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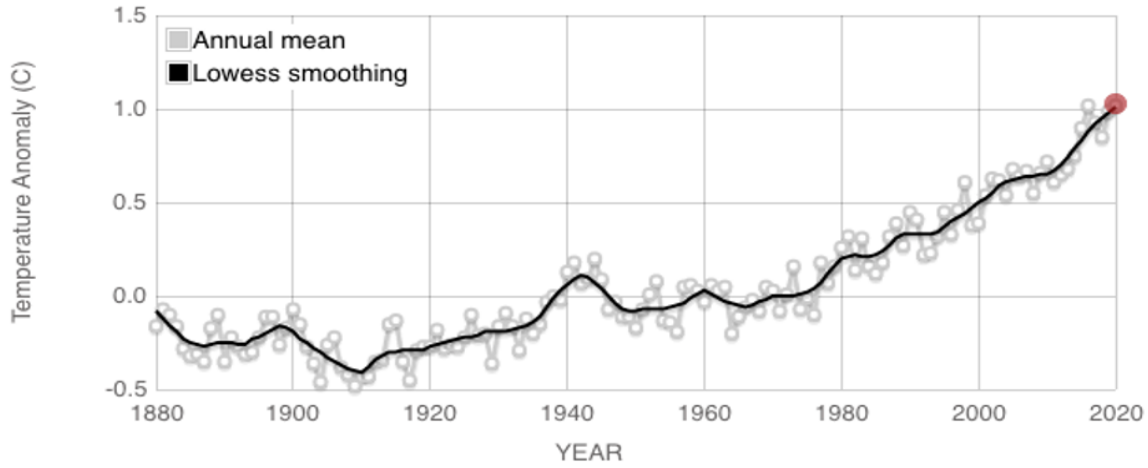
Abstract: Scientists are in agreement that climate change is a real threat to people and the planet, worldwide. Human activities are believed to be the primary cause for this change. In countries, such as Namibia, in which the majority of people in rural areas largely depend on rainfed agriculture and water resources for their livelihood, the rapid changing climate may mean that more people will likely move to the urban centres, no matter restrictive migration measures in place. The intricate relationship between climate change and human mobility, however, is a phenomenon not yet very well-articulated or established. In Namibia, while migrating to an urban area in some instances might offer potential opportunities -in the form of employment, better economic status and standard of living for migrants- but the move not only comes with negative effects and challenges for the migrants but also for urban governance in delivering services to the increasing urban masses. This study used a hybrid methodological approach by which a critical analysis and the consolidation of the existing literature on climate change, migration and urbanisation was combined and complemented with supplementary in-depth interviews carried out with 13 participants with a migratory background. The objective of the study was to investigates the nexus between climate change and migration, and subsequently examines the relevance of climate induced rural-urban mobility in Namibia. The findings of the study indicate that Namibia's increasing changing climate patterns magnifies the existing problems of rural-urban migration, resulting in Namibia's internal migration phenomenon to be determined by more than the usual factors of rural-urban migration.

Keywords: Climate change, urbanisation, migration, Namibia

1. Introduction

The UN Framework Convention on Climate Change [1, art 2] defines climate change as "*a change in climate due to direct or indirect human activity that alters the global atmosphere along with natural variation in climate*". The framework's emphasis is on increased emissions of CO2 and other greenhouse gases to the atmosphere that subsequently alter the atmosphere's radiative properties, resulting in warming of the climate system [2][1]. Climate change hence refers specifically to the rise in global temperatures.
As indicated in figure 1, the decade 2010-20 was the hottest since record keeping began in 1880. NASA's analysis also revealed that 2020 was the hottest year ever recorded and that ocean temperatures were the highest they ever been. Carbon dioxide and other greenhouse gas emissions were the main sources of this global warming.

Figure 1 Global Land-Ocean Temperature Index



Source: [4]

[1] Other human activities influencing climate include the emission of aerosols and other short-lived climate forcers, and land-use change such as urbanisation, [2].

Throughout history, climate has continually changed, but this change occurred naturally and at a slow pace [3]. What we are observing currently is, instead, an anthropogenic era of climate change because research [4] indicates that the changes are occurring at a much faster rate as result of human activity such as burning fossil fuels in the form of natural gas, oil, and coal (Fig. 1); therefore. causing the environment to change rapidly for worse. [5,6,7]. The effects and the intensity of this climate change on human migration are, however, not that straightforward to observe. For one, migration is a complex phenomenon that is based on a multiplicity of overlapping factors which make it difficult to attribute it to one driver only [8]. Therefore, the simple fact that changes are happening in the climate patterns do not automatically prove mass migration. If anything, such assumption fails to consider the full spectrum of choices of why people decide to migrate from one area to another [9]. That, at the present, there is no single definition commonly accepted at international level also makes it more difficult to pinpoint the nexus between climate change and migration. This implies that the quantification differs depending on the definition that is adopted in a particular context. Equally, the broader, but also less accurate and verifiable, is the definition, the larger is the number of migrants that can be associated with the status of environmental/climate migrants [10].

However, the deterioration of the natural system-accompanied by poor governance, poverty and social tensioncan reinforce the existing migratory patterns in any country [11]. And this is particularly true for southern Africa, and Africa in general, in which patterns of climate change happen alongside weak governances and deteriorating socio-economic development [12]. Two-thirds of the African continent is desert or dryland, and the region is affected by frequent and severe droughts, which have been particularly harsh during recent years in the Horn of Africa and the Sahel. As a consequence, an argument has been advanced that climate change is likely to worsen these existing conditions in most parts of Africa, with average rainfall predicted to decrease while evapotranspiration is predicted to increase, and therefore increasing the vulnerability of rainfed agriculture resources on which large part of the population in Africa depend for their livelihood [13]. Faced with extreme depleted sources of livelihood, Africa's rural population in such event is expected to relocate to urban areas in search of better quality of life, further influencing urban population growth in the continent, [14].

It is against this context that we are conscious of the challenge to establish the linkage of how climate change, especially climate-linked migration, affects the daily lives of Namibians. For one, this is because Namibia's complex climatic biomes makes it challenging to record and communicate climate trends. However, recent data from several weather stations in Namibia, points to a consistent pattern of an increase in daily maximum temperatures, with some biomes receiving more rainfall (therefore changing their annual rainfall portfolio), and while others are receiving less rainfall causing irreversible arid conditions. On the topping list of Namibia's changing climate is the concern that sea levels are expected to rise up by 30cm. The impacts of climate change - which Namibia's National Policy [15] defines as any significant change in measures of climate such as temperature, precipitation or wind that last for an extended period- in Namibia is estimated to worsen due to increased hot and cold extremes, seasonally changing rainfall, frequent heatwaves and longer dry spells. Crop yields are also decreasing and livestock losses have become more common. Food insecurity and food prices have increased while waterborne diseases have become the next thing to normal [16, 17].

In Namibia, the environment is the primary source of social welfare and social functioning for most of Namibia's 2.6 ml population. Namibians who live in rural areas largely depend on rainfed agriculture and water resources for their livelihood. The more the climate change, as described in above, worsen, the more the impacts will be on those in rural communities of Namibia, a situation that is likely to accelerate Namibia's urbanisation process as the changing weather patterns could drive more and more people from rural peripheries to towns in search of employment and better living conditions.

The current level of urbanisation in Namibia is 52.03 %: up from 28 % in 1991, and by 2050, Namibia's population is projected to increase by 3.98 million people means more rural-urban migration. [18,19]. Broadly speaking, Namibia's rural-urban migration relatively has had some positive effects on intergenerational poverty reduction, especially for the population in the so-called former Bantustan homelands, now transformed into 14 political regions in independent Namibia. Many migrants in urban centres of Namibia still maintain a foothold-(culturally, socially, economically) in rural areas, and contribute to the development of these areas through remittances [20]. Due to the complex nature of migration in Namibia, data about the number and nature of migrants in the country is sparse, so is information about the role of climate change. While wide sectoral responses to climate change are gaining momentum in the country, yet, climate-linked migration is still severely under-recognised and understudied. Statistical projections, however, reveals that human mobility in the country is likely to intensify further, and therefore resulting in many future urban migrants to settle in dense, informal spaces that are vulnerable and inadequately demarcated, posing serious threat to urban governance.
This work aims to revisit and draw lessons from existing findings on the nexus of climate change, migration and urbanisation, and apply it to the Namibian case as additional scholarship which can be used in understanding the climate-migration linked phenomenon better. It uses a hybrid methodological approach by which a critical analysis and the consolidation of the existing literature on climate change, migration and urbanisation has been combined and complemented with in-depth interviews carried out with 13 participants with a migratory background. After this introduction in which we have presented a general overview of the research and its significance, in

section 2 the paper covers the theoretical approach adopted on human mobility and urbanisation, with a subsection where climate induced mobility is contextualise to the Namibian setting. Section 3 describes the research methodology, whereas section 4 presents and discuss the empirical findings. A conclusion and a summary of key points and recommendations on how to address urban mobility in the wake of climate change in Namibia, complete the paper.

2. The Mobility and Urbanisation Challenges

Human mobility has often been looked at from an international and intercontinental perspective. Before the humanitarian crises, caused by the war in Ukraine, migrants have usually been perceived according to a Eurocentric stereotypical lens and / or a flawed representation of them [21,22]. A simple quest for the word migration on the main web search engines, such as *Google, Yahoo* or *Bing*, leads to web sites, news or academic articles referring to international migration and/or movements from poor and/or war-torn areas to Western countries, mainly in Europe. The images of Africans climbing on the anti-immigration fences, built on the Moroccan-Spanish borders, or those of the migrants rescued in the Mediterranean Sea on overcrowded boats, while trying to reach the *Europe's promised land* are some of the examples that capture the attention of the media [23,24].
Based on this Eurocentric narrative of migration, particularly in the last two decades, human mobility has been analysed in order to find solutions to the supposed threats that such migratory movements could cause in the opulent Western Europe [21,25]. Internal migration did not, and does not receive the same level of attention, being often analysed primarily as a domestic affair of the developing nations associated to events of crisis, such as war or famine. Concurrently, and instrumental to the above positions, the discourse on human mobility has shifted around in terms of the ways how to classify the migrating individuals: Some of the common identification include: economic migrants (contract/migrant workers, labour migrants, skilled professionals), refugees, asylum seekers, Internally Displaced Persons (IDPs), and more recently environmental or climate migrants [26,27,28]. Such categories are functional in assisting the host governments in regulating and controlling human mobility and selecting who should be entitled of protection and assistance. In our view these categories, however, create a false separation among migrants which do not add much in explaining, understanding and addressing the migration phenomenon. Our perspective is in line with a growing literature [29, 30, 31, 32, 33] that goes beyond those categories and look at migration holistically, as fundamental human rights issue. It is a fact that human mobility has increased in intensity in the last decades [34], an event for which data is easily available. In 2020 there were more than 280 millions of international migrants; when global population growth is factored in, those numbers appear, however, less frighting, considering that from 1970 to 2020, their proportion of world population has only moved up of 1.3 % points, from 2.3 to 3.6 % [35,36].

Table 1 International Migrants Stocks 1970-2020

Year	Number of International Migrants	Migrants as % of world's population
1970	84,460,125	2.3
1975	90,368,010	2.2
1980	101,983,149	2.3
1985	113,206,691	2.3
1990	152,986,157	2.9
1995	161,289,976	2.8
2000	173,230,585	2.8
2005	191,446,828	2.9
2010	220,983,187	3.2
2015	247,958,644	3.4
2020	280,598,105	3.6

Source: [37,35]

On the other hand, determining the size of internal migration is not an easy task because of the non-availability of reliable data. Bell and Muhidin [38] (were the first in the last two decades to comprehensively analyse the internal migration fluxes. They were able to provide a rough approximation of the global scale of internal migration, suggesting that, "at the turn of the millennium, in the world as a whole, some 740 million people were living within their home country but outside their region of birth" [38, p. 55].
Bell and Charles-Edwards [39], using a much ample sample of 70 countries, extracted from the data set on the project Comparing Internal Migration Around the Globe (IMAGE)[2], made an upward revision of the figure

2 In 2013 IMAGE had data on round population census for the year 1999, 2000 and 2010 when available from 179 countries. The 70 countries selected by Bell and Charles-Edward for the studies represented 71% of the total population in 2010 having

estimated by Bell and Muhidin in 2009, bringing to 763 million the number of people living in the country of birth but outside their region/area of birth[3]. Among them one should include the internally displaced persons (IDPs) whose number is increased more than ten times between 1993 and 2019 [40]. The majority of environmental migrants can be associated to the IDPs' category which encompasses those who "…*have been forced, or obliged to leave their habitual residence as a result of, or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized state border"*, [41, p.3]. Moreover, there is a clear convergence and an overlap between conflicts and disaster areas, even if, as exposed by McAuliffe, and Triandafyllidou [36] in the last years many more people have been displaced due to disasters than conflict and violence, and many more countries are affected by disaster displacement[4].

Moving to the migration's drivers, a substantial body of literature indicates that economic considerations motivate migration [42]. The most basic model, [43,44] explaining migration as the result of geographic difference in wages among labour abundant supply and demand areas. Urban areas offer job opportunities with higher salaries, and attract individuals who are pushed away from the rural areas due to lack of prospects and/or because of lower remunerations. At international level the migration movement is similarly driven by wage differentials between capital-rich industrialised countries, which offer higher salaries and labour-intensive, and underdeveloped countries with fewer opportunities and lower salaries, 45,46,47]. Such economic explanations can be related to what Giddens [38] calls reflexive life planning. According to Giddens, the individual biography "*must continually integrate events which occur in the external world and sort them out into the ongoing story about self*", [48, p. 54]. In this case, the decision to move or not to move, taken by the agent (the migrant), is the result of a reflexive process which makes him/her to balance between opportunities and risk, and the self and the outside world. Though economic evaluations have a role in the decision to move, mobility remains primarily a social phenomenon in nature, (49,50,51].

As noted by Clemens [52], the relationship between level of income and international migration shows that emigration increases with higher income levels, which is consistent with McAuliffe and Trianddafyllidou's [36, p. 213] findings that "*between 1995 and 2020, migration from low and medium HDI countries increased, but only slightly*". The migrants are here considered as agents who reflexively interact with the external environment, and both directly and indirectly can change their social and economic status [53]. Economic considerations hence intertwine with a range of other factors, associated to the opportunity to improve well-being beyond economic aspects such as social capital and cultural links, demography and demographic change, safety and protection, as well as geography and proximity, [54,55,56,57,58,59]. It is important to note, however, that economic factors play a decisive role in the decision to move, particularly in the presence of climate induced events when the most vulnerable people may lack both the resources to prevent the events as well as those to cope with its effects. On the other hand, slow-onset events give more time to adapt and henceforth may prevent or delay the decision to move, making less evident the correlation between climate change and migration.

Having described the theoretical underpinning of the drivers of migration we move to the analysis of the urbanisation challenges posed by mobility.
Rural - urban migration movements have been conventionally associated to the push and pull factors accompanying the transformation of a country's economic structure. With the introduction of cash crops, which in turn reduced the opportunities in the traditional agriculture sector while at the same time creating paid jobs in the manufacturing and services sectors in the urban centres, the rural-urban migration phenomenon was put in motion [60,61]. As an antithesis, scholarship suggests that promoting rural development is the answer in reducing rural-urban movements of people. While there is some truth to such theoretical assumptions, we are of the opinion that urbanisation cannot really be halted. Rural development ultimately also has the same effects of promoting the growth and transformation of rural centres into peri, and new urban areas, [62] which, if not properly managed, will lead to similar situation of poverty entrapment [63] experienced by rural migrants in the megacities.

Between 2000 and 2014 the number of people, world-wide, living in urban slums increased from 807 million to 883 million [64]. New-comers/migrants normally settle in these are, poorly serviced or without services, and with weak form of urban governance [62]. In addition, they often have problematic relationships with local government, in part, this is because they live in informal settlements, and are typically engaged in semiformal or informal activities. Ultimately, they end up having limited resources, insufficient access to basic amenities, due to low socio-economic status [65 Das, M]. They are also highly vulnerable in that they are likely to experience a life of exclusion and inequality [66]. Slums are frequently located near open drains or in low-lying areas where land is more affordable but extremely exposed to natural disasters.

a full coverage of countries in all continents, 16 countries in Africa, 25 in Asia, 10 in Europe, 23 in Latin America and the Caribbean 3 in North America and 3 in Oceania.

3 This meant that nearly 12 per cent of the world population in the year 2010 was made of internal migrants.

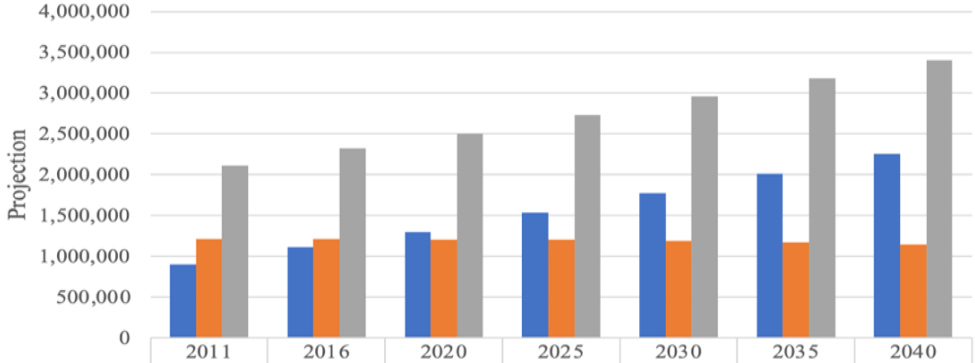
4 In 2020 new displacements occurred 144 times due to disasters compared to 42 times due to conflict and violence [36].

2.1 Climate induced mobility in Namibia

Measured at 825,419 km2 (318, 772 sq. mi.), Namibia is not only the least densely populated country in the world [67, 68], but also, from a climate perspective, one of the driest countries in Africa. Located between the Kalahari and the Namib deserts, 22% of its area is classified as hyper-arid, 33% as arid, 37% as semiarid, and only 8% is sub-humid [69,70]. Due to shortages in surface water, the country relies heavily on groundwater reserves which are subject to low recharge rates from rainfall and periodic ephemeral floods. As indicated by the Namwater hydrological services *"…of the rainfall received, 83% is evaporated, 14% is lost through transpiration, 2% is run off in the rivers and 1% seeps underground*"; the country is hence, water stressed and water has always been a scarce resource, [71].

The country's primary industries represent almost 20% of the GDP, are principally from extraction and processing of minerals for export. Agriculture, fisheries and tourism also plays a prominent role in the country's economy [72]. Though, since the end of apartheid in 1990, there has been some improvements in the major socio-economic indicators, which resulted it being classified as an upper middle-income country by the World Bank, poverty reduction efforts have yielded mixed results of 40%. And, as a consequences poverty reduction results are uneven across its 14 political regions, and therefore remains a serious problem, particularly for the rural population. As result mobility towards urban centres has accelerated resulting in mostly unplanned urbanisation. Due to poverty and unemployment, in 2020 urban population overcome rural population representing 1,295,820 (51.7%) and 1,208,678 (48.3%) respectively (Fig. 2). This means rural areas are expected to shrink further, while urban areas are projected to increase sharply mostly due to rural to urban migration.

Figure 2. Urban and Rural population Growth projections 2011-2040 (medium variant)



	2011	2016	2020	2025	2030	2035	2040
Urban	903,434	1,112,868	1,295,820	1,531,917	1,770,807	2,011,793	2,256,123
Rural	1,209,643	1,211,520	1,208,678	1,201,421	1,189,735	1,173,212	1,145,764
Total	2,113,077	2,324,388	2,504,498	2,733,338	2,960,542	3,185,005	3,401,887

Source: Our elaboration from [73, 74].

Despite such movements, one can observe that migration studies in the country have tended to focus on the pre-independence migration flows [75, 76]. Analysed from a historical perspective, migration has been seen as the result of the forced contract labour system (also known as migrant/forced labour system) introduced during the colonial/apartheid period, which was the central element of the Namibian colonial economy of the then South West Africa SWA, now Namibia, for almost one hundred years. Initiated under the German rule (1884-1915), the forced labour regime instituted in 1907, was fully utilised under the South African Administration (1915-1990), and it remained practically unaltered until the workers' strike forced its abolition in 1971-72 [77].
As a result of contract labour practices, thousands of native workers, mainly from the northern districts of the country (the former Owamboland, Kavango and Caprivi), were displaced hundreds of kilometres away and uprooted from their families and places of their birth, often, to the coastal towns in the south, the central area, and the capital Windhoek. The aim was to fill the growing needs of cheap manpower coming from the mining and the fishing industries, as well as the needs of the commercial farming sector. This was a forced migration rather than driven by the specific need/decisions of the migrants by choice. Author's nr3 father was part of this migrant worker system and fully remember the experience of his father not being present in his life because his was away for 6 to 12 months for contract work. On the other hand, post-independence migration studies largely analysed the rural-urban migration patterns focusing on the migrants' socio-economic impact on the urbanisation process [78,79,80], and on women empowerment [59]. Our paper uniquely diverts from that trend and introduces the climate change element to such line of research.

Climate change has increased the occurrences of both sudden onset events such as floods, and slow-onset events such as droughts, which by impacting on agricultural productivity are generally associated with the rural to urban movements [81,82]. The 2008, 2011 and 2013 floods in the north and central regions caused widespread damage destroying livelihood in both rural and urban areas. More than 350,000 people (nearly 17% of the country's population) were affected and about 13,500 where displaced and 9,200 were relocated to higher grounds [83,84,85]. However, the affected areas have been historically susceptible to the floods and the local communities

over generations used to move as an adaptation strategy, and then rebuild in the flood prone areas and the end of the flood event. We acknowledge that Namibia's changing weather patterns are making it difficult for rural people to rely on rainfed agriculture and water resources for their livelihood. We hypothesize that in the absence of mitigation measures, recovery processes and specific intervention aiming at addressing the structural gaps in the rural areas, migration to urban towns in search of better living conditions remains the only option left.

3. Methodology

This work uses a hybrid methodological approach by which a critical analysis and the consolidation of the existing literature on climate change, migration and urbanisation has been combined and complemented with in-depth interviews carried out with 13 participants with a migratory background. Qualitative research is best if one aims to advance more thoughtful of the existence of any unknown event; to understand the meaning and dynamics of social or human problems [86] to get an accurate perception of things, as well as to recognize factors that may be tested and describe situations which would not have been accurately interpreted using quantitative study [87]. The objective is to assess the generality of previous literature findings and explore trough the participants' narratives the dissimilarities/similarities that emerge between the participants' narratives and the existing body of evidence, and to generate a new and concrete interpretation of the phenomenon observed**.** In this study, a thematic analysis was carried out to interpret the participant's narrative, without a predetermined coding scheme [88], key themes that emerged in the interviews were recorded in the researchers' field journal and used to interpret the findings. An inductive approach has been applied where the theory has been generated after data has been collected and analysed accordingly [89]. The sample was purposefully selected to yield cases that were information rich; starting from an initial informant, known to one of the authors, the remaining participants were identified via chain referral and selected based on the importance of availability, the willingness to participate, and the ability to communicate [90]. Face to face interviews were conducted between the 1st and 30th of June 2022, in a location convenient to the respondents.

Table 2 below gives a description of the participants; almost half of the respondents originate from the Kavango's regions in the North of the country which are usually more water abundant, the rest from the other Northern regions which are those where traditional agriculture is prevalent. The respondents' average age is 33 years and the majority of them are prevalently engaged in informal activities in the urban area. In line with the recent genderisation of rural to urban migration [11, 91] the sample is biased towards female respondents, who are also those that take the burden of the agricultural activities and this could reinforce their propensity to move.

Table 2 Respondents' characteristics

	Gender	Age	Type of work in urban area	Region
1	Male	49	Formal	Kavango East
2	Female	38	Informal	Kavango East
3	Female	25	Informal	Kavango West
4	Female	53	Informal	Kavango West
5	Female	24	Informal	Kavango West
6	Male	37	Informal	Kavango West
7	Male	27	Formal	Kavango West
8	Female	23	Informal	Oshikoto
9	Male	26	Formal	Ohangwena
10	Female	35	Informal	Zambezi
11	Female	29	Informal	Omusati
12	Male	28	Informal	Oshana
13	Female	30	Informal	Oshana

Participants had shown willingness to be interviewed and informed consent for their participation was obtained; the consent agreement allowed the participants to withdraw from the interviews at any time. Although the number of respondents may appear limited, saturation of the sample was reached with the 13 identified participants [92].

4. Interview Results

In this section, we present the results as expressed by the respondents. What clearly emerged from the respondents' narratives is the suggestion that changes in weather patterns have created the conditions for significant change in the living conditions ultimately leading the respondents to move to the urban areas. The findings, in line with what observed by Angula [93], shows that no distinction is made between climate change and weather variability based on the observed changes experienced over the past decades, as clearly indicated by the respondents:

"*Before when the rain was reliable, few of the elders worked here in Windhoek or Johannesburg as migrant labour, many stayed in the village as they were able to produce enough food for the family*" (respondent 1).

"…over the last ten years the impact of climate change has become visible, effecting livelihoods in the process. Many people are implicated without a choice as harvest are inconsistently poor. Harvest is not good as years of our forefathers" (respondent 7).

"*Yes, when I was young in those past seasons, we worked the land and produced food. This lifestyle shaped by agriculture is disappearing as our crops are increasingly burnt from the sun. We are struggling to make a living*", (respondent 10).

Respondent 1's observation, a 49 years old male from the Kavango East, is revealing of the challenges facing those living in the rural areas*, "I cannot live in my village when my wife and children and extend family have nothing to eat, the soil is losing fertility, poor rainfall"*, (respondent 1).

This is echoed by respondent 4, a 53 years old female from the same region, who notices that "*... climate change motivated my move to escape poverty somehow as we are not securing enough food through agriculture*", (respondent 4).

Although the distinction between climate change and weather unpredictability is not apparent in the respondents' narratives, one can clearly observe that push factors on the side of the rural areas, such poor rainfalls as a result of drought situation in North Western and far north of Namibia respectively, resulting in poor harvesting and lack of food, as well as lack of opportunities and services, are driving people out of the rural areas.

"*If the harvest was good, I could have stayed in my local area. I came here to search for better survival opportunities away from agriculture that have become difficult in the mist of limited rainfall"* (respondent 4).

"*I could have not moved if I had food produced from my land. Why should one move if you have food? To look for what?*.", (respondent 10).

"*Climate change drove me out of my village, life is becoming hard day by day as the harvest has become poor, everyone is affected, agriculture losing it values because of limited rainfall*", (respondent 8).

On the other hand, respondent 6, a 37 years old male from Kavango West provides a different angle to the researched question, suggesting that the urban areas (Windhoek) continue to exerts a strong attraction for what they can offer in comparison to rural areas such as job opportunities, better network coverage, better health care and access to education.
"*…major reason that motivated* [the] *move is poverty related and wanted to get of the rural area in search for access to better services. Rural area has many challenges as farmer's sometime struggle to get access to the market and the prices for agricultural product is not motivating remain poor in the rural area. Market for rural farmer is non-existed*".

This view is echoed by respondent 7, a 27th male also from Kavango West.
". *If we were provided* [by the government] *with water to irrigate our crops, I will stay in my village against all odds of climate change"*.

5. Discussions
The interviews findings reveal that there is a correlation between climate change and migration, and hence urbanisation, even if the strength of the correlation between climate change and migration cannot be lucidly identified in the respondent's narratives. Climate change is probably a contributing cause but not the main reason to the decision to move; it remains, however an area of community and national concern in Namibia, since it affects people in different ways.

Participants personally had to confront climate change by adjusting to migrate and reported that they considered climate change as a factor that pushed them to move and many could have opted to stay in areas of their birth had they received the proper support from the government and their harvest been good to ensure food security for themselves and families. In this our findings echoes similar studies showing that response to climate change depends on available resources of the people affected and the existence of adaptive responses in situ, which can ultimately encourage return migration [94,95,96,97,98]. At the same time, many are adjusting to their new found realities in urban areas, where they have become dwells in the informal settlement.
It is difficult for participants to adjust in towns because the urban life was entirely different from the village, especially when the participants work in the informal sector and their sources of income are limited. All participants indicated that their desire to return to the villages more often is prevented by financial difficulties but as noted by respondent 13, a 35 years old female from the Zambesi region, "... [I visit the village] *annually but once money is available more visit occurs as sense of belonging is in the village*" confirming that if they had the opportunity they would have not moved "*I came here to search for better survival opportunities away from agriculture that have become difficult*", (respondent 4)

Overall, 109 family members from the respondents' homesteads also moved out in the recent years to Windhoek, or other urban areas; an average of 8 members per respondent, ranging from a minimum of 3 to a maximum of 20.

These data provide a direct confirmation of the Namibia Statistics Agency analysis of a shrinking rural population in the period since 2011 to 2020 with a further urban population increase, [73, 74]. This is in line with Gitonga and Visser's findings [99] that each additional migrant increases the households' annual consumption spending.
On the other hand, the high number of household's members moving to the urban areas confirm rural migration to be an adaptive livelihood diversification strategy to climate change, to seek a supportive economic base which is not available in rural areas.

Over the last decade, scholars and policy makers have started to pay more attention on the impact of climate change on human mobility [100,101]. The 2010 Cancun Adaptation Framework is the first major climate policy document which refers to human mobility associated to the climate change-induced displacement, human mobility and planned relocation [102]. However, depending on the economic and socio-political conditions in the respective regions of origin, the connection between climate change, mobility and hence urbanisation are not always very well made. Our findings confirm this perspective.

The nexus of climate change-human mobility is generally presented using sensational and alarming prediction, promoting fear-based stories of waves of climate migrants forced to move from their place of residence [103,104] ultimately landing to Europe and North America, [105]. These predictions, although well intended, aimed at educating on impact of climate change and promoting humanitarian intervention, may have the opposite in terms of unintended effects. Particularly in Europe, and elsewhere where nationalist/populist movements have been emerging very strong, where the fear of environmentally induced mobility is used to promote restrictive migration policies or boost parties' political agenda, [104]. As stated by several authors [36,104,106], mobility in the event of an adverse climatic events, may depend on personal wealth and choice of the affected individual. For this very same reason, while acknowledging that climate changes exist, it can and do affect the migration's drivers, in the paper we follow a broader approach looking at the migration phenomenon in its whole complexity. What is clear, from this study, is that climate change, per se, does not make people to move but it produces effects and aggravates present vulnerabilities that make it difficult for people to survive where they are, [28]. On the other hand, environmentally induced migration, particularly sudden-onset events [107], generally echoes the same pattern of all other forms of migration. The movement is mostly internal or follow a regional/continental root, and rarely environmental migrants move large distances/intra-continentally. This observation is strengthened by Cattaneo and Peri's [108] observation that environmental induced movements depend on the initial level of income of the affected individuals.

Although the movements are hard to predict, one trend is however apparent, people do move to the urban areas. In 2020 at least 2.59 billion people lived in metropolises with more than 300,000 inhabitants representing approximately 60% of the world's urban population. Alongside the natural urban population increase, human mobility does make a significant contribution on the urban's growth, particularly in those countries where the urbanisation process is more recent [109]. It is projected that the number of people living in metropolises in 2035 will increase to 3.47 billion representing 39% of the global population and 62.5% of the world's urban population, [110].

In general, climate change affects urban livelihoods through a broad spectrum of impacts: from the type of services provided to the newcomers to the opportunities open to them. But cities/towns are also exposed and vulnerable to human provoked natural hazards as denoted by Gu [111] who assessed the level of exposure and vulnerability of 1,860 world cities to six natural hazards such as floods, cyclones, earthquakes, droughts, landslides, and volcanic eruptions. Gu's findings reveal that almost 58% of the sample's cities were highly exposed to at least one of the natural hazards he studied, less than 14%, and around 2% were severely exposed to more than two and three natural hazards, respectively. The quality of housing and infrastructure available, as well as the level of preparedness among the city's population and key emergency services, increase or reduce the scale of the risk from these extreme weather events. However, this also open the ground to what we call here the urbanisation divide, which mostly impact, as indicated in section 2, the newcomers to urban areas.
The projected reduction of renewable surface and groundwater resources caused by climate change [112] combined with the existing poor socioeconomic conditions in many sub-tropical countries may ultimately have an impact on accelerating the rural to urban movements. In Namibia the impact of climate change on human mobility and hence on the growing urbanisation process in the country is an area that has not received adequate attention in research hence our interest.

6. Conclusion/recommendation

The purpose of this paper addresses the rural to urban mobility in the wake of climate change in Namibia. Erratic weather pattern with longer drought spells, together with the affirmation of commercial farming have reduced farming in the rural areas, even those based on subsistence activities. The findings confirm the historical

demographic trends of the last decades, indicating that people move away from rural areas to find new survival opportunities in cities such as the City of Windhoek. Although climate change is not the main motive behind such movement, it is undoubtedly a concurrent factor. The increasing population is putting a heavy burden on the cities' resources, this will actually mean that urban areas have to prepare to deliver services to the demand of the rising population, which is bold on seeking for opportunities.
Climate related events such as poor rainfalls and droughts create patterns of mobility, however the findings of rural to urban migration in Namibia indicates that the decision to move is often determined by more than environmental factors [113] while climate change it magnifies the exiting problems leading to migration [93]. In this the findings echoes Suckall et al.'s findings indicating that migration drivers were not based on resource scarcity but "*potential migrants were motivated by pursuit of life outside of farming*" [114, p. 7]. Although our findings cannot be regarded as representative for all countries considering the small sample used and the specific characteristics of Namibia, we believe that they present a different scenario, whereby climate change is one of the many drivers of migration, hence the necessity to focus on the structural factors, since migration may be a last resort decision, taken under duress and by lack of any other alternative options, [115].

On the other hand, Namibian will have to adapt to live with the changes in the climate and build communities that are resilience. Enacting public policies as weapons to fight climate change is inadequate without broader political will and community involvement. Adaptation should be tailored to local levels with respect to indigenous, scientific and technological interventions. Information sharing through public awareness campaigns should be intensified in the mass media and transforming the curriculum to feature climate change.

At the same time, one cannot fail to notice that urbanization processes have too often paid little attention to equality and wealth distribution, or to environmental and social sustainability, and virtually none to human rights, [116]. As a result, millions of people have been left in unacceptable living conditions in overgrowing and poorly managed urban centres. In line with the New Urban Agenda, [117], readdressing the way cities and human settlements are designed, governed and managed, is a key to help ending poverty, reduce inequalities, promote sustained, inclusive and sustainable economic growth; foster resilience; and promote a process which is environmentally sustainable and social inclusive. Recalling that cities are at the forefront of managing migration it is important to promote a safe and orderly settlement for the new comers, while providing infrastructure and services in safe locations as clearly indicated in the Marrakech mayors' declaration, [118].
The above considerations highlight the need to focus on improved policies for better urban planning and land-use and city management, considering that the scale of the risk from climate change events is much influenced by the quality of housing and infrastructure, the extent to which risk reduction within urban construction and expansion has been ensured and the level of preparedness among the city's population and key emergency services It necessary a paradigm shift to change the perception of migration in general, and rural to urban migration in particular, as an issue to an opportunity to develop effective urban adaptation policies to climate change. On the other hand, adaptive agriculture as well as disaster preparedness, can help to mitigate climate changes hazards, [119]. The Namibian government so far has, mainly, concentrated on policy measures to govern climate change. We critique this approach as it proves to be lacking and does not address the fundamental economic, environmental and social change required to achieve Namibia's climate objectives that meet the country's obligation and its international obligations.

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References

1. United Nations, United Nations, Framework Convention on Climate Change, accessed on 3 march 2022, https://unfccc.int/resource/docs/convkp/conveng.pdf
2. IPCC, Summary for Policymakers. in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Masson-Delmotte, V., et al. (eds.), Cambridge University Press, 2021.
3. Venditto, B, Collective leadership and climate change, *Development Studies Newsletter*, Special Issue Leadership and Development, 2021, 3(1), 8-9.
4. NASA, Global climate change: Facts, accessed on 2 April, 2022, https://climate.nasa.gov/vital-signs/global-temperature/
5. Hausfather, Z., Why scientists think 100% of global warming is due to humans. Carbon Brief, 2017, accessed on 18 February 2022, https://www.carbonbrief.org/analysis-why-scientists-think-100-of-global-warming-is-due-to-humans
6. Abhinav, A.; Arjun, K.; Simi, M., Interlinkages between urbanization and climate change: Identifying and understanding the challenges and the prospects. *Journal of Regional and City Planning* 2020; 31(3), 285-300.
7. National Research Council, *Climate change: evidence and causes: Update 2020*. Washington, DC: The National Academies Press, 2020.

8. Mbiyozo, A-N., African city must prepare for climate migration, *Institute for Security Studies* 15 Jan 2021, accessed on 30 August 2022, https://issafrica.org/iss-today/african-cities-must-prepare-for-climate-migration
9. Venditto, B., Water, migration and environment in a Mediterranean perspective, *International Journal Migration and Residential Mobility*, 2018; 1(4), 283-299.
10. Caruso, I., Venditto, B., Le migrazioni ambientali nel Mediterraneo: il caso studio dei paesi del Medio Oriente e del Nord Africa, in Bruno, C. G.; Caruso, I.; Sanna, M.; Vellecco, I, (Eds.). *Percorsi Migranti*, (pp. 115-130). Milano: McGrow – Hill, 2011.
11. Awil, M.; Alpha, K.; Sönke, K., Climate change, development, and migration: an African Diaspora perspective, Germanwatch, www.germanwatch.org/en/8456
12. Mpandeli, S.; Nhamo, L.; Hlahla, S.; Naidoo, D.; Liphadzi, S.; Modi, A.T.; Mabhaudhi, T. Migration under climate change in Southern Africa: A nexus planning perspective, *Sustainability* 2020; 12, 4722.
13. Abrams, L., *Unlocking the potential of enhanced rainfed agriculture*. Report no. 39. SIWI, Stockholm, 2018.
14. Mercandalli, S.; Losch, B, (eds.), *Rural Africa in motion. Dynamics and drivers of migration south of the Sahara*, FAO and Centre de Coopération Internationale en Recherche Agronomique pour le Développement, Rome, 2017.
15. Ministry of Environment and Tourism, *National Policy on Climate Change for Namibia*, Windhoek, Namibia 2010.
16. USAID, Food Assistance fact sheet: Namibia, USIAD, 2020, accessed on 15 February 2022, https://www.usaid.gov/namibia/food-assistance
17. FAO, Crop prospect and food situation, Quarterly Global Report, 2022, 1, Rome.
18. Namibia Statistic Agency, *Namibia population projections (2011-2041)*, Namibia Statistic Agency, Windhoek, Republic of Namibia. 2014.
19. Mulama, L., *Population Dynamics*, National Planning Commission, Republic of Namibia, 2015.
20. Venditto, B., The construction of the self: Narrative of rural migration in contemporary Namibia, *Africa N.S*, 2019; 1(2), 97-118.
21. Flahaux, M-L.; de Haas, H. African migration: trends, patterns, drivers, *Comparative Migration Studies*, 2016; 4, 1.
22. Hinojo, A., Africa from the West: A biased view. Accessed 23 November 2021, https://lab.cccb.org/en/africa-from-the-west-a-biased-view/
23. Euronews, Melilla, decine di migranti superano le barriere di filo spinato accessed on 10 April 2022, http://it.euronews.com/2014/02/17/melilla-decine-di-migranti-superano-le-barriere-di-filo-spinato/
24. Baratta, L., Con i Balcani bloccati, la Spagna ora teme lo spostamento della rotta dei migranti, *Linkiesta* 2016, accessed 10 April, 2022, http://www.linkiesta.it/it/article/2016/03/15/con-i-balcani-bloccati-la-spagna-ora-teme-lo-spostamento-della-rotta-d/29614/
25. Caruso, I.; Venditto, B., African migration: the case of Western Africa, in *Human mobility: Migration from a European and African viewpoint*, Bruno, G.C., Caruso, I., Venditto, B. (eds.) (pp 233-254), Rubbettino: Catanzaro, 2013.
26. Wacker, E.; Becker, U.; Crepaz, K., *Refugees and forced migrants in Africa and the EU: Comparative and multidisciplinary perspectives on challenges and solutions*. Springer, 2019.
27. Fasani, F., *Refugees and economic migrants: Facts, policies and challenges*, CEPR Press, 2016.
28. Laczko, F.; Aghazarm, C., *Migration, environment and climate change: Assessing the evidence*, International Organisation for Migration: Geneva, 2009.
29. Betts, A., Survival migration: A new protection framework, *Global Governance*, 2010; 16: 361-382.
30. Crawley, H.; Skleparis, D., Refugees, migrants, neither, both: Categorical fetishism and the politics of bounding in Europe's migration crisis, *Journal of Ethnic and Migration Studies*, 2018; 44 (1), 48-64.
31. Foster, M*., International refugee, law and socio-economic rights*, Cambridge: Cambridge University Press, 2007
32. Elliott, S., Call me by my name, *Anti-Trafficking Review*, 2018; 11, 133-136.
33. Pijnenburg, A.; Rijken, C., Moving beyond refugees and migrants: reconceptualising the rights of people on the move, *Interventions*, 2021; 23(2), 273-293.
34. Department of Economic and Social Affairs. (2020). International migrant stock: The 2019 revision. United Nation.
35. UN DESA, *International Migrant Stock 2020*, New York, 2021.
36. McAuliffe, M.; A. Triandafyllidou (eds.), *World Migration Report 2022*. International Organization for Migration (IOM), Geneva, 2021.
37. UN DESA, *International Migrant Stock: The 2008 Revision*, New York, 2008.
38. Bell, M.; Muhidin, S., Cross-national comparisons of internal migration. Human Development Research Paper 2009/30, UNDP, accessed 2 July 2021, http://hdr.undp.org/sites/default/files/hdrp_2009_30.pdf
39. Bell M.; Charles-Edwards E., *Cross-national comparisons of internal migration: An update on global patterns and trends*, New York: United Nation, 2013, accessed 2 July 2021, http://www.un.org/en/development/desa/population/publications/pdf/technical/TP2013-1.pdf
40. IDCM, *Global report on internal displacement 2021. Internal displacement in a changing world*, Norwegian Refugee Council, 2021.
41. Africa Union*, Convention for the protection and assistance of Internally Displaced Persons in Africa*, Kampala Convention, 2009.
42. Adepoju, A., Links between internal and international migration: the African situation, in C. Stahl (Ed.), *International migration today, volume 2 Emerging issues* (pp. 34-45). University of Western Australia: UNESCO, 1988.
43. Lewis, W.A., Economic development with unlimited supplies of labour, *Manchester School of Economic and Social Studies*, 1954; 22, 139-191.
44. Harris, J. R.; Todaro, M.P., Migration, unemployment and development: A two-sector analysis, *American Economic Review*, 1970; 60, 126-142.
45. Piore, M., *Birds of passage. Migrant labor and industrial societies*, New York: Cambridge University Press, 1979.
46. Itzo, I. (2008). Internal migration: a review of the literature. MPRA Paper, 2008; 8783, accessed 2 February2015, http://mpra.ub.uni-muenchen.de/8783/
47. Gurieva, L. K.; Dzhioev, A. V. (2015). Economic theory of labour migration, *Mediterranean Journal of Social Science*, 2015; 6(7), 101-109.
48. Giddens, A., *Modernity and self-Identity. Self and society in the late modern age*, Cambridge: Polity, 1991.

49. De Jong, G.F.; Fawcett J.T. (). Motivations for migration: An assessment and a value-expectancy research model, in: *Migration decision making. Multidisciplinary approaches to micro level studies in Developed and Developing Countries,* G. F. De Jong; R.W. Gardner (Eds.) (pp. 13-58), New York: Pergamon Press, 1981.
50. Porters, A., *The Economic sociology of immigration*. New York: Russell Sage Foundation, 2015.
51. Haug, S., Migration networks and migration decision-making. *Journal of Ethnic and Migration Studies*, 2008; 34, (4), 585-605.
52. Clemens, M.A., Does development reduce migration? *IZA Discussion Paper Series*, 2014; 8592.
53. Venditto, B. *Human mobility and Namibian family transformation: an analysis of socio-economic development and family-migrant connections in contemporary Namibia*. Unpublished Master Thesis, University of Namibia, Repository, 2018.
54. Stark, O., *The migration of labor*, Cambridge: Basil Blackwell, 1991.
55. Faist, T., *The volume and dynamics of international migration and transnational social spaces*, Oxford: Clarendon, 2000.
56. O'Reilly, K., *International migration and social theory*, Basingstoke: Palgrave Macmillan, 2012
57. Massey, D. S.; Arango, J.; Hugo, G.; Kouaouci, A.; Pellegrino, A.; Taylor, J.E., *Worlds in motion. Understanding international migration at the end of the millennium*, Oxford: Clarendon Press, 1998.
58. de Haas H. (). Migration and development: a theoretical perspective, International Migration Review, 2010; 44 (1).
59. Portes, A.; Rumbaut, R.G., Immigrant America. A portrait, updated, and expanded. University of California Press, 2014.
60. Mini, S.E. The impact of rural-urban migration on the rural economy in Eastern Cape villages. (Unpublished paper delivered at the HSRC migration workshop, Pretoria, 17-20 March, 2003 accessed on 10 May 2022 http://www.hsrc.ac.za/en/research-data/view/89
61. Alarina, C.I., Factors influencing rural-urban migration of youth in Osun State, Nigeria, *Journal of Tropical Agriculture, Food Environment and Extension* 2018; 17(3), 34-39.
62. United Nations, *World Urbanisation Prospect. The 2018 Revision*, Department of Economic and Social Affairs, Population Division, New York: United Nation, 2019.
63. Dao, N.T.; Edenhofer, O., On the fiscal Strategies of escaping poverty–environment traps towards sustainable growth, *Journal of Macroeconomics*, 2018; 55, 253-273.
64. United Nation, *The Sustainable Development Goals Report, 2018*, United Nation: New York, 2018.
65. Das, M.; Das, A.; Momin, S.; Pandey, R. Mapping the effect of climate change on community livelihood vulnerability in the riparian region of Gangatic Plain, India. *Ecological Indicators*, 2020; *119*, 106815.
66. Alakshendra, A.; Kumar, A.; Mehta, S., Interlinkages between urbanization and climate change: Identifying and understanding the challenges and the prospects, *Journal of Regional and City Planning*, 2020; 31(3), 285-300.
67. Worldometers, available on line https://www.worldometers.info/world-population/namibia-population/, accessed on 3 march 2022
68. Namibia Statistic Agency, Namibia Population and Housing Census 2011, Namibia Statistic Agency Windhoek, Namibia, 2013.
69. van Rensburg, P.; Tortajada, C., An assessment of the 2015-2017 drought in Windhoek, *Frontiers in Climate*, 2021; 3, 602962
70. Shikangalah, Rosemary N., The 2019 drought in Namibia: An overview. Journal of Namibian Studies, 2020: 27, 37-58.
71. Namwater, *Services*, Namwater website accessed on 25 March 2022, https://www.namwater.com.na/index.php/services/56-hydrological services?showall=1#:~:text=four%20Northern%20Regions.,-EVAPORATION,through%20evaporation%20within%20one%20season.
72. Bank of Namibia, Annual Report 2020. Bank of Namibia, Windhoek, Namibia, 2020.
73. Namibia Statistics Agency, Namibia population projections (2011-2041). Namibia Statistic Agency, Republic of Namibia, 2014.
74. Namibia Statistics Agency, Namibia inter-censal demographic survey. 2016 Report. Namibia Statistic Agency, Republic of Namibia, 2017.
75. Gordon, R. J., *Mines, masters and migrants: Life in a Namibian mine compound*, Johannesburg: Ravan, 1977.
76. Moorsom, R., Underdevelopment, contract labour and worker consciousness in Namibia, 1915-1972, *Journal of Southern African Studies*, 1977; 4(1), 52–87.
77. Hishongwa, N.S., *The contract labour system and its effects on family and social life in Namibia: A historical perspective*, Gamsberg: Macmillan, 1992.
78. Clemens, G., Patterns of translocality: Migration, livelihoods and identities in Northwest Namibia, *Sociologus*, 2010; 60(2), 131-161.
79. Nghiulikwa, R.W., *Re-situating and shifting cultural identity in contemporary Namibia: The experience of rural-urban migrants in Katutura (Windhoek)*. Unpublished Master Thesis, University of the Western Cape, Cape Town 2008, accessed 15 March 2022, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.935.2817&rep=rep1&type=pdf
80. Niikondo, A., Migrants to cities and towns in Namibia: What their interests are?, accessed 11 March 2022, http://ir.polytechnic.edu.na/bitstream/10628/249/1/Niikondo.%20Migrants%20to%20cities%20and%20towns%20in%20Namibia.pdf.
81. Ministry of Agriculture, Water and Forestry, Crop, prospects, food security and drought situation report, Windhoek, Namibia, 2015.
82. International Organisation for Migration, Assessing the evidence: Migration, environment, and climate change in Namibia, International Organisation for Migration, Geneva, Switzerland, 2018.
83. Office of the Prime Minister, *Report on national response to the 2008 flood disaster*, Windhoek, Namibia, 2008.
84. Office of the Prime Minister, *National response to the 2011 flood disaster*, Windhoek, Namibia, 2011.
85. Office of the Prime Minister, *Drought relief report*, Windhoek, Namibia, 2013.
86. Creswell, J.W.; Creswell, J.D., *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, (5th ed), Sage publications, 1329 Inc., Thousand Oaks, CA 2018.
87. Kothari, C.R. *Research Methodology: Methods and Technique*, New Delhi: New Age International Publishers 2010.

88. Nowell, L.S.; Norris, J.M.; White, D.E.; Moules, N.J., Thematic analysis: Striving to meet the trustworthiness criteria, *International Journal of Qualitative Methods*, 2017; 16, 1-16
89. Abbott, M. L.; McKinney, J. *Understanding and applying research design*. John Wiley & Sons 2013.
90. Palinkas, L.A.; Horwitz, S.M.; Green, C.A.; et al., Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm Policy Mental Health*, 2015; 42, 533–544.
91. Legal Assistance Centre, *Namibia Gender Analysis 2017*, Delegation of the European Union to Namibia, Windhoek, 2017.
92. Vasileiou, K.; Barnett, J.; Thorpe, S; et al., Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period, *BMC Med Res Methodol*, 2018; 18, 148.
93. Angula, M., *Gender and climate change. Namibia case study*, Hinrich Böll Stiftung, Southern Africa, 2010
94. Brzoska, M.; Fröhlich, C., Climate change, migration and violent conflict: vulnerabilities, pathways and adaptation strategies, *Migration and Development*, 2016; 5(2), 190-210.
95. Call, Maia, A.; Gray, C.; Yunus, M; Emch, M., Disruption, not displacement: Environmental Variability and temporary migration in Bangladesh, *Global Environmental Changes*, 2017; 46, 157-165.
96. Loebach, P., Household migration as a livelihood adaptation in response to a natural disaster: Nicaragua and Hurricane Mitch, *Population and Environment*, 2016; 38, 185-206.
97. Thiede Brian C.; Gray Clark. L., Erratum to: Heterogeneous climate effects on human migration in Indonesia, *Population and Environment*, 2017; 39, 173–95.
98. Entwisle, B.; Verdery, A.; Williams, N. Climate change and migration: New insights from a dynamic model of out-migration and return migration, *AJS*, 2020; 25(6), 1469-1512.
99. Gitonga, Z.; Visser, M. Is migration an effective adaptive livelihood diversification strategy among households in arid regions of Namibia? An application of constructed instruments using heteroscedastic errors, paper presented at the 6th African Conference of Agricultural Economists, September 23-26 2019, Abuja, Nigeria, accessed on 17 July 2022 https://ageconsearch.umn.edu/record/295859/files/345.%20Migration%20in%20Namibia.pdf
100. Traore Chazalnoël, M.; Ionesco, D., A moment of opportunity to define the global governance of environmental migration: Perspectives from the International Organization for Migration, in *Routledge Handbook of Environmental Displacement and Migration*, R. McLeman; F. Gemenne, (eds.). Routledge, London and New York, 2018.
101. Šedová, B.; Čizmaziová, L.; Cook, A., *A meta-analysis of climate migration literature*. Discussion paper No. 29, Center for Economic Policy Analysis, Potsdam, 2021.
102. Warner, K., Human migration and displacement in the context of adaptation to climate change: The Cancun Adaptation Framework and potential for future action. *Environment and Planning* 2021; C 30, 1061-1077.
103. Myers, N., Environmental refugees: A growing phenomenon of the 21st century. *Philosophical Transactions: Biological Sciences* 2002; 357(1420), 609–613.
104. Henley, J., *Climate crisis could displace 1.2bn people by 2050, report warns*. The Guardian, 2020, accessed on 1 February 2022 https://www.theguardian.com/environment/2020/sep/09/climate-crisis-could-displace-12bn-people-by-2050-report-warns
105. Lustgarten, A., The great climate migration. New York Times, 2020, accessed on 1 February 2022, https://www.nytimes.com/interactive/2020/07/23/magazine/climate-migration.html
106. Trilling, D., Flag, faith and fear for the planet - how the far right is exploiting climate change for its own ends. *Magazine*, 2020, accessed on 2 February 2022, https://www.prospectmagazine.co.uk/magazine/far-right-climate-change-orban-wilders-salvini-eco-fascism
107. Cattaneo, C.; Peri, G., The migration response to increasing temperatures, *Journal of Development Economics*, 2016; 122,127-146.
108. Kleemans, M., Migration choice under risk and liquidity constraints. Technical report, 2015, Working Paper
109. Jiang, L.; O'Neill, Brian C., Determinants of urban growth during demographic and mobility transitions: Evidence from India, Mexico, and the US, *Population and Development Review*, 2018; 44(2), 363-389.
110. UN Habitat, *Global state of the metropolis, 2020. Population data booklet*. United Nations Human Settlements Programme, UN Habitat, Nairobi, Kenya, 2020.
111. Gu, D., Exposure and vulnerability to natural disasters for world's cities, *DESA* 2019; 4, 1–43.
112. Jiménez Cisneros, B.E.; Oki, T.; Arnell, N.W.; Benito, G., Cogley, J.G.; Döll, P., et al. Freshwater resources, in Climate Change. accessed on 28 February 2022, https://www.ipcc.ch/site/assets/uploads/ 2018/02/WGIIAR5-Chap3_FINAL.pdf
113. Brozoska, M.; Fröhlich, C., Climate change, migration, violent conflict: Pathways, vulnerabilities and adaptation strategies, *Migration and Development*, 2016; 5(2), 190-210.
114. Suckall, N.; Fraser, E.; Forster, P.; Mkwambisi, D., Using a migration systems approach to understand the link between climate change and urbanisation in Malawi. *Applied Geography*, 2015; 63, 244-252.
115. Kniveton, D.; Smith, C.; Black, R.; Schmidt-Verker, K., Challenges and approaches to measuring the migration-environment nexus, in Laczko, F.; Aghazarm, C., *Migration, environment and climate change: Assessing the evidence*, (pp 43-111) International Organisation for Migration: Geneva, 2009.
116. OHCHR, Urbanisation and human right, accessed on 17 July 2022 https://www.ohchr.org/en/land/urbanization-and-human-rights#:~:text=Human%20rights%20are%20key%20to,and%20empowers%20individuals%20and%20communities.
117. United Nations, *New Urban Agenda*, Habitat III, United Nations, 2017.
118. UN General Assembly, *City working together for migrants and refugees, 5th Mayoral Forum on Human Mobility, Migration and Development*, Marrakech, 2018.
119. Mukherji, A.; Scott, C.; Molden, D.; Maharjan, A., Megatrends in Hindu Kush Himalaya: climate change, urbanisation and migration and their implications for water, energy and food. In Biswas, A.; Tortajada, C.; Rohner, P. Assessing global water megatrends (pp. 125-146). Springer, Singapore 2018.