

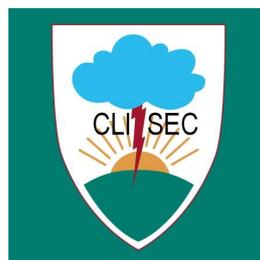


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*Migration as a resource for resilience
and innovation in climate adaptation:
Social networks and co-development in Northwest Africa*

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Working Paper
CLISEC-16



Migration as a resource for resilience and innovation in climate adaptation: Social networks and co-development in Northwest Africa

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Abstract: Human migration has been described as one of the conflict constellations in regions severely affected by climate change, but alternatively can become a resource for climate adaptation and development. Migrant social networks can help to build social capital to increase the social resilience in the communities of origin and trigger innovations across regions by the transfer of knowledge, technology, remittances and other resources. These could increase the flexibility, diversity and creativity of communities in addressing climate stress and open new pathways for action. To prevent conflicts related to climate change and migration, co-development serves as an integrative concept for institution-building that links strategies for development in the communities of origin and the communities of destination which are connected through social networks and cooperative gains. Based on a review of the key concepts in the migration context, the paper explores possible opportunities, innovative approaches and limitations in support of migration as a resource for climate adaptation. The Western Sahel will be used as a case study region, with a focus on Mali, Mauritania and Senegal, using qualitative and quantitative analysis with regard to the role of remittances at the national level, and a micro-level analysis on the role of migrant networks in these countries in specific co-development projects in water, food and energy.

Keywords: Climate Adaptation; Co-Development; Innovation; Institutions; Migration; Remittances; Social Capital; Social Networks; Social Resilience; Sahel; Mali; Mauritania; Senegal.

1 Introduction

Climate change can create multiple stresses on people in many regions of the world. Potentially affected are systems, networks and processes that support human needs, including water, food, health and energy services, agriculture, land use, and urban infrastructure. Human life can be directly affected by climate-related phenomena such as extreme weather events and natural disasters, or indirectly through gradual change of environmental conditions. Since natural resources are vital for human wellbeing and security, their depletion through climate change could undermine human development and also affect the stability of social systems, e.g. through weakened economies, infrastructures or institutions.

The impact of climate change on human communities depends on their vulnerability, which is affected by their adaptive capacities and responses (for an overview see Adger et al. 2009; Mearns & Norton, 2009; regarding conceptual aspects Scheffran, 2011). The possibility to adapt to or cope with the consequences is an integral aspect of the vulnerability concept which “is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.” (IPCC, 2007: 883) Adaptation is meant here as the “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” (ibid.). Although this dual nature of handling the harmful consequences and developing

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opportunities for improvement is part of the core concept of adaptation, there has been a bias towards the first aspect. Focusing more on the second aspect offers the chance to develop innovative strategies that could strengthen the adaptive capacity of communities to gain new capabilities and revive their livelihoods. This would involve not only technical innovations that facilitate the sustainable management of natural resources under conditions of climate change, but also institutional innovations that organize and coordinate community actions to exploit the “beneficial opportunities”.

Similarly, the concept of social resilience offers various meanings. It builds upon the terminology of ecological resilience, which is the ability of a system to cope with or compensate for external shocks and surprises.² Accordingly, social resilience is “the ability of a community to withstand external shocks and stresses without significant upheaval” (Adger et al. 2002), which implies that communities “may be able to absorb these shocks, and even respond positively to them.” (ibid.) Resilient communities are not only able to absorb and survive external shocks and surprises. Since they involve active agents that are able to design their environment, they can also anticipate and resist to future shocks and stresses and recreate and rebuild themselves to preserve their self-conceived identities, which are subject to their internal motivations and capabilities. Combining absorption, resistance and recreation offers an expanded conceptual framework of anticipatory social resilience that transcends the reactive nature of adaptation towards mitigation (regarding the concept of anticipatory learning see Tschakert & Dietrich, 2010).

What matters both in adaptation and social resilience is the capacity of the community to cope with the magnitude of climate change, which is a function of temperature, precipitation and other climatic variables. To assess the vulnerability and risks posed by climate stress to communities, it is essential to understand the possible alternative action paths. Some responses could help to diminish harm and develop new opportunities; others may cause additional problems, called maladaptation (see Agrawal, 2008). To shape the debate towards more constructive approaches, it is essential to consider innovative strategies to respond to climate change by developing beneficial opportunities for solving the problems. This would involve technical innovations as well as institutional mechanisms to mitigate conflict and support sustainable peace-building by designing processes that facilitate cooperation to improve the social resilience of communities.

The focus will be on human migration, which has been described as one of the conflict constellations of climate change,³ but alternatively could become a resource for social resilience and climate adaptation if supported by an adequate institutional framework. Throughout history, migration has been an adaptive response not only to poverty and social deprivation but also to environmental and climatic change. Though migration was often associated with hardships and conflicts, it also offers opportunities through the acquisition of new knowledge, income and other resources as well as the creation of social networks across regions, which can be used to increase resilience and pursue innovative strategies that were not available before. These could make existing actions more efficient, open new action pathways and rules, response patterns and institutional frameworks. Co-development is an integrative concept that links strategies for development in the communities of origin and the communities of destination which are connected through social networks and cooperative gains for both communities (see discussion in section 3).

² The resilience concept was first developed for ecological systems (Holling, 1973) but has spread to socio-economic systems, in particular with regard to climate change (see the review in Campana, 2010).

³ Conflict constellations are defined as “typical causal linkages at the interface of environment and society, whose dynamic can lead to social destabilization and, in the end, to violence”. (WBGU, 2007:2)

We will investigate possible opportunities and innovative approaches for the development of migration as a resource for climate adaptation, starting with a review of the role of migration regarding key theoretical concepts (social capital and networks, human capability and sustainable livelihood, social resilience and co-development). This will set the context for the focus on the Western Sahel as a case study region, in particular on Mali, Mauritania, and Senegal. Our methodology will use qualitative and quantitative analysis with regard to the role of remittances at the national level. This will be accompanied by a micro-level analysis on the role of migrant networks in these countries in specific projects of co-development in water, food, and energy with relevance for climate adaptation. By developing a conceptual framework that incorporates migration as a contribution to climate adaptation and investigating the migration-adaptation relationship for cases in the Western Sahel we enter new ground and add value beyond previous research.

2 Transforming the relationship between climate change and migration

2.1 From threat to opportunity: Pathways between climate change and migration

Climate change has been described as a stress factor that increases migration pressure in “climate hot spots” (WBGU 2007; Warner et al., 2010) and the likelihood of conflict because migrants could compete with the resident population for scarce resources such as farmland, housing, water, employment, and basic social services. The causal chains between climate change, migration and conflict are quite complex and uncertain, with unclear empirical evidence (for an overview see Nordas, & Gleditsch, 2007; WBGU, 2007; Scheffran, & Battaglini, 2011). There is still lack of research on these relationships, and also no commonly agreed definition of climate migration. Regarding environmental migration, EACH-FOR (2009) distinguishes between people who (a) move voluntarily from their residence primarily due to environmental reasons (environmental migrants); (b) are forced to leave their residence because of environmental risks (environmental displaced); or (c) are intentionally relocated or resettled due to a planned land use change (development displaced).

While these definitions are still contested, this is even more the case for the number of potential climate migrants. Some estimates reach several hundred million people who have to flee the impacts of climate change (Myers, 2002, 2005), others question these numbers as highly speculative and exaggerated, lacking justification and empirical evidence (Jakobeit and Methmann, 2011). Some scholars criticize the threat terminology regarding migrants who are struggling for their life (Oels, 2011) and are concerned that treating environmental migrants as a security threat could become a self-fulfilling prophecy. Many non-governmental organizations emphasize that those who are vulnerable and exposed to climate risks are “victims,” requiring international support to protect them.

With this article we will pursue a differentiated approach beyond the threat-victim dichotomy. We describe communities and migrants as active social agents who shape and create their livelihood under changing environmental conditions to find collective responses. Migration is considered as a complex multi-causal process that precludes isolating environmental factors from other migration drivers. Following Adger et al. (2002), we point to the significance of migration effects on social resilience and the natural environment in both areas of origin and of destination. This view emphasizes both the challenges and the opportunities of migration for development and climate adaptation and aims to improve the understanding under which conditions “distress migration” can turn into “migration as opportunity.”

To investigate and develop the multi-faceted relationship between migration and climate adaptation and possible strategies to shape this relationship, we will discuss three concepts relating migration and adaptation that involve the communities of origin, the migrant networks and institutions, and the interactions between them as key focal points. After elaborating each concept, we will introduce an integrated framework in section 3.

1. Adaptation preventing forced migration: In this view, adaptation aims to avoid forced migration as a distressed response to livelihood destruction caused by climate change. Strengthening social resilience of affected communities through improved capabilities, livelihoods and institutions could prevent or slow down distressed migration.

2. Migration as adaptation: Where communities are threatened by climate change despite efforts for local adaptation and protection, migration is a legitimate adaptive response. Institutions help to accommodate emigrants in their new locations, meeting preventive measures to avoid conflicts including those that result from growing pressure on resources.

3. Migration for adaptation: New opportunities, resources and networks of migrants in the host regions can diversify livelihood of households, support climate adaptation and build social resilience in the regions of origin. Co-development and related institutional processes channel Diaspora contributions in knowledge transfer, remittances and return migration into measures strengthening communities' resilience.

2.2 Adaptation to prevent forced migration

When communities are exposed to harsh environmental conditions and climate stress, they are forced to respond to diminish adverse consequences, increase the chances of survival and improve livelihood. Farmers and pastoralists have developed various adaptation mechanisms to deal with a changing climate (Amekawa et al., 2010; Freier et al. 2011; Schilling et al. 2011; Tacoli, 2011), including seasonal migration, which in some areas became part of their culture. Less desirable is permanent distress migration caused by hostile conditions in the home location (such as the loss of vital assets). What is possible and adequate depends on the exposure, the vulnerability and resilience to hazards, innovation and capability for self-help, adaptive capacity and social organization of the community. Despite a body of literature on community adaptation to climate change (e.g. Below et al., 2010; Christoplos, 2010), there are still significant gaps in current knowledge about the role of institutions.

2.3 Migration as adaptation

In human history, migration was associated with people looking for opportunities elsewhere, anticipating jobs, income and know-how. Rather than just being a short-term survival strategy or a flight from misery, labour migration is a deliberate decision to improve resilience and livelihoods. Before whole families are relocated, individual members are sent away to a foreign region to diversify income, spread risk, and gather the capabilities necessary to sustain a community, including assets to insure against future shocks and stresses (de Haan et al., 2000). In times of emergency the greatest remittances are sent back to families (Campana, 2010). Accordingly, migration is a possible coping strategy for climate adaptation and a component of the demographic transition. It reduces population pressure, lessens the strain on scarce resources, facilitates risk reduction and offers new opportunities for survival. At the same time, it implies the loss of valuable labor, income, wealth and knowledge that is missing to sustain the livelihood and adaptive capacity of a community. The "empty space" in terms

of labour force created by emigrants is sometimes filled by immigrants from other regions, as observed by Tacoli (2011) in Senegal.

Along the migration process migrants often lose part of their livelihood, but may also gain new capabilities when they settle at new locations. Despite significant changes, migrant societies maintain social networks among themselves, as well as with their home communities, provided the home communities have not been destroyed by disasters or severely restrained by political and administrative elites. At the same time, migrants establish new social networks and social capital with their host communities.

The strain on the destination region depends on the magnitude and character of migration, as well as on the resilience of destination communities. If migration flows are sudden, unexpected and large-scale, communities and governments in affected regions face enormous challenges which can overwhelm their management capacities and provoke conflict. If migration occurs at a moderate rate and migrants fit to target region, they can be more easily integrated, for instance when they compensate for population decline and offer a labour force that is in demand. An indirect effect is that the growing living standard of migrant populations increases resource consumption and adds to carbon emissions, exacerbating climate change. This effect can be compensated by improved resource efficiency and sustainable development that diminish the climate impact.

2.4 Migration for adaptation

Feedbacks of migrant networks, including transfer of knowledge, remittances and return migration, can contribute to technical and institutional innovations for risk-reduction, resilience-building and climate adaptation in the home communities. The capability-enhancing potential of migration can partly compensate for the original loss of resources (e.g. brain drain) and increase the options of communities to adapt to climate change. Migration affects the use of natural resources, the availability of technology, and the sustainability of resource extraction. According to Adger et al. (2002) remittance income has direct effects on the resource base and economic well-being, as well as the social structure, asset distribution, and income inequality of the home community.

Additional resource flows from migrants could foster alternative strategies for climate adaptation, sustainable development and peace-building. In many countries young, professionally-trained returnees are involved in successful environmental initiatives (Conway & Lorah, 1995), diversifying the coping strategies of the community. Returnees already understand the local socio-ecological system at home and are in a good position to help their families. Technologies play an essential role if designed to restore livelihood under changing climatic conditions, e.g. by utilizing existing natural resources more efficiently, growing and producing new types of natural resources and crop varieties, providing sustainable energy supply, and improving disaster management. Not less significant are governance mechanisms and institutions that are effective in facilitating the livelihood people need through co-development and co-management of natural resources and agricultural systems.

3 Framework for integration of migration and climate adaptation

To address the migration challenge of climate change, we will now further explore conditions and concepts to develop opportunities and use resources for building social resilience and sustainable livelihood of communities in regions affected by climate change. We consider a

framework that integrates the multiple pathways of migration into climate adaptation and discuss how key related concepts affect potential barriers as well as innovative strategies and institutional settings to support a constructive relationship (see Figure 1).

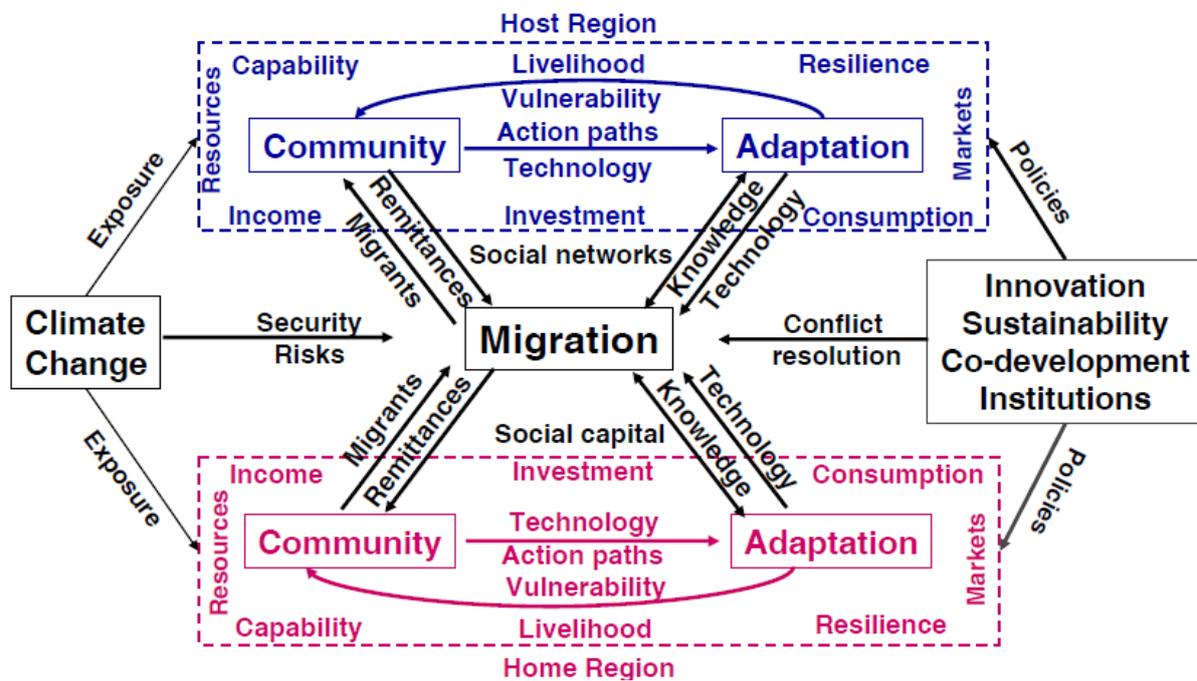


Figure 1. Framework for integrating migration into community adaptation to climate change (source: own work)

3.1 *Community income, investment and migrant remittances*

Remittances sent home by migrants through their social networks provide an additional source of income for communities and households. Many countries and communities at the local level depend on migrant remittances as an essential component of their income (Gammeltoft, 2002; Hanson, 2009). Remittances have substantially increased (WB, 2011) and can be used for a wide range of purposes although their impact is subject of debate and controversy (Roberts, & Morris, 2003; Adams & Cuecuecha, 2010; Bollard et al, 2010).

Like any other source of external income, remittances give households greater freedom to concentrate their activities and allocate investment to those economic sectors they perceive as most reliable and profitable. Many farmers are primarily concerned with protecting their assets as the sources of future income. Migration can also be considered as a strategy to overcome market constraints in developing countries, such as lack of credit and insurance. They may serve as a safety net and deliver aid directly to the people in need. Remittances are less affected by political barriers than other capital flows and less diverted by government officials (Jones, 1998; Kapur, 2003). Investing remittances into alternative action paths offers new opportunities for development and the environment if used to preserve the natural capital stock or protect against climate-induced risks.

In more pessimistic views, "South–North"⁴ migration is perceived as one of the causes of underdevelopment and inequality discouraging economic growth in migrant-sending countries (Rubenstein, 1992). The loss of labour and human capital could promote the breakdown of traditional, stable village communities and regional economies, and support passive, non-productive communities, which become increasingly dependent on remittances (de Haas, 2006). The direct benefits of remittances are often selective and do not flow to the poorest communities or countries (CDR, 2002; Kapur, 2003). On the contrary, migrants from relatively wealthy families tend to send more remittances which exacerbates income and asset inequality (Adger et al., 2002). If remittance income is mostly spent for consumption, it distracts from productive investments and contributes to resource scarcity and environmental degradation.

3.2 Capability, livelihood and development

In many parts of the agrarian world, temporary migration contributes to the livelihood of communities. Resources that migrants acquire abroad can directly support human capabilities, economic development and sustainable resource use (Bebbington, 1999). The capability approach (Sen, 1985) provides a framework to assess human capabilities and livelihoods under conditions of environmental change. The livelihood concept comprises the "capabilities, assets (including both material and social resources) and activities required for a means of living" (Carney, 1998). In sustainable livelihoods, communities preserve their resources under environmental change (Valdes-Rodriguez & Perez-Vazquez, 2011) which is subject to human agency, i.e. the capacity of agents to act in a social environment.

The opportunities and resources of migration also shape the development discourse (Adger et al., 2002; Pradhan et al., 2008; Ratha et al., 2011). The new economics of labour migration (e.g. Taylor, 1999) argues that migration has considerable innovative potential through "North–South" transfer of capital and exposes traditional communities to modern knowledge and education: "Several studies have shown that not only do migrant households tend to have a higher propensity to invest than do non-migrant households, but also that consumption and the often trivialised 'non-productive' investments in housing, small businesses and education can have positive income multiplier effects, through which the benefits of remittances might also indirectly accrue to non-migrant households." (de Haas, 2006: 567)

The impact of migration on development needs to be differentiated according to a wide range of factors (de Haas, 2006: 567). In a more recent review of empirical evidence this author warns that the naivety of recent views celebrating migration as self-help development from below could "shift the attention away from structural constraints and the vital role of states in shaping favorable conditions for positive development impacts of migration" (de Haas, 2010).

3.3 Diversity, resilience and social capital in migrant networks

To survive hardships and shocks, many households in developing countries diversify their livelihoods and pursue alternative action pathways, such as agricultural intensification and local non-farm activities (McDowell & de Haan, 1997). Migration is part of the portfolio of strategies to secure and improve livelihoods, to reduce resource dependence and search for

⁴ The World Bank applies "North" to the so-called high-income economies (all countries with \$12,196 or more GNI per capita, Ratha and Show, 2007). UN applies "North" to all high-income OECD member-countries. Here we use "North" for industrialized countries in Europe and North America, as well as Australia, New Zealand, Israel, North Korea and Japan, and "South" for developing countries in Africa, Latin America and Asia.

new opportunities. Diversification increases the breadth of knowledge and resources available to a community and expands the spectrum of opportunities (Campana, 2010). Investments in physical, human and social capital contribute to resilience-building,

Social linkages and networks are vital parts of the social capital of home and migrant communities.⁵ Throughout the migration process, they maintain connections and “tie the migrant to the source community” (Conway & Cohen, 1998: 33) and empower local communities in support their resilience (Folke et al., 2005). When communities are affected by hardships, they develop mechanisms of self-help which are particularly important when members of these communities transform their social networks in the migration process. Migrants often maintain connections between home and the destination country through channels of communication and other transactions which may preserve, restore or recreate the networks. In the case of return migration, migrants can revive their existing social networks at the original communities and reverse the brain drain by a direct and personal transfer of knowledge and experience.

These links and networks established through migration provide access to resources that are otherwise unavailable and provide the channels along which resource flow is organized (Woodruff & Zenteno, 2007). Migrant networks are beneficial to the origin communities not only through the transfer of financial capital, but also because they enrich the stocks of human, social, and cultural capital of home communities.

3.4 Institutions, cooperation and co-development

The challenge is to develop adequate institutional frameworks that help to overcome the barriers and create conditions in favour of beneficial outcomes. Institutions are “humanly created formal and informal mechanisms that shape social and individual expectations, interactions, and behavior” (Agrawal, 2008). They are important to overcome the limits of individual action through coordinated collective action, using synergistic mechanisms to merge capabilities, efforts and actions, and adjust values, goals and rules for multiple actors. Provided the actor nodes do not act against each other or run into conflicts, migrant social networks can provide a mechanism for institution-building (Connell & Conway, 2000). Social structures formed in the migration process (self-help, alternative action paths, social rules) serve as a basis for cooperation between governments, citizen groups and business. If climate stress requires actions to maintain resilience that individuals cannot achieve, efforts to exceed a critical mass of social capital to compensate for the stress need to be merged. This would increase the readiness to see climate change as a joint problem that requires joint responses, thus providing arguments for cooperation rather than conflict.

In this context, the concept of co-development is useful for assessing collective development projects initiated by the immigrants’ organizations. They involve not only financial capital in terms of remittances and investment, but also contributions in the form of cultural (knowledge-sharing and technology transfer) and cross-border social capital (Ostergaard-Nielsen, 2010). These projects can be solely financed by the migrants, or co-financed by governmental and non-governmental institutions and private entities in countries of origin and destination. Being local, participatory and transnational (Ostergaard-Nielsen, 2010), co-development is a bottom-up micro-scale approach to meet the communities’ needs and to increase their social resilience. Migration networks within the Diaspora organisations, as well as towards the institutions in the countries of origin and destination are essential to the success

⁵ Regarding the concepts of social capital and social networks see Porter, 1998; Granovetter, 1973.

of co-development activities. Rather than preventing migrants from circulating their resources, sensible immigration policies could promote the exchange in income, wealth, knowledge, expertise and labor between sending and receiving areas, seeking to enhance the mutual benefits of building social capital, livelihood and resilience between migrants and their origin communities. For comparison of advantages and shortcomings of co-development see Table 1.

CO-DEVELOPMENT	
Advantages	Shortcomings
Benefiting vulnerable communities	Generating social inequalities
Merging cultural capital acquired in the countries of origin and destination, brain-gain	Promoting brain-drain
Creating and expanding social networks (social capital) between countries of origin and destination	
Sustainable investments motivated by strong identification of the donors with the beneficiaries (Migrants want to benefit from their contributions to development when they return)	Investments in unsustainable consumption
Employment, co-development projects tend to employ local people	Job destruction through increased imports
Remittances have been observed to increase in times of crises in the communities/countries of origin	Dependency on the economies of the sending countries
Reduced dependency from external aid	Increased dependency from emigration
Bottom-up participatory approach	Small-scale projects with limited outreach, unable to deal with large-scale structural needs
Reduces the pressure to migrate by improving opportunities at home	Success of emigrants increases the pressure on youth to migrate

Table 1. Advantages and limitations of co-development (source: authors)

4 Climate change, migrant networks and co-development activities in the Western Sahel

4.1 Climate change and migration-as-adaptation

Irregular rainfalls, prolonged drought periods and vulnerable ecosystems in the Sahel have always required a high level of adaptation from its populations (Rain, 1999). Population mobility in the form of diverse types of migration is the most common strategy to cope with the variable climate: For centuries, nomadic pastoralism and transhumance⁶ allowed communities to sustainably utilize the Sahel by moving in search of new pastures and land, but also for trade and conquest (Diop, 1960; McDowell & de Haan, 1997). One of the most observed forms of mobility in the region is circular migration, whereby migrants move from rural to urban areas in search of income during the dry season and return to their villages during the rainy season to participate in the agricultural activity (SWAC/OECD, 2007). During their absence they usually send remittances home and contribute to their families’ income.

⁶ “A system of animal production characterized by seasonal and cyclical migration of varying degrees between complementary ecological areas and supervised by a few people, with most of the group remaining sedentary” (SWAC/OECD, 2007: Policy Note Number 3, Promoting and Supporting Change in Transhumant Pastoralism in the Sahel and West Africa)

Since the early 1970s all the case study regions report a sharp increase in emigration, probably as an adaptive response to the unprecedented droughts that have hit the Sahel from the late 1960s to 1990s, when the annual rainfall went back by 40% (Figure 2) compared to the previous thirty years (IPCC, 2007). The availability of fresh water was drastically reduced challenging the adaptive capacities of the affected communities. The Sahelian droughts have been observed to be "... among the largest climate changes anywhere" (Bates et al., 2008) and found a huge response in the scientific and popular media. Climate scientists initially attributed the reduction in precipitation to feedback mechanisms between atmospheric circulation and land surface due to different radiative properties of cultivated and/or deforested land (Charney, 1975). Consequently climate change in the Sahel was thought to be caused by local anthropogenic effects like rapid population growth resulting in an increased demand in energy and food, which lead to environmental mismanagement (deforestation, over-grazing, over-cultivation).

More recent climate modelling studies however suggest that large-scale climate variations attributed to the anthropogenic activities in the industrial world are more important for the Sahelian precipitation than local land-used changes (Bates et al., 2008). Variations in circulation patterns such as AMO (Atlantic Multi-decadal Oscillation) could drive the multi-decadal variations in Sahel drought (Kerr, 2000). According to Bader & Latif (2003) and Giannini et al. (2003), the anomalies of the sea surface temperature (SST) can have a significant impact on the Sahelian precipitation patterns. Sulfate aerosols have the optical and microphysical properties that can inhibit precipitation and potentially contribute to the observed climatic phenomenon (Rotstayn & Lohmann, 2002). Pragmatically speaking, the causes for the droughts have been diverted from the local mismanagement to the global climate change due to greenhouse gases and aerosols emitted by industrialised countries. Up to now, climate models have difficulties to simulate the 1960s-1990s drought because the complex scale interactions between the atmosphere, ocean, biosphere and hydrosphere are not well understood (IPCC, 2007).

Most case studies presented here are located in the Senegal River Valley (Figure 3) which provides water to the semi-arid parts of Mauritania, Senegal and Mali. A large north-south precipitation gradient ranges from high rainfalls in the South (2000 mm/yr, main source in the Fouta-Djalon Mountains in Guinea) to less than 200 mm/yr in the north. The 400 mm isohyet (the line connecting points of equal precipitation) has shifted southward over some 100 km since the 1970s, "thereby jeopardising rain-fed agriculture over large areas" (Oyebande & Odunuga, 2010).

In 1973, as a response to the persistent water scarcity, nine nations in the region formed the Interstates Committee for Drought Control in the Sahel (*Comite Permanent Inter-Etats de Lutte Contre la Secheresse dans le Sahel*, CILSS) with a mandate to "invest into the research for food security and in the fight against the effects of drought and desertification in order to achieve a new ecological equilibrium" (CILSS, 2000).

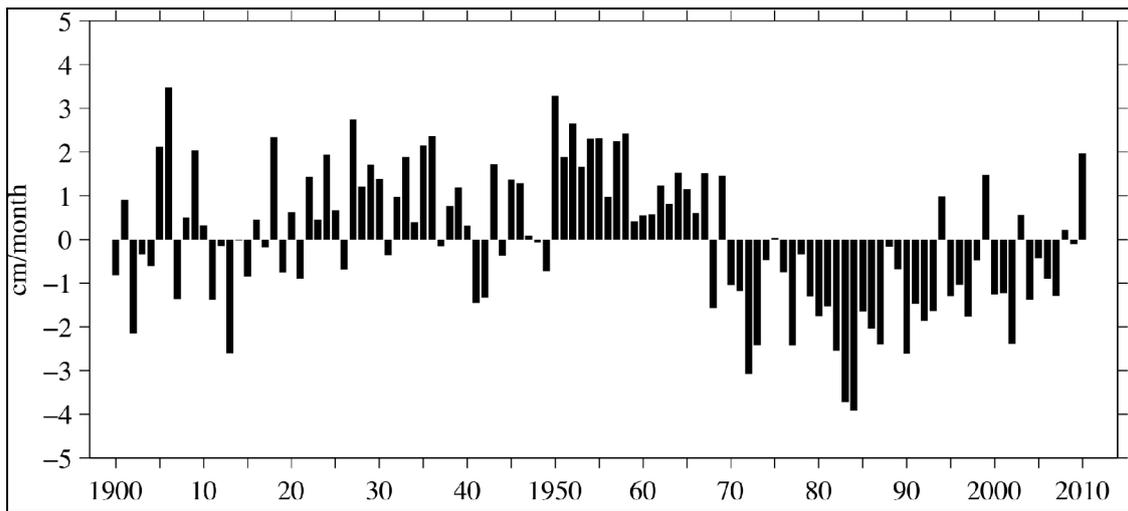


Figure 2. Mean Sahel precipitation anomaly during the rain season (June-October). Averages over 20-10N, 20W-10E. 1900-2010 climatology. NOAA NCDC Global Historical Climatology Network data. Source: Joint Institute for the Study of the Atmosphere and Ocean at the University of Washington, USA. <http://jisao.washington.edu/data/sahel/#analyses>

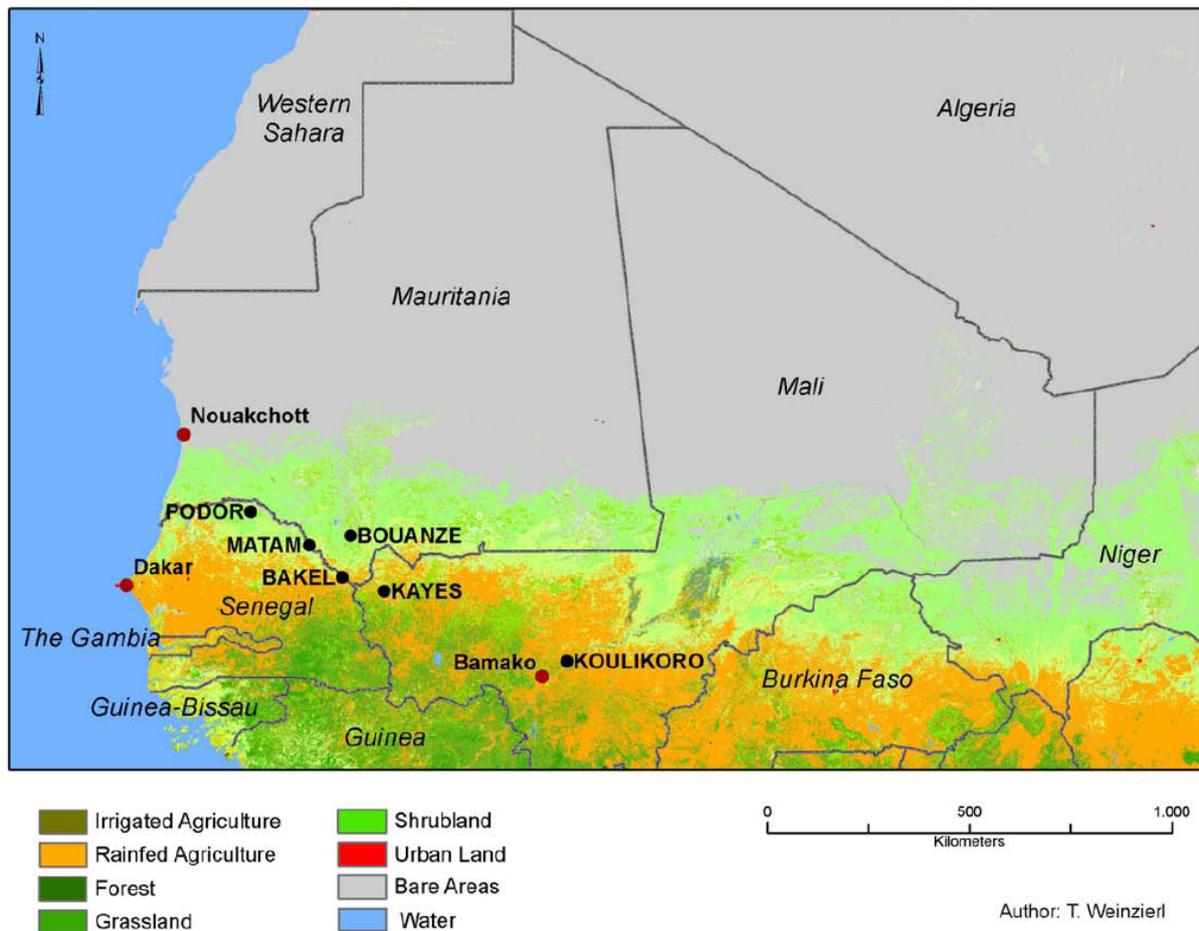


Figure 3. West Africa land use and case studies in the Senegal River Valley (marked with black dots and capital letters)

Sahelian economies largely depend on agriculture and livestock, which is mostly rain-fed (CILSS, 2000). Therefore, it is difficult to explicitly distinguish between economical and environmental migration, especially in the case of transnational migration. Unlike short-term circular migration, transnational migration is usually long-term since it requires higher

resources and therefore takes longer time to pay-off. But even if migrating transnationally, Sahelian people usually continue to maintain strong links with their areas of origin over extended periods of time, sending money home and in many cases planning to return (Riccio, 2008; McDowell & de Haan, 1997).

4.2 Migration-for-adaptation: Role of remittances in the region

Most of the transnational Sahelian emigrants remain in the “South”, moving to the neighbouring Sub-Saharan (SSA) and North African (NA) countries; a smaller number migrate to industrialized countries in the “North” (Figure 4). However, remittances transferred home from countries with stronger economies are usually higher due to higher incomes and stronger currency (Table 2).

Source country	Population Millions	Emigrants % of population	North emigrants % total	North remittances % total	South emigrants % total	South remittances % total
Mali	13	7.8%	10%	33%	90%	67%
Mauritania	3.3	3.5%	26%	57%	74%	43%
Senegal	12.5	5.1%	40%	70%	60%	30%

Table 2. Emigrants and remittances flows, “North” and “South” (source: World Bank (WB, 2011); bilateral data for 2010)

On average, African immigrants were found to remit twice as much as immigrants from other developing countries (Bollard et al., 2010). For example, Malians and Senegalese living in France transfer 10-15% of their monthly income (ADB, 2007). In the Senegal River valley, migrant remittances provided for 65% of households’ cash income (household survey, Findley & Sow, 1998). According to the World Bank (WB, 2011) international remittances have steadily increased despite the financial crisis (Figure 5). These data are based on estimates; directly measuring the financial transfer of emigrants proves difficult since informal transfer channels are often used (Tall, 2002; Page & Plaza, 2005; Sow & Alissoutin, 2010) making up 25-80% of all transfers to Sub-Saharan African countries (ADB, 2007). Irregular status of immigrants, insufficient banking systems, and disproportionately high transfer rates, make informal transfers like hand delivery more attractive.

Empirical evidence on the diversity of transfers (financial, cultural and social) and their contribution to development is scarce. Individual remittances are mostly directed to support family members and to invest in homes and businesses for the projected return (ADB, 2007; Riccio, 2008). An important part of the economies of many Sahelian countries strongly depends on migrants’ remittances. In some countries, remittances exceed foreign aid, and in some regions, they constitute a significant fraction of household resources (Page & Plaza, 2005; Ammarrasi, 2005; Sow & Alissoutin, 2010).

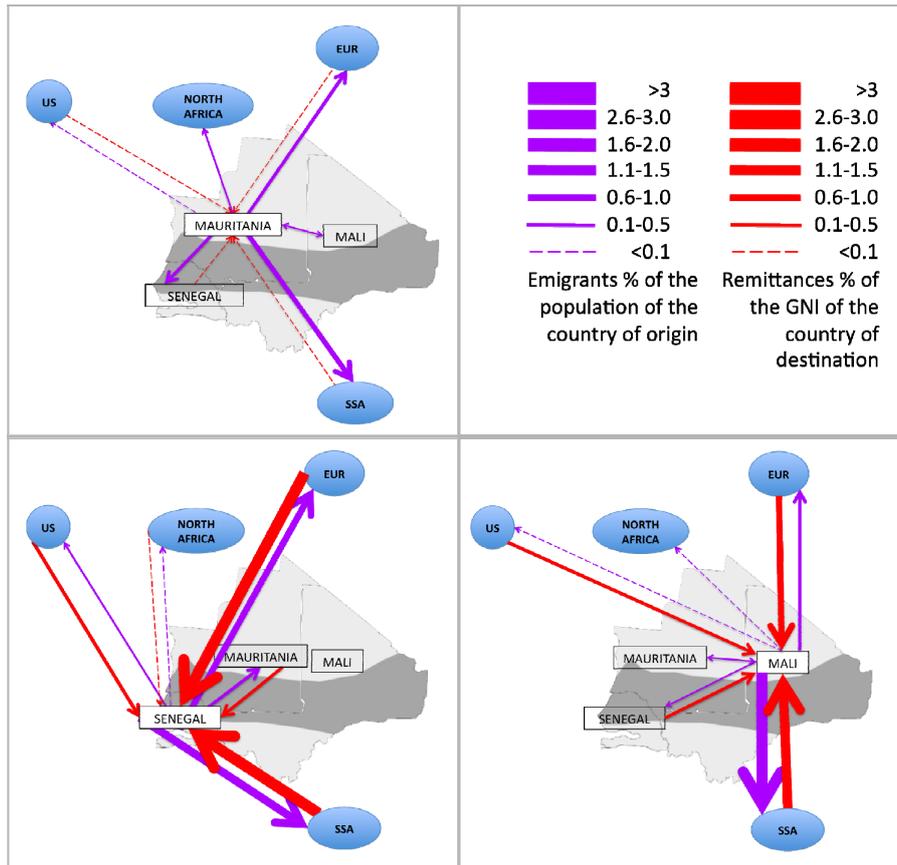


Figure 4: Emigration as % of population of the country of origin. Remittances as % of the GNI (Gross National Income) of the country of destination (sources: Emigration: WB, 2011; de Haas, 2007; AMERM, 2008; CARIM, 2010. Remittances: WB, 2011)

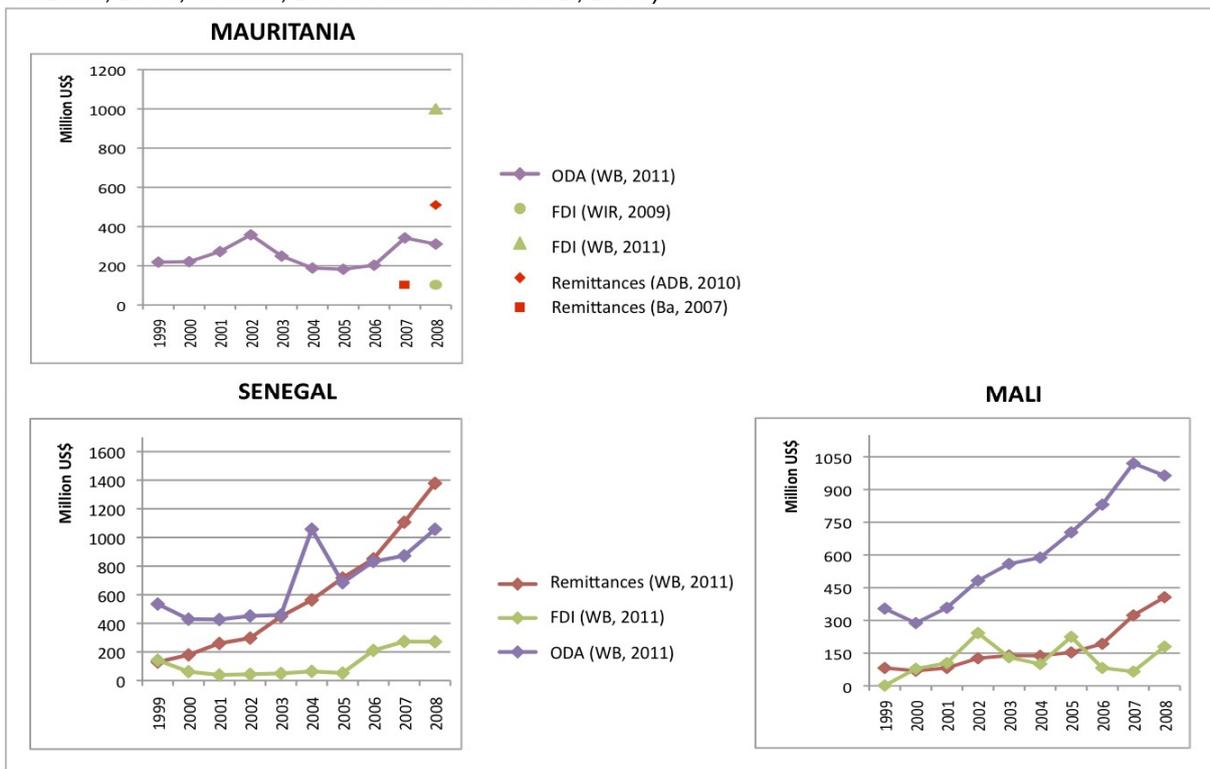


Figure 5 Time series for Official Development Assistance (ODA), Foreign Direct Investment (FDI) and remittances in Mauritania, Senegal and Mali. Complete remittance data for Mauritania are not available (source: own work)

4.3 Migration-for-adaptation: Co-development and migrant networks

Since the 1960s, sub-Saharan African migrants in France have created organizations and initiated co-development projects directed to the construction of schools, clinics, drinking water and irrigation systems. Since the 1990s West African migrants increasingly settle in Spain and Italy, extending their organisations and co-development activities to their new host countries (Grillo & Riccio, 2004; Avalua, 2008). These activities have been studied and documented (Daum, 1994 and 1995; Timera, 1996), but are not well known outside those cited European countries.

Projects undertaken in the context of co-development are either solely financed by Diaspora organizations or co-financed by governmental and non-governmental organizations and private companies in countries of origin and host countries. Governmental support has been made available in France, Spain and Italy, and also by the European Commission. However, European states have the tendency to use developmental strategies to achieve immigration control following the *adaptation-to-prevent-migration* path, which can sometimes lead to cooperation failures, as in the case of Mali (Galatowitsch, 2009) where NGOs took over the partner role of the French government. Institutional support for co-development programs is being offered by the countries of origin, albeit to a different degree (see 5).

A French study of projects initiated and financed by migrants from the Senegal River valley living in France showed that 36% of them were dedicated to health care and education and 23% to water and agriculture (Gonin, 2001). Migrants invest physical and social capital in co-development activities; however, innovation and knowledge transfer also play an important role (Babu & Asenso-Okyere, 2010). For example, the Diaspora Association of Engineers for the Development of the Sahel provided support and advice for over 200 projects in the Kayes region of Mali (Sall, 2005). An advantage of projects initiated by migrants as compared to foreign aid is offered by migrants' social networks and knowledge of political, cultural and environmental conditions of local communities. Furthermore, the migrants benefit from this development indirectly by supporting their families or even directly, in case of return.

5 Migration-for-adaptation: Country case studies

The case studies presented here (Table 3) have been carried out on different spatial scales. The study from Mauritania demonstrates a project evaluation report on construction of one well in 2004-2006 in Bouanze, a village in Guidimaka region in Southern Mauritania, initiated by an emigrant organization in Spain⁷ (Avalua, 2008). A longitudinal study (1996 and 2000) was carried out in order to assess the involvement of Senegalese immigrant organizations in France in development projects in the water sector involving 44 organizations representing over 70 villages (Drevet, 2000). The Malian case cites several studies on the contribution of emigrants of the Kayes region living in France (Galatowitsch, 2009), which is the best-documented case of co-development practices in the Western Sahel. Another example in Southern Mali portrays an innovative project initiated by a "second generation" return migrant from Italy.

The migrant organisations in the case studies are located in Western Europe, while most of the partnerships are located in the Senegal River valley, a vulnerable eco-climatic zone in the Sahelian belt (Figure 3). Furthermore, all three cases studies focus on the emigrants' contributions in the sector of climate adaptation (water supply and renewable energy).

⁷ Project assessment and evaluation with participation of P. Sow

Country	Region	Sector	Actors	Innovation
Mauritania	Guidimaka, Bouanze	Water	Emigrant Organization in Spain, Spanish governmental and non-governmental organizations	Social, financial and cultural capital of emigrants
Senegal	Podor, Matam, Bakel	Water	Emigrant Organizations in France, private companies, governmental and non-governmental organizations in Senegal, African & European Countries	Social and financial and cultural capital of emigrants
Mali1	Kayes	Renewable energy	Emigrant organizations in France, non-governmental organizations in Mali and France	Technological innovation, social and financial capital of emigrants
Mali2	Kayes	Electrification	Emigrant Federation in France, Private companies in France	Partnership between emigrants and private businesses
Mali3	Koulikoro	Renewable energy	"Second generation" return migrants from Italy, US, Italian and Malian NGOs	Technological innovation, social capital

Table 3 Case studies, summary (source: own work)

5.1 Mauritania

Estimates about the total number of international emigrants from Mauritania vary between 105,000 emigrants, or 3.2% of the population in 2005 (WB, 2011) and 250,000, equivalent to 8.1% of the population in 2004 (CARIM, 2010). Severe droughts in the 1970's seem to have fostered international emigration, initially mainly directed towards the neighbouring West-African countries. Since the late 1980s and after the Senegal-Mauritania conflict, emigrants increasingly settle in the Gulf countries, in Libya and in Europe (CARIM, 2010). In terms of countries of destination, both datasets agree that a majority of international emigrants (some 70%) move to the "South" (African and Gulf countries), while only about 30% settle in the countries of the "North". Estimates on annual remittances transferred to Mauritania by international emigrants vary significantly, between 2 million USD in 2010 (WB, 2011) and 360 million Euro in 2008 (ADB, 2010), corresponding to over 10% of gross national income (GNI), with 100 million USD estimated by Ba (2007) in between.

Mauritanian emigrants cooperate with NGOs in the host countries, such as the Research Group and Realizations for Rural Development (GRDR) in France⁸ to support development initiatives in their home locations, invest in infrastructure, health care and water supply. For example, out of 18 co-development projects initiated by Mauritanian Diaspora organisations in partnership with GRDR in 2007-2009, 14 could be classified as climate adaptation activities – 6 projects in the water sector, 4 in dam construction, 3 in agriculture/food security, one in reconstruction of buildings destroyed by 2007 floods (GRDR, 2009). In some cases Mauritanian emigrants promote cooperatives, small and medium enterprises (Ba, 2006). Mauritanian Diaspora is organised in migrant associations, professional and student transnational networks which support Mauritians abroad and keep maintaining links to their home communities, for example the students association ACEM (*L'Association Culturelle des Etudiants Mauritaniens*)⁹ and the Mauritanian Association Network in Europe (RAME).

The Mauritanian government has consolidated temporary economic migration frameworks with the EU member states and the Gulf countries. However, governmental institutions do not offer significant support to embed Diaspora in the context of development; neither strong institutional links with Diaspora nor policy framework concerning Diaspora investments have been developed (CARIM, 2010).

⁸ http://www.grdr.org/spip.php?page=sommaire&id_rubrique=107

⁹ <http://asso.acem.free.fr/>

Well construction project in Bouanze, region of Guidimakha, Mauritania

The mountainous Guidimakha region in Southern Mauritania, on the border with Senegal and Mali, hosts 10% of the country's total population (3.3 million) and is the centre of Mauritania's agricultural production. However, it is considered to be the most neglected region by the State, with significant emigration; most of the male population over 25 years of age leaves the region to contribute to their families' income. The money transferred by the international Diaspora of the region provides a strong basis for the local economy (Avalua, 2008). The region of Guidimakha is predominantly populated by Soninke. Economic migratory activities as traders or labourers are an integrative part of the lifestyle of the Soninke people. Young men are expected to migrate at the age of eighteen in order to attain majority status (Smale, 1980). Since the 1970s drought, the duration, direction and composition of migration shifted significantly (ibid).

Bouanze, a village in Guidimakha with some 10,000 inhabitants, was severely affected by the drought in the 1970s, causing a massive emigration to cities and across the borders. The Diaspora organization AFUB (*Association des Feres Unis of Bouanze*) was founded in 1975 by emigrants of Bouanze in France and in 1996, it also established a branch in Spain. AFUB currently consists of 400 members in both European countries. The organizations' aims are to foster development in the home region, support the remaining families and inhibit the emigration of young men by improving opportunities at home. In cooperation with local authorities, NGOs and aid organizations, AFUB has initiated several development projects in the water sector and the waste management sector. In 1992, a well to irrigate the agricultural co-operative was constructed in cooperation with a French NGO. During 2004-2006, a well supplying drinking water to individuals and institutions (mosque, hospital and dispensary) was constructed in cooperation with a Spanish NGO, SPS (Santa Perpetua Solidaria¹⁰) and involving a major contribution from the Catalan Cooperation Fund for Development¹¹. In 2011, AFUB initiated a waste management project in cooperation with the same Spanish NGO. AFUB is also running an agricultural co-operative for women, involving 40 women and employing four. The irrigated land produces fruits and vegetables during the dry season, so these products do not have to be imported (Avalua, 2008).

For the construction of the well, the emigrants pulled together all resources available to them. They contributed financial capital of over 13,000 EUR to the construction and maintenance of the well and made use of the social capital in the origin and destination countries. Close links to their home community enabled them to identify the population's needs. Networking with Spanish organizations and authorities provided financial support for the project. Some of the AFUB members are simultaneously members of the SPS. Cultural capital was also committed. Emigrants from Bouanze have been active in contracting and supervising hydro-geological and geophysical studies, coordinated the project management and maintenance and organized training for the employees. AFUB has taken part in project management from the construction phase and is still involved in the everyday monitoring of water supply, maintenance and the purchase of spare parts. AFUB has also contributed to the installation of two solar panels to increase energy supply to the generator that powers a pump. The well construction contributed to the employment of two technicians and fifteen people working at the distribution points (ibid).

¹⁰ <http://www.spsolidaria.pangea.org/index.php>

¹¹ The Catalan Cooperation Fund for Development is an organization formed for Catalan municipalities and other local organizations, who spent part of their budget to finance projects for Development Cooperation and Solidarity.

5.2 *Senegal*

Because of its political stability and the strategic location it presents for transit migration, Senegal attracts immigrants from the neighbouring West African countries and is home to over 25,000 refugees from Mauritania who arrived after the Senegal-Mauritania conflict in the 1980s (CARIM, 2010). Lately, the country has solidly become a country of emigration. Up to the 1990s, the emigration was predominantly directed towards Sub-Saharan African countries (mostly Ivory Coast, Congo, Central Africa) but in the last 20 years, North Africa, Europe and the USA began to attract a significant fraction of Senegalese emigrants (de Haas, 2007; CARIM, 2010). In 2003-2004, some 650,000 Senegalese were residing abroad, consisting of 12% of the total population, one third of them without a regular legal status. This could probably explain why other sources indicate a smaller number of 480,000 (MDRC, 2007). In Europe, most Senegalese settle in France; in recent decades Italy and Spain also became important host countries (de Haas, 2007; CARIM, 2010). Out of the three Sahelian countries, Senegal has the highest percentage (over 40%) of emigrants moving to countries of the “North”. Senegal is also receiving the highest amount of remittances relative to the GNI, around 1.16 billion USD in 2010 (WB 2011).

Emigration is an important form of household strategy in Senegal (Sow, 2002; de Haas, 2007). A recent survey showed, that 2/3 of the surveyed households had at least one migrant; with an equal share of national and international migrants (Plaza et al., 2011). According to the same survey, remittances received from national emigrants were predominantly spent on food (80%), compared to only 50% spend on food of the remittances received from the “North”. The majority of internationally emigrating Senegalese is young, educated and male - nearly 70% are 15-34 years old (2002 census, cited in ANSD, 2009), nearly 45% completed tertiary education (Plaza et al., 2011). The inflow of remittances from international emigrants is higher than foreign aid and a corner stone of the national economy (Tall, 2002). The Senegalese Diaspora is strongly organized in village associations, professional and students organizations. Their role is to create and maintain Diaspora networks to support local communities in the countries of destination as well as to foster developmental projects back home (Grillo & Riccio, 2004; Riccio, 2008; ADB, 2007; CARIM, 2010).

Senegalese migration policy encourages co-development through remittances, investment and return of emigrants. Governmental agencies are promoting the investments of the Diaspora in government-run infrastructure projects and utilizing business contacts and professional networks established by Senegalese emigrants abroad (Panizzon, 2008). Since 2008, the NGO FES (*La Fondation des émigrés sénégalais*)¹² with support by the Ministry of Senegalese Abroad and by Spain, aims at channeling Diaspora investments into Senegal. The Senegalese government offers loans for migration-related craft development projects (Panizzon, 2008). Another government program, Agrobiotech, a part of the Return to Agriculture Program REVA (*Retours vers l'agriculture*), seeks to “reintegrate” return migrants by involving them in modernization of agricultural activities, among others by growing jatropha for biofuel production. The program is addressing highly skilled Senegalese professionals in the Diaspora offering them options to return. This and other returnee programs are co-founded by the EU, France and Spain (Panizzon, 2008) in the context of the European adaptation-to-prevent-migration strategy.

Spain and Italy actively participate in co-development projects with Senegalese Diaspora organizations, for example through the MIDA programmes of the International Organization

¹² <http://www.la-fes.org/>

for Migration (IOM)¹³. The French Priority Solidarity Funding (FSP), a part of the French-Senegalese co-development convention signed in 2000, co-finances 25% of migrant-led projects. Senegalese-French co-development projects in the water sector are mainly run by the Programme Solidarité Eau (pS-Eau).¹⁴

Involvement of Diaspora organizations in water development in Senegal

The regions of Podor, Matam (North) and Bakel (South-East) are located in the Senegal River Valley, and have been characterized by strong emigration since the 1970s drought (CARIM, 2010). Figure 6 shows the degree of aridity (ratio between annual precipitation and potential evapotranspiration) during 1961-1996 illustrating how the drought affected these regions. “The drought has reduced rain-fed agriculture, decreased the seasonal flooding of wetlands, limited economic development, and in the overall, enhanced poverty” (Oyebande & Odunuga, 2010).

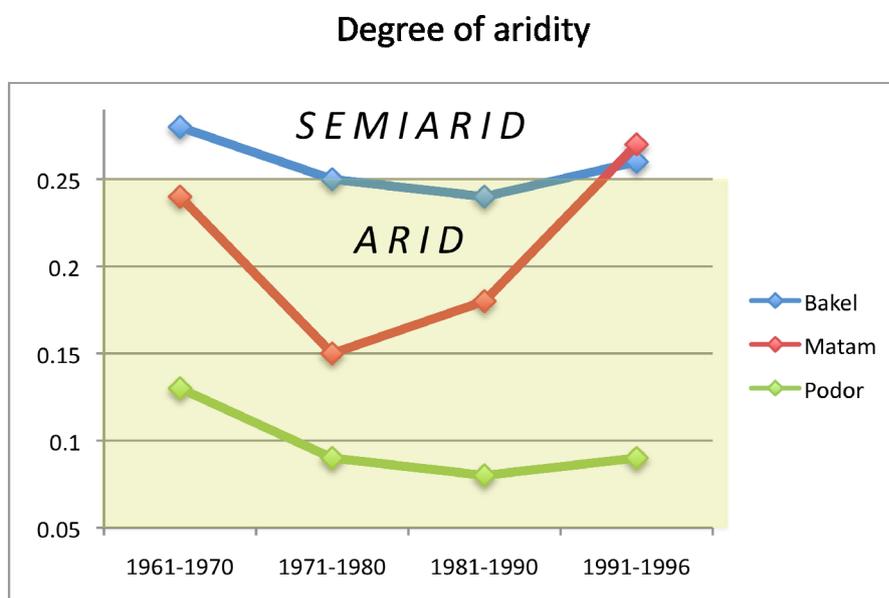


Figure 6 Degree of aridity (ratio between annual precipitation and potential evapotranspiration) in Bakel, Matam and Podor. Source: Oyebande and Odunuga, 2010

In view of the insufficient provision of rural population in Senegal with drinking water and sanitation and the reduced availability of fresh water due to droughts, investments and improvements in the water sector are essential measures to adapt to climate change. Migrants from these regions living in France were surveyed in order to investigate their contribution to developmental projects in the water sector (Drevet, 2000). Forty organizations (5,800 members) were surveyed, each representing one or several villages, with the total population of over 400,000 (ibid). Most of the organizations were founded in the 1960s and the 1970s.

The members pay monthly contributions to the organizations for all activities. However, some organizations regularly collected extra fees for the “water” fund. Contributions for particular water projects depended on the projects’ budgets, which ranged from 3,000 to 136,000 Euros (Drevet, 2000). A total of 70% of all projects in the water sector were fully financed by the migrant organizations; only 30% were co-financed. For larger projects, co-financing was sought by governmental and non-governmental organizations and businesses in Senegal and other African countries, in Europe and in the US. In the years 1996-2000, nearly 70% of all

¹³ <http://www.iom.int/jahia/Jahia/activities/africa-and-middle-east/west-africa/senegal#md>

¹⁴ <http://www.pseau.org/cms/index.php?id=codevsenegal>

organizations initiated at least one project in the water sector (ibid). Other projects were mainly directed towards education and health services, and to a lesser extent, to construction of mosques and agricultural projects. Some of these projects have also been combined sectors, for example, if a school was renovated or constructed, water and sanitation systems for the school were also installed in some cases.

Most investments in the water sector were directed at maintenance, repair and extensions of existing water systems, rather than new water systems. Most of the organizations have been involved in the management of the water service in their home villages. One fourth of the surveyed organizations were not involved in the water management, because they claimed that either the water was well-managed locally and their contribution was not needed, or that the water was locally mismanaged leading to a conflict between migrants and local population (Drevet, 2000).

5.3 Mali

Mali is a landlocked country where only 3.8% of the land is arable and 80% of the population is dependent on the primary sector that contributes 40% of the GNI (MPI, 2004). Migration is deeply rooted in Malian society, initially due to the millennial Trans-Saharan trade, the vulnerable environment, and wars, in recent history followed by the labour demand in the Malian gold mines, in the plantations in Senegambia and Ivory Coast and in the automobile sector in France. Most of the population movement occurs within the country: a survey conducted in 1992-93 found that by age 25, citizens have migrated at least once to another district, but by age 35 most men had moved again (MPI, 2004). International migration is mainly directed towards other African countries, less than 10% of emigrants move to the “North” (Table 2). In Europe, most Malians reside in France and Spain, an increasing number emigrates to North America (MPI, 2004). Officially recorded remittances transferred to Mali are higher than FDI and make up 43-90% of external aid. Gubert (2009) found that Malian remittances reduce the poverty rate and the Gini coefficient¹⁵ by 5%.

Since the early 1960s Malian emigrants organized themselves in Diaspora organizations. The organizations became popular and the participation in them steadily grew. In 1985, nearly 70% of all Malian immigrants in France were organized in these organizations (Daum, 1995). A study conducted in 2004 (FSP, 2004) sampled 42 migrant organizations with 11,000 members, representing 31 villages in Mali with a total population of 135,000. The sampled organizations have implemented 250 developmental projects. Most commonly the projects were directed towards education, while mosques were seen as the most prestigious projects.

The government of Mali pursues a strategy “to ensure and coordinate ... the participation (of emigrants) in local development, ... favour investments from Malian expatriates, ... and organise relations with the Diaspora”. The High Council of Malians Abroad is represented in 62 countries (CARIM, 2010). In 2002, in the framework of a bilateral program between France and Mali (Priority Solidarity Fund Co-development Mali) Malian government started a program to actively support co-development activities. However, in 2009, France discontinued its support of the program, as Mali refused to sign the immigration agreement with France accepting repatriation of any irregular Malian immigrants living in France. The program continues running on the side of Mali with the support of the government. Projects funded are required to be at least 30% co-financed by immigrants (Galatowitsch, 2009).

¹⁵ The Gini coefficient is a measure of the inequality of a distribution (Gini, 1912)

The case of the Kayes Region, Mali

The region of Kayes, the Malian part of the Senegal River Valley, is mostly populated by Soninke, who have a long tradition of journey, commerce and migration (Azama & Gubert, 2006). In Mali, Kayes has the highest rate of migration, historically motivated by high vulnerability of the region to desertification and drought, and by the extended trade of millet and slaves (in the time of the Empires). During the colonial period, labour migration to peanut plantations in Senegambia and cotton and cocoa plantations in the Ivory Coast was particularly encouraged (Galatowitsch, 2009). After Mali's independence, France promoted temporary migration to fill the labour gaps in its automobile industry. Wealthier Soninke were attracted to temporary migration, as it was prestigious for them and their families (Azama & Gubert, 2006). Remittances were found to make up 80% of household resources in Kayes (Ammarrasi, 2005). Other than sending individual remittances, the emigrants of Kayes have been very active in collective projects and have contributed to 60% of infrastructure in the region (WB, 2005).

Today, migrant organizations co-finance the majority of development projects in the region of Kayes, investing in wells, water tanks, dikes, health centres, schools, cooperatives, grain mills, transportation and other projects (Galatowitsch, 2009). Between 2000 and 2004, Some 7.8 Million USD were contributed by immigrants to developmental projects in Kayes (FSP, 2005). In terms of the projects costs, a 2004 study of 38 village associations from 5 districts of the Kayes region showed that 42% of migrant investments have been dedicated to the building of mosques, 20% were invested in the water sector, 17% in health, 10% in education and only 3% in agriculture (Gauvrit & Bahers, 2004). According to Daum (2007), migrants quadruplicated the health care facilities between 1980 and 1995. While in the late 1980s school facilities were quite inadequate, nearly every village in the region had its own school by 2005, also this development is largely financed by emigrants (ibid). However, migrants commit not only financial resources to the development of their home communities but play an important role in the project implementation and management (Cambrézy, 2007).

The access to electricity in rural Mali is exceptionally low. Diaspora organizations in Kayes participate in electrification projects in their region. The use of solar panels is given a priority. Together with the Malian NGO "AND DEFAR" and the associated French NGO "ADER"¹⁶ Diaspora organizations are running several projects involving the use of solar energy. These projects often provide the first electrification for private households and public facilities. Solar panels have been already installed in over 8,000 private households; 30,000 people benefit from the electrification of public facilities. Immigrants in France set up a company providing the solar hardware, in which local technical and financial operators work together under contractual agreements with "AND DEFAR". The program carries out training for local technical support teams and organizes credits for the emigrants to finance the projects.

A different electrification project in the region of Kayes was initiated in 1999 by Malian immigrants residing in Paris and federated within the Sahel Development Immigration Organization (IDS). The project created a Rural Energy Services Company (RESCO), funded by the French energy companies EDF (70%) and TOTAL (30%). The immigrants in Paris pay 70% of the connection and the monthly fees for the clients in Mali. The electricity provision is based on solar home systems (10%) or small low-voltage village micro-networks supplied by diesel generators (90%). Research studies are conducted with the view to replace diesel by bio

¹⁶ <http://www.ader.eu/english/ader.html>

fuels (UNDP, 2007). From 1999-2005 RESCO provided electricity to 510 private households (10,200 people) in four villages and to the villages' public facilities (UNDP, 2007).

Innovative project in Southern Mali

An innovative electrification project in the Koulikoro region in Southern Mali was initiated in 2005 by a second generation immigrant born in Italy and “returning” to Mali to set-up a micro-enterprise, Afriq-Power,¹⁷ constructing solar panels in Mali. The project runs in cooperation with the American NGO, Practical Small Projects (PSP). Afriq-Power found innovative ways to manufacture solar photovoltaic modules made in Mali with mostly local materials (some of them recycled) at a cost less than imported panels. This novel approach has led to independence from imports and international donors in the solar energy sector. Afriq-Power trains and employs local personnel; designs, produces and installs private PV systems generating income, as well as community systems financed by NGOs (Kamp, 2010).

The example of Afriq-Power shows the diversity of co-development paths and activities directed to climate change adaptation (and mitigation). This project does not fit the pattern of partnerships between immigrant organisations and institutions in origin and destination countries commonly found in the literature and demonstrated in the case studies above. The so-called “second generation”, often growing up in a transnational world, multi-lingual and freely moving between cultures and societies, sometimes offers even greater opportunities than their parents, who are often still caught in the struggle of “integration” and “adaptation” in the destination countries. The framework of co-development, seen as contribution to development in home regions from those who once left in search of better opportunities, offers a lot of potential for creativity and innovation to adapt and mitigate climate change.

6 Conclusions and final remarks

Climate change undermines the living conditions of people in many parts of the world and may force them to leave their home if life becomes unbearable. On the other hand, migration is an adaptation measure that reduces pressure in climate hot spots and offers potential opportunities and resources for regions affected by climate change. With these resources, migrant networks can strengthen the social capital, livelihood and resilience of their origin communities and develop innovative approaches for climate adaptation. As the case studies in Mauritania, Senegal and Mali demonstrate, co-development projects initiated and run by migrant organizations in water, food and energy can be successful if jointly supported by institutional frameworks, involving governmental and non-governmental organizations and companies in countries of origin and destination.

The United Nations can play an important role in supporting such an institutionalization process. The 2010 Cancun Accord has provided a first step towards addressing climate change-induced migration as a policy issue on the international agenda: "Measures to enhance understanding, coordination and cooperation with regard to climate change induced displacement, migration and planned relocation, where appropriate, at national, regional and international levels." With this new framework, the foundations have been laid for accepting migration as a legitimate adaptation option which, when taken seriously, would also require financial and institutional mechanisms to facilitate the migration-as-adaptation pathway.

¹⁷ A documentary about Daniel Dembélé and Afriq-Power “Burning in The Sun” by Cambria Matlow <http://burninginthesun.wordpress.com/>

For the time being, adaptation for preventing migration remains the dominant concept to avoid climate change from becoming a threat to human livelihood that forces people to flee. With growing relevance of climate change, the migration-for-adaptation path may gain importance, in particular in the Sahel. According to the IPCC, “the decreasing rainfall and devastating droughts in the Sahel region during the last three decades of the 20th century are among the largest climate changes anywhere” (Bates et al., 2008). In all three case regions, the pressure to migrate increased since the 1970s possibly as a response to the onset of the persistent droughts. For those who take this step the international community needs to take supportive measures that move beyond the threat-victim dichotomy and treats migrants as active agents who develop their livelihood options.

Migration was found to be an integral part of livelihood for all described societies for centuries, as it is true for human mobility in many other societies and parts of the world. In view of this fact adaptation strategies should be de-linked from measures to stop migration. Instead developing adaptation can be useful to decrease the pressure on young people to migrate by preserving and improving their livelihood options. New ground can be entered by developing the migration-for-adaptation pathway that improves resilience to climate change and strengthens the links between migrants in host regions and their home communities. Any institutional support may be already welcome at this stage.

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