Climate-related events and environmental stressors' roles in driving migration in West and North Africa

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Acknowledgements

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1. Introduction

The relationship between the effects of climate change, environmental drivers of mobility, and the actual decision and act of migration is complex. We all too often see the direct link between a sudden-onset disaster like a storm, or flooding, and immediate, short-term (and often short-distance) displacement. However, the link between repeated experiences of sudden-onset disasters, or of slow-onset disasters,[1] and a more considered decision to move – which may still be perceived as forced – is less clear. Similarly, it is not always easy to establish the effects of climate change on populations who are already mobile, nor on the changes in their patterns of mobility, which can culminate in "displacement in place".[2] This is one of the key reasons why integrating issues of climate change and environmental drivers into migration policy-making and management has been a challenge in West and North Africa, but also globally.

In its _Migration policy framework for Africa and plan of action (2018 – 2030)_, the African Union (AU) recognises the importance of climate change in migration management and policy-making, recommending that African governments should:

> **Incorporate environmental considerations in the formulation of national and regional migration management policies to better address environment related causes of migratory movements, as well as the impact migratory movements have on the environment - increase collaboration with relevant international agencies to this end, including by strengthening research and data gathering and exchange on the relationship between migration and the environment.**

This paper starts with a brief literature review of the state-of-the-art on environmental change and migration outcomes. Secondary source analysis suggests that internal displacement and involuntary immobility, rather than cross-border movements, are the most likely migration outcomes resulting from the impact of climate change on environmental drivers.

Afterwards, this paper uses data from the Mixed Migration Centre's (MMC) flagship data collection project, 4Mi, to gain insight into how some people who cross international borders – those forcibly displaced and those undertaking more 'voluntary' forms of movement – perceive environmental factors as direct or indirect stressors within their movement decision-making. It will examine:

1. How do people on the move through West and North Africa distinguish environmental drivers from other drivers of movement?

2. How do environmental drivers interact with other drivers?

3. What specific kinds of natural disasters and environmental stressors played a role in the decision to migrate of people on the move in West and North Africa?

The paper will conclude by presenting a new conceptual model recently developed by the MMC to gain a more complete picture of the impact of environmental change on mobility, focused on 4 potential outcomes.[3] The model takes inspiration from studies on resilience and adaptation to better understand how people are responding (adapting) to the effects of climate change and applies this to the ability/aspiration framework of migration decision-making. The model defines four climate-induced migration outcomes: involuntary immobility, forced displacement, voluntary migration and voluntary immobility.

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1   Changes in climate parameters—such as temperature, precipitation, and associated impacts, such as water availability and crop productivity changes—that occur over long periods (in contrast to rapid-onset events, such as cyclones and floods, which take place in days or weeks). Word Bank, Groundswell II report, 2021

2   "Displacement in place" refers to the involuntary immobility of people who would otherwise have mobile lifestyles. For instance, if people who engage in seasonal labor migration are forced to remain in their home communities due to widespread crop failure in their normal place of destination and to the severe economic constraint prompted by the temporary closure of this livelihood opportunity. S.C. Lubkemann, 2008, Involuntary Immobility: On a Theoretical Invisibility in Forced Migration Studies, Journal of Refugee Studies, 21(4), pp. 454–475.

3   The model was developed in the context of MMC's work under the Africa Climate Mobility Initiative, ACMI, launched in September 2021 by African Union Commission, World Bank, United Nations Development Programme, United Nations Framework Convention on Climate Change, and the International Organization for Migration. As part of this, MMC conducted field research in seven locations across the African continent, where populations are affected by various types of climate variability and extremes.

2. Literature review

The recent *Africa Migration Report* highlighted the need for 'a new paradigm on African migration' and raising awareness of the link between climate change and 'forced mobility'.[4] Attention and ambitions surrounding the topic have also been central to The Africa Agenda 2063, the Sustainable Development Goals, the priorities outlined by the UN Secretary General at the 2019 Climate Action Summit and the proposed activities linked to climate change and migration by the African Union in the three-year implementation plan of action for the Global Compact for Safe, Orderly and Regular Migration in Africa.[5]

Africa is a highly mobile continent, aided in part by regional economic blocs that have enshrined free movement of populations across borders.[6] Climate impacts are likely to accelerate population movements.[7] Recent research suggests that the optimal climate niche for human habitation will shrink on the continent,[8] and that natural disasters such as drought and flood intensity will grow in frequency and severity.[9] In addition, research suggests that climate change-induced mobility (short distance), migration (longer distance, may be international) and displacement is already taking place,[10] and is most significant in the kind of marginal environments so prevalent in Africa – drylands and mountainous zones.[11]

Past studies seeking to gauge the strength of slow-onset climate change and related environmental drivers of migration (including by MMC) have suggested that climate-induced mobility is generally short-distance (within countries, or within regions, from rural to urban areas). However, it has been hard to establish a direct link between longer distance, international migration and the impact of climate change, among the vast range of factors that contribute to the decision to migrate.[12] Some research suggests that climate-induced migration is part of the phenomenon of 'stepped' migration, with people first migrating shorter distances, internally, and then – possibly after accumulating additional resources through work in urban centres – moving further and sometimes internationally. In this form of 'slow-onset international migration' as a result of slow-onset climate-related disasters, the role of environmental drivers is often 'lost' in this longer-term human decision-making process.[13]

By contrast, the role of climate change acting as a multiplier or intensifier of migration drivers is being increasingly recognised in the literature. Research has highlighted that global environmental change affects the main drivers of migration, as climate change, natural disasters, and natural resource degradation have an impact on the political, demographic, economic, social and environmental factors that affect migration.[14] Climate change impacts may behave as a threat multiplier at the onset of other shocks, such as the COVID-19 pandemic, fragility and conflict situations, as well as an amplifier in the fallout of such shocks.[15] Climate change also has the potential to act as a catalyst for increased conflict and violence causing migration and flight.[16]

4   AU, IOM, 2020, Africa Migration Report: Challenging the Narrative, Addis Ababa, IOM.
5   AU, 2020. Three-year Implementation Plan of Action for the Global Compact on Safe, Orderly and Regular Migration in Africa (2020-2022).
6   A. Adepoju, 1995, 'Migration in Africa: An overview'. In J. Baker & T. A. Aina (Eds.), The migration experience in Africa (pp. 87–108); World Bank, Forthcoming, Climate Change-induced Migration in Coastal West Africa: Results of a Modeling Study. Report prepared by CIESIN and CIDR for the World Bank West Africa Coastal Adaptation Project. Washington DC: World Bank.
7   I. Niang et al., 2014, Africa. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1199-1265; M. New et al., 2011, The possible impacts of high levels of climate change in 2060 and implications for migration. UK Government's Foresight Project, Migration and Global Environmental Change.
8   C. Xu, et al., 2020, Future of the human climate niche. Proceedings of the National Academy of Sciences. 201910114; DOI: 10.1073/pnas.1910114117; J. Samson, et al., 2011, Geographic disparities and moral hazards in the predicted impacts of climate change on human populations. Global Ecology and Biogeography doi:10.1111/j.1466-8238.2010.00632.
9   R. Cervigni et al., 2016, Chapter 4. Vulnerability in Drylands Tomorrow: Business as Usual Raising Ominous Prospects. Confronting Drought in Africa's Drylands: Opportunities for Enhancing Resilience, African Development Forum Report 37. Washington DC: Agence Francaise de Developpement & World Bank Group.
10   M. Borderon, et al., 2018, A systematic review of empirical evidence on migration influenced by environmental change in Africa. IIASA Working Paper WP-18-003, July 24, 2018; C. Cattaneo and E. Massetti. 2015, Migration and Climate Change in Rural Africa. Milano, Fondazione Eni Enrico Mattei; Foresight: Migration and Global Environmental Change (2011) Final Project Report, The Government Office for Science, London.; R. Black et al., 2011, Migration as adaptation. Nature 478 447–9.
11   C. Wiederkehr et al., 2018, Environmental change, adaptation strategies and the relevance of migration in Sub-Saharan drylands, Environmental Research Letters 13, no. 11: 113003; A. de Sherbinin et al., 2012, Migration and risk: Net migration in marginal ecosystems and hazardous areas. Environmental Research Letters, 7, 045602.
12   . See for example: MMC, 2020, Weak links: Challenging the climate & mixed migration paradigm in the Horn of Africa & Yemen; MMC, 2019, Mixed Migration Review 2019, p.138; B. Frouws and O. Akumu, 2017, Drought: A contributing or limiting factor in migration?;
13   W. Neil Adger et al., 2020, Urbanisation, Migration, and Adaptation to Climate Change, Commentary 3 (4), 396-399. See also a recent study synthesizing the state of (and gaps in) knowledge on the topic: C. Cattaneo et al., 2019, Human Migration in the Era of Climate Change, Review of Environmental Economics and Policy, 13(2), pp. 189–206.
14   Foresight: Migration and Global Environmental Change, 2011
15   Word Bank, Groundswell II report, 2021
16   Word Bank, Groundswell I report, 2018

Climate change is also affecting another important and often under-researched typology of human mobility: so-called 'involuntary immobility', which refers to the forced immobility of people who have the aspirations to migrate, but lack the capability to do so (resources, skills, etc.). While climate change is likely to make certain kinds of movement more probable for those with the capacity to move, it may also make movement as a coping strategy less possible for those with lower capabilities.[17] People lacking capital, in the form of financial, social, political or physical assets may be unable to move away from locations where they are extremely vulnerable to environmental change. As explained in the 2011 UK Foresight report "…trapped populations face double jeopardy: they will be unable to move away from danger because of a lack of assets, and it is this very feature which will make them even more vulnerable to environmental change."[18]

While researchers and policy actors recognise the nexus between the environment and mixed migration, the legal status and rights of those displaced by environmental factors remain unclear and contested. In international law, the status of people crossing an international border for environmental reasons remains undefined, mainly due to the difficulty of isolating environmental factors from other, often related, drivers of migration and because such people are not covered by the 1951 Refugee Convention.[19] While the interplay between climate change and various aspects of eligibility for refugee status is increasingly recognised, for instance by governments like the United States,[20] migrants forced to move by climate-related factors are still at high risk of falling through the cracks of international refugee and immigration policy, presenting a dilemma for agencies and governments.[21] In the future, more people either directly or indirectly impacted by climate-related factors might be joining mixed movements, potentially entering and transiting countries irregularly and at risk of facing rights abuses and security risks.

17 Word Bank, Groundswell II report, 2021
18 Foresight: Migration and Global Environmental Change, 2011
19 Maria Waldinger and Sam Fankhauser, Center for Climate Change Economics and Policy (2015). Climate Change and Migration in Developing Countries.
20 White House, 2021, Report on the Impact of Climate Change on Migration.
21 European Parliamentary Research Service, 2019, The concept of 'climate refugee'.

3. 4Mi Analysis and Results

What's 4Mi

4Mi offers a regular, standardized, quantitative system of collecting globally comparable primary data on mixed migration and has been operational since 2014. Data collection occurs through a field-based network of 120 enumerators accessing hard-to-reach and mobile populations, collecting around 10,000 interviews per year. The data collected offer rich insights focusing on the human face of mixed migration, capturing:

- Profiles of people on the move,
- Drivers of migration, aspirations, and intentions,
- Facilitation of journeys (including interactions with smugglers)
- Experiences along the journey and in destination countries, with a strong focus on protection.

4Mi field enumerators situated along frequently used routes and in major migratory hubs conduct face-to-face and phone interviews with refugees and migrants on a continuous basis.

Given that 4Mi's methodology is adapted to target people on the move – a population whose fluidity makes it both challenging to reach and difficult to count – 4Mi data collection uses a purposive sampling methodology, and therefore is not intended to be representative of the overall volume or characteristics of people on the move in the region. 4Mi takes a careful sampling approach, seeking diversity, and providing rich indicative insights for populations on the move and its substantial sample size helps mitigate the limits of non-representativeness. Results should be treated with caution.[22]

The dataset utilised for this analysis is comprised of 5,825 4Mi surveys collected between February and September 2021 in six countries: Mali, Niger, Burkina Faso, Libya, Tunisia and Sudan. The 4Mi survey includes questions that enquire on the role of environmental drivers in the decision to migrate (as described above, page 2). While the analysis will often provide country of origin-specific findings, respondents categorised as West African and Central African are as follows:

West African: Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo

Central African: Cameroon, Central African Republic (CAR), Chad, Democratic Republic of the Congo, Equatorial Guinea, Gabon, and Republic of the Congo.

The sample consists of 37% women and 63% men, aged between 18 and 55 years with an average age of 29. The main nationalities are: Nigeria (18%), Cote d'Ivoire (10%), Guinea (9%), Mali (7%), Cameroon (6%), Niger (6%), Togo (5%), Burkina Faso (5%), Chad (5%), Benin (5%), Ghana (5%), and Senegal (5%).

Table 1. What is your country of nationality? (n=5,825; Top 5 nationalities in each region)

N°	West Africans			Central Africans		
	Nationality	Count	% (of total sample)	Nationality	Count	% (of total sample)
1	Nigeria	1,031	18%	Cameroon	363	6%
2	Côte d'Ivoire	574	10%	Chad	292	5%
3	Guinea	512	9%	CAR	120	2%
4	Mali	387	7%	Gabon	79	1%
5	Niger	362	6%	Democratic Republic of the Congo	77	1%

Throughout the following sections, analysis of 4Mi data is presented with the objective of providing insights on environmental drivers related to respondents' regions/ countries of origin. Sample and sub-sample size is indicated throughout. Although not representative, 4Mi sub-samples are sufficiently large to allow for interpretation and comparison using descriptive statistics, though results should be treated with caution.

Identifying environmental drivers of migration

Interviewed refugees and migrants were asked what were the reasons that led them to leave their places of origin, with the possibility of selecting multiple answer options. A first and important outcome is that 41% of respondents selected multiple reasons for leaving.

Hidden in plain sight

Figure 1 illustrates responses amongst West African and Central African respondents. Economic-related factors as drivers of the decision to leave were the most selected amongst respondents from both West (86%) and Central Africa (69%) and were particularly high amongst West Africans. Central Africans, more often selected reasons related to violence, insecurity, and conflict (31%), access to services/corruption (20%), and rights and freedom (18%). In this question, environmental factors were the least cited reason for the decision to migrate amongst both West (2%) and Central Africans (5%).

Figure 1. For what reason did you leave (place of origin)?
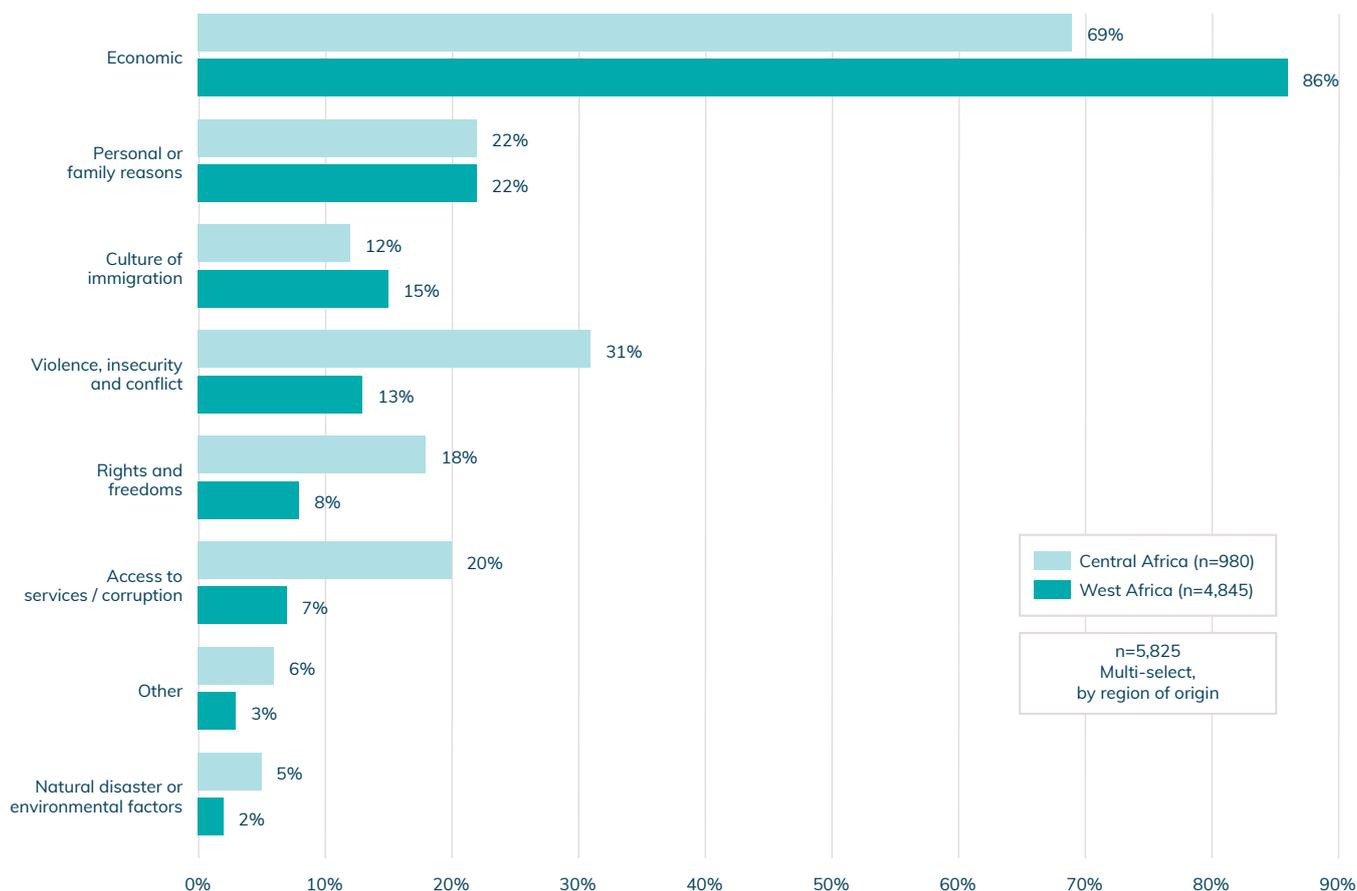
This suggests that, upon first thought, respondents did not directly link their decision to migrate to environmental factors. However, when the same respondents were asked a targeted follow-up question which specifically enquired on whether environmental factors played a role in their decision to leave – "Were environmental issues a factor in your decision to leave your country of departure?" (see Table 2 below)– results change significantly. Where in the previous question just 2% of West Africans and 5%

of Central Africans cited environmental issues as reasons for leaving, in answer to the more targeted question, 41% of West Africans and 50% of Central Africans acknowledged that environmental factors had an impact on their decision to leave.

The stark difference in the responses may seem contradictory, but highlights the importance of a targeted survey methodology in unravelling the complex

interactions among environmental drivers and other drivers. The first question is indirect, and as such few respondents self-identify that they left for environmental reasons. In the second, more targeted question, respondents are asked directly, pushing them to consider environmental factors. The different responses to the two questions might reveal how climate-related factors are not being considered as direct or *proximate* drivers of their decision to migrate but as more indirect or *underlying* drivers upon more targeted reflection.

Indeed, a 2009 study from Senegal and the broader Sahel found a lack of direct links between climate factors and respondents' adaptation or livelihood strategies in their survey data, likely owing to climate factors being perceived in a more indirect way. By contrast, when using more targeting data collection methods, which in their study took the form of semi-structured interviews, respondents more readily explored underlying causes and drivers linked to climate.[23]

Respondents from CAR, Cameroon, Chad, Mali and Niger most affected

Table 2. Were environmental issues a factor in your decision to leave your country of departure? (n=5,460, by nationality – only presenting nationalities with 100 or more respondents)

Nationality	Yes	No	Don't know/Refused
CAR (n=120)	62%	33%	6%
Cameroon (n=363)	51%	43%	6%
Chad (n=292)	49%	46%	5%
Mali (n=387)	49%	48%	3%
Benin (n=286)	48%	48%	3%
Niger (n=362)	49%	50%	1%
Gambia (n=188)	48%	50%	2%
Ghana (n=281)	43%	56%	1%
Burkina Faso (n=312)	43%	54%	3%
Côte d'Ivoire (n=574)	42%	56%	2%
Sierra Leone (n=161)	40%	57%	2%
Nigeria (n=1031)	39%	57%	4%
Togo (n=313)	36%	63%	1%
Senegal (n=278)	33%	64%	3%
Guinea (n=512)	33%	64%	3%

Responses varied considerably across countries of nationality: while 62% of nationals from the Central African Republic and 51% of Cameroonians answered 'Yes,' this was true for 33% of Guineans and Senegalese. Overall, no considerable differences in the answer were noted between genders. However, women from Central Africa did more frequently report that environmental issues were a factor in their decision to leave (51%), than did women from West Africa (39%), while this difference was less pronounced among men (49% of Central Africans vs 43% of West Africans). The higher number of respondents who reported the environment as a factor

in their decision to migrate are nationals of countries already affected by either extreme climate events and/or political instability, conflicts and/or extreme poverty. The Notre Dame Global Adaptation Initiative (ND-Gain) index assesses a country's vulnerability to climate change and other global challenges based on its ability to build resilience. In West and Central Africa, Mali, CAR, Guinea Bissau, and Niger are among the lowest ranked countries. Taking the example of CAR and Mali, both countries are experiencing armed conflict which takes a heavy toll on state infrastructures and has prompted the withdrawal of government from certain zones. Therefore,

23 Mertz, O. et al., 2009, 'Farmers' Perceptions of Climate Change and Agricultural Adaptation Strategies in Rural Sahel.' Environmental Management. 43:804–816.

they are disproportionately vulnerable to climate variability and change, because the adaptive capacity of people, systems and institutions already coping with the consequences of conflict tend to be limited.[24]

CAR is also increasingly suffering from extreme climate events such as the severe flooding in 2019, which forced tens of thousands of people to flee their homes in Bangui, and prompted an outbreak of malaria and cholera (in a country with limited access to healthcare).[25] According to the World Bank Climate Knowledge Portal, although droughts are frequent in CAR, rainfall is projected to become more erratic, in terms of duration, intensity, and frequency. Finally, with livelihoods at risk, social tensions between farmers and nomadic herders from the Sahel and Chad are increasingly present in CAR.[26] With the Sahel being 75% too dry for herders to remain sedentary, herders adapt and move towards arable territories. Conflict between herders and farmers are growing in the region, which in turn impact the mobility of people. A recent example in **Cameroon** illustrates this reality, as conflict between herders, fishermen and farmers led 11,000 Cameroonians (mainly women and children) to cross the border with Chad.[27] The conflict was triggered by disputes over diminishing water supplies. All the above-mentioned factors interact to shape the decision of people to leave.

The intertwined nature of environmental and other drivers of migration

The examples from CAR, Mali and Cameroon illustrate the intertwined nature of environmental and other drivers of migration. This link is further evidenced in Figure 2, which outlines whether 'environmental issues' had indeed influenced respondents' migration decision and the other factors through which they were mediated.

Environmental issues impacting economic drivers, living conditions and conflict

The direct impacts of environmental issues on survival and living conditions were identified by 16% (on average, Central and West Africans together) and 23%, respectively, of respondents who had reported the environment as being a factor in their decision to migrate. A considerably higher proportion of respondents – 64% – cited environmental issues in relation to economic drivers. This is not surprising for, as described in Figure 1, economic reasons are the main factor driving the decision to migrate across Central and West African respondents. However, when asked specifically about the impact of environment on their decision to migrate, it appears that environment often manifests as a stress multiplier, exacerbating other challenges. In this case, environmental factors affect other drivers of migration, such as livelihood opportunities (economic reasons) or conflict, which is what respondents indicated when asked without prompting (i.e. Figure 1).[28] This aligns with the literature on environmental chance and migration, which often frames environmental issues an indirect drivers mediated through and dependent upon economic, political, social and demographic factors.[29]

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24 ICRC, 2019, When rain turns to dust, Understanding and responding to the combined impact of armed conflicts and the climate environment crisis on people's lives.

25 ICRC, 2021, Climate change in the Central African Republic: what threats?

26 Ibid.

27 UNHCR, 2021, Climate change fuels clashes in Cameroon that force thousands to flee.

28 Mixed Migration Centre (2021) Migration drivers and decision-making of West and Central Africans on the move in West and North Africa: a quantitative analysis of factors contributing to departure

29 Black, R. et al., 2011, 'The effect of environmental change on human migration.' Global Environmental Change. 21S: S3–S11.

Figure 2. Were environmental issues a factor in your decision to leave your country of departure? What were the reasons? (Amongst those reporting environmental factors did influence their decision to migrate)
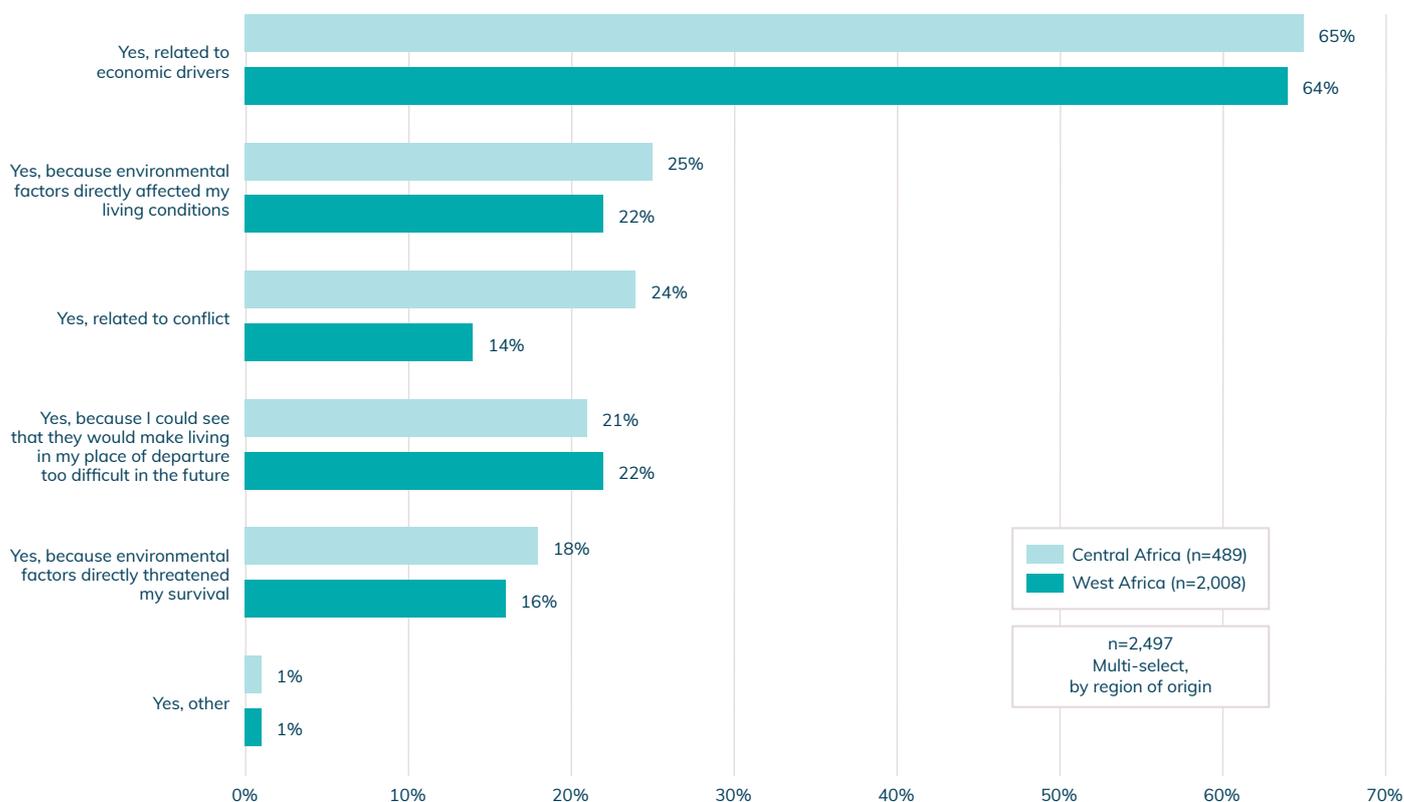
Respondents also frequently specified that environmental factors related to conflict had influenced their decision to leave, particularly in Central African countries (24% of those who reported environmental issues had been a factor), especially CAR (41%). A large portion of respondents from West Africa come from countries not currently impacted by conflict (such as Senegal, Guinea, Côte d'Ivoire, and the Gambia, to name a few), which also explains the regional difference for this sample.

However, looking specifically at countries affected by conflict such as Mali, 32% of respondents said that environmental issues were a factor in leaving their homes, in relation to conflict. This number was a bit lower amongst Burkinabè (20%), which could suggest that conflict-affected populations in Burkina face some degree of involuntary immobility. Overall, more than one-fifth (22%) of respondents reported that a contributing factor to their decision was that they could envisage environmental issues making living in their place of departure too difficult in the future. This was particularly the case among women (28% vs 18% for men), suggesting that women's livelihoods may be

particularly impacted by slow environmental change, that women respondents more often factored the potential role of the environment into the future planning, or simply that women respondents more often invested in thinking about their futures. In this way, some movements linked to climate might be anticipatory or in response to slow-onset hazards such as drought and sea level rise, pre-empting an expected deterioration of conditions, although these types of movements are particularly hard to detect.[30]

These results unravel the complex interaction between environmental and other drivers. Unless in the case of immediate, sudden onset environmental disasters and changes forcing people to move, environmental reasons are usually further to the back of people's mind when they give reasons for migration. Research shows that environmental factors do play a role in decision-making around migration, and perhaps a stronger role than is sometimes assumed, but we have not yet reached a full understanding of the complex links between environmental and other drivers in the decision to migrate.

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30 See IDMC, 2019, Global report on internal displacement.

Types of environmental stressors affecting migration

Respondents who stated that environmental issues had affected their decision to migrate were asked which type of environmental factor or natural disaster had done so.[31] As can be observed in Figure 3, livestock or crop disease had a high selection rate in both regions (31% in Central Africa and 28% in West Africa), while flooding, storms, earthquakes or fires were more common amongst respondents from Central Africa (34%) than West Africa (17%). Central Africans also commonly identified drought or dryness (23%), unpredictable weather patterns (14%), and extreme temperatures (12%). In West Africa, droughts were the second-most important type of environmental factor (18%).

Figure 3. What kind of natural disaster or environmental factor? (Amongst those reporting environmental issues had influenced their decision to migrate)

Legend:
- Central Africa (n=158)
- West Africa (n=464)

n=622
Multi-select,
by region of origin

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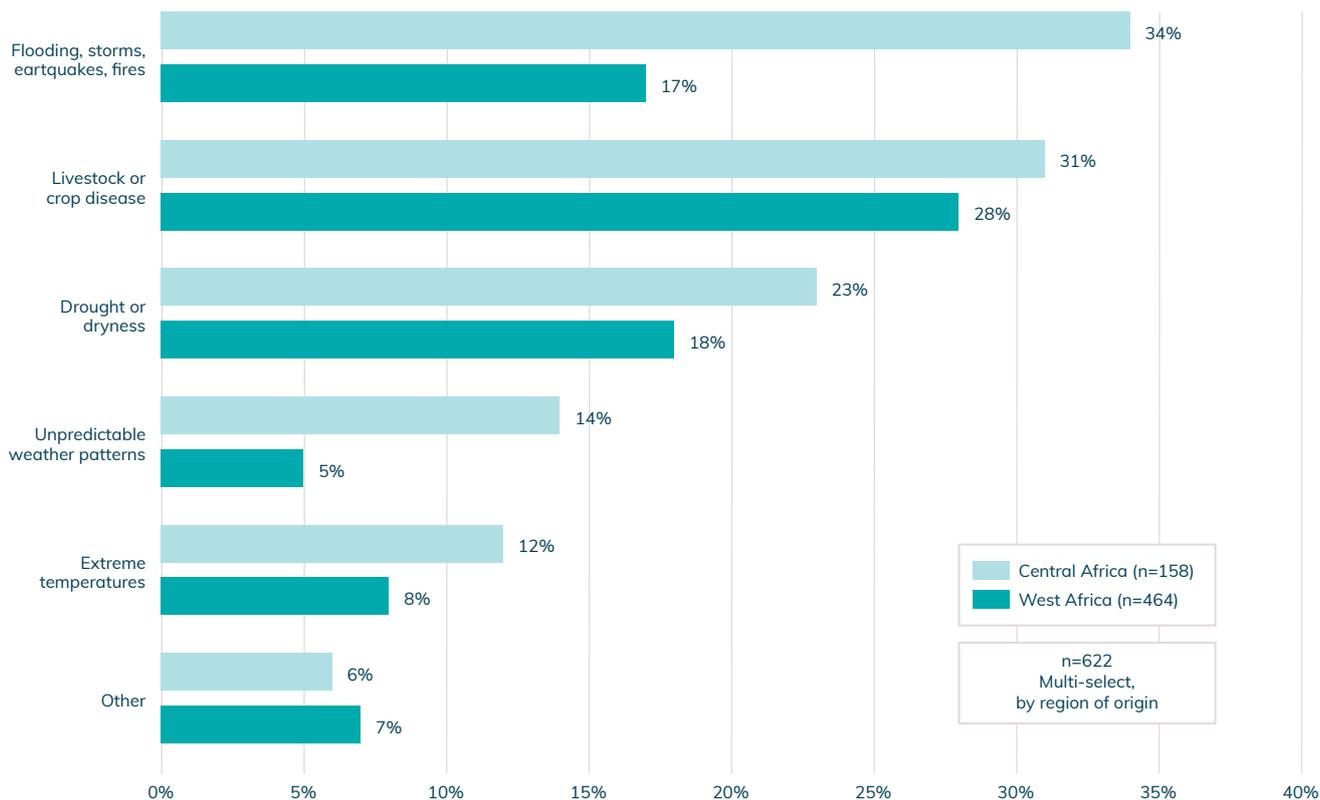
31 The condition which determined whether this question was asked was modified in a survey update in July 2021. Prior to this date, only respondents that selected 'Natural disaster or environmental factors' to the first drivers question 'For what reasons did you leave (country of origin)?' were asked the question. After July 2021, also respondents answering 'Yes' to 'Were environmental issues a factor in your decision to leave your country of departure?' were asked the question. For this reason, the sample size upon which findings on this variable are based is smaller than for the variables above.

Table 3. What kind of natural disaster or environmental factor? (Amongst those reporting environmental issues had influenced their decision to migrate; n=526, multiselect, by nationality - only presenting nationalities with 20 or more respondents)

Nationality	Flooding; Storms; Earthquakes; Fires	Drought or dryness	Livestock or crop disease	Extreme temperatures	Unpredictable weather patterns	Other
Benin (n=40)	18%	15%	30%	8%	0%	5%
Burkina Faso (n=29)	17%	24%	17%	0%	7%	14%
Cameroon (n=42)	29%	31%	29%	19%	10%	2%
CAR (n=32)	44%	13%	28%	0%	19%	3%
Chad (n=42)	21%	33%	29%	7%	5%	7%
Côte d'Ivoire (n=47)	19%	17%	21%	15%	9%	11%
Gambia (n=23)	17%	4%	39%	4%	0%	0%
Ghana (n=30)	10%	17%	33%	3%	7%	3%
Guinea (n=41)	7%	12%	37%	7%	5%	2%
Mali (n=62)	6%	27%	35%	10%	5%	8%
Niger (n=53)	21%	26%	36%	11%	6%	2%
Nigeria (n=55)	31%	13%	25%	7%	11%	7%
Togo (n=30)	10%	10%	20%	3%	0%	7%

Droughts influencing decision to migrate from Sahel while flooding prompting migration from CAR

When assessing responses by country, we observe that in CAR, 44% of respondents for whom environmental issues had influenced their decision to migrate identified flooding, storms, earthquakes and/or fires as the specific climate-related factors that influenced their decision. Respondents from Nigeria (31%) and Cameroon (29%) also frequently identified the same environmental issues. Respondents from the Sahel countries more often mentioned drought as a driver of their decision to migrate: Mali (27%), Niger (26%), Chad (33%) and Burkina Faso (23%). These align with the patterns described in the 'State of the Climate in Africa' in relation to the climate impact on the Sahel and Central Africa regions.[32] Across most countries of origin, livestock and crop disease were also selected by around one-third of respondents.[33]

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32 World Meteorological Organization, 2020. State of the Climate in Africa
33 See for instance USAID, 2014, Climate change in Mali: Expected impacts on pests and disease afflicting selected crops.

4. A Conceptual Framework for Climate-Induced Mobility

4Mi is a data collection initiative focusing on international movements, and therefore data analysis only sheds light on cross-border mobility and not other migration outcomes associated with environmental stressors, such as internal displacement and involuntary immobility. In an attempt to capture, more broadly and systematically, the role of migration and mobility as a response to environmental stressors and climate change (and the role of climate change as a driver of migration), this paper puts forward a new conceptual framework, developed by MMC. The framework demonstrates how impacts relating to climate change can influence migration and mobility outcomes. It takes inspiration from studies on resilience and adaptation to better understand how people are responding (adapting) to the effects of climate change and applies this to the ability/aspiration framework of migration decision-making.[34]

The framework starts with environmental factors: it considers that changing environmental factors influence households' adaptation strategies, and their ability to maintain either existing patterns of mobility or the ability to remain in place (capability to stay). Resilience and adaptation are commonly used terms in the literature on sustainable development, especially within the context of climate change. In relation to human behaviour, resilience is more frequently defined as a capacity to 'bounce back' within a system; adaptation, or adaptive capability, can be understood slightly differently (some conceive of adaptation lying within a broader definition of resilience), and is more about finding ways to function within a new system.[35]

The model also considers that these same environmental factors may influence household aspirations around mobility, as they impact directly or indirectly on the wide range of other possible reasons (drivers) that people have for migrating (or not), including economic, sociocultural, and political. However, an understanding of adaptation strategies and aspirations are not enough to determine migration outcomes. A household may have exhausted all its adaptation strategies and desire to leave, but other factors – here defined as the household's 'capability to migrate' must be considered for the migration outcome to be determined

Carling introduced the aspiration/ability model to help describe the conditions under which people decide to migrate. Aspirations refer to the preference to migrate, while abilities are the set of factors determining the capacity to migrate.[36] Both concepts are determined by both external factors as well as individual characteristics, and differences in the degrees of aspirations and abilities lead to different outcomes and modes of migration.

Adaptation, aspiration to migrate, ability to migrate and realised aspirations

The conceptual framework proposed by MMC pictured in Figure 4 brings these concepts together to be able to understand the role of environmental factors (induced by climate change) in mobility outcomes, while at the same time acknowledging the role of a wide range of other factors in determining mobility outcomes.

Moreover, it covers a number of potential outcomes with regard to mobility, including the risk of involuntary immobility, which has been underscored in the environmental change and migration literature, as well as forced displacement and voluntary migration.[37]

34   J. Carling and Kerilyn Schewel, 2018, Revisiting aspiration and ability in international migration, Journal of Ethnic and Migration Studies, 44:6, 945-963, DOI: 10.1080/1369183X.2017.1384146

35   E. Lisa F. Schipper & Lara Langston, 2015, A comparative overview of resilience measurement frameworks: analysing indicators and approaches, Working Paper 422, London, ODI, 10-12; For lists of relevant indicators see N.A. Marshall et al., 2009, A Framework for Social Adaptation to Climate Change; Sustaining Tropical Coastal Communities and Industries. Gland, IUCN; C. Wiederkehr et al., 2018, op. cit.; Food and Agriculture Organization of the United Nations, 2016, Resilience Index Measurement and Analysis-II, 2016.

36   J. Carling, 2002, Migration in the age of Involuntary Immobility: Theoretical Reflections and Cape Verdean Experiences, Journal of Ethnic and Migration Studies 28 (1): 5–42. See also H. De Haas, 2011, The Determinants of International Migration. Conceptualizing Policy, Origin and Destination Effects (paper DEMIG project2). Oxford: IMI Working Paper 32.

37   See Science for Environment Policy, 2015, Migration in response to environmental change, Thematic Issue 51. Issue produced for the European Commission DG Environment by the Science Communication Unit, Bristol, UWE ; Foresight, 2011, op. cit.

Figure 4. Conceptual framework for climate-induced mobility

Climate-related environmental stressors

Existing adaptation strategies
- Existing mobility patterns
- Capability to stay
- Other adaptation strategies

Aspiration to migrate?
- Climate-related drivers
- Other (political, economic, cultural, social, etc.) drivers

Capability to migrate?
- Individual & household characteristics
- Migration interface

Yes / No / No / No / Yes / Yes / No / Yes

Migration outcomes*
- Involuntary immobility
- Forced mobility
- Voluntary mobility
- Voluntary immobility

Potential responses
- Humanitarian assistance
- Disaster risk reduction / preparedness
- Resilience & adaptation
- Facilitation of movement

- Disaster response: humanitarian assistance
- Relocation support

- Safe pathways / free movement
- Integration / planning in destination
- Remittance policies

- Disaster risk reduction/ preparedness
- Resilience and adaptation

*Note that the line from "voluntary" to "involuntary is a continuum. The boxes here simplify to clarify the model but do not reflect reality.

Migration outcomes and realised aspirations

There are four potential migration outcomes in the model, to allow for illustration: it must be noted that voluntary migration and forced displacement are, of course, not binary conditions but represent two opposed ends on a continuum. For example, if people choose to migrate because they feel they have exhausted the alternatives, then to what extent is the migration voluntary? One of the aims of this model is to guide exploration of this spectrum and learn more about the degree to which decision-making around migration and mobility is voluntary.

The aim of this framework is to model more clearly the complex relationship between the impacts of climate change (as well as other environmental stressors) and migration outcomes. It takes us further into decision-making around responses to climate impacts – and where migration lies within that – than 4Mi currently does, and can be applied to better understand the drivers of migration among those who have moved or who are on migration journeys, but also to understand thinking about migration among those who have not moved away, but who are affected by climate-related impacts.

Consider, for example, people repeatedly affected by storms and tropical cyclones. By applying this framework, we can find out about people's capability (and aspiration) to adapt to the impacts of the storms and cyclones and stay, as well as their capability and aspiration to move. And we can find out what this means in terms of migration outcomes: are people happy to stay and able to thrive or are they trapped? Are they forcibly displaced? Or are they choosing freely to move? If they are moving – where are they going and what is happening in destination?

Being able to more accurately answer questions about the impact of climate factors on aspiration and capability to move allows for a better-informed discussion around resilience and adaptation, and developing policies that will meet the needs of populations impacted by climate change. How can policy makers improve the capability to stay? How can they facilitate migration as an adaptation strategy, which works both for affected and host populations? This framework can be used not only as a research tool, to gain a better understanding of the relationship between climate change impacts and mobility, but also in practice, to work through solutions to challenges relating to climate impacts and mobility. To return to the example of people repeatedly affected by storms and tropical cyclones: the framework can show people's aspirations and capabilities around staying in place or moving away from areas impacted by climate change, and can also indicate what measures could improve their capabilities, to move or to stay, and help them meet their aspirations.

5. Conclusions and Policy Implications

Through a review of existing literature and 4Mi data analysis this paper tried to shed light on the complex relationship between the effects of climate change, the environmental drivers of mobility, other migration drivers and resulting movements.

The literature review highlighted that while climate change and environmental stressors affecting human mobility are unquestionably already well underway, they are already affecting mobility and displacement and are set to intensify. Their impact on migration decision making processes and dynamics and the extent of their influence are not yet fully understood and should be further investigated. The existing literature also highlight that, while a lot of attention is currently given to future potential climate-induced cross-border movements, existing studies seem to be pointing at much stronger links with other migration outcomes, such as internal displacement and involuntary immobility - i.e. trapped populations. Having said that, climate induced cross-border movements do remain an extremely important and thorny issue, particularly around how people crossing borders as a direct or indirect result of climate will be able to seek protection and what their legal status will be.

The analysis of the 4Mi data collected in West and North Africa, focusing on cross-border movements, highlighted that climate change often plays out as an underlying factor as well as a stress/vulnerability multiplier, particularly in already fragile livelihoods and economies. Across regions of origin and gender, environmental issues play a role in refugees and migrants' decisions to migrate more often in relation to economic drivers than to their direct survival or living conditions. Yet, in rural communities where economies rely on agriculture and weather conditions, the relationship between environmental stressors and survival should not be underestimated. According to 4mi data, key differences exist between Sahelian and central African countries with regards to the type of natural disasters and environmental issues impacting mobility, highlighting the need for context-specific responses.

As 4Mi data analysis only looked at cross-border mobility, the paper ended with a proposal for a conceptual framework, developed by MMC, to look at the role of climate-related impacts in thinking about mobility more broadly. This framework offers a way of understanding where mobility fits among other adaptation strategies, and it covers the full spectrum of climate-induced mobility outcomes (rural to urban movements, involuntary immobility, the disruption of existing patterns of mobility -such as those by transhumant or nomadic pastoralists-, internal displacement, and cross-border long distance movements), enabling a more complete picture of how climate change and mobility link together.

Policy implications

The variety of the mobility and non-mobility outcomes included in the proposed conceptual framework also highlight the very broad range of policy areas that potential policy responses should be based on, summarised in Figure 5.

- **Adaptation & Resilience;** migration can be the result of the failure to put in place other strategies to adapt or increase people's resilience in response to the impact of climate change. Investments in adaptation and resilience strategies can increase people's capability to stay. Adaptation and resilience-building approaches should aim at empowering people to stay-and-cope, if they wish so, but also to safely move-to-cope, if they decide to do so. In short, the approach should be focusing on reducing forced mobility and supporting, instead, voluntary mobility (and immobility).

- **Urban planning;** often rural to urban movements are the first step in climate-induced mobility patterns while, at the same time, many cities themselves – and in particular the areas within cities where most migrants end up living - are vulnerable to the impact of climate change. The needs of incoming climate-induced migrants as well as those already residents but potentially exposed to climate impact should be included in the central tenets of urban planning— community, engagement, data, and strategic design. For cities that do demonstrate leadership and initiative in advancing plans for responding to and anticipating climate-induced rural to urban mobility dynamics, funding will likely remain one of most significant barriers and therefore will require the support of national and international actors. [38]

- **Management and facilitation of (cross-border) circular movements;** in many contexts, like border areas, migration and mobility are already part of the adaptation strategies put in place to cope with the

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[38] J. S. Wolff, 2020, "A warmer welcome – city planners preparing for future flows", in Horwood, C, Frouws, B. & Forin, R. (Eds.). (2020). Mixed Migration Review 2020. Highlights. Interviews. Essays. Data. Geneva: Mixed Migration Centre

negative impact of climate change. As such, they should be preserved and even further facilitated; border management policies should take border communities into account.

- **Management and facilitation of cross-border migration;** when permanent cross-border movements are the only option available (forced mobility), or the

solution sought by people affected by the impact of climate change, these movements should be as much as possible safe, orderly and regular. In order to develop more appropriate migration policies, it is important for decision and policy makers to understand where migration is a response to a failure to adapt versus migration as successful adaptation, and to prevent the former while facilitating the latter.

Figure 5. Priority policy areas for future migration policy-making and planning
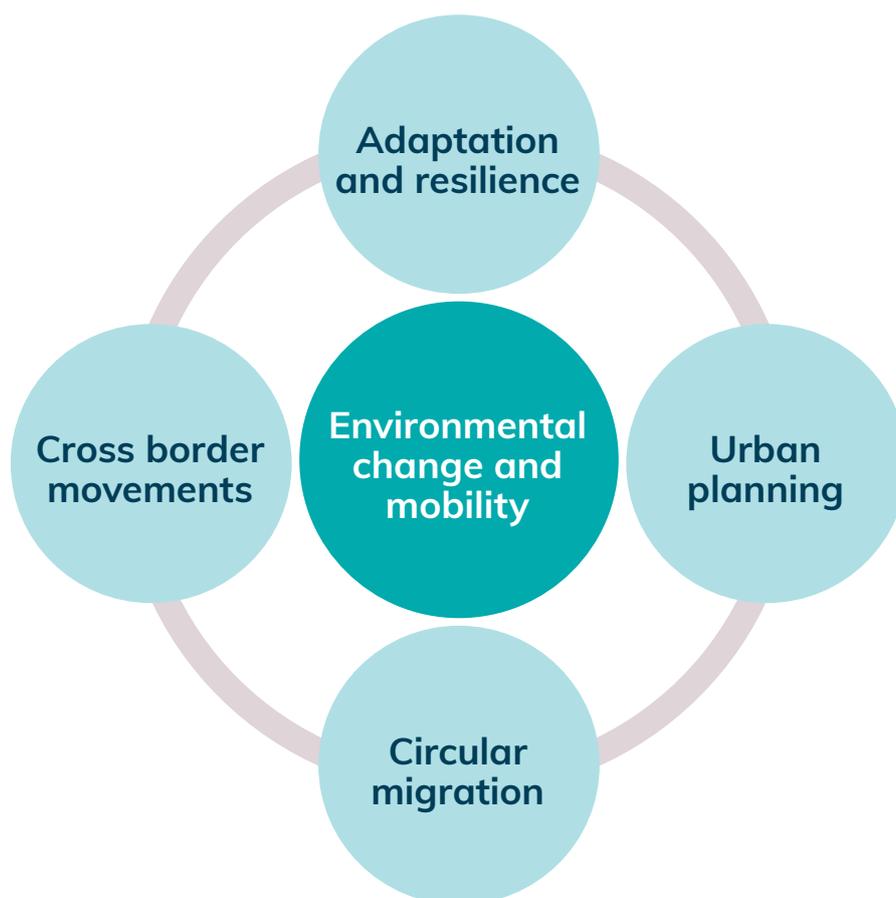
Ultimately, a nuanced understanding and approach to the issue of environmental stress and climate change and migration and mobility is crucial. Political and media discourse and commentary by climate activists, often portray a 'catastrophe' of imminent mass migration as a consequence of inaction on climate change, which is not necessarily supported by evidence. The data presented in this paper, on the interactions between environmental factors and other migration drivers, contribute to such a more nuanced picture. Additionally, the conceptual model and policy responses listed above add further nuance. The nexus between climate change and mixed migration needs to consider the full spectrum of mobility

and immobility drivers and outcomes associated with climate change. Mobility can be a sign of positive coping or adaption or a negative measure of last resort. Similarly, immobility can be both a sign of positive adaptive capacity to stay in place or one of desperation and extreme vulnerability. Each of these outcomes suggest different targeted programmatic and policy responses.[39] Policy and programmatic interventions should focus on avoiding forced immobility and forced mobility, while enabling both voluntary immobility and voluntary mobility as desirable outcomes of successful adaptation.

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39 Zickgraf, C. (2021). Stifling silos: the need for a more holistic approach to mixed migration in a warming world. In: Horwood, C. and Frouws, B. (2021). Mixed Migration Review 2021. Highlights. Interviews. Essays. Data. Geneva: Mixed Migration Centre. Available at: https://mixedmigration.org/wp-content/uploads/2021/11/Mixed-Migration-Review-2021.pdf

The MMC is a global network consistent of six regional hubs and a central unit in Geneva engaged in data collection, research, analysis and policy development on mixed migration. The MMC is a leading source for independent and high-quality data, information, research and analysis on mixed migration. Through the provision of credible evidence and expertise, the MMC aims to support agencies, policy makers and practitioners to make well-informed decisions, to positively impact global and regional migration policies, to contribute to protection and assistance responses for people on the move and to stimulate forward thinking in the sector responding to mixed migration.

The MMC is part of and governed by the Danish Refugee Council (DRC). Global and regional MMC teams are based in Geneva, Turin, Dakar, Nairobi, Tunis, Bogota and Dhaka.

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