

**“The fish migrate and so must we”:
The relationship between international and internal environmental mobility in a
Senegalese fishing community**

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I. Introduction

One of the most frequently discussed human aspects of climate change is its potential for massive human displacement and what has been termed ‘climate refugees’ (McTegart et al. 1990; Myers 2002; Stern 2007). Estimates of the people at risk of displacement in the future, although widely debated and challenged in academic circles, proliferate in public and political discourse (Gemenne 2011). Often population movements in developing countries instigated to some degree by climate change and other forms of environmental transformations are framed in terms of victimization and/or as posing security threats to developed countries. Firstly, this belies the fact that much human mobility related to environmental degradation involves labor migration due to decreasing livelihood sustainability. Migration can therefore act as a means of adaptation to climate change through diversifying household livelihood strategies, decreasing pressure on local resources, or facilitating social remittances (Barnett and Webber 2010; Black et al. 2011), much like other forms of voluntary migration, even if numerous obstacles may impede it from reaching its full potential (McLeman and Smit 2006).

Secondly, much environmental degradation results in South-South mobility, rather than movements from the Global South to the Global North (Schellnhuber 2010). The waves of ‘climate refugees’ threatening European and other Western countries’ security portrayed in the media do not account for the fact that migration requires

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some degree of capital (human, social, and financial), especially for traversing long distances across national borders. Moreover, in regions such as West Africa, intra-regional mobility (environmental or otherwise) is much more statistically significant than intercontinental migration. Examining environmental mobility between South-South countries is therefore necessary to understand current migratory dynamics associated with areas affected by environmental changes as well as for projecting future scenarios of climate change-related mobility.

Thirdly, the importance of internal mobility within affected countries has not been adequately depicted in public discourse, even as disaster displacement is often confined within the borders of the affected nation-state. While migration and refugee studies often focus on international impacts, such as the Nansen Initiative's focus on disaster-induced cross-border displacement, internal mobility responses to environmental degradation must equally be considered if one is to adequately understand the impact of environmental changes, slow-onset or sudden disasters, on population dynamics within a nation-state and to create appropriate policies including integrating environmental mobility within National Adaptation Plans for Action (NAPAs).

Lastly, focusing on either internal or international migratory responses to climate change and other forms of environmental degradation can obscure the relationships between the two – including how one may facilitate the other. Adaptation to climate change is often considered in terms of the benefits for migrants themselves and, to a lesser extent, for the families 'left behind' in the community of origin. This separation between the study of internal and international mobility is reflective of a gap in migration studies more generally, whose empirical and theoretical frameworks tend to only analyze one form of migration without simultaneous acknowledgment of the other (King and Skeldon 2010).

In recognition of these tendencies and gaps, the goals of the following paper are to examine international South-South labor movements related to environmental change in the highly mobile region of West Africa, and also to demonstrate how international migration impacts internal movements in the Saint-Louis region of Senegal. Rather than taking a victimization approach or strictly examining human displacement, this

case study integrates international labor migration from Saint-Louis to Mauritania with the associated internal relocation of households within Saint-Louis. In doing so, it therefore calls for future theoretical and empirical frameworks that incorporate both international and internal mobility, assess the transnational impacts of environmental migration on the country of origin including their potential to facilitate local adaptation, and that do not attempt to isolate environmental changes from other drivers of migration (economic, social, demographic and political) (Black et al. 2011).

II. Environmental changes as a driver in Senegal

West Africa has the highest number of mobile peoples of any region in the world. According to the bilateral migration matrix developed by the World Bank (2010a), over 58% of migration flows take place within the region. The importance of intra-regional migration in West Africa can be partly attributed to the establishment in the late 1970s of an area of free movement of people within the Economic Community of African States West (ECOWAS). Immigration in West African countries is mostly from neighboring countries (World Bank 2010b). In fact, it is the only region of Africa where intra-regional migration is greater than outward migration (34.5%, mainly to Europe) (Ndiaye and Robin 2010). With some 8.4 million people, West Africa also has the largest stock of migrants of any sub-region in the world (UN DESA 2009). In addition to its high intra-regional mobility rates, West Africa is one of the most pertinent regions in which to examine the mobility impacts of climate change. From the Sahel to its coasts, it faces sea level rise, soil salinization, floods, drought, desertification, intensifying winds and heat waves (IPCC 2014; DARA 2013).

The country of Senegal is no exception: the Senegalese population has a long history of internal and international migration of varying sorts, especially marked by movement for labor and economic reasons (Diatta and Mbow 1999). Senegalese people have come to constitute significant migrant populations in a number of European countries, including Spain and Italy, as regular and irregular labor migrants, students, professionals, etc. However, many Senegalese mobility patterns are also intimately intertwined with transformations to the natural environment in various regions of the country, from drought and desertification to flooding and coastal

erosion. While it is difficult if not impossible to neatly isolate the influence of slow-onset environmental changes from political, economic, social and demographic factors (Black et al. 2011), the expected changes to the physical environment due to climate change will certainly play an increasing role in shaping migratory dynamics in the decades to come. Senegal's vast experience with man-made and climate change-related environmental degradation and projected impacts in tandem with its history of inter-continental, intra-regional and internal migration makes it an ideal site for the study of environmental mobility patterns and their impacts on adaptation.

Environmental migration can be witnessed across Senegal, from displacement due to flooding and in migration patterns associated with slow-onset changes. The Senegalese coastline is threatened by climate change impacts of coastal erosion, sea level rise, flooding, soil salinization, and increasing storm surges (Salem 2013). These environmental changes threaten the livelihoods of the approximately 600,000 people directly or indirectly working in the Senegalese fishing industry (FAO 2008), augmenting and diversifying existing mobility patterns, yet fishing communities have received scant attention. Although many regions provide useful contexts of study, this case study specifically targets the city of Saint-Louis. The Saint-Louis region of Senegal is one of the most environmentally fragile in the country. In 2008, UN-Habitat designated the Saint-Louis the "the city most threatened by rising sea levels in the whole of Africa" (BBC 2008). The Langue de Barbarie on the northwest coast of the country faces concomitant sea level rise, coastal erosion, soil salinization, maritime storms and depletion of fish stocks and biodiversity (IPCC 2014). Additionally, the opening of a breach in 2003 had disastrous effects for rural villages in the southern part of the Langue de Barbarie, with many villages being destroyed. While entire rural communities were displaced because of this government initiative (Tacoli 2011), which was amplified due to climate change, the northern urban portion of the island experiences the most directly visible impacts of climate change. Saint-Louis consists of three primary geographical sites, the western-most being home to its fishing industry and also the most threatened by concomitant economic, demographic and environmental pressures. In terms of the environment, the people of Guet Ndar, a busy, densely populated fishing quarter, are coping with environmental challenges on two fronts: on one hand, coastal erosion and storms have destroyed sea-front homes, displacing locals, and, on the other, overfishing and climate change's maritime

impacts are making local artisanal fishing, the main source of income for the population, more difficult as a livelihood strategy. Compounding local vulnerability, the quarter is one of the most densely populated districts in all of West Africa, with more than 25,000 inhabitants occupying an area of 1 km long and 300 m wide according to regional statistics (CLUVA 2013; Ateliers 2010). These various stressors have resulted in both international and internal mobility out of Guet Ndar. As we shall see, some of these mobility patterns reflect and have intensified longstanding migration routes while others have been created in response to the local population's increasing vulnerability on a number of fronts.

Map 1: Map of Saint-Louis



Source: Google Earth

III. Methods

In order to investigate the relationship between international and internal mobility related to environmental drivers and particularly climate change (without dismissing the importance of other factors), a qualitative case study was performed over a five-

week fieldwork during the summer of 2014 in and around Saint-Louis, Senegal.² Data was collected in the Langue de Barbarie in both rural and urban locations, however the majority of fieldwork was concentrated in the urban fishing quarter of Guet Ndar and its neighboring quarters of Santhiaba and Goxum Bacc. These quarters were selected over rural environments in the southern part of the island after initial investigation based on their more visible struggles with climate change, rather than the aforementioned breach opening in 2003. The study targeted these areas not only for their location on the frontlines of coastal erosion, but also because of their economic reliance on natural resources, specifically the maritime environment. Along with an extensive literature review and document analysis of existing evidence on West African mobility, the primary tools of investigation were 40 qualitative, in-depth interviews³ as well as focus groups with fishermen (migrant and non-migrant) and women working in the local fishing industry. Additional interviews and consultations were conducted with researchers, NGO representatives and community and association leaders in Saint-Louis and with experts based in Dakar.⁴

Semi-structured interviews covered themes of local challenges (environmental or otherwise) facing the people of Guet Ndar and its surrounding neighborhoods, their causes and the coping strategies currently implemented by households; migration histories, intentions and motivations; and the relationships between mobile and immobile members of households. This qualitative data was then complemented with local geographers' assessments of environmental transformations and future threats.

IV. International and internal mobility responses to environmental degradation in Senegal

a. Differentiated vulnerability and migratory responses

Although Guet Ndar accounts for a relatively small geographical portion of the city of Saint-Louis, and it has a homogenous economy in that nearly all residents rely

² The research leading to these results has received funding from the European Union Seventh Framework Programme *FP7/2007-2013* under *grant agreement n° 603864*. For more on this project visit www.helixclimate.eu

³ Interviews with experts were conducted in French while interviews with local populations were conducted with the help of a local Wolof translator.

⁴ The USAID project COMFISH operating in Guet Ndar and the GERM laboratory of the University of Gaston-Berger led by Prof. Aly Tandian were vital in providing access and information in the conduct of fieldwork.

directly and/or indirectly on the fishing sector, Guet Ndarians have differentiated vulnerability to the impacts of climate change and migration capacities. Several variables affected individual and household vulnerability levels, including proximity to the coast, age, gender, and socio-economic status. In turn, these factors contributed to different mobility responses.

In terms of geography, households located nearest to the ocean were clearly more vulnerable to storm surges and coastal erosion. Many of these homes have been either partially or entirely destroyed in the past few years. These respondents also perceived coastal erosion to be a more imminent threat in contrast to their neighbors in the central and eastern parts of the island, who were more concerned by the economic impacts of diminished local fish stocks than coastal erosion. These perceptions of vulnerability were crucial for migratory responses and intentions in that coastal homes, if not already in the process of relocating or building a second home elsewhere, felt an urgent need to move. One respondent's home – in which dozens of family members of multiple generations resided – had already been partially destroyed and thus reported losing sleep because of the waves crashing against the remaining portions of the family home (See Figure 1 below).

Figure 1: *Partially destroyed home in Guet Ndar, Saint-Louis*⁵



⁵ All photos were taken by the author, C. Zickgraf.

Aside from the geographical location of households, age also affected vulnerability and migratory responses. As has been established elsewhere (Patwardhan et al. 2007), the elderly are often amongst the most vulnerable populations to environmental changes because of their limited physical capacity to move for example, but also to directly support their households as wage-earners when confronted with the economic impacts of environmental degradation. Retired fishermen often depended exclusively on their sons' and wives' incomes (women's retirement occurred often much later in life than their men's), even if it was they who in fact own their pirogues (fishing boats). Even those older but active fishermen were limited in their ability to garner livelihoods from fishing. The physical capacity necessary to navigate rough seas and perform sea-based fishing over long periods meant that oceanic fishing was considered the task of the young. As fishermen aged, they transitioned to river fishing and eventually retiring by their early 50s. On the other hand, young boys started fishing locally around nine to ten years old, with some fishing internationally already by age 13 or 14.

Gender-wise, men were much more mobile than their female counterparts, leaving women more vulnerable to local impacts of climate change than their spouses and other male relatives. While it is indeed true that many women were immobile thanks to their positions as the managers of the family home and guardians to young children, many Guet Ndarian women are active in the local fishing sector. The two primary occupations of women are first as 'transformatrices'⁶ (the women who process fish by salting, curing or smoking) and as 'mareyeuses' (fish vendors in the local market). With coastal erosion exacerbating an already overcrowded district, women's local workplaces continue to shrink. Because of their land-based occupations in tandem with their household responsibilities, the women of Guet Ndar are highly vulnerable to the effects of climate change economically as well as residentially. Unlike their male fishermen counterparts, most do not see migration as a viable option to improve their livelihoods.⁷ Many women as well as the elderly thus rely on the remittances sent by their active male household members to constitute or supplement household income.

⁶ This profession is almost exclusively female.

⁷ There were a few reported instances of women migrating with their husbands to Mauritania to either manage large houses of Guet Ndarian migrants or to process fish.

b. International migration

As the elderly and women were typically less able to leave Guet Ndar even for short periods to engage in labor migration, international migrants were almost exclusively active, young fishermen. The fishermen of Guet Ndar have long-been a highly mobile people, moving seasonally along the coasts of West Africa in pursuit of the best catches to maximize household income. Retired fishermen frequently reported having worked in Mauritania, Guinea-Bissau, Guinea, The Gambia, Sierra Leone and Liberia in addition to other parts of Senegal throughout their careers. Most fishermen however migrated seasonally and returned to Guet Ndar to fish locally for at least part of the year, taking the summer months off (during the reproductive season for fish). Labor migration from Guet Ndar has therefore always been intimately intertwined with the patterns and changes in West Africa's maritime environment. However, accelerated environmental degradation has transformed and exacerbated fishermen's migration patterns and extended their duration significantly, with very few active people living in Guet Ndar year-round. A decline in local fish stocks and a decrease in maritime bio-diversity around Saint-Louis has pushed artisanal fishermen farther out into the ocean (increasing the dangers with rougher seas), but especially northward up the Mauritanian coast. On one hand, the diminishment of local livelihood sustainability has been caused by overfishing in Senegalese waters, with local fishermen affected by the harmful practices of licensed and irregular foreign vessels that arrive from places such as the EU⁸, Russia and Korea, whose trawling often indiscriminately picks up fish that are traditionally left in the waters, for example by catching fish before full maturity and therefore harming reproduction (Sall and Morand 2008). On the other hand, changes in maritime currents and temperatures have also affected available fish stocks and diversity, with attainable fish being of lower valuable such as sardines rather than the more lucrative White Grouper (*Thiof*) previously more widely available in Senegalese waters. Together, these environmental transformations make it less and less feasible for fishermen to stay and work in Guet Ndar even seasonally.

⁸ S. Lafranière, "Europe takes Africa's fish, and boatloads of migrants follow", *New York Times*, 14 January 2008.
http://www.nytimes.com/2008/01/14/world/africa/14fishing.html?pagewanted=all&_r=0

Relying on their sector's historical mobility, Guet Ndarian fishermen engage in international migration southward to Guinea-Bissau but the vastly dominant migration trajectory is northward to Mauritania, especially in the last ten years (Sall and Morand 2008). Mauritania, without a strong traditional fishing history of its own, has seen a swell in the sector, including the establishment of factories in Nouakchott and Nouadhibou. Without skilled national fishermen, it relies on its more experienced neighbors to the south to provide its labor force.⁹ The location of these factories in Nouakchott and Nouadhibou makes these cities the primary destinations for Guet Ndarians and other Senegalese (See Map 2).

Map 2: Senegal-Mauritania Map with Key Migration Destinations



Source: Google Earth

⁹ At least one Mauritanian is required on each fishing boat, but respondents reported that they were rarely involved in fishing and only present on the boat to satisfy authorities.

The primary migration path amongst Guet Ndarians is to work with such Mauritanian factories through contract-based labor. Representatives from the factories are sent to recruit in fishing communities, especially Guet Ndar, relatively nearby and well known for its skilled fishermen. Local fishermen easily obtain contracts with the factories, which also provide upfront costs for equipment such as nets and motors – a great incentive for Guet Ndarians who struggle to obtain financial credit in Senegal for such equipment because of their unreliable income and high interest rates. However, as they are paid based on their catches, which cannot be guaranteed, many artisanal fishermen quickly become heavily indebted to the factories and then must work off their debt before seeing much, if any, profit and extending the duration of their migration often far beyond initial expectations.

The preferred migration pattern is in fact to obtain one of 300 licenses granted to Senegalese fishermen each year (recently increased to 400 in December 2014), who after a period of 15 days fishing for Mauritania are allowed to bring back their catches to sell in Senegal.¹⁰ These licenses, however, are hard to come by, especially considering the high demand and boom in the number of Senegalese and other West African *pirogues* in recent decades (Sall and Morand 2008). Some fishermen who were unable to obtain one of the licenses cross into Mauritanian waters illegally and bring fish back to Guet Ndar. This migration, however, is a dangerous one, especially considering the history of conflict between the two countries (Parker 1991). Even fishermen granted licenses reported abuse and corruption among the fervent Mauritanian coast guard, but those caught without licenses reported being beaten, jailed, heavily fined and having their materials confiscated. These abuses caused some fishermen to stay in Guet Ndar, preferring to cut their household expenditures including food for their families rather than to risk their safety in Mauritania. However, most respondents and relatives of respondents, unable to support their large families locally, unable to get licenses for circular migration, and unwilling to risk life, limb and income to fish irregularly, saw long-term migration to Mauritania through contract labor as their best option. This type of migration, a rarity in the past, has become the new normal among Guet Ndarian men. While some men moved to Mauritania for three weeks to three months at a time (especially to the closer

¹⁰ Under the latest agreements, Senegalese crews are allowed to capture up to 50,000 tons each year. 12 tons must stay in Mauritania.

destination of Nouakchott), most respondents would travel to Nouakchott and Nouadhibou with their male relatives working the same pirogues or in pairs of pirogues, live in fishermen's camps or rented homes with dozens of other Guet Ndarians, work for factories for anywhere from ten to eleven months, and then return to their families only for Muslim holidays of Korité and Tabaski, when able. Despite the longer term nature of migration to Mauritania, Senegalese respondents and their kin in Guet Ndar did not report investing in homes in Mauritania. Although vacation was the only time many returned to their home city, migrants themselves conceived of their migration as temporary rather than permanent.

c. Internal migration

Environment-related human mobility amongst Guet Ndarians is not, however, limited to male-dominated international labor migration. At the same time that local livelihoods are threatened by fish stock degradation, the very land that comprises Guet Ndar is subjected to coastal erosion and storm surges. To the east, Guet Ndar is limited by the Senegal River, while to the west it borders the Atlantic Ocean. The oceanic coastline has progressively retreated over the past years, and now rubble where front-line homes once stood lines the shores. Some households in this area of Saint-Louis are partially protected by an old colonial French seawall, but further north, newer neighborhoods such as Goxum Bacc have no such protection, increasing their vulnerability to the impacts of climate change and man-made erosion. Without government assistance, families build makeshift barriers in front of their homes consisting of sand bags, netting, and remnants of destroyed structures. Although sand is no longer allowed to be taken for building projects elsewhere in the island because of the recognized exacerbation of erosion, without alternatives families living on the 'front lines' continue to quarry sand to stabilize their homes with sand bags despite the environmental harm (see Figure 2 below).

Figure 2: *Sand bag barriers stabilized with old fish netting. Goxum Bacc, Saint-Louis, Senegal.*



However they perceived the imminence of the threat to their own households, nearly all respondents recognized that sooner or later the sea ‘would arrive’. As one woman reported, “One thing is certain, in forty or fifty years, the sea will meet the river and Guet Ndar will disappear”. Historically, however, leaving Guet Ndar permanently was out-of-the-question culturally. Most of Guet Ndar consists of traditional family homes that house multiple generations with up to 30 people living in one place. These ancestral homes are passed down and it is considered essential that they are maintained. Therefore, it was taboo for people to move out of Guet Ndar, even with the extreme and growing demographic pressures. Moreover, the seaside location of the neighborhood is practically and culturally significant. A community defined by its links to the sea, moving away from the ocean, storing boats out of sight, and living on the mainland seemed unfathomable to many in the past. As their cultural attachment to their land is strong, so too is their attachment to fishing. Few moved out of the fishing industry, especially after the 2008 crisis when fishermen reported that at least in fishing their children would be able to eat. However, while attachments to land remain strong, the recognition of potential displacement has shifted local mentalities towards relocation. Without giving up their traditional homes, many respondents had either completed or begun the process of building another ‘back up’ home outside of Guet Ndar in response to both overcrowding

(exacerbated by coastal erosion) and the encroaching sea. This relocation was often to Hydrobase, south of Guet Ndar on the Langu de Barbarie, or to neighborhoods on the mainland, a 10-minute drive to the ocean.¹¹

International labor migration provided livelihood diversification and income maximization in response to local fish stock depletion whereas internal relocation was motivated by coastal erosion, but the former was deeply connected to the latter. Some Guet Ndarians were able to fund their home-building projects outside of their neighborhood thanks to their higher levels of financial capital: those who, for example, had made significant profits as owners of local businesses, the proprietors of boat fleets who did not themselves need to migrate but rather benefited from the fishing of others or from their facilitation of Mauritanian recruitment contracts. Mauritanian recruiters, in fact, required local go-betweens to locate fishermen and negotiate their contracts because of their social connections. These middlemen were often trusted, older community members. Earning money from local businesses or from this practice gave them enough income to build their second homes outside of Guet Ndar. Income earned locally directly from fishing was rarely significant enough to fund building projects. International labor migration was therefore crucial because of its remittance potential to facilitate internal household relocation.

The ability to utilize remittances for adaptation to environmental transformations in the form of relocation, however, was far from homogenous. “All fishermen are not equal,” reported one person. In fact, it was those fishermen who already had significant capital that benefited the most from remittances. These men were the owners of the largest fishing pirogues (25m), typically two or more that fished in tandem. Some owned multiple ‘fishing teams’ consisting of their male relatives but also who hired non-kin to work their boats. The size of the pirogues and their fishing techniques allowed them to bring in much larger catches than their smaller counterparts. This, in turn, boosted their earnings, and therefore their remittances. These men were the first to leave Guet Ndar and their housing projects were completed in the shortest timeframe.

¹¹ Commuting experiences in Mauritania lessened the cultural aversion to commuting to the sea amongst migrant fishermen.

As the size of the boats decreased, so too did the remittance potential of migrants. For migrants with lower levels of capital, money sourced from Mauritanian migration was sent back to households in Guet Ndar, and depending on the sum, would be saved until a plot could be purchased, after which homes were slowly built over a period of years through the accumulation of migrant remittances. Even still, this was only attainable for the middle- to upper- earning fishermen. Those with smaller boats and/or without ownership were often those with the lowest socio-economic status to begin with. Migration for these fishermen could still result in remittances to their families in Guet Ndar, but remittances were rarely enough to put towards home construction. The first priority for these men was to provide for the immediate security of their households – including their wives, children, as well as their parents and other extended kin – in the form of food, water, and other basic expenditures. Remittances were used to cope with the economic struggles of their families because of diminished returns in Guet Ndar, but were not able to cover the purchasing of plots, construction materials or labor costs despite a desire to move elsewhere. In addition to their limited profits (if any depending on their catches), incomes earned in Mauritania had to be exchanged into local currency in Senegal (CFA). Respondents complained that their low wages in Mauritania (some referring to it as a form of slave labor or indentured servitude by Mauritania factories, in which they could never escape their accumulated debts) were further diminished by the unfavorable exchange rate. Those fishermen able to obtain licenses to fish in Mauritania and then return with catches to Senegal, moreover, battled with corruption and abuse by the Mauritanian coast guard. Even as the ‘lucky few’ who were licensed, the fines and confiscation of fishing equipment could wipe out any profit made during circular migration.

In effect, while remittances gained through labor migration could increase the adaptation capacity of households in the country of origin by enabling internal mobility, this was only the case for the wealthiest of non-migrant and migrant households. Although some benefitted from the migration industry either as migrants or as non-migrant middlemen, for the most vulnerable Guet Ndarians migration could increase the resilience of local households to environmental degradation only as an immediate coping strategy but not as one that could create long-term protection from coastal erosion. Without government assistance to mitigate local effects of climate

change or to protect migrants from abuses and exploitation, international migration in response to environmental and economic pressures will not facilitate internal mobility for the poorest and most vulnerable households but will rather benefit the wealthiest and least vulnerable.

V. Conclusions

Driven by concomitant residential destruction due to coastal erosion and economic strife caused by maritime resource degradation, urban fishermen and their families are highly vulnerable to the current impacts of climate change, which will only augment migratory pressures in the future. In order to protect these coastal populations, firstly local and national governments must intervene to mitigate the effects of climate change insofar as possible and to help communities adapt, whether in situ or through internal and international mobility. As is, outside of makeshift barriers, departure is often seen as the only solution for those who have the capacities to do so. Environmental degradation is already significantly influencing both internal and international mobility patterns in Saint-Louis, especially among fishermen along the coast. However, Guet Ndarian households' vulnerability varies and so does their capacity for migration and resilience. Even within local populations affected by the same climatic threats, their vulnerability and likelihood to migrate is affected by their socio-economic status (with those having some form of financial and social capital more able to adapt locally and/or through migration), their dependence on natural resources, and their demographic characteristics (age, gender, etc.). Active fishermen are able (if not always willing because of precarious conditions) to move up the coast in order to sustain their livelihoods, while those who are retired, elderly, whose occupations are land-based and women are less able to enact migration as an adaptation strategy and therefore rely on household members' labor migration to provide or supplement household income.

But while most fishermen are able to embark on international labor migration in one form or another (whether with contracts, with licenses or irregularly), only the most successful fishermen are currently able to relocate their families within Senegal. These migrants, however, are already classed among the richest households in Guet Ndarian in terms of human, social and economic capital. The case of Guet Ndarians

therefore demonstrates the importance of integrating livelihood strategies and socio-economic status variations into vulnerability and resilience assessments and local, national and intra-regional adaptation plans, but also in examining the potential of migration to increase the adaptive capacities of households in the countries of origin. Policies and government initiatives must also make relocation available to the most vulnerable households, those in imminent danger of displacement, and those without the capital to move out of harm's way.

Lastly, the enmeshment of internal and international mobility patterns exposes the importance of addressing environment-related population movements holistically and integrating local and regional solutions. Climate change's effects on West African mobility cannot be isolated to a singular outcome. Environmental degradation, whether resulting from slow-onset changes or sudden shocks, affects populations' vulnerability and resilience capacities in complex manners. As demonstrated by empirical investigation, these mobility responses are highly interrelated, and therefore call for cooperation among different levels of government and other key stakeholders. Despite its challenges and differentiated outcomes, migration's *potential* to increase adaptive capacity (here exemplified by financial remittances but also in terms of social remittances) should be considered as it benefits migrants themselves, their families in the communities of origin, but also as labor mobility may facilitate other types of environmental mobility.

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