences of
 245 disaster impacts, the socio-environmental context of their work and home life, and their
 246 decision-making regarding migration and non-migration from and within the region. Attention
 247 was paid to those with locally-situated livelihoods so that shared experiences (such as from the
 248 impacts of the same extreme weather events) could be captured across the interviews (Adeola,
 249 2007). However, it is important to note that though extreme weather events affect the whole
 250 community, not all participants across each livelihood category experience these events in the
 251 same way; each has a different adaptive capacity in the face of such threats (Fischer and
 252 Chhatre, 2016). Adaptive capacity also differs across ethnic and religious groups (Sen et al.,
 253 2020), and so local diversity was taken into account, including respondents from minority
 254 Rakhine communities.

255

256 Within the non-random sample we aimed to recruit decision-makers across low, medium, and
 257 high-income households, with respondents represented in each livelihood category. We note
 258 that decision-making at the household scale is dominated by wage-earners. This created a
 259 problem of gatekeeping, one that inevitably skews our respondent sample towards the
 260 perspectives of male wage-earners. Specific efforts were made to include women in the
 261 interview process, though cultural barriers concerning household role and interaction with male
 262 interviewers limited women's participation. The study tried to include all decision-makers of a
 263 household interviewed together whenever possible to optimise data quality, as adaptive
 264 decisions are usually joint efforts of the members in a household. As such we discuss the
 265 findings at the scale of the household, though interviews were with individual respondents
 266 (Hossain et al., 2017).

267

268 All interviews were recorded in the respondents' home. No incentives were offered. Written
 269 consent was obtained. Interviews were conducted in Bangla and were recorded audio-visually.
 270 Bangla transcripts were translated into English. The lead author is a bilingual speaker. English
 271 transcriptions were coded using computer-aided qualitative data analysis software NVivo™
 272 using thematic analysis whereby a coding framework was established to capture relational and
 273 expressive values through a sequential process of description, interpretation, and explanation
 274 of qualitative data. This process established a multi-level framework of coding – from top-level
 275 thematic coding to establish the context and production processes of broader themes,
 276 subsequently followed by a more detailed examination of utterances to better understand the
 277 psychological, socio-cultural and political-economic context and to produce an interpretive
 278 framework (Baxter and Eyles, 1997; Braun and Clarke, 2006). Emergent themes form a four-
 279 part top-level coding framework used to structure the results below, each representing a
 280 dimension of human-place relationships built through the interpretive analysis of coded
 281 utterances.

282

283 **6. Results**

284 Through inductive qualitative analysis we identify four themes across a continuum of place
 285 relations dialectically linking issues of structure and agency, migratory and non-migratory
 286 conditions (Chouinard, 1997) discussed below:

287

1. Livelihood opportunities

288

2. Place obduracy

- 289 3. Risk perceptions
 290 4. Social-structural constraints
 291

292 **6.1 Livelihood opportunities**

293 Livelihood opportunities are understandably the primary socio-economic context within which
 294 place-relations are defined, with most participants volunteering this as a principal factor in their
 295 utterances. At the time of data collection (pre-Covid-19 pandemic, early 2020), the significant
 296 livelihood opportunities available locally were farming, coastal fishing, small businesses, and
 297 informal employment/day labouring. Livelihood opportunities were increasing at the point of
 298 data collection due to government support for transforming Kuakata into a tourist attraction.
 299 Most new opportunities were in the hospitality industry: either working in hotels, as tourist
 300 guides, or bike cabbng. However, it must be noted that we would expect livelihood
 301 diversification strategies that rely upon tourism to be adversely impacted by Covid-19 in the
 302 short-medium term (Islam, 2021).

303
 304 Smallholder and subsistence farmers' perspectives differ from those of lease-taking farmers of
 305 small holdings and day labourers on larger farms. Subsistence farmers have a smaller asset-
 306 base and usually insufficient savings or ties of indebtedness to relocate. Landless farmers are
 307 arguably the most vulnerable, given their limited asset base and most of their skills are specific
 308 to farm-labour. Land-owning farmers with sufficient capital or access to credit to invest
 309 reported tend towards agricultural diversification – either saline tolerant rice, crops resistant to
 310 extreme weather events, higher value crops such as mango and coconut, and cattle/poultry
 311 farming. Some also consider fishing as a viable option depending on their skills, asset base and
 312 social networks. For example, one male interviewee identifies as a middle-class farmer and
 313 fisherman in Kawar Char. His family of eight members has three working members.
 314 Collectively, the family has repeated experience of crop-loss, as he states:

315
 316 *“The embankment collapses easily and floods the farmland. This island is full of*
 317 *farmers. If they can't make enough money from farming, then it is a big problem. People*
 318 *go fishing, but it does not make enough. But if farming goes well, people can make a*
 319 *good profit.”*

320
 321 As shown by this utterance, the *potential* for profit remains a decisive motivating factor – given
 322 that crop loss is not limited to one specific region, agricultural vulnerability from specific
 323 weather events is insufficient to force migration for subsistence farmers. As with farming, boat-
 324 owners and day labourers have very different livelihood strategies. Within our study, most of
 325 the day-labourer fishers live in government-built huts along the coast or their ancestral land.
 326 Some also owned small patches of farming lands where rice and vegetables are grown, and
 327 others owned hens, goats, and cows. However, most household income stems from fishing
 328 labour. Most fishing opportunities go to physically fit men, with very few opportunities for
 329 women. Traditionally, women work as homemakers, or less commonly as day-labourers drying
 330 fish or farm-working. A male coastal fisher who self-identifies as lower-middle-class, explains
 331 that for day-labourers there is increasing diversification of livelihood types and that flexibility
 332 under conditions of uncertainty is essential, stating:

333
 334 *“When it [catch] was low, the fishermen had to work outside. For example, they had to*
 335 *work as labourers, harvesting crops on others' lands, pottery, whatever skills they had.*
 336 *Whatever work they found, they did to carry on. Recently, as the catch has gone up, we*
 337 *are better now. Here is good for living. Because the demand for fish in here is high,*

338 *people here can also do other things, for example, farming, business, etc... The*
 339 *availability of different [livelihoods] helps me to keep going.”*
 340

341 This utterance describes new income-opportunities and limited local economic market
 342 diversification, enhancing livelihood outcomes and contributing to improved adaptive capacity
 343 manifested as better economic wellbeing (Kelly and Adger, 2000; Peña-Lévano, Taheripour
 344 and Tyner, 2019). But it also indicates the dependence on labour markets over which they have
 345 very little influence. Livelihood opportunity is geographically rooted for vulnerable
 346 households. For example, certain livelihood activities' skills and experience influence people
 347 to carry on living in the same location despite environmental risks. Another male coastal fisher
 348 states:

349
 350 *“This is our fishing place. I was born here. Where else would I go? What will I do*
 351 *there? I am good at fishing. I know where to get more fish around the coasts of Kuakata.*
 352 *You don't get fish everywhere in the sea.”*
 353

354 Livelihood opportunities for small business owners are also a vital dimension of place relations.
 355 Around a quarter of interview participants owned small businesses, usually small shops on the
 356 coasts on the seaward side of the embankment. These shops are highly vulnerable to storm
 357 surges, erosion, and sea-level rise. One respondent owns a small souvenir shop in the coastal
 358 market that is his only source of income. He described his livelihood opportunities and
 359 environmental risks as:

360
 361 *“My souvenir shop is only good in the tourist's places. And most tourist places are on*
 362 *the coasts. So, the risks are everywhere.”*
 363

364 More than half of the participants reported multiple sources of income. Recent economic
 365 development initiatives have expanded employment opportunities for local communities. Some
 366 had started working for construction companies who used to be working in farming, fishing,
 367 or as day-labourers before. Tourism-based self-employment, i.e., bike cabbage, photography,
 368 selling street-foods, have further diversified income streams. These new opportunities are a
 369 decisive motivating factor in explaining the conditions of non-migration. The perceived
 370 threshold of environmental risk is not yet high enough for most participants to ignore these
 371 livelihood opportunities available, even though those risks are rapidly increasing in severity
 372 and frequency in the case study location.

373

374 **6.2 Place Obduracy**

375 The place relations that root people within local economic opportunities, known social and
 376 environmental risks are complex and multidimensional. Despite many suffering from insecure
 377 livelihoods and exposure to health and safety risks from extreme weather events, the socio-
 378 psychological bonds with which respondents create a sense of place (of where they are born,
 379 grow up, work, and live) is a powerful rooting factor. To explain these relationships we draw
 380 upon the aforementioned components of sense of place, place dependence, place identity, and
 381 place attachment (Mulaney, Merrill and Mazzotta, 2020), while adding *place obduracy* as
 382 another key dimension of place relations, based upon emergent perspectives from interviewees
 383 (as described below).

384

385 Despite the experience of having lost crops, farmlands, livestock, and sadly even members of
 386 the family due to extreme weather events, place identities, dependencies, and attachments
 387 remain strong. Place identity refers to the psycho-social bonds that link an individual to their

388 community. Locality, culture, language, memory, and kinship harmonize to create a sense of
 389 home, one that links familial bonds and intensifies the sense of community as an established
 390 'in-group'; and this stretches across social classes and income levels. For example, a self-
 391 identified middle-class Rakhine farmer has multiple small patches of farmlands, a family of
 392 five members, and lives in Dariaramkhola Para. The household has multiple experiences of
 393 crop loss due to flooding and cyclones. Yet he explains the emotional bonds with the place he
 394 lives alongside recognition of limited livelihood opportunities elsewhere:

395

396 *"Where would I go leaving this place? I was born and grew up here. My ancestors have*
 397 *lived here. If we go somewhere, it won't be any easier for us."*

398

399 A farmer respondent built his hut on a patch of land allocated by the local government in Kawar
 400 Char. He and his son work as day-laborers in between fishing and selling fish products in the
 401 local market. He describes his household as poor and expresses his experience of
 402 environmental conditions: "[there are] *no limits to disasters here*". However, he identifies the
 403 place where he lives accordingly:

404

405 *"We leave our homes during disasters and go to the cyclone shelter. When the disaster*
 406 *is gone, we come back home and start all over again ... Brother, we cannot go far. Who*
 407 *is going to look after my children? Where will we go? My birthplace is here. My father*
 408 *and my grandfather were born here."*

409

410 The psycho-social and cultural ties to place, such as family history and ancestral memory, blend
 411 together with recognition of livelihood constraints and practical considerations, such as
 412 childcare, material constraints such as land or homeownership and renting, schooling, and
 413 caring responsibilities. Notably, these two elements are discussed in concert with one another.
 414 For example, a fisherman living in Abasan, the government-built shelter in Khajura describes
 415 his dependency as:

416

417 *"Because we don't have any land, either to farm or to live. We could not send our*
 418 *children to school. I have always been poor. The only work I have learnt is fishing. We*
 419 *all are fishermen here."*

420

421 It is in this way that place-identity from cultural ties links to place dependence from the material
 422 constraints that trap the poorest people into routines of low paid work and (in this case
 423 subsidized) housing, which in turn, then embeds families within social networks that are place-
 424 based and relatively static. Even when new places provide features and conditions that support
 425 specific economic goals, i.e., fertile farmlands, availability of fish in the sea, demand for labor
 426 etc., these are insufficient to disrupt the sense of place attachment felt by respondents.

427

428 We find that when a place's physical characteristics change rapidly under evolving
 429 environmental conditions (making a place unsafe), the relationship between place identity,
 430 dependence, and attachment does not change at the same speed. The sense of place persists
 431 within the community imagination even when the nature of that place changes rapidly due to
 432 environmental stress. We describe this phenomenon as *place obduracy*, related to livelihood
 433 opportunities that rapidly encroach upon communities due to climate change are not met with
 434 social adaptations to reduce vulnerability. In a similar manner to *sociotechnical obduracy*
 435 discussed in other fields of urban geography (Hommels, 2005; Cresswell and Hoskins, 2008),
 436 place obduracy describes the conditions under which human place-relations adapt too slowly

437 to meet the (new and emerging) needs and circumstances of a community. Place obduracy
 438 establishes a non-migratory decision-context. In this context, participants who experience place
 439 obduracy will commonly have a specific skill set, such as extensive fishing experience, but
 440 little formal school education or support to adapt through alternative skill training. We found
 441 that it is difficult for many respondents to think about picking up new skills or moving away
 442 to an environmentally ‘safer’ region. However, the relationship between skills, economic
 443 opportunity, livelihood strategy, and migration differs across class boundaries. Indeed, for the
 444 lowest paid respondents with the least material assets (particularly land, property, and capital)
 445 there is a more substantial degree of labour migration because this has become a feature of their
 446 household livelihood strategies due to their limited asset base. One respondent, a day labourer
 447 with no farmland, living in the ancestral home with three members describes how he works
 448 someone else’s farmlands or goes fishing in someone else’s boat, however he states:

449
 450 *“I want to live here with my family. If I want to leave, I probably can. However, I do*
 451 *not want to leave.”*

452
 453 There is evidence here of a perceived capacity to adapt the livelihood strategy through
 454 migration, but the non-migratory decision is bound up in respondents' place-identity.
 455 Respondents imagine themselves as coastal or rural people with corresponding locally
 456 embedded skills, cultural practices, and preferences. Place identity for people of rural
 457 Bangladesh is unique from their urban counterparts, and this identity remains stable across
 458 class and income boundaries. Therefore, we can explain place obduracy as a position in which
 459 the environmental risk threat has not yet exceeded a threshold or tipping point to trigger a
 460 migratory response – the sense of place and livelihood constraints that respondents experience,
 461 continues to anchor them to specific geographic spaces and communities, even when the threat
 462 to life, wellbeing and livelihood from environmental risk is growing over time. It is self-
 463 reflection and growing awareness of imminent risks – the sense of uncertainty and unease
 464 regarding livelihood futures, and the need for diversification strategies through new skills and
 465 income opportunities – that reveal early signs of disruption to place obduracy, and hence a
 466 motivation for migration either now or in the future.

467

468 **6.3 Risk perceptions**

469 Interviewees in Kalapara experienced multiple and overlapping environmental hazards:
 470 including cyclones, storm surges, salinity intrusion and coastal erosion. However, there
 471 remains a stark difference between scientific assessment of regional risk factors and the
 472 expressed perception of these risks by interviewees. Direct experience of hazards is not a clear
 473 indicator of a strong desire to migrate. For some, the thought of migration has not consciously
 474 entered their decision-making. Instead, they are familiar with coping with disasters; for
 475 example, by taking safe shelter and then returning when the cyclone subsides, and the flood
 476 waters recede. Responses to environmental hazards are mediated through the *nature* of the risk
 477 (Lechowska, (2018) and its *influences* (Satter, 2019). It is a combination of the physical and
 478 emotional experience of these two factors that play an essential role in the formation of risk
 479 perceptions (Bronfman et al., 2020). However, this process is complex and differentially
 480 distributed across age, gender, community status, education, household demographics, and
 481 class structures (Lee, 1966; Clar, 2019). The intersection of risk perception and migratory
 482 decision-making is not as straightforward as a push or pull mechanism. For example, a female
 483 shopkeeper in Kuakata and farmer near Tolatuli describes her aspiration towards migration as:

484

485 *Yes, [laughs]. When storm hits, crops get damaged, then I think of leaving. When the*
 486 *disasters is over, then... [she laughs again, implying a change of mind]*

487
 488 The reasons for the exclusion of migration as an adaptation response are explained by two
 489 principal mediating factors – on the one hand, familiarity, and normalisation of the landscape
 490 of risk, on the other, the perception of risk management responsibility. Also of note here is the
 491 use of humour to normalise and diminish the sense of risk (Parkhill et al., 2011).

492
 493 One participant, a male subsistence farmer and fisher described the risks to his farm and house
 494 as:

495 *“If Allah wants to keep someone alive, who can kill! He has created us. He is the one*
 496 *who will look after us. This is why we stay here, confidently. The environment is good*
 497 *here. I haven’t thought of going anywhere. Rich people think of buying land in safer*
 498 *places, not people like us.”*

499
 500 We see that religious beliefs, ethical norms, value systems, and specific socio-cultural
 501 structures and institutions influence risk perception (Renn and Rohrman, 2000; Lee et al.,
 502 2015). Interviewees commonly expressed risks in fatalistic ways, drawing on religious
 503 convictions – with utterances that display an acceptance of hardship as part of the human
 504 condition (Jahan, Mamun-ur-Rashid and Wahab, 2015). Another male small business owner
 505 who has farmlands from Kuakata bazaar and self-identifies as poor, similarly states:

506
 507 *“Yes, we want to raise her [daughter] here because this is her ancestral land too. The*
 508 *rest is the Will of Allah. If the government can keep the embankment secure, everybody*
 509 *here will be able to live peacefully.”*

510
 511 These statements speak to *fatalistic* responses to risk management, to use the terminology of
 512 ‘grid-group’ theory (Douglas and Wildavsky, 1982; Spickard, 1989), familiar to social contexts
 513 in which religious belief mediates local place-based knowledge and experience (Jahan,
 514 Mamun-ur-Rashid and Wahab, 2015). A supernatural explanation of control over seemingly
 515 external hazards such as cyclones or other life-threatening or livelihood-disrupting events is a
 516 means to cognitively resolve the sense of powerlessness felt in the face of harm and conversely
 517 strengthen the sense of personal agency. What is novel here is the introduction of a social class
 518 element – that hierarchical and egalitarian risk responses are blended with the fatalistic
 519 description – safety through migration is for the rich, and safety through religious observance
 520 is for the poor. Yet as the second statement shows, this is mixed with a concern that the
 521 Bangladeshi government must step in to protect the vulnerable through hard infrastructure risk
 522 mitigation responses. Aspirations towards migration are therefore grounded and contextualised
 523 in broader webs of religion, class, income, and trust-in-government relationships. Risk
 524 management at the household level is not a simple matter of moving away from the site of risk
 525 to protect personal safety or property. There is little sense of *personal* agency primarily due to
 526 these other cognitive, sociocultural, and structural-material factors that disempower the
 527 individual to act in the face of climate risk. As one fisher describes:

528
 529 *“I went four years back. I used to drive in Dhaka. My mother died, and I had to come*
 530 *back. I used to earn a lot but could not save. I thought I would stay with my father and*
 531 *give him a hand. I have a fishing boat and net too.”*

532
 533 The quote illustrates the social context of the male-dominated household in which men are
 534 expected to be primary income providers. The gendered work structure entrenches specific

535 livelihood strategies in rural Bangladesh. In this case the quoted male interviewee is solely
 536 responsible for family income. Economic opportunity stimulates rural-to-urban migration
 537 though the relatively higher cost of urban living outweighs any financial security benefit gained
 538 from employment. Changes in family and life circumstances (such as bereavement) disrupt this
 539 fragile livelihood strategy. Migratory decision-making is balanced against a combination of
 540 personal, familial network ties and environmental risks from fishing and farming. Thus, even
 541 when migration is experienced, it is not the primary or dominant adaptation response given the
 542 place and community-focused loci of decision-making that respondents experienced.

543

544 **6.4 Social-structural constraints**

545 As our interviewees express, environmental migration (Foresight, 2011; Logan, Issar and Xu,
 546 2016; Ayeb-Karlsson, Smith and Kniveton, 2018) in response to temperature change or
 547 changes in the disaster profile of a place – are insufficient to explain migratory adaptation
 548 responses. Under conditions of extreme deprivation, migration is constrained by the lack of
 549 multiple capitals (including financial and social) necessary to relocate (Zickgraf, 2019). We
 550 assess these elements as forms of social-structural constraint (Bakewell, 2010) that limit the
 551 decision-making capacity of the individual or household. We find that, contrary to expectation,
 552 social-structural and material constraints to migration do not always correspond directly with
 553 financial poverty. Multidimensional economic, social, political, and personal health factors,
 554 directly and indirectly influenced by slow and fast onset environmental drivers, all play a role.
 555 Though we make no claims to demographic proportional representation in the interview
 556 sample, it is nonetheless interesting to note that less than one-third of participants mentioned
 557 that they intended to migrate but could not do so due to one or more external constraining
 558 factors. Through thematic analysis, we break down social-structural constraints into four sub-
 559 thematic categories of emergent utterances concerning: *insufficient means*, *socio-demographic*
 560 *constraints*, *poor governance*, and *geographical constraints*, which leads to what is often
 561 described as the ‘trapped population’ problem– where people want to leave but lack the agency
 562 or capacity to do so.

563

564 Respondents commonly discuss the condition of insufficient means. For example, a male
 565 souvenir shopkeeper at the coast of Kauata Bazar self-describes himself as poor and has four
 566 other household members. When a cyclone hits the region, it is weeks before he can reopen his
 567 shop, meaning that he has considered migrating away from the area. However, a lack of
 568 financial assets provides a critical barrier to migration. He states:

569

570 *“I have to have money to think that way [moving to a safer place]. I can’t afford that.*
 571 *So, I keep that aspiration [of migration] in me.”*

572

573 As climate change exacerbates the frequency and severity of extreme weather events, coastal
 574 livelihoods become untenable due to the prolonged periods of closure and economic inactivity
 575 that result. Where respondents have small or unstable social networks there is little recourse to
 576 formal livelihood support systems (such as bank loans or government grants). This leads to
 577 reliance upon local money lenders that are often private business owners. For example,
 578 participants mentioned boat owners that set out loans in exchange for an agreement to work in
 579 fishing. Debt then creates indentured servitude, severely limiting their agency in many aspects
 580 of social life, including migratory decision-making and the effective marketing of personal
 581 skills (the indentured personal may not have fishing skills, for example), in a “Faustian
 582 Bargain” (Wood, 2003).

583

584 The conditional constraint of insufficient means works across familial networks. The case of a
 585 father of three sons who does not work regularly anymore illustrates the following point. His
 586 sons work as a tailor, labourer, and priest in a local mosque in Kolatoli respectively. They
 587 consider themselves poor. The father had an aspiration to send one of his sons to work abroad
 588 to send remittances home. However, he never had enough money to diversify their existing
 589 livelihoods. He describes the phenomenon as:

590

591 *“I have already grown old. But my sons and I, we are in a combined family. My son is*
 592 *a priest here in Kuakata. What will he do outside? Migration needs money. We don’t*
 593 *have that money.”*

594

595 Age, gender, and disability in at-risk households can reduce their respective coping capacities,
 596 simultaneously creating place-based constraints. The means and agency to migrate are thus
 597 linked to socio-demographic constraints, specifically those relating to financial and social
 598 capital and the flexibility and stability of social and knowledge networks. To illustrate: a day
 599 labourer respondent has a family of four members in Kolatoli. He explains the social context
 600 uncertainties that he faces:

601

602 *“Let’s say I go somewhere new. I am not known to anybody there. I will have to work*
 603 *to live there. It’s not like that that I go somewhere, buy a business. On the other hand,*
 604 *everybody knows me since I was a child. Everybody calls me if they need someone to*
 605 *work.”*

606

607 Familiarity, networks of association, and bonding capital create conditions of livelihood
 608 stability. The expressed concern for a lack of social networks in other places then becomes a
 609 barrier to regional outmigration. In Bangladesh, place-based social capital is a significant factor
 610 in employment in both rural and urban areas. Those with substantial social capital across a
 611 place-based network use this to build resilience (Matin, Forrester and Ensor, 2018).

612

613 The capacity to migrate is not just a matter of financial assets but how an individual can utilise
 614 those assets within broader a broader context of social, political, and institutional constraints.
 615 The challenges of weak political governance at national-to-local scales result in inefficient risk
 616 management and climate maladaptation. Examples of weak governance can be seen in land
 617 management and administrative practices. For example, a male subsistence rice farmer in
 618 Tolatoli self-describes as having a small amount of private land and considers himself poor.
 619 The participant describes poor governance and corruption limiting his ability to take migratory
 620 decisions:

621

622 *“Increased land price has created many problems for us. Even if you have records in*
 623 *the land registry, you can’t have the land. The politically powerful people in society are*
 624 *taking control of the land by producing false documents and using local goons.”*

625

626 Mobility for rural people requires stable land management systems and governance, clear
 627 tenure and ownership rights, rights of access, and support mechanisms for financing land use
 628 and making productive use of land. Under conditions of what is reported as corrupt local
 629 governance, the breakdown in land management systems becomes a key constraint on the
 630 migratory agency. However, state intervention in the provision of early warning systems and
 631 emergency shelters has been considerably more effective, leading to significant reductions in
 632 disaster-related fatalities and injuries across the country. Yet such successes have unintended
 633 consequences of creating a false sense of security in the long-term efficacy of state-led disaster

634 risk reduction (in line with White's (1954) concept of the 'levee effect', whereby disaster
635 protection measures act as a perverse incentive to remain or settle in high-risk locations). It
636 remains to be seen whether it will be the failure in such measures that ultimately incentivises
637 local people to migrate, and if so, at what scale of severity such failure might occur.

638
639 Geographic location shapes patterns of human-place relationships through access to natural
640 resources and livelihood provision. For the poorest people, areas of abundant natural resources
641 are increasingly prone to cyclones and storm surges. For example, a smallholding farmer in
642 Tolatuli farms chillies, butternut squash, and bitter vegetables. Extreme precipitation or wind
643 will destroy the entire crop. In 2019 this farmer lost his chilli farm entirely along with thousands
644 of other farmers. In response to why he still lives in the region, he responded:

645
646 *"I neither know any business nor can get a job. I could not study. My parents died when*
647 *I was young. I had to work to keep the family going... To survive, what other work can*
648 *we do? If we want to live, we have to work [on my farmlands]."*

649
650 Limitations in education qualifications, broad skills suitable for other economic sectors, and
651 caring responsibilities keep this participant trapped in the same livelihood strategy despite
652 concern that it is no longer tenable. For the participant to fully adapt to the risks created by
653 environmental stressors requires a complex set of support mechanisms. It is necessary for
654 policy authorities to provide livelihood diversification through skills training, support
655 mechanisms for family networks, and land governance that allows for smoother transactions in
656 changing land ownership.

657

658 7. Conclusions

659 This study contributes to a broader understanding of non-migratory decision-making in the face
660 of intensifying climate change, and illustrates the influence of material assets, social relations,
661 and subjective and psychological dimensions of place relations for climate-vulnerable
662 households. In qualitative evaluation of rural and coastal Bangladeshi experiences of climate
663 change we find four overarching themes of: *livelihood opportunities*, *place obduracy*,
664 *environmental risk perceptions* and *social-structural constraints*. The first three in this list
665 represent core aspects of social agency: the capacity of the individual or household to define
666 their livelihood, cultural observance, and familial networks within a place, even when these are
667 threatened by external environmental risks. The last theme, structural constraints, represents
668 the inability to make choices and/or the inhibition of decision-making capacity. These
669 overarching themes explore the dimensionality of place relations – that there is a dialectical
670 relationship between structural and agential factors in defining place relations in contrast to a
671 binary distinction between voluntary and involuntary migratory and non-migratory conditions.

672

673 We argue that migration and non-migration are dependent upon the sensitivity of the affected
674 households to environmental change mediated through place relations. The vulnerabilities
675 experienced and their adaptive capacity are primarily a function of what we term *place*
676 *obduracy* – describing the speed at which socio-cultural and economic change within a place
677 can adapt to changing environmental conditions. Place obduracy as a subset of place relations
678 provides an novel conceptual framework through which to explain why and how maladaptation
679 occurs, the cultural values and local political economy in which migratory and non-migratory
680 conditions occur, how decisions are taken, how such decisions are constrained by social-
681 structural relations, and the timing of such decisions in the face of growing climate change-
682 induced environmental stress. In short, where social-institutional, risk perception, and

683 livelihood constraints on migratory agency lag behind changing environmental conditions, this
684 causes further injustice to occur within environmentally stressed households, and this provides
685 grounding for future research into non-migration under conditions of climate emergency.

686

687 For many interviewees, the lack of assets and supportive social relations outside of their current
688 community setting provide substantive socio-cultural and material barriers to migration.
689 Current locally based livelihood opportunities, however precarious, are considered
690 economically viable – they still allow residents to remain in place. This is, however, unlikely
691 to be tenable in the future, as climatic change outpaces obdurate social adaptation. Thus, while
692 the focus of our research is on non-migratory decision-making of individuals and households,
693 it is also important to consider the point at which the state accepts the necessity of planned
694 retreat (migration) as the only viable option for vulnerable populations in the face of
695 intensifying climate change. Adaptation responses that emphasise hard infrastructure
696 protection for coastal regions, local job creation programmes in tourism, and rehousing
697 schemes for coastal residents may prove ineffective or maladaptive and thus prolong settlement
698 in locations that will be no longer viable. Under conditions of place obduracy, as a form of
699 place relations, residents may continue to support in-place adaptive measures such as this, even
700 when they no longer provide sufficient safety, wellbeing, and livelihood protection. Adaptation
701 planning and disaster risk management, therefore, requires a careful, socio-culturally sensitive
702 development response: understanding that decision-making at the lowest level, addressing
703 social-structural inequalities, a robust understanding of climate risks and uncertainty,
704 transparency, accountability, collaboration among a range of stakeholder groups is crucial to
705 optimise the informed adaptation practices that manifest through stable place relations, or else
706 the challenge of internal and cross-border displaced population will remain a persistent threat
707 to the poorest at-risk households in Bangladesh and other climate-change stressed regions
708 globally.

709

710 **References**

711

712 Adams, H. (2016). Why populations persist: mobility, place attachment and climate change.
 713 *Population and Environment*, 37 (4), Springer Netherlands., pp.429–448. [Online]. Available
 714 at: doi:10.1007/s11111-015-0246-3.

715 Adams, H. and Neil Adger, W. (2013). The contribution of ecosystem services to place utility
 716 as a determinant of migration decision-making. *Environmental Research Letters*, 8 (1).
 717 [Online]. Available at: doi:10.1088/1748-9326/8/1/015006.

718 Adeola, F. O. (2007). Nativity and environmental risk perception: An empirical study of native-
 719 born and foreign-born residents of the USA. *Human Ecology Review*, 14 (1), pp.13–25.

720 Adie, B. A. (2020). Place attachment and post-disaster decision-making in a second home
 721 context: a conceptual framework. *Current Issues in Tourism*, 23 (10), Taylor & Francis.,
 722 pp.1205–1215. [Online]. Available at: doi:10.1080/13683500.2019.1600475.

723 Ahamed, S., Rahman, M. M. and Faisal, M. A. (2012). Reducing Cyclone Impacts in the
 724 Coastal Areas of Bangladesh: A Case Study of Kalapara Upazila. *Journal of Bangladesh*
 725 *Institute of Planners*, 5 (December), pp.185–197. [Online]. Available at:
 726 <http://en.wikipedia.org/wiki/Cyclone>.

727 Aniah, P., Kaunza-Nu-Dem, M. K. and Ayembilla, J. A. (2019). Smallholder farmers’
 728 livelihood adaptation to climate variability and ecological changes in the savanna agro
 729 ecological zone of Ghana. *Heliyon*, 5 (4), Elsevier Ltd., p.e01492. [Online]. Available at:
 730 doi:10.1016/j.heliyon.2019.e01492.

731 Ardoin, N. M., Schuh, J. S. and Gould, R. K. (2012). Exploring the dimensions of place: A
 732 confirmatory factor analysis of data from three ecoregional sites. *Environmental Education*
 733 *Research*, 18 (5), pp.583–607. [Online]. Available at: doi:10.1080/13504622.2011.640930.

734 Aryal, J. P., Sapkota, T. B., Rahut, D. B., Krupnik, T. J., Shahrin, S., Jat, M. L. and Stirling, C.
 735 M. (2020). Major Climate risks and Adaptation Strategies of Smallholder Farmers in Coastal
 736 Bangladesh. *Environmental Management*, 66 (1), Springer US., pp.105–120. [Online].
 737 Available at: doi:10.1007/s00267-020-01291-8.

738 Ayeb-Karlsson, S., Smith, C. D. and Kniveton, D. (2018). A discursive review of the textual
 739 use of ‘trapped’ in environmental migration studies: The conceptual birth and troubled teenage
 740 years of trapped populations. *Ambio*, 47 (5), Springer Netherlands., pp.557–573. [Online].
 741 Available at: doi:10.1007/s13280-017-1007-6.

742 Baker, R. G. V. (1982). Place Utility Fields. *Geographical Analysis*, 14 (1), pp.10–28. [Online].
 743 Available at: doi:10.1111/j.1538-4632.1982.tb00051.x.

744 Bakewell, O. (2010). Some reflections on structure and agency in migration theory. *Journal of*
 745 *Ethnic and Migration Studies*, 36 (10), pp.1689–1708.

746 Baxter, J. and Eyles, J. (1997). Evaluating qualitative research in social geography:
 747 Establishing ‘rigour’ in interview analysis. *Transactions of the Institute of British*
 748 *Geographers*, 22 (4), pp.505–525. [Online]. Available at: doi:10.1111/j.0020-
 749 2754.1997.00505.x.

750 Bernzen, A., Jenkins, J. C. and Braun, B. (2019). Climate change-induced migration in coastal
 751 Bangladesh? A critical assessment of migration drivers in rural households under economic
 752 and environmental stress. *Geosciences (Switzerland)*, 9 (1). [Online]. Available at:

- 753 doi:10.3390/geosciences9010051.
- 754 Biswas, B. and Mallick, B. (2020). Livelihood Diversification as Key to Long-term Non-
755 Migration: Evidences from Coastal Bangladesh. *Environment, Development and*
756 *Sustainability*, Forthcomin (0123456789), Springer Netherlands. [Online]. Available at:
757 doi:10.1007/s10668-020-01005-4.
- 758 Black, R., Bennett, S. R. G., Thomas, S. M. and Beddington, J. R. (2011). Migration as
759 adaptation. *Nature*, 478 (7370), pp.447–449. [Online]. Available at: doi:10.1038/478477a.
- 760 Black, R. and Collyer, M. (2014). ‘Trapped’ Populations: Limits on Mobility at Times of
761 Crisis. In: Martin, S. F., Weerasinghe, S. and Taylor, A. (Eds). *Humanitarian Crises and*
762 *Migration*. London, UK : Routledge. pp.287–305.
- 763 Bonaiuto, M., Alves, S., De Dominicis, S. and Petruccelli, I. (2016). Place attachment and
764 natural environmental risk: Research review and agenda. *Journal of Environmental*
765 *Psychology*, 48, Elsevier Ltd., pp.33–53. [Online]. Available at:
766 doi:10.1016/j.jenvp.2016.07.007.
- 767 Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research*
768 *in Psychology*, 3 (2), pp.77–101. [Online]. Available at: doi:10.1191/1478088706qp063oa.
- 769 Brehm, J. M., Eisenhauer, B. W. and Stedman, R. C. (2013). Environmental Concern:
770 Examining the Role of Place Meaning and Place Attachment. *Society and Natural Resources*,
771 26 (5), pp.522–538. [Online]. Available at: doi:10.1080/08941920.2012.715726.
- 772 Bronfman, N. C., Cisternas, P. C., Repetto, P. B., Castañeda, J. V. and Guic, E. (2020).
773 Understanding the Relationship Between Direct Experience and Risk Perception of Natural
774 Hazards. *Risk Analysis*, 40 (10), pp.2057–2070. [Online]. Available at: doi:10.1111/risa.13526.
- 775 CEGIS and GoB. (2013). *Vulnerability to climate induced drought*. 53 (9).
- 776 Chen, J. and Mueller, V. (2019). Climate-induced cross-border migration and change in
777 demographic structure. *Population and Environment*, 41 (2), Population and Environment.,
778 pp.98–125. [Online]. Available at: doi:10.1007/s11111-019-00328-3.
- 779 Chouinard, V. (1997). Structure and agency: Contested concepts in human geography.
780 *Canadian Geographer*, 41 (4), pp.363–377.
- 781 Clar, C. (2019). How demographic developments determine the management of
782 hydrometeorological hazard risks in rural communities: The linkages between demographic
783 and natural hazards research. *WIREs Water*, 6 (6), pp.1–20. [Online]. Available at:
784 doi:10.1002/wat2.1378.
- 785 Cohen, J. H. and Sirkeci, I. (2011). *Cultures of Migration: The global nature of contemporary*
786 *mobility*. Austin . [Online]. Available at: doi:10.7560/726840.
- 787 Cresswell, T. and Hoskins, G. (2008). Place, persistence, and practice: Evaluating historical
788 significance at Angel Island, San Francisco, and Maxwell Street, Chicago. *Annals of the*
789 *Association of American Geographers*, 98 (2), pp.392–413. [Online]. Available at:
790 doi:10.1080/00045600701879409.
- 791 Das, I., Lauria, V., Kay, S., Cazcarro, I., Arto, I., Fernandes, J. A. and Hazra, S. (2020). Effects
792 of climate change and management policies on marine fisheries productivity in the north-east
793 coast of India. *Science of the Total Environment*, 724. [Online]. Available at:
794 doi:10.1016/j.scitotenv.2020.138082.

- 795 Devine-Wright, P. (2013). Think global, act local? The relevance of place attachments and
796 place identities in a climate changed world. *Global Environmental Change*, 23 (1), Elsevier
797 Ltd., pp.61–69. [Online]. Available at: doi:10.1016/j.gloenvcha.2012.08.003.
- 798 Diener, A. C. and Hagen, J. (2020). Geographies of Place Attachment: a Place-Based Model
799 of Materiality, Performance, and Narration. *Geographical Review*, 00 (00), Routledge., pp.1–
800 16. [Online]. Available at: doi:10.1080/00167428.2020.1839899.
- 801 De Dominicis, S., Fornara, F., Ganucci Cancellieri, U., Twigger-Ross, C. and Bonaiuto, M.
802 (2015). We are at risk, and so what? Place attachment, environmental risk perceptions and
803 preventive coping behaviours. *Journal of Environmental Psychology*, 43, Elsevier Ltd., pp.66–
804 78. [Online]. Available at: doi:10.1016/j.jenvp.2015.05.010.
- 805 Douglas, M. and Wildavsky, A. (1982). *Risk and Cultures*. California Press. [Online].
806 Available at: doi:https://doi.org/10.2307/3323308.
- 807 Eskander, S., Fankhauser, S. R. and Jha, S. (2016). Do Natural Disasters Change Savings and
808 Employment Choices? Evidence from Bangladesh and Pakistan. *SSRN Electronic Journal*,
809 (505). [Online]. Available at: doi:10.2139/ssrn.2894791.
- 810 Farbotko, C. and McMichael, C. (2019). Voluntary immobility and existential security in a
811 changing climate in the Pacific. *Asia Pacific Viewpoint*, 60 (2), pp.148–162. [Online].
812 Available at: doi:10.1111/apv.12231.
- 813 Farbotko, C., Stratford, E. and Lazrus, H. (2016). Climate migrants and new identities? The
814 geopolitics of embracing or rejecting mobility. *Social and Cultural Geography*, 17 (4),
815 Routledge., pp.533–552. [Online]. Available at: doi:10.1080/14649365.2015.1089589.
- 816 Farnum, J., Hall, T. and Kruger, L. E. (2005). *Sense of place in natural resource recreation
817 and tourism: An evaluation and assessment of research findings*. [Online]. Available at:
818 doi:10.2737/PNW-GTR-660.
- 819 Fischer, H. W. and Chhatre, A. (2016). Assets, livelihoods, and the ‘profile approach’ for
820 analysis of differentiated social vulnerability in the context of climate change. *Environment
821 and Planning A*, 48 (4), pp.789–807. [Online]. Available at: doi:10.1177/0308518X15623278.
- 822 Foresight. (2011). Migration and Global Environmental Change (2011) Final Project Report.
823 *Government Office for Science - London*, p.234. [Online]. Available at:
824 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/287717/11-
825 1116-migration-and-global-environmental-change.pdf.
- 826 Gemenne, F. (2011). Why the numbers don’t add up: A review of estimates and predictions of
827 people displaced by environmental changes. *Global Environmental Change*, 21 (SUPPL. 1),
828 pp.41–49. [Online]. Available at: doi:10.1016/j.gloenvcha.2011.09.005.
- 829 De Haas, H. (2010). Migration and development: A theoretical perspective. *International
830 Migration Review*, 44 (1), pp.227–264. [Online]. Available at: doi:10.1111/j.1747-
831 7379.2009.00804.x.
- 832 De Haas, H. (2014). *Working Papers Migration Theory The IMI Working Paper 24*.
833 (November), pp.1–39. [Online]. Available at:
834 https://heindehaas.files.wordpress.com/2015/05/de-haas-2014-imi-wp100-migration-theory-
835 quo-vadis.pdf.
- 836 Habib, A., Ullah, M. H. and Duy, N. N. (2014). Bioeconomics of Commercial Marine Fisheries
837 of Bay of Bengal: Status and Direction. *Economics Research International*, 2014, pp.1–10.

- 838 [Online]. Available at: doi:10.1155/2014/538074.
- 839 Haer, T., Botzen, W. J. W., de Moel, H. and Aerts, J. C. J. H. (2017). Integrating Household
840 Risk Mitigation Behavior in Flood Risk Analysis: An Agent-Based Model Approach. *Risk*
841 *Analysis*, 37 (10), pp.1977–1992. [Online]. Available at: doi:10.1111/risa.12740.
- 842 Hasan, M. K. and Akter, R. (2019). Climate change impacts on local people livelihood and its
843 adaptation through agroforestry in coastal district Patuakhali of Bangladesh. *Agriculture and*
844 *Forestry Journal*, 3 (1), pp.6–14.
- 845 Hjälml, A. (2013). The ‘Stayers’: Dynamics of Lifelong Sedentary Behaviour in an Urban
846 Context. *Population, Space and Place*, 20 (May 2013), pp.569–580.
- 847 Hommels, A. (2005). Studying obduracy in the city: Toward a productive fusion between
848 technology studies and urban studies. *Science Technology and Human Values*, 30 (3), pp.323–
849 351. [Online]. Available at: doi:10.1177/0162243904271759.
- 850 Hoogendoorn, G., Sütterlin, B. and Siegrist, M. (2020). The climate change beliefs fallacy: the
851 influence of climate change beliefs on the perceived consequences of climate change. *Journal*
852 *of Risk Research*, 0 (0), Routledge., pp.1–13. [Online]. Available at:
853 doi:10.1080/13669877.2020.1749114.
- 854 Hossain, B. M. R., Hassan, S. M. K., Islam, S. and Nabi, F. D. (2017). Empowering the
855 Vulnerable Women in Disaster Prone Areas : A Case Study of Southern and Northern Region
856 of Bangladesh. *IOSR Journal Of Humanities And Social Science*, 22 (9), pp.14–21. [Online].
857 Available at: doi:10.9790/0837-2209151421.
- 858 Hugo, G. (1996). Environmental Concerns and International Migration. *International*
859 *Migration Review*, 30 (1), p.105*120. [Online]. Available at:
860 doi:10.1080/08882746.1997.11430277.
- 861 Hunter, L. M. (2005). Migration and environmental hazards. *Population and Environment*, 26
862 (4), pp.273–302. [Online]. Available at: doi:10.1007/s11111-005-3343-x.
- 863 IPCC PSB AR6. (2021). *Assessment Report 6 Climate Change 2021: The Physical Science*
864 *Basis*. [Online]. Available at: <https://www.ipcc.ch/report/ar6/wg1/>.
- 865 Islam, M. T. (2021). Impact of Covid-19 on Tourism Industry In Bangladesh: Narrative Review
866 of The Period March 2020 to March 2021. *The Indonesian Journal of Social Science*, 4 (1),
867 pp.53–66.
- 868 Jackson, G., McNamara, K. E. and Witt, B. (2020). “System of hunger”: Understanding causal
869 disaster vulnerability of indigenous food systems. *Journal of Rural Studies*, 73 (April 2019),
870 Elsevier., pp.163–175. [Online]. Available at: doi:10.1016/j.jrurstud.2019.10.042.
- 871 Jahan, F., Mamun-ur-Rashid and Wahab, S. A. (2015). The Role of Fatalism in Resilience to
872 Food Price Volatility in Bangladesh. *IDS Bulletin*, 46 (6), pp.60–67. [Online]. Available at:
873 doi:10.1111/1759-5436.12187.
- 874 Jahan, M., Kabir, R. and Chowdhury, A. (2016). *Comparison of Present-day and End-Century*
875 *Multi-hazard Maps for Bangladesh Coast*. (April 2019). [Online]. Available at:
876 doi:10.13140/RG.2.2.10474.57288.
- 877 Kelly, P. M. and Adger, W. N. (2000). Theory and practice in assessing vulnerability to climate
878 change and facilitating adaptation. *Climatic Change*, 47 (4), pp.325–352. [Online]. Available
879 at: doi:10.1023/A:1005627828199.

- 880 Kelman, I. (2018). Islandness within climate change narratives of small island developing
881 states (SIDS). *Island Studies Journal*, 13 (1), pp.149–166. [Online]. Available at:
882 doi:10.24043/isj.52.
- 883 Kelman, I., Orlowska, J., Upadhyay, H., Stojanov, R., Webersik, C., Simonelli, A. C.,
884 Procházka, D. and Němec, D. (2019). Does climate change influence people's migration
885 decisions in Maldives? *Climatic Change*, 153 (1–2), pp.285–299.
- 886 Khanam, R. (2017). Community-based livelihood management in relations to natural disaster
887 - A study on Teknaf (coastal) area of Bangladesh. *IOP Conference Series: Earth and*
888 *Environmental Science*, 70 (1). [Online]. Available at: doi:10.1088/1755-1315/70/1/012044.
- 889 Khatun, M. N., Mitra, S. and Sarker, M. N. I. (2021). Mobile banking during COVID-19
890 pandemic in Bangladesh: A novel mechanism to change and accelerate people's financial
891 access. *Green Finance*, 3 (3), pp.253–267. [Online]. Available at: doi:10.3934/gf.2021013.
- 892 Kirezci, E., Young, I. R., Ranasinghe, R., Muis, S., Nicholls, R. J., Lincke, D. and Hinkel, J.
893 (2020). Projections of global-scale extreme sea levels and resulting episodic coastal flooding
894 over the 21st Century. *Scientific Reports*, 10 (1), Nature Publishing Group UK., pp.1–12.
895 [Online]. Available at: doi:10.1038/s41598-020-67736-6.
- 896 Kniveton, D., Smith, C. and Wood, S. (2011). Agent-based model simulations of future
897 changes in migration flows for Burkina Faso. *Global Environmental Change*, 21 (SUPPL. 1),
898 Elsevier Ltd., pp.S34–S40. [Online]. Available at: doi:10.1016/j.gloenvcha.2011.09.006.
- 899 Lechowska, E. (2018). What determines flood risk perception? A review of factors of flood
900 risk perception and relations between its basic elements. *Natural Hazards*, 94 (3), Springer
901 Netherlands., pp.1341–1366. [Online]. Available at: doi:10.1007/s11069-018-3480-z.
- 902 Lee, E. S. (1966). A THEORY OF DEMOGRAPHY. *Demography*, (3), pp.6–7.
- 903 Logan, J. R., Issar, S. and Xu, Z. (2016). Trapped in Place? Segmented Resilience to Hurricanes
904 in the Gulf Coast, 1970–2005. *Demography*, 53 (5), Demography., pp.1511–1534. [Online].
905 Available at: doi:10.1007/s13524-016-0496-4.
- 906 Mallick, B., Rogers, K. G. and Sultana, Z. (2021). In harm's way: Non-migration decisions of
907 people at risk of slow-onset coastal hazards in Bangladesh. *Ambio*, Springer Netherlands.
908 [Online]. Available at: doi:10.1007/s13280-021-01552-8.
- 909 Mallick, B. and Schanze, J. (2020). Trapped or voluntary? Non-migration despite climate risks.
910 *Sustainability (Switzerland)*, 12 (11), pp.1–6. [Online]. Available at: doi:10.3390/su12114718.
- 911 Massey, D. S., Axinn, W. G. and Ghimire, D. J. (2010). Environmental Change and Out-
912 Migration: Evidence from Nepal. *Population and Environment*, 32 (2), pp.109–136.
- 913 Matin, N., Forrester, J. and Ensor, J. (2018). What is equitable resilience? *World Development*,
914 109, pp.197–205. [Online]. Available at: doi:10.1016/j.worlddev.2018.04.020.
- 915 Maxmillan, M. (2016). *Moving from the margins : migration decisions amidst climate- and*
916 *environment- related hazards in Bangladesh*. p.324.
- 917 McLeman, R. (2009). On the origins of environmental migration. *Fordham Environmental*
918 *Law Review*, 20 (2), pp.403–425.
- 919 Miah, M. Y., Zia, M., Kamal, U., Salam, M. A. and Islam, M. S. (2020). Impact of salinity
920 intrusion on agriculture of Southwest Bangladesh-A review. *International Journal of*

- 921 *Agricultural Policy and Research*, 8 (2), pp.40–47. [Online]. Available at:
922 doi:10.15739/IJAPR.20.005.
- 923 Miller, F. (2019). Exploring the consequences of climate-related displacement for just
924 resilience in Vietnam. *Urban Studies*. [Online]. Available at: doi:10.1177/0042098019830239.
- 925 Ministry of Foreign Affairs of the Netherlands. (2018). Climate Change PROFILE Bangladesh.
926 *Ministry of Foreign Affairs of the Netherlands*. [Online]. Available at:
927 www.government.nl/foreign-policy-evaluations.
- 928 Mojid, M. A. (2020). Climate change-induced challenges to sustainable development in
929 Bangladesh. *IOP Conference Series: Earth and Environmental Science*, 423 (1). [Online].
930 Available at: doi:10.1088/1755-1315/423/1/012001.
- 931 Monirul Alam, G. M., Alam, K., Mushtaq, S. and Clarke, M. L. (2017). Vulnerability to
932 climatic change in riparian char and river-bank households in Bangladesh: Implication for
933 policy, livelihoods and social development. *Ecological Indicators*, 72, Elsevier Ltd., pp.23–32.
934 [Online]. Available at: doi:10.1016/j.ecolind.2016.06.045.
- 935 Mulvaney, K. K., Merrill, N. H. and Mazzotta, M. J. (2020). *Sense of Place and Water Quality:
936 Applying Sense of Place Metrics to Better Understand Community Impact of Changes in Water
937 Quality*. [Online]. Available at: doi:10.5772/intechopen.91480.
- 938 Nawrotzki, R. J. and DeWaard, J. (2018). Putting trapped populations into place: climate
939 change and inter-district migration flows in Zambia. *Regional Environmental Change*, 18 (2),
940 pp.533–546.
- 941 Nicolosi, E. and Corbett, J. B. (2018). Engagement with climate change and the environment:
942 a review of the role of relationships to place. *Local Environment*, 23 (1), pp.77–99. [Online].
943 Available at: doi:10.1080/13549839.2017.1385002.
- 944 Nunn, P. D. and Campbell, J. R. (2020). Rediscovering the past to negotiate the future: How
945 knowledge about settlement history on high tropical Pacific Islands might facilitate future
946 relocations. *Environmental Development*, 35 (July), Elsevier B.V., p.100546. [Online].
947 Available at: doi:10.1016/j.envdev.2020.100546.
- 948 O'Donnell, T. (2019). Don't get too attached: Property–place relations on contested coastlines.
949 *Transactions of the Institute of British Geographers*, (December 2019), pp.1–16. [Online].
950 Available at: doi:10.1111/tran.12368.
- 951 Owain, E. L. and Maslin, M. A. (2018). Assessing the relative contribution of economic,
952 political and environmental factors on past conflict and the displacement of people in East
953 Africa. *Palgrave Communications*, 4 (1), Springer US. [Online]. Available at:
954 doi:10.1057/s41599-018-0096-6.
- 955 Parkhill, K. A., Henwood, K. L., Pidgeon, N. F. and Simmons, P. (2011). Laughing it off?
956 Humour, affect and emotion work in communities living with nuclear risk. *British Journal of
957 Sociology*, 62 (2), pp.324–346. [Online]. Available at: doi:10.1111/j.1468-4446.2011.01367.x.
- 958 Paton, D., Bürgelt, P. T. and Prior, T. (2008). Living with bushfire risk: Social and
959 environmental influences on preparedness. *Australian Journal of Emergency Management*, 23
960 (3), pp.41–48.
- 961 Peña-Lévano, L. M., Taheripour, F. and Tyner, W. E. (2019). Climate Change Interactions with
962 Agriculture, Forestry Sequestration, and Food Security. *Environmental and Resource
963 Economics*, 74 (2), Springer Netherlands., pp.653–675. [Online]. Available at:

- 964 doi:10.1007/s10640-019-00339-6.
- 965 Rahman, M. M., Haque, S. M., Galib, S. M., Islam, M. A., Parvez, M. T., Hoque, M. N.,
 966 Wahab, M. A., Egna, H. and Brown, C. (2020). Mud crab fishery in climate vulnerable coastal
 967 Bangladesh: an analysis towards sustainable development. *Aquaculture International*, 28 (3),
 968 pp.1243–1268. [Online]. Available at: doi:10.1007/s10499-020-00523-2.
- 969 Rigaud, K. K., de Sherbinin, A., Jones, B., Bergmann, J., Clement, V., Ober, K., Schewe, J.,
 970 Adamo, S., McCusker, B., Heuser, S., et al. (2018). *Groundswell: Preparing for Internal*
 971 *Climate Migration*. [Online]. Available at:
 972 <https://openknowledge.worldbank.org/handle/10986/29461>.
- 973 Rustad, S. A., Rosvold, E. L. and Buhaug, H. (2019). Development Aid, Drought, and Coping
 974 Capacity. *Journal of Development Studies*, 56 (8), Routledge., pp.1578–1593. [Online].
 975 Available at: doi:10.1080/00220388.2019.1696958.
- 976 Sakdapolrak, P., Naruchaikusol, S., Ober, K., Peth, S., Porst, L., Rockenbauch, T. and Tolo, V.
 977 (2016). Migration in a changing climate. Towards a translocal social resilience approach.
 978 *Journal of the Geographical Society of Berlin*, 147 (2), pp.81–94.
- 979 Sattar, M. A. and Cheung, K. K. W. (2019). Tropical cyclone risk perception and risk reduction
 980 analysis for coastal Bangladesh: Household and expert perspectives. *International Journal of*
 981 *Disaster Risk Reduction*, 41 (July), Elsevier Ltd., p.101283. [Online]. Available at:
 982 doi:10.1016/j.ijdr.2019.101283.
- 983 Sen, L. T. H., Bond, J., Winkels, A., Linh, N. H. K. and Dung, N. T. (2020). Climate change
 984 resilience and adaption of ethnic minority communities in the upland area in Thừa Thiên-Huế
 985 province, Vietnam. *NJAS - Wageningen Journal of Life Sciences*, 92 (August 2019), Elsevier.,
 986 p.100324. [Online]. Available at: doi:10.1016/j.njas.2020.100324.
- 987 Shamsuddoha, M., Khan, S. H., Raihan, S. and Hossain, T. (2012). *Displacement and*
 988 *Migration from Climate Hot-spots in Bangladesh: Causes and Consequences*.
- 989 Simoni, J. and Floress, K. (2015). An exploration of place meanings among residents in central
 990 Wisconsin. *Lake and Reservoir Management*, 31 (1), pp.1–10. [Online]. Available at:
 991 doi:10.1080/10402381.2014.963755.
- 992 Singh, C. and Basu, R. (2020). Moving in and out of vulnerability: Interrogating migration as
 993 an adaptation strategy along a rural–urban continuum in India. *Royal Geographical Society*,
 994 186 (1), pp.87–102. [Online]. Available at: doi:10.1111/geoj.12328.
- 995 Spickard, J. V. (1989). A guide to mary douglas’s three versions of grid/group theory.
 996 *Sociology of Religion: A Quarterly Review*, 50 (2), pp.151–170. [Online]. Available at:
 997 doi:10.2307/3710986.
- 998 Staller, J. E. (2008). Dimensions of place: The significance of centers to the development of
 999 Andean civilization: An exploration of the Ushnu concept. In: *Pre-Columbian Landscapes of*
 1000 *Creation and Origin*. pp.269–313. [Online]. Available at: doi:10.1007/978-0-387-76910-3_9.
- 1001 Tapsuwan, S., Leviston, Z. and Tucker, D. (2011). Community values and attitudes towards
 1002 land use on the Gngangara Groundwater System: A Sense of Place study in Perth, Western
 1003 Australia. *Landscape and Urban Planning*, 100 (1–2), pp.24–34. [Online]. Available at:
 1004 doi:10.1016/j.landurbplan.2010.09.006.
- 1005 Tuan, Y.-F. (1974). *A Study of Environmental Perception, Attitudes and Values*. New Jersey:
 1006 Prentice Hall : Englewood Cliffs.

- 1007 Uddin, M. N., Saiful Islam, A. K. M., Bala, S. K., Islam, G. M. T., Adhikary, S., Saha, D.,
1008 Haque, S., Fahad, M. G. R. and Akter, R. (2019). Mapping of climate vulnerability of the
1009 coastal region of Bangladesh using principal component analysis. *Applied Geography*, 102
1010 (May 2016), Elsevier Ltd., pp.47–57. [Online]. Available at:
1011 doi:10.1016/j.apgeog.2018.12.011.
- 1012 UNFCCC. (2017). *Report of the Task Force on Displacement*. (September), p.89. [Online].
1013 Available at: <https://unfccc.int/node/285>.
- 1014 UNHCR. (2020). Trends at a glance: Global trends forced displacement in 2019. *UNHCR The*
1015 *UN Refugee Agency*, pp.1–84. [Online]. Available at: <https://www.unhcr.org/5ee200e37.pdf>.
- 1016 Vaske, J. J. and Kobrin, K. C. (2001). Place Attachment and Environmentally Responsible
1017 Behavior. *The Journal of Environmental Education*, 32 (4), pp.16–21. [Online]. Available at:
1018 doi:10.1080/00958960109598658.
- 1019 White, G. F. (1954). Human Adjustment to floods: A Geographical approach to the flood problem
1020 in the United States. *Department of Geography Research Papers*.
- 1021 Wiegel, H., Warner, J., Boas, I. and Lamers, M. (2021). Safe from what? Understanding
1022 environmental non-migration in Chilean Patagonia through ontological security and risk
1023 perceptions. *Regional Environmental Change*, 21 (2), Regional Environmental Change.
1024 [Online]. Available at: doi:10.1007/s10113-021-01765-3.
- 1025 Williams, D. R. and Vaske, J. J. (2003). The Measurement of Place Attachment: Validity and
1026 Generalizability of a Psychometric Approach. *Forest Science*, 49 (6), pp.830–840. [Online].
1027 Available at: doi:10.1093/forestscience/49.6.830.
- 1028 Wood, G. (2003). Staying secure, staying poor: The ‘Faustian bargain’. *World Development*,
1029 31 (3), pp.455–471. [Online]. Available at: doi:10.1016/S0305-750X(02)00213-9.
- 1030 World Bank. (2010). *The Economics of Climate Change Bangladesh*. [Online]. Available at:
1031 [https://openknowledge.worldbank.org/bitstream/%0Ahandle/10986/12837/702660v10ESW0](https://openknowledge.worldbank.org/bitstream/%0Ahandle/10986/12837/702660v10ESW0P0IC000EACC0Bangladesh.%0Apdf?sequence=1)
1032 [P0IC000EACC0Bangladesh.%0Apdf?sequence=1](https://openknowledge.worldbank.org/bitstream/%0Ahandle/10986/12837/702660v10ESW0P0IC000EACC0Bangladesh.%0Apdf?sequence=1).
- 1033 Zickgraf, C. (2019). Keeping people in place: Political factors of (im)mobility and climate
1034 change. *Social Sciences*, 8 (8). [Online]. Available at: doi:10.3390/socsci8080228.
- 1035