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migration, climate & environment

Climate Change, Environment and Migration in the Sahel

Selected Issues with a Focus on Senegal and Mali

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About the Project

The research project *micle* – "Migration, Climate and Environmental Changes in the Sahel" – investigates the social-ecological conditions of population movements in Mali and Senegal. The overall goal of the project is to contribute to a better understanding of the complex relationships between (climate-related) environmental changes and migration.

Sahelian countries are expected to be amongst the regions most affected by impacts of climate change such as hotter and drier climates, oscillations in precipitation patterns and land degradation. The UNDP estimates that a considerable amount of drylands in sub-Saharan Africa could experience severe droughts. Countries like Senegal and Mali could lose up to 50 percent of their agricultural capacity. The Sahel and particularly West Africa has, on the other hand, a long history of population movements and represents a multitude of migration patterns and trajectories. For a few years now, internal and international migrations have increased in both countries. However, causes and motives for migration are manifold, and the relationship between ecosystem changes and population mobility is complex. Therefore, an inter- and transdisciplinary research approach is needed.

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1 Introduction

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For the last two decades, there has been an increasing interest in connections between the environment and migration in the public and scientific debate. The discussion about the impacts of climate change has also fuelled the debate. Alarming predictions about millions of 'environmental migrants' or even 'climate refugees' in the near future possibly raised some awareness about negative consequences of climate change but did little to promote an enlightened public debate. Yet, knowledge in this field still remains vague and fragmented: the significance of environment and climate within the broader social, political and economic context of migration is currently a subject of fierce scientific debate.

African regions are expected to be the most affected by impacts of climate change such as hotter and drier climates, oscillations in precipitation patterns, droughts and land degradation. The UNDP (2009: 18) estimates that up to 90 million ha of drylands in sub-Saharan Africa could experience drought. Cline (2007) illustrates that Sahelian countries like Senegal and the Sudan could lose just over 50 percent of their agricultural capacity and Mali 30 to 40 percent (Leighton 2011: 331). On the other hand, the Sahelian region and particularly West Africa has a long history of population movements and represents a multitude of migration patterns and trajectories. Mobility has been common in West Africa since pre-historic times and has included both cyclical migrations linked to agricultural production styles, as well as more permanent movements resulting from the search for economic opportunities and changes of the environment (Castles 2009, Sieveking/Fauser 2009, Schapendonk 2010, Cordell et al. 1996).

The research project "Migration, Climate and Environmental Changes in the Sahel" – *micle* investigates the social-ecological conditions of population movements in Senegal and Mali. The overall goal of the project is to contribute to a better understanding of the complex relationships between (climate-related) environmental changes and migration, following an inter- and transdisciplinary approach. Based on an in-depth study at local level, the migration dynamics in two selected regions are analyzed as well as the specific ways in which people assess and evaluate environmental changes on the one hand and migration options and experiences, on the other. Two representative study regions were selected for empirical research in both countries: the region of Bandiagara in the southeast of Mopti in Mali and the region of Linguère in the north of Senegal. Based on first studies we identified both regions characterized by significant changes of the environment and high population mobility.

Figure 1: Study regions of the micle-project. Source: Wegener 2011

Within the *micle* project empirical research is conducted among the residents of the selected regions as well as among migrants from these regions at other places within the two countries, in West Africa, and Europe. These findings are supplemented with regional demographic data, and a policy analysis of the institutional conditions, political instruments and governance structures with respect to migration, development and land use. Within the analysis of environmental changes and climate variability special attention is paid to land degradation. Focussing on a local and regional scale will help to analyse how climate variability and vegetation changes are linked. With these correlations in mind, degradation as well as improvement of vegetation can be assessed independently from climate variations in order to focus on land use practices and their impacts on environmental changes. Like this, we gain a deeper insight into the influences of climate change and land use on environmental change, as well as into possible adaptation strategies. The studies will not be based on purely natural science methods alone but will involve the perception and evaluation of environmental change by the local population. This not only allows us a better understanding of ecosystem changes, but also to link the natural-scientific findings to the results of the socio-political analysis.

On this empirical basis, we will be able to make more robust statements about the relevance of environmental changes for migration. The project also contributes to methodological advancement. A methodology for integrating diverse kinds of research results is iteratively developed. That way, natural-scientific findings on environmental changes, in particular land degradation, are linked to social-scientific insights into migration. This is done by joint conceptual work, the formulation of hypothesis, and modelling. The practical objective of *micle* is to identify policy options and possibilities for decision-making in order to support locally adapted policies.

This working paper provides a summarized state of the art of selected issues analyzed in the *micle* project. Chapter 2 gives an outline of the current scientific debate on climate change, environment and migration and highlights the most significant controversies, as well as overall conceptual and methodological issues. Chapter 3 addresses the climatic and environmental conditions in the Sahel in general and Mali and Senegal in particular. It mainly discusses the issue of land degradation in the region and the role of agriculture in this context. The issue of migra-

tion is subject of chapter 4. Firstly, the changing patterns of migration into and from West Africa are analyzed. Against this background, the subsequent sections address migration dynamics in Senegal and Mali, and in the study regions Linguère and Bandiagara. Chapter 5 examines the most important international, regional and national policies concerning migration in both countries. Chapter 6 concludes with an overview of the conceptual approach of the *micle* project.

2 Research on Climate, Environment and Migration

Diana Hummel, Martin Doevenspeck

2.1 Numbers and estimates

Since the last two decades, there has been an increasing interest in linkages between the environment and migration, both within the scientific community and among policy makers. Numerous studies and reports assume that environmental change and climate change will in all likelihood be a major cause for increasing population movements in the future. Already in 1990 the Intergovernmental Panel on Climate Change (IPCC) indicated "The gravest effects of climate change may be those on human migration as millions will be displaced" (IPCC 1990: 20). Just over 20 years ago, the executive director of the United Nations Environment Programme (UNEP) reported that "as many as 50 million people could become environmental refugees" if the world did not act and support sustainable development (Tolba 1989: 25). However, estimates of the current and potential future magnitude of environmentally induced population movements differ broadly and are highly controversial.

Myers (1993, 2001) estimated the numbers of environmentally displaced persons by the year 2010 at around 25–50 million people. These numbers are based on calculations of the number of inhabitants of a region that might become affected by some form of environmental degradation. Myers assumed that these people will become "environmental refugees" (cf. Kniveton et al. 2008: 29). A number of recent reports highlighted the potential for additional mass migration as a result of climate change, drawing on figures put forward by Myers and Kent (1995) in the context of the "environmental refugee" debate. A report written for Greenpeace Germany suggests that there will be 150 to 200 million "climate change refugees" in the coming 30 years (Jakobeit/Methmann 2007). The Stern Review on the economics of climate change mentions 120–200 million people (Stern 2007: 77) while a report for Christian Aid (2007) goes much further suggesting more than 700 million people by 2050. Based on the estimates of Myers (2005) the International Organization for Migration (IOM) assumes a number of 200 million "environmental migrants" by 2050 (Brown 2008). This number is the most frequently cited figure in literature. Against the background of these highly divergent figures the 4th Assessment Report of the IPCC regards the estimates of numbers of "environmental migrants" as "at best, guesswork", because of a host of intervening factors that influence both climate change impacts and migration patterns, and suggests the need for extreme caution in dealing with numbers (Wilbanks et al. 2007: 365, see also Black et al. 2008: 5).

Estimates of the Environmentally Displaced Population due to Climate Change Impacts

- People potentially at risk of being displaced because of desertification: 135 million (Almería Statement 1994)
- Number of people who have fled because of floods, famine and environmental disasters: approximately 24 million (UNHCR 2002: 12)
- People at risk of sea-level-rise by 2050: 162 million (Myers 2002)
- People at risk of droughts and other climate change events by 2050: 50 million (Myers 2002)
- People estimated to become permanently displaced "climate refugees" by 2050: 150–200 millions (Stern 2007)
- Environmentally displaced people by 2010: 50 million (UNFCCC 2007)
- Refugees due to climate change by 2050: 250 millions (Christian Aid 2007)
- People displaced by 2030: 78 million (Global Humanitarian Forum 2009)

Estimates of environmentally displaced people (Adamo 2008: 6, Foresight 2011: 28).

There are several reasons for these huge differences in numbers: First, there is no general agreement about the causal linkages among environmental changes and migration. Secondly, the estimates refer to different notions and concepts of "environmental refugees", "climate induced migration" etc. Thirdly, the estimates of the potential magnitude of climate-change related displacements differ broadly depending on sources and methods. According to Adamo (2008) the numbers generally tend to reflect population at risk from certain environmental degradation. However, as Black (2001: 9) emphasized, "calculating the population 'at risk' from sea level rise is a long way from predicting mass flight of a 'refugee' nature" (Black 2001: 9). Moreover, being at risk does not necessarily mean that people do actually move (Piguet 2008: 4). The key issue as Adamo (2008: 6) points out is "A more precise measurement and eventually forecasting of environmentally induced displacements would require a better understanding of the mechanisms linking environmental stress and demographic behaviour. The identification of these mechanisms entails considering different factors, levels of determination and temporal and spatial scales". Measurement problems include, among others:

– lack of a clear definition of environmentally induced displacements;
– the general scarcity of migration data, particularly longitudinal data and data from developing countries;
– the use of different information sources (broad-ranging global prognosis on population growth, climate change and resource constraints, or national or local studies of specific situations);
– the complexity of linking migration to environmental processes and events;
– lack of consideration of other adaptive practices than migration (Adamo 2008: 5).

2.2 Definitions and Terminological/Conceptual Difficulties

The increasing political and scientific concerns about the consequences of climate change for population mobility have not resolved the debate on exactly what constitutes an environmentally induced move and how to explain it. "The current general agreement that environmental factors contribute to population mobility translates into only modest consensus about the mechanisms, character, extent of that contribution" (Adamo 2008: 2). In the literature, different concepts and terminologies are used: "environmental refugees", "environmental migrants", "environmentally induced migration", "climate refugees" etc. All these terms are highly controversial.

The idea of "environmental refugee" was introduced by several authors. Lester Brown of the World Watch Institute already used the term in the 1970s (Kniveton et al. 2008: 29)[1] and it was further popularized in 1985 by El-Hinnawi in a report for the United Nations Environmental Programme (UNEP). This report defined environmental refugees as "those people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life [sic]". In this context'environmental disruption' is defined as any physical, chemical, and/or biological changes in the ecosystem (or resource base) that render it, temporarily or permanently, unsuitable to support human life" (El-Hinnawi 1985: 4). The debate on "environmental refugees" was strongly influenced by the neo-Malthusian assumption that population growth would lead to migration and conflict caused by resource scarcity. Albeit, this assumption was barely supported by empirical evidence, the term has been widely diffused in the political as well as in the academic debate since the 1980s. On the other hand, it has been widely challenged by a number of scholars (Castles 2002, Bates 2002, Black 2001, Lonergan 1998, Kibreab 1997). In short, objections are derived from three perspectives: theoretical, legal, and political (Oliver-Smith 2009: 10f.):

1. Theoretical arguments: Many authors state that it is misleading to attribute a direct causality since migration is always a result of multiple factors. For example, Castles (2002: 5) rejects the term "environmental refugee" because of being "simplistic, one-sided and misleading. It implies a monocausality which very rarely exists in practice". Instead, environmental factors should be seen as part of a "complex pattern of multicausality", in which they are closely linked to economic, social and political factors (ibid.). There is a complex relationship between environmental change, perceptions of these change, and human agency, which also includes possible adaptation in a way that might reduce the need to migrate (Tacoli 2009: 107).
2. Legal arguments: Different authors (Laczko/Aghazarm 2009: 18, Brown 2008: 13f., Black 2001) indicate that the term "environmental refugee" or "climate refugee" is a misnomer under international law and risks undermining the precise legal definition of a refugee and the existing protection regime.[2] Furthermore, the term "refugee" is defined in relation to cross-

[1] Some use the term „ecological refugee". In German, authors such as Wöhlke (1992), Bächler (1994) and Richter (1998) introduced the term "Umweltflüchtlinge". In French, the term "réfugiés de l´environnement" has been used, for example, by Gonin and Lassailly-Jacob (2002).

[2] The United Nations' 1951 Convention and 1967 Protocol relating to the status of refugees are clear that the term should be restricted to those fleeing persecution: "a refugee is a person who owint to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion,

border movement. Since the bulk of environmental migration tends to occur within countries rather than between countries Laczko/Aghazarm (2009: 18) suggest adding the term "internally displaced persons".

3. Political arguments: Other authors formulate objections because of instances when the term "refugee" has nourished anti-immigration and racist perspectives, pointing to the fear that has recently entered the political discussion in Europe and North America . For example, Kibreab (1997: 21) is arguing that the term "environmental refugee" was "invented at least in part to depoliticise the causes of displacement, so enabling states to derogate their obligation to provide asylum". More recently, Wisner (2009) and Hartmann (2009) argued that research on environment and migration runs the risk of energizing anti-immigration policies, and assert that the term "environmental refugee" could naturalize and depoliticize the economic and political causes and mask the institutional responses to it. Such arguments can certainly be discussed however, the concerns express the difficulties of developing adequate political and practical responses to deal with environmentally induced population movements.

Given the difficulty of having different definitions Renaud et al. (2007) proposed to distinguish between environmental refugees, environmentally motivated migrants and environmentally forced migrants. They define "a forced environmental migrant as a person who 'has to leave his/her place of normal residence because of an environmental stressor (…) as opposed to an environmentally motivated migrant who is a person who 'may' decide to move because of an environmental stressor" (Renaud et al. 2007: 11f.).

The International Organization for Migration (IOM) aimed at offering an alternative for the use of the term 'environmental refugees' and proposed the comparatively broad working definition of "environmental migrants" who are described as "persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad" (IOM 2007: 1).

For a more precise definition of migration related to the impacts of climate change Kniveton et al. (2008: 16) refer to the working definition of the IOM cited above. The authors propose to consider "climate change migrants" as a sub-set of environmental migrants and suggest the following broadened concept of "persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment *as a result of climate change* that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad" (emphasis by the authors). Following Piguet (2008: 4) this definition is well suited to designate a category of migration in an unambiguous way vis-á-vis the 1951 Convention, "but it might give to the climate a nearly deterministic status of deus ex-machina which is not confirmed in empirical research on migration".

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is outside the country of his nationality, and is unable to or, owing to such fear, is unwilling to avail himself of the protection of that country" (Resolution 429 of the United Nations General Assembly, 1951, http://www.cas/com/discoveryguides/refugee/review2.php/)

Generally speaking, the deficiencies and caveats of the several concepts can be summarized by the following points (Doevenspeck 2011):

- Analytical weakness: The terms “environmental refugee” or “environmental migrant” suggest a unidirectional link between environmental changes and migration. The core of the problems is that most migration has manifold, interrelated and complex causes. It thus seems analytically impossible to identify a migration stream as principally environmentally-induced. In most cases only through simplifications can environmental factors be identified as root causes for population displacement.
- Terminological ambiguity: despite various attempts (Myers/Kent 1995, Bates 2002) the term itself remains poorly defined, thus making it extremely difficult to decide who could be classified as an environmental refugee. Attempts to overcome this deficit by using a less biased terminology such as environmental migrants or distinguishing between environmentally motivated migrants, environmentally forced migrants and environmental refugees may be useful for policy action. But given the seamless transitions between “motivated” and “forced”, this does not offer a convincing solution for conceptual and theoretical problems.
- Political instrumentalization: Even if it is doubtful that the concept of environmental or climate refugees is the result of a coordinated strategy of political decision-makers in the industrialized world in order to depoliticize international migration it is astonishing that such an analytically weak concept is still so prominent on the agendas of organizations such as IOM, UNEP, IPCC and UNU which are very powerful in setting the international discourse.

Meanwhile, there is wide agreement among scholars that environmentally induced population movements may be arranged in a broad spectre ranging from forced to compelled to voluntary, depending on the intensity of the hazard, the vulnerability of the exposed population, and the availability of assistance (Hugo 1996, Renaud et al. 2007, Bates 2002). “Population mobility is probably best viewed as being arranged along a continuum ranging from totally voluntary migration, in which the choice and will of the migrants is the overwhelmingly decisive element encouraging people to move, to totally forced migration, where the migrants are faced with death if they remain in their present place of residence. The extremes in fact rarely occur, and most mobility is located along the continuum. Environmentally induced migration is concerned with moves toward the forced end of this continuum” (Hugo 2008: 16).

The majority of the environmentally induced population movements have been internal and short-term (Lazko/Aghazarm 2009: 23, Hugo 1996, Hugo 2008, Myers 2002). Some evidence shows that the spatial distribution of pre-existing migrant networks and other forms of social capital are relevant to estimate the probability of local or long-distance moves as well as the probability to return (Curran 2002, Adamo 2009: 14).

To capture several possible combinations, particularly for policymaking and development planning, the IOM (2007) has suggested different scenarios (Adamo 2009: 14):

1. The propensity to migrate in relation to environmental change	2. The impact of migration on the environment	3. Interactions between migration, environmental change, human security and conflict[3]
A. Migration at less advanced stages of gradual environmental change	E. Migration's impact on the environment in areas of destination	G. Human security challenges of environmental change and migration
B. Migration at advanced stages of gradual environmental change	F. Migration's impact on the environment in areas of origin	H. Conflict potential of environmental change and migration
C. Migration due to extreme environmental events		
D. Migration due to large-scale development and land conservation		

Table 1: IOM's Migration-Environment Scenarios. Source: Adamo 2009: 14

In sum, migration can occur in response to sudden disasters and extreme environmental events, e.g. earthquakes, hurricanes, floods, drought (cf. Naik 2009) and gradual, slow-onset environmental change (e.g. sea level rise, soil erosion, deforestation and desertification (cf. Leighton 2009). While in the case of sudden natural disasters the role of geophysical factors is immediately evident, this role is less clear in the case of slow-onset disruption (Adamo/de Sherbinin 2008: 26). Furthermore, population movements can be organized according to the following spectrum: voluntary – forced; temporary – permanent; short-term – long-term; short distance – long distance; internal – international; vulnerability – resilience (Laczko/Aghazarm 2009: 23, Adamo/de Sherbinin 2008: 26).

Terms such as "environmental change", "environmental stress" or "environmental degradation" encompass a diversity of phenomena which need further specification. In the literature, different categories of environmental changes are listed, which might cause population displacements (McLeman/Hunter 2010, Lonergan 1998, Naik 2009, Leighton 2009, Piguet et al. 2011) and which can be categorized as follows: 1) natural disasters characterized by rapid onset (e.g. earthquakes, volcanoes, and floods); 2) cumulative changes or slow-onset changes (deforestation, land degradation, desertification); 3) accidental disruptions or industrial accidents (e.g. chemical manufacture and transport or nuclear reactor accidents); 4) development projects involving forced settlements (e.g. dams, large irrigation projects) and 5) conflict and warfare. These different categories must be treated separately, and cannot be considered collectively as "environmental change", since they have quite different impacts on population movements. While in the case of sudden natural disasters the role of geophysical factors is often regarded as immediately evident, this role seems to be lass clear in the case of slow-onset disruption (Adamo/de Sherbinin 2008).

[3] This third category „Interactions between migration, environmental change, human security and conflict" is mentioned here only for the sake of completeness. This issue will not be addressed in the *micle* project. Moreover, the concept of "human security" remains vague, and the linkages among environmental changes, migration and conflict is scientifically a controversial issue.

Piguet et al. (2011: 6ff.; see also Martin 2009: 356) predict three main environmental factors that might significantly increase due to climate change, and which are held to have impacts on migration: sea level rise, increase in strength and frequency of natural disasters (hurricanes, cyclones, heavy rains and floods), droughts and desertification. .

For the *micle* project, particularly the two last mentioned (climate-induced) environmental changes are of relevance: a) Possible increase of heavy rains and floods as rapid-onset phenomena with an impact on population movements and b) drought and land degradation – which is the major focus of the *micle* project. Generally, these environmental processes encompass very different phenomena that usually generate impacts of a far less sudden nature such as increasing temperatures and changing rainfall patterns. They affect agricultural production and diminish people's livelihoods and access to clean drinking water, thus potentially leading "to more progressive patterns of mobility" (Piguet et al. 2011: 8). However, the research manifests very little consensus about the impacts of land degradation on migration, and the results are highly varied – depending on the regions and scales studied, and on the diversity of data sets used (ibid.). Some studies confirm a direct link between drought and emigration, others come to a contradictory result, namely that drought has only minimal impacts on migration, while a third group shows contrasting patterns according to the type of migration concerned – long-term vs. short-term and long-distance vs. short-distance migration (ibid., see also Leighton 2011, Foresight: Migration and Global Environmental Change 2011).

Generally, there is a broad consensus in the scientific literature that environmental change is one of a multiplicity of contributing factors to environmentally-induced migration. Migration is a complex phenomenon that cannot be explained by one single reason alone (Piguet et al. 2011, Laczko/Aghazarm 2009, Warner et al. 2009, Martin 2009, Kniveton et al. 2009, Hugo 2008, Castles 2002, Black 2001, Wood 2001). "There is agreement today that natural factors are not the sole cause of migration in themselves and that the economic, social and political situation of the zone under threat can, depending on the case, increase or decrease the flow of migrants" (Piguet 2008: 3). Similarly, climate change, on its own, does not directly cause people to move, but it produces environmental effects and exacerbates current vulnerabilities that make it difficult for people to survive where they are. Environmental changes such as land degradation can contribute to migration just as the economic, demographic, political and social situation can do. The challenge therefore is to relate the multiple factors shaping migration streams in the context of environmental/climate change in order to understand their internal logics and interactions. Furthermore, the formulation of appropriate analyses requires a theoretical contextualisation of these interactions, which enables the researcher to make reliable assumptions about potential linkages between the environment and human mobility. Therefore, a research approach is needed which at least combines natural-scientific and social-scientific expertise.

2.3 Environment, Climate and Population Movement: the Weak Link to Migration Theory

As mentioned in the previous section, there is a broad consensus among scholars involved in research on the environment-migration nexus that migration is a complex phenomenon, which cannot be addressed with a mono-causal explanatory approach. However, what at first glance appears to be a refreshingly differentiated view turns into a truism if one takes a quick look at contemporary migration research and migration theory (e.g. de Haas 2008). Here, it is anything but a new insight that migration cannot be explained in a deterministic linear way and that its causes, features and patterns are complex, dynamic and highly context-dependent. What is more, is that many empirical case studies on environmentally induced migration contradict the more general claims of policy papers of the IOM or publications of the UNU staff (see Warner et al. 2010, Warner 2011) by reproducing simplistic causal relationships. In his literature review Jónsson (2010) shows that more recent studies on migration and environment in the West African Sahel are still deeply entrenched in static push-pull frameworks and neglect the intertwining of environmental with the various other dimensions of human migration. To cite only one of the case studies realized within the project Environmental Change and Forced Migration Scenarios (EACH-FOR): "Generally, when people migrate, they do not have anything and therefore, they do not have any other choice than to move. Therefore, it is forced migration for environmental reasons" (Afifi 2009: 23). This discrepancy can be seen as a tendency of the debate on environment and migration to isolate itself from the empirical and theoretical insights of mainstream migration research (Verne/Doevenspeck forthcoming). This in turn, leads to undertheorized case studies, which ultimately provokes widespread doubts about the credibility of a whole branch of research. To sum it up, population movements to whatever extent shaped by environmental factors must be reconnected to migration theory instead of approaching them as an isolated phenomena. Hence, in what follows we will roughly outline the three most influential theoretical approaches to migration, position them briefly within mainstream social theory and try to formulate a preliminary synthesis.

1. The understanding of migration streams as environmentally determined implies a theoretical positioning within the *neo-classical equilibrium perspective* which itself can be situated within the functionalist paradigm of social theory. It conceptualises migration, in analogy to approaches that focus on labour markets and income differentials of individuals (Todaro 1980, Borjas 1989), as a process of equalisation between regions of deteriorating environmental conditions and areas where the state of the environment is better. Although these push-pull assumptions point at some causation factors for and consequences of unidirectional migration, they do not help to understand why migration continues without spatial differences in wages and income or, to remain in the context, why environmental degradation in a certain region never leads to emigration of all inhabitants. The limitations of push-pull explanations become even more apparent when we consider the relativity and weak conceptualisation of alleged 'root causes' of migration in sub-Saharan Africa such as 'population pressure' and 'environmental degradation'. Moreover „many migrants tend to move from areas with relatively low population densities and relatively little environmental degradation to environmentally degraded areas with high population densities. People tend to be increas-

ingly concentrated in crowded places – cities, towns, and prosperous agricultural areas – that, however, in spite of their crowdedness generally offer better social and economic opportunities in terms of individual freedom, safety, education, health care, paid labour, entrepreneurial activities and amusement" (de Haas 2008: 10).

2. As a criticism against the rigidity and the individualistic perspective of neo-classical and structuralist approaches, the *new economics of labour migration theory* conceptualizes migration as a household strategy of minimizing and spreading risk (Stark 1991, Massey et al. 1993). In line with prevailing theories in the social sciences during the 1980s and early 1990s that focussed on structure-agency-interactions, this approach considers the household as the key decision-making unit in migration processes and calls for a systematic embedding of migration decisions in the respective social and political context. The new economics of labour migration theory shares the emphasis on human agency with the sustainable livelihood approach that considers not only the households' income but also a range of different social, economic, political and natural resources (assets) to analyse how the poor in the global south actively cope with their harsh living conditions (see Chambers/Conway 1992). Accordingly migration can be seen as one of various strategies to strengthen and sustainably improve rural livelihoods (Findley 1997, de Haan et al. 2002).
3. A third theoretical perspective that focuses less on proper migration causes than on the interplay between migration and processes of formation and maintenance of social structures and thus on the perpetuation of human mobility is the *social network approach*. Already Hugo (1981: 208–209) stated that a "key role of these networks in the decision-making process is that of taking much of the uncertainty out of moving by providing assurances of assistance in seeking employment and housing as well as emotional support at the destination. … Movement generally occurs through well-defined contact networks. … They may be kinship or friendship channels that have been shown to be particularly important in Third World countries". In this perspective migration is understood as a social product and not as a response to economic, political or environmental stimuli (Portes/Sensenbrenner 1993). Even if scholars such as Portes (1995) pointed at the hidden costs of social networks and the associated constraints for migration, social capital is mostly considered as promoting migration (Massey/Espinosa 1997, Muanamoha et al. 2010). It is thanks to the social networks approach that migration is now widely considered as a selective process that develops very different patterns at the same time and in the same place which points at the importance to analyse the internal dynamic of multidirectional migration and the formation of delocalised social phenomena.

However, considering that social network approaches fail to include external and structural factors that shape migration and the role of negative social capital to weaken ties within networks, it becomes obvious that with one single theoretical approach complex migration processes cannot be entirely understood. There is a good reason for the multitude of theoretical approaches to migration given the multitude of (political, economic, ecological and social) reasons for and the various forms and courses of migration. Hence, the theoretical pluralism must be exploited to formulate appropriate syntheses for empirical findings on migration that are neither under- nor over-socialised and meet the requirements, which the cumulative causes for migration, its ten-

dency of self-perpetuation and its inter-temporal dimensions represent. With regard to the potential linkages between migration and the environment the following theoretically based hypothesis can be summarized: Environmental degradation may be one part of the structural conditions within the contexts of the country of origin. These structural conditions shape migration patterns that can partly be explained with classical theoretical approaches. At the same time people perceive and deal with these conditions in different ways, which is why migration becomes a selective process, influenced by factors on different levels. These factors interact, they may accumulate, decrease or increase in importance as time goes by and maybe even be overlaid by completely new ones. Once the process of migration has started, mechanisms of social structuring bring about self-strengthening of migration, whereas the accumulation of driving forces and their temporal and spatial variations contribute to its perpetuation. Factors shaping migration may change during time and may be different for each single migration during a life course. Migration itself causes and enforces social and economic change and brings about new migration as a consequence. Thus a unidirectional perspective should be abandoned in favour of an analysis of multidirectional one.

Although this synthesis seems to be a careful and convenient working hypothesis it must not be overlooked that even this attempt still contains a certain sedentary bias since the inherent conceptualization of mobility itself ultimately tends to frame migration as a problem, "a response to crisis rather than a 'normal' part of people's lives" (Bakewell 2008: 1345). Especially research on migration in Africa seems to reproduce a normative charging and a politicisation of human mobility (Castles 2009) and while mobility in the 'developed world' is something desirable if not indispensable, it is mostly seen as something that diverges from a proclaimed sedentarist norm for the 'developing countries'. As Castles (2009) has pointed out, it is especially policy-driven migration research that is in danger of solidifying an understanding of migration as a "coping mechanism of last resort" (Adepojou 2006: 35). Such an understanding calls for a removal of the 'root causes' for these situations of hardship and for stabilizing the 'affected' people in their contexts of origin. "In the long run, however, the aim must be to create sustained development and opportunities for ‹decent work›, to motivate people to remain in their home countries and benefit from local alternatives to migration" (ibid.). Here, the risk is that such an understanding contributes to the already mentioned isolation of migrations studies from broader social research. The so-called mobility paradigm that conceptualizes movement "as constitutive for economic, social and political relations" (Urry 2007: 43) acknowledges mobility as an integral part of human life and not as a problem per se, regardless of the place where this life is lived. This does not mean to ignore or to negate that people in Africa do have to tackle serious problems but it is reminder to not conceptualize mobility differently 'here' and 'there' and to accept that migration must not always and necessarily be a coping strategy. It should help to avoid the nonreflective perpetuation of the metaphor of migration pressure and other "myths of migration" (Skeldon 1997: 7).

Since natural and social processes are always intertwined there is no need for a peculiar theory for migration in the context of environmental or climate change. However, this short conceptual outline should have made clear, that the debate on the environment and migration must be reconnected to migration theory in order to avoid simplistic frameworks and flawed concepts and to address the question empirically in a methodological sound way.

2.4 Methodological Aspects

With the exception of flight as direct response to extreme events such as natural disasters or industrial accidents it is not only a conceptual but also a methodological challenge to make reliable assertions about the linkages between environmental change and migration. However, there is vast spectrum of methodological approaches to unbundle environmental issues from the multitude of other factors that shape migration decisions. They can roughly be differentiated in quantitative, qualitative and model-based ones. This section gives a brief overview on the most frequent approaches within the variety of methods and their respective strengths and weaknesses as well as about some more general methodological problems linked to some conceptual flaws.

A common approach is to collect environmental data, data on the social and economic context and on past or current (panel data) migrations through standardised questionnaires in more or less large surveys (Findley 1994, Henry et al. 2004, Massey at al. 2007, Shresta/Bhandari 2007). Though these approaches succeed to some extent by revealing case-specific correlations or non-correlations between environmental factors and population movement, the main weakness is "that environmental change is only very incompletely captured" (Piguet 2010: 519). Piguet resumes that none of the studies based on sample surveys he reviewed "draws on detailed environmental evolutions captured along the whole period under review, and it thus remains difficult to disentangle environmental variables from other contextual effects" (ibid).

Studies that apply ecological interference look at potential correlations between environmental demographic features of a certain region. The hypothesis is that environmental degradation should for example be reflected in a negative migration balance in this region. Multivariate statistics are used to disentangle the environmental factor from others and a couple of studies reveal correlations thatvary greatly with regard to their significance (Henry et al. 2003, Reuveny/ Moore 2009, van der Geest et al. 2010). Here, the main criticism is that the results do not allow reconstructing individual decision-making in migration processes from spatial and demographic aggregates. "In other words, nothing guarantees that the very people who emigrated and contributed to a negative migration balance in an area under environmental stress, for example, are the same individuals who experienced that environmental stress and took a decision to migrate accordingly" (Piguet 2010: 518).

Ethnographic approaches that result in thick descriptions through observation and in-depth, often biographical interviews with migrants are also frequently applied and can often avoid the methodological problems of the quantitative paradigm (see Meze-Hausken 2000, McLeman/ Smit 2006, Mortreux/Barnett 2009). Though these place-sensitive studies are usually more susceptible to the social constructedness of alleged 'facts' such as droughts and land degradation and manage to put meaning to the focus by considering perceptions and experiences of people, the problem remains in the limited comparability of a multitude of qualitative studies and hence the difficulties to aggregate them into a more general picture.

Given the pros and cons of the methods briefly presented so far, a multilevel approach (see Zolnik 2009) seems to be the most promising, although it is probably the most costly and time-intensive way to obtain valuable results. Such an approach has to consider perceptions, experiences and the agency of individuals, as well as survey data on the household level, aggregated

demographic and ecological data by combining ethnographic-qualitative and if possible also mobile data gathering (Sheller/Urry 2006), multivariate statistics and remote sensing data on a longer time interval. There are already some examples, which, do, however, not entirely cover the data sets suggested above, but at least constitute a reliable and inspiring basis for future research (eg. Ezra/Kiros 2001, Carr 2005, Gray 2009).

3 Environment and Migration in the Sahel

Cyrus Samimi, Martin Brandt

3.1 Climate

The climate in West Africa hence Senegal and Mali is characterized by the seasonal fluctuation of the West African monsoon. In general, the rainfall decreases from south to north, with more than 3000 mm along the coast of Liberia, Sierra Leon and Guinea, dropping below 50 mm in northern Mauretania and northern Mali (fig. 2). Corresponding to the amount of rainfall the variability of precipitation increases from south to north.

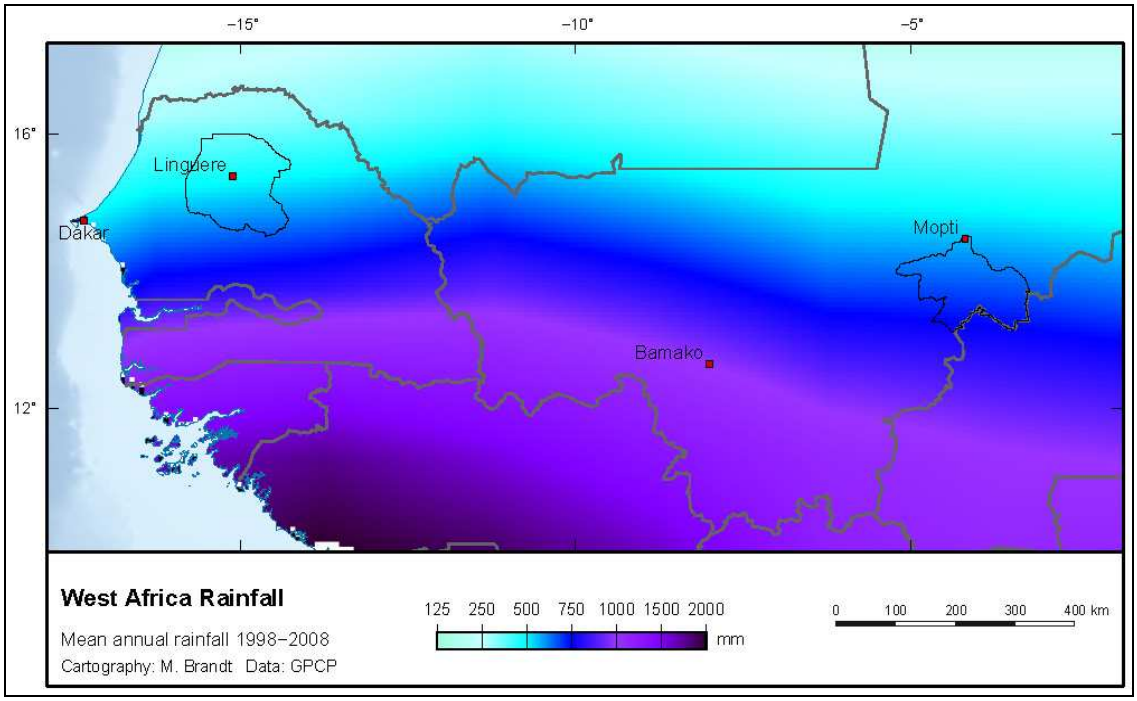

Figure 2: Mean annual rainfall in West Africa, 1998–2008 (data after Adler et al. 2003)

The precipitation is related to the seasonal movement of the Intertropical Convergence Zone (ITCZ). It moves northward during boreal summer reaching at most 20°N, in winter the ITCZ is placed along the Gulf of Guinea coast. In West Africa the ITCZ marks the convergence zone of moist monsoonal air masses originating from the St. Helena anticyclone system and dry north-eastern trade winds originating from the North African subtropical high, alternatively known as the Intertropical Discontinuity (ITD). The northward movement of the monsoon trough is often very variable, causing monsoon breaks with dry conditions. Additionally, it fluctuates diurnally by about 200 km. During northern summer the surface airflow is capped by two easterly jets, the African Easterly Jet (AEJ) and the Tropical Easterly Jet (TEJ). The rainfall patterns in West Africa are determined by the position of the monsoon trough, the strengths and latitudinal positions of the easterly jets and the development of African easterly waves (AEW) along the AEJ (e.g. Nicholson 2008, 2009). The region can be divided into three rainfall zones (D, C, and B) and a zone north of the monsoon trough (Zone A), related to the movement of the trough. During northern summer the coastal belt (Zone D) receives light rain. In the southern part of Zone C

rainfall is continues without storms. The north of Zone C, is mainly characterized by disturbance lines with stormy rain induced by the dynamics of the AEJ. In Zone B the depth of the monsoon air decreases rapidly and rain is produced only by isolated storms and thunderstorms. Areas north of the monsoon trough are almost totally dry (Zone A). In summary, the complex dynamic interactions between the surface airflows and the easterly jets control the rainfall patterns in West Africa (e.g. Hastenrath 1988, Leroux 2001).

These main processes of the West African monsoon are well understood, but causes for variations in the fluctuations of the monsoon trough, the exact role and dynamics of the AEJ and the related squall lines are still not entirely clear (e.g. Camberlin et al. 2001, Fall et al. 2006, Hulme et al. 2001, Janicot et al. 2001, Jenkins et al. 2002, Moron et al. 2008, Nicholson 2008, Paeth/ Thamm 2007).

A clear influence on the rainfall distribution in West Africa is related to the sea surface temperatures (SST) in the Atlantic and the El Niño-Southern Oscillation (ENSO). In this context El Niño events significantly correlate with droughts in the Sahel (Camberlin et al. 2001, Ward 1998). Hirst/Hastenrath (1983) among others showed that warmer SSTs in the South Atlantic result in higher rainfall in the Gulf of Guinea and its coast but lower precipitation in the Sahel from July until September but there is no clear link between ENSO events and Sahel rainfall especially at a low-frequency scale but a clear response to SST fluctuations in the Atlantic (Janicot et al. 2001). Janicot et al. (2001) come to the conclusion that a complex influence of SSTs is responsible for rainfall patterns and trends in the Sahel at different frequency scales, including ENSO-SSTs, SSTs in the Mediterranean Sea (Rowell 2003) and the Indian Ocean (Bader/Latif 2003). Additionally, land-surface-moisture feedbacks play an important role (Paeth/Thamm 2007), as well as the strength and position of the Sahara low (Biasutti et al. 2009).

The complexity of the climatic situation in Western Africa is also the reason why mid-time fluctuations of rainfall are not yet fully understood. In the 60s, 70s and 80s of the 20th century the rainfall in the Sahel of Western Africa was characterized by an amount below average and long lasting droughts. Since the 90s the precipitations are slowly increasing but have not yet reached the levels of mid last century (Fink et al. 2010, Giannini et al. 2008, Lebel/Ali 2009, Nicholson 2008). But the precipitation patterns in the Sahel are characterized by a high spatio-temporal variability and so droughts and floods occur frequently on interannual and decadal scales (e.g. Paeth 2004, Paeth et al. 2011, Tarhule 2005). After the late 1980s variability has become even more frequent and extreme (Dai et al. 2004, Paeth et al. 2011) and could get even more so in the future (e.g. Christensen et al. 2007: 871). It is also discussed that rainfall patterns might increase along the Guinean coast with a decrease in the Sahel (Camberlin et al. 2001, Hulme et al. 2001, Milly et al. 2002, Paeth 2004, Paeth/Hense 2004, Paeth et al. 2009, Vigaud et al. 2009). However, it must be stressed that according to the 21 models used in the IPCC 4th Assessment Report, the development of rainfall in West Africa is fairly uncertain at present (Christensen et al. 2007, Joly et al. 2007).

In contrast to the changes in rainfall it is proved that the temperature in West Africa has dramatically increased during the last decades (fig. 3) and scenarios predict a further increase

(Christensen et al. 2007). So higher precipitation might be compensated by higher evapotranspiration.

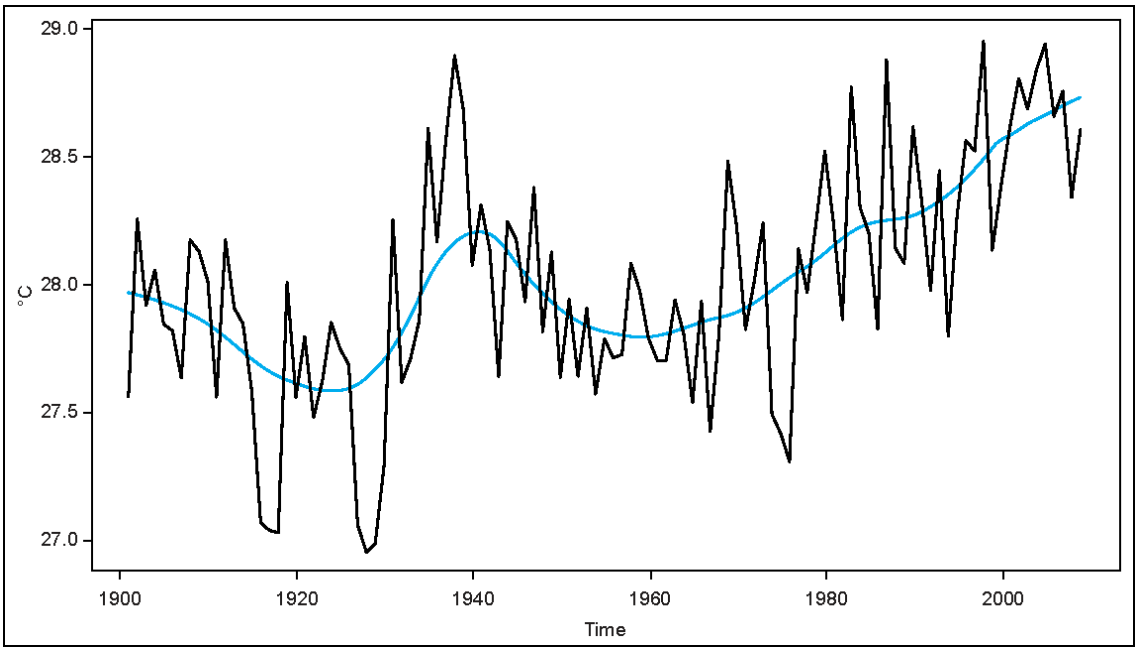

Figure 3: Annual mean of daily mean temperatures in Western Africa (the region is given by fig. 2) (data after Mitchell/Jones 2005)

3.2 Environment

The vegetation in the Sahel is mainly controlled by precipitation (Hickler et al. 2005), yet it remains unclear how exactly the declining rainfall and especially the severe droughts in the 70s and 80s have affected vegetation types and patterns during the last 30 years. Climate change and variability are regular features of the Sahel. Hence, the native plant communities are well adapted to a certain range of climatic variations and it is hard to separate climatic factors which contribute to a changing environment from other factors. However, it is certain that human activities have a serious impact on the environment. First evidence of human existence in the Sahel dates from 600,000 B.P. Since that time, hunting, bush fires, agriculture, herding, charcoal production, exploitation of forest products and other activities may have modified the ecosystem, leading to a gradual reduction of biodiversity (National Research Council 1984). This slow and gradual impact has changed dramatically during the last 50 years. Combined with a changing climate (droughts, increasing variability, decreasing rainfalls, higher temperatures, more intensive rainfalls, floods, shorter rainy season), rapid population growth, economic development, urbanization and intensification of agriculture have serious implications for the people and the environment in the Sahel as summarized by Hammer (2005):

– The rapid growth of urban areas affects many fertile regions like river valleys and basins,
– due to a decrease in woody vegetation there is a decline in biodiversity, evapotranspiration, soil moisture, soil fertility and natural food supply for humans and animals,
– the wildlife declines rapidly,

– decreasing rainfall, droughts and floods change the regeneration rate of the vegetation and of the ground water with severe implications for people, flora and fauna,
– urbanization creates new environmental problems, like air pollution, the need for waste management and soil- and water pollution. These problems also occur in rural areas, where waste is tilled into the soil,
– intensification of agriculture and its expansion into new regions reduce the natural vegetation and may lead to land degradation,
– animal husbandry causes pressure on vegetation and soil also leading to land degradation,
– regular bush fires replace natural trees and shrubs with less readily disseminated trees and shrubs or permanent grassland. Those fires reduce and simplify the vegetation and deplete the soil through losses of nitrogen (National Research Council 1984).

Recent pilot studies conducted by the GLCN in Senegal during a climatically more or less stable period (1990–2005) using remote sensing and field assessment show a dramatic increase in agricultural areas and a small increase in tree plantations, closed trees and urban areas, while all other naturally vegetated areas (especially grassland and open shrubland, but also open tree and closed shrubland) significantly decreased between 1990 and 2005 (fig. 4, GLCN 2010).

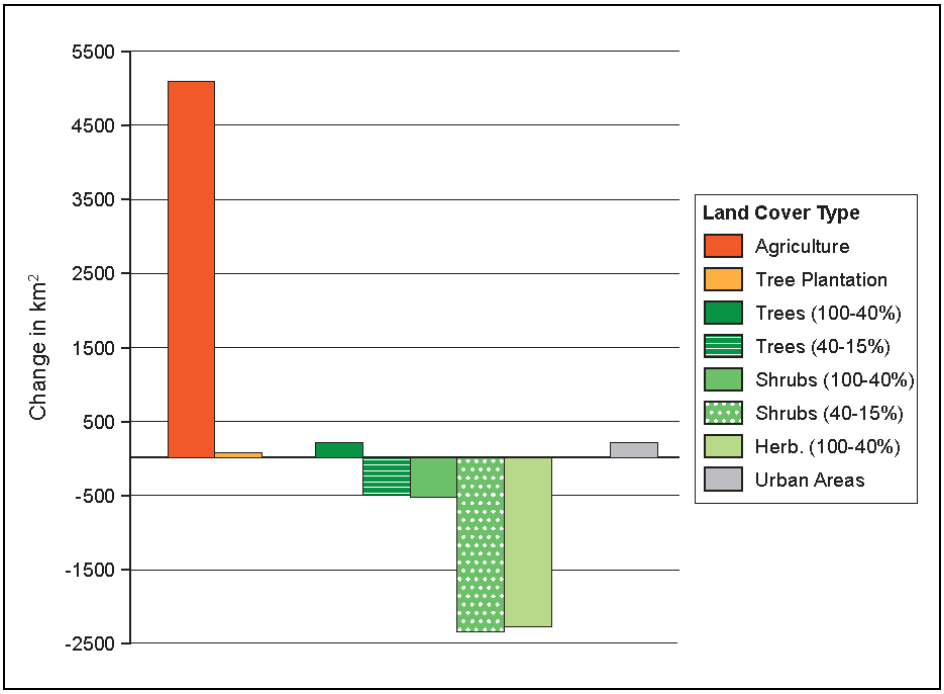

Figure 4: Senegal land cover change between 1990 and 2005 (GLCN 2010)

Long term studies indicate an overall decrease in natural vegetation and an increase in agricultural areas (Tappan et al. 2000, Tappan et al. 2004). For example savannahs in the Senegal decreased from 74% to 70% while croplands increased from 17% to 21% between 1965 and 2000, resulting in an overall decrease of the biodiversity. However, the studies state that in 2000 Senegal's savannahs, woodlands and forests still cover two-thirds of the country.

Unfortunately, detailed and reliable data at a national scale is only available for Senegal, but it is likely, that other Sahel countries show a similar pattern. For example Ruelland et al. (2010)

studied three experimental areas in Mali over 40 years and found a steady increase in croplands as well as a reduction of woodlands. Brink/Eva (2009) confirm this trend for the whole Sahel. They identified an agricultural expansion of +14.2% at the expense of forest (-1.5%) and natural non-forest vegetation (-29.2%). The West African Land Use and Land Cover Trends Project by the USGS and AGRHYMET mapped land cover and land use changes between 1975 and 2000 in 12 West African countries (Tappan 2010). The results reflect the dramatic population's growth showing striking increases in agricultural and urban lands (table 2).

	Agriculture	Others
Benin	+77.0%	-27.1% dense forest
Burkina Faso	+50.2%	-13.6% savannahs
Ghana	+96.5%	-17.9% dense forest
Guinea	+2.6%	
Togo	+80.0%	

Table 2: Environmental change in West African countries (after Tappan 2010)

3.3 Land Degradation

The West African Sahel is an ecologically highly vulnerable region because of its high climatic variability and fragile soils. That is why land degradation in the Sahel region has been a frequently debated topic in scientific circles over the last three to four decades. The degree and severity of land degradation are still unclearas they are caused by uncertain definitions and knowledge, which are summarized by Rasmussen (1999):

– The definitions are vague and often only refer to certain scientific disciplines. Additionally, ifferences in perception and interests influence the terminology.
– There is a lack of hard data and studies that really prove degradation is a problematic basis for environmental policies.
– Spatial variability is often neglected. In the Sahel, differences in soil properties and rainfall show local and regional patterns, but the data used are often either micro-scale or global.
– The understanding of environmental processes over a longer period of time is deficient. Due to the lack of historical environmental data, false conclusions may be drawn, especially in highly diverse regions like the Sahel.

There are many definitions of land degradation, but one of the most accepted is that of Williams/Balling (1995, cited in Rasmussen 1999: 152): "Reduction of biological productivity of dryland ecosystems, including rangeland pastures and rainfed and irrigated croplands, as a result of an acceleration of certain natural processes." This may include a variety of processes such as loss of biodiversity, soil erosion by wind and water, depletion of soil nutrients, changes in the physical structure of the soil, salinization and others (Rasmussen 1999). All these processes interact and may be driven by human and/or climatic factors, which may again be enhanced by the effects of degradation. Figure 5 tries to illustrate these interactions.

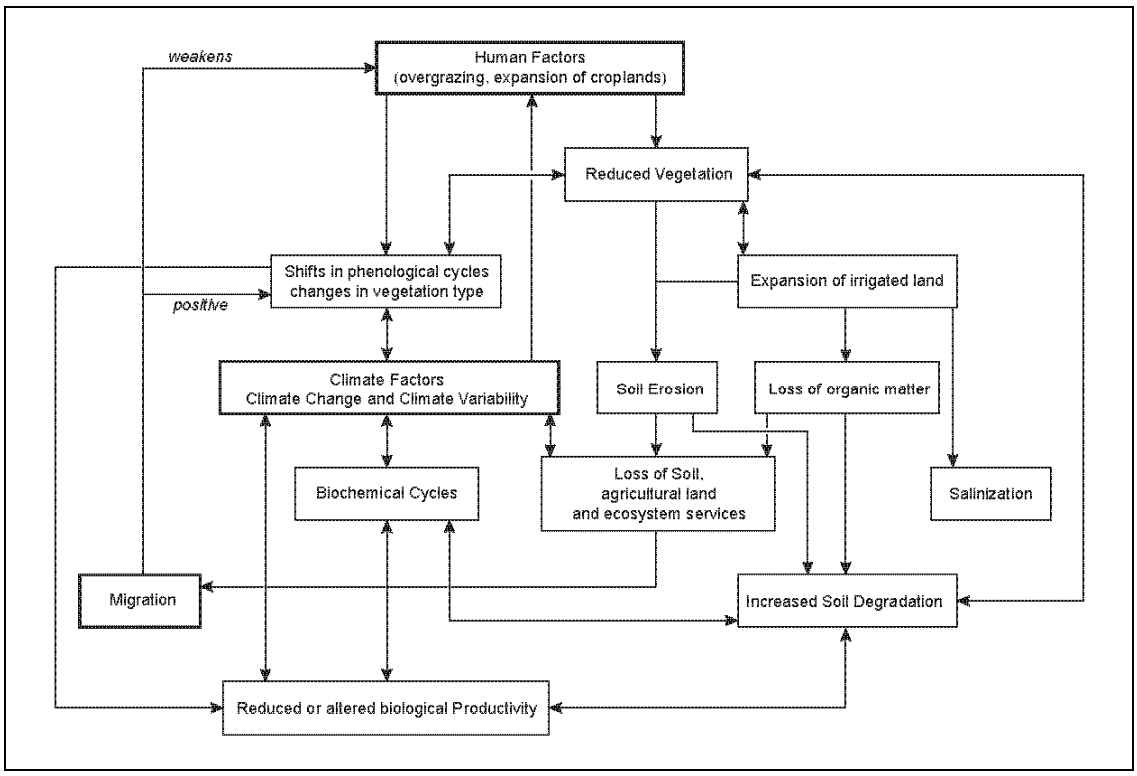

Figure 5: Interaction among climate and human activities causing land degradation (after Hammer 2005, Ustin et al. 2009)

However, in reality land degradation can be much more complex. Hammer (2005) classifies land degradation in the Sahel using the following ecological factors:

- temporal and spatial rainfall variability,
- dropping ground water level,
- highly vulnerable soils,
- infertile soils,
- high evapotranspiration,
- sparse vegetation cover,
- declining soil fertility and production of biomass,
- strong winds and dust storms,
- intensive rainfall.

Internal factors are:

- abandonment of traditional land use systems,
- stagnancy of rural production- and resource management systems,
- pressure on resources through livestock,
- land and soil scarcity,
- wood as a main source of energy,
- loss of innovative young people due to migration,
- inadequate irrigation,

– consumer orientated agricultural policy (not producer oriented),
– prevention of a change due to the political leaders' attitudes,
– population growth,
– uncertainty in land use rights.

External factors are:

– colonial history and policy,
– orientation towards the global market and price fluctuations,
– terms and conditions of the global market,
– national debt,
– export production,
– an increasing technological gap between Africa and the North.

All these factors create processes, which interact and lead to a cycle enhancing land degradation, but the actual degree of land degradation in the Sahel remains unclear. There seem to be two parties with a differing judgment on land degradation. On one hand organisations like the UN and the FAO publish reports about widespread degradation in the Sahel. According to the United Nations Environment Programme (UNEP), the combined effects of population growth, deforestation, intensive cropping, overgrazing, reduced rainfall and the lack of environmental policies have transformed a large proportion of the Sahel in barren land during the last 50 years (Kandji et al. 2006). In numbers, the UNEP states that 500 million hectares of African land are degraded, including 65% of agricultural land and 30% of the Sahel (Niemeijer/Mazzucato 2002). On the other hand there is a scientific community who tries to support this with hard data, but mostly fails and sometimes even comes to opposite conclusions (e.g. Mortimore 1998, Tiffen/Mortimore 2002, Warren 2002). Niemeijer/Mazzucato (2002) for example found a rising agricultural productivity in Burkina Faso, one of the officially most degraded countries in Africa.

The reliability of the UNEP estimates is hard to prove. Most reports still rely on a 20 year old project called "Global Assessment of Human induced Soil Degradation" (GLASOD) from 1991 (Oldeman et al. 1991). This project produced maps and reports based on regional expert judgements, but the data have hardly been tested for consistency and so remain subjective. The type, rate, and extend of soil degradation were mapped for the whole globe and most of the Sahel countries separately. This approach has been misused and was criticised by many scholars (e.g. Nachtergaele et al. 2010, Niemeijer/Mazzucato 2002) and should therefore not be used at a regional or national scale. But there are still a few alternatives available, and even recent studies rely on figures produced by GLASOD, indicating that 320,106 ha of the Western Sahel are affected by soil degradation (Hammer 2005, Sissoko et al. 2010). Figure 6 shows that the GLASOD approach suggests a degradation in the Western Sahel ranging from light to very severe.

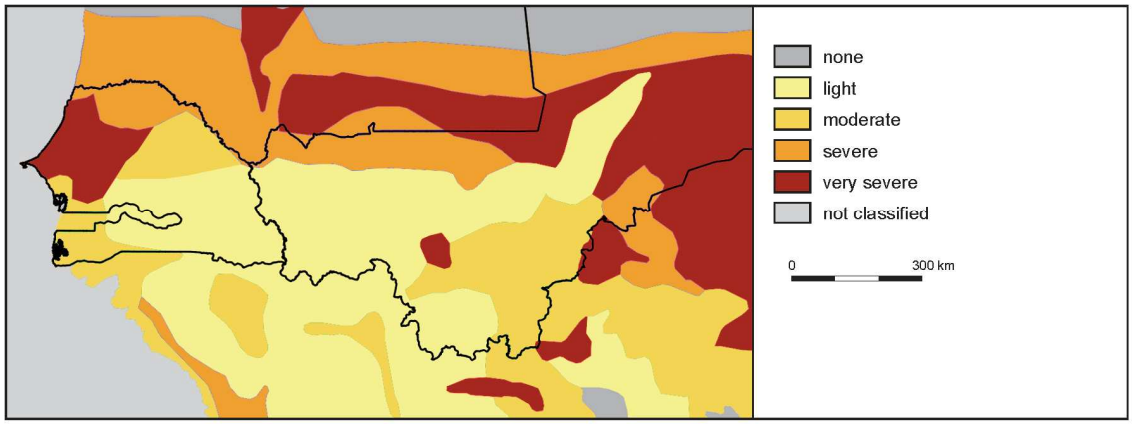

Figure 6: GLASOD human induced soil degradation for the Western Sahel (after Oldeman et al. 1991)

Due to the criticism of GLASOD, a more recent approach called GLADA (Global Assessment of Land Degradation and Improvement) within the FAO program Land Degradation Assessment in Drylands (LADA) maps land degradation and improvement by using remote sensing techniques (Bai/Dent 2007). They try to identify changes in net primary productivity using a dataset called GIMMS. This dataset contains global vegetation data with a spatial resolution of 8 km and a temporal resolution of 15 days is available since 1982 (Tucker et al. 2005). However, remote sensing can only provide indicators; a negative or positive trend does not necessarily mean degradation or improvement as greenness depends on many factors.

So far, remote sensing studies in the Sahel do not reveal any kind of broad degradation. The GIMMS dataset was used in several studies, and NDVI analyses revealed a considerable greening in most parts of the Sahel since 1982 (Anyamba/Tucker 2005, Eklundh/Sjöström 2005, Heumann et al. 2007, Olsson et al. 2005). Correcting the remotely sensed NDVI by the effects of rainfall to identify areas which do not respond to increasing rainfall also confirm the greening trend (fig. 7, Bai/Dent 2007, Herrmann et al. 2005). This greening might be a sign of recovery from the severe droughts in the 70s and the beginning 80s. The situation before the drought is unclear because of lacking data. It is also not yet known which vegetation type is causing the greening of the Sahel, but it can often be observed that diverse vegetation is replaced by vegetation of poor quality, a process hardly distinguishable by remote sensing. Additionally, it is questionable if the GIMMS dataset is reliable enough and if a resolution of 8 km and a time-scale of about 25 years are adequate, but these studies contradict the theory of a widespread and irreversible degradation. There is also no indication for the existence of millions of hectares of barren land and a large scale reduction of biological productivity, like reported by UNEP (Kandji et al. 2006).

The use of the Rain Use Efficiency (RUE), which uses the net primary production (NPP) and annual rainfall, neither showed showed severe degradation (Bai/Dent 2007, Prince et al. 1998). If degradation was detected by the RUE (Hein/Ridder 2006), the used methodology was strongly disputed (Prince et al. 2007).

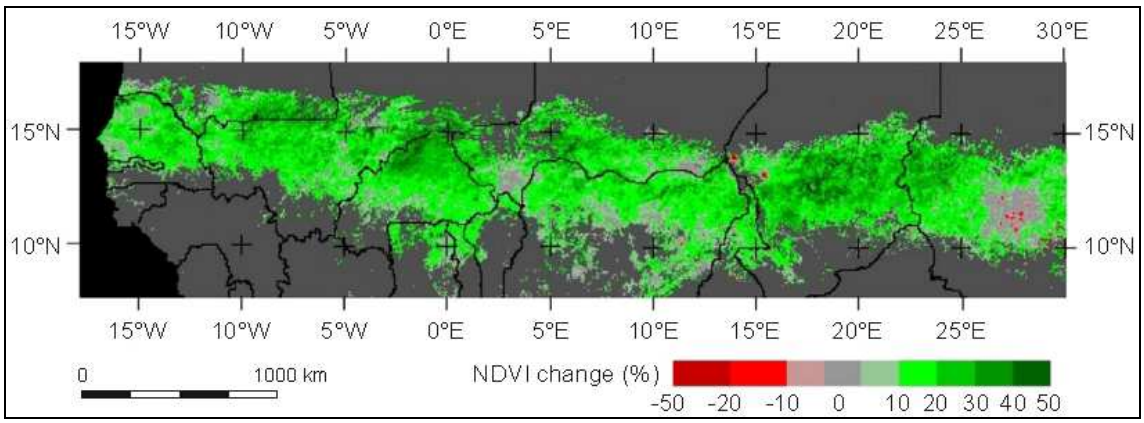

Figure 7: Greening of the Sahel between 1982 and 2003 (Herrmann et al. 2005)

Tucker/Nicholson (1999) could not detect a permanent expansion of the Sahara desert in the Sahel region, but proved a fluctuation of the green vegetation boundary of up to 150 km which occurred when a wet year followed a preceding dry one. This fluctuation depends strongly on precipitation and was often misinterpreted as irreversible desertification in periods of droughts (Nicholson 2001). According to Nicholson (2001) there is a full recovery of the land productivity at the end of the drought period. Studies in Namibia show a total misclassification of land cover types caused by rainfall variability when using standard remote sensing techniques (Wagenseil/Samimi 2006, 2007). And this is true for the whole Sahel region, since its vegetation mainly depends on seasonal rainfall.

All remote sensing studies demonstrate that there was neither a progressing shift of the Sahara desert southwards, nor a large-scale expansion of less productive land in the Sahel region. Of course, this does not necessarily mean that degradation and the replacement of vegetation is absent on a local scale, as studies in the 80s demonstrate (Nicholson 2001).

The most recent global approach to assess land degradation called GLADIS (Global Land Degradation Information System), is done by LADA and is still in a beta status. LADA defines land degradation as “the reduction in the capacity of the land to provide ecosystem goods and services over a period of time for its beneficiaries” (Nachtergaele et al. 2010). GLADIS is working with a model, which uses a variety of input-variables from a database and produces several indices to assess the degradation status. Data included in the model are land use information and a background database containing ecosystem processes, goods and services related to vegetation, biodiversity, soil, water, society and economy. It then processes all mentioned variables separately, as a status or a process (Nachtergaele et al. 2010). A major criticism may be the quality and spatial resolution of the input data and the suitability of a global-scale model for the situation on a regional level. The overall approach is, however, promising and may give useful hints about degradation which then should be tested on a regional or local level.

The model is available for the public at http://lprapp11.fao.org:8080/glad_res/. Outputs for the Western Sahel mainly reveal poor biodiversity, soil quality, water resources, biomass and economic production and a moderate social status, but the development of the parameters seem to remain generally stable or even show a positive trend (fig. 8). The indices show a low to very low status of the ecosystem services and a mostly severe and very severe biophysical status. The

land degradation index ranges from moderate improvements to high degradation, while the services and goods affected indicate only soil. The land degradation impact index measuring the effect of poverty ranges from low to high in the Western Sahel.

Assessing land degradation is much more complex than often thought, and expert assessments, remotely sensed time series and model outputs can hardly cope with the dynamics found in Sahelian countries. Changes in species distribution, encroachment of undesirable species, dust generation and soil compaction are hard to determine with models and remote sensing. Also the social complexity and political interests are not easy to incorporate. However, Herrmann/Hutchinson (2005) demonstrate that the context of the desertification debate is changing and highlight the importance of an interdisciplinary approach which includes the ecological and social aspects of the research areas.

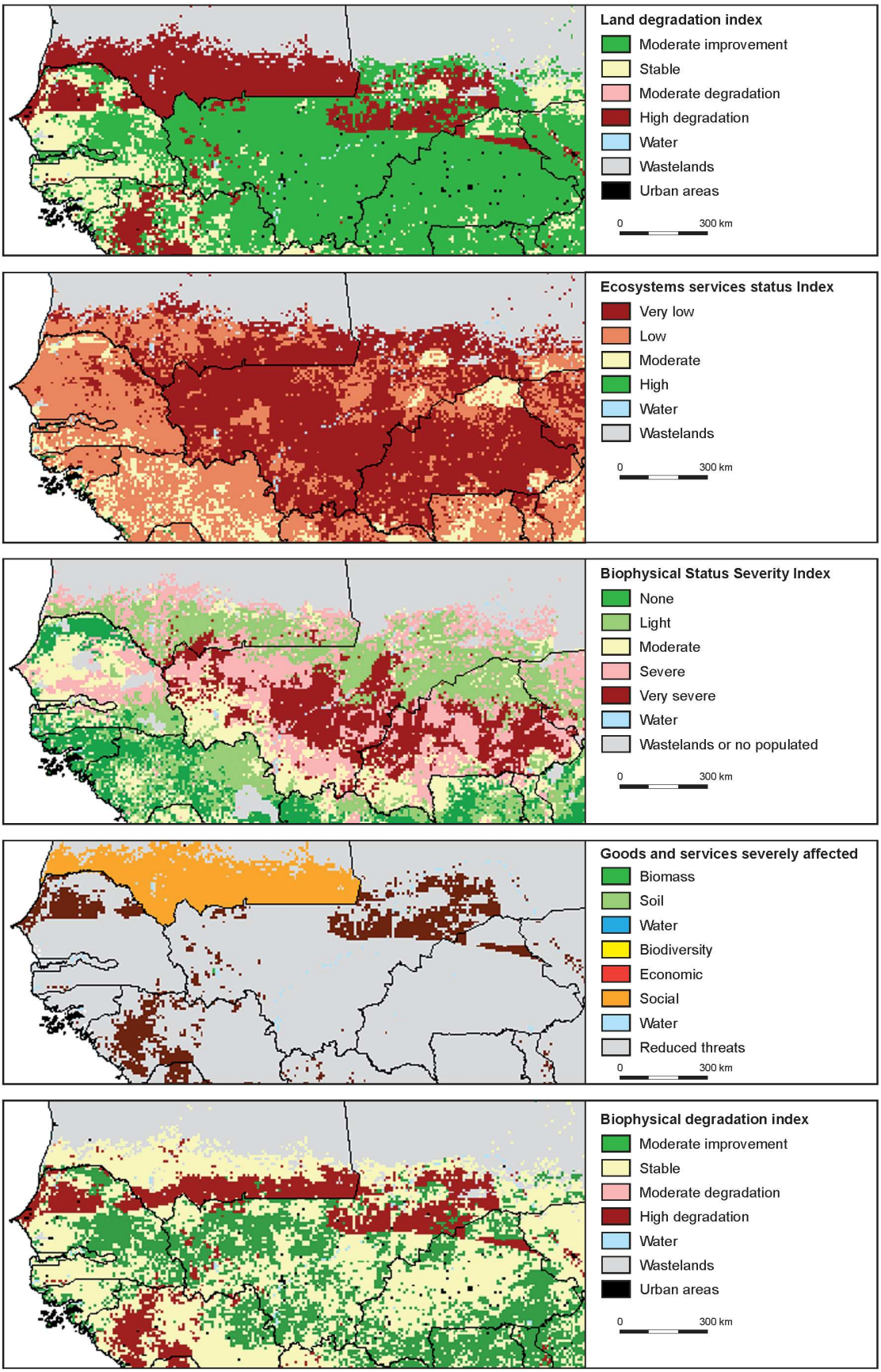

Figure 8: GLADIS model output for Western Africa (based on http://lprapp11.fao.org: 8080/glad_res/)

3.4 Role of Agriculture

Farming is the main source of income for most of the inhabitants of the Sahel with millet and sorghum as the major crops. Most low and middle-income households are active in subsistence farming, which is almost entirely reliant on the rainy season between June and October. Especially in the northern Sahel, many people live as semi-nomads, farming and feeding livestock in the north during the rainy season and trekking to the wetter south to find better grazing lands during the dry season (Hammer 2005).

As already stated, agricultural lands in the Western Sahel have dramatically increased over the last 50 years. Population pressure and new techniques lead to the exploitation of new regions, intensification of cropping, deforestation and overgrazing. Overuse of land for agricultural purposes plays a significant role in land degradation and is a main issue of climate change theories as well.

Rainfed Agriculture

Expansion of rainfed agriculture started with the cessation of slavery which encouraged a northward drift of agricultural populations into formerly hostile regions (National Research Council 1984). Mali and other Sahel countries reported an 80% increase in rainfed crop production between 1952 and 1975.Those results were achieved at the expense of fallow periods and lead to a reduction of natural vegetation like trees and shrubs, which are also used for construction and as fire wood (National Research Council 1984). In many areas, agricultural development has focused on the production of cash crops such as groundnut, resulting in a serious loss of soil structure and fertility. Soils in the semi-arid zone are mostly fragile and infertile with very little organic material. Harvesting crops without the use of fertilizers or longer fallow periods removes essential nutrients. Deforestation and cultivation destabilizes the soil structure and exposes it to wind- and water-erosion (Brandt et al. 2009).

Irrigated Agriculture

In addition to rainfed agriculture, irrigation schemes have been introduced in many basins of the Sahel like the Senegal River Valley, the Interior Delta of the Niger and the Lake Chad. In combination with new technologies and fertilizers the yields have been increased, but new difficulties were encountered. Insects and rodents consume large quantities of the crops, sheet erosion is caused by dry-season winds, soils become saline and the costs for fertilizers and irrigation schemes are hardly affordable (National Research Council 1984).

Livestock

Even if cattle is poorly adapted for Sahelian conditions (they require large quantities of water and are highly susceptible to stress) and declining rainfall and decreasing vegetation cover (some fodder species disappeared and were replaced by species requiring less water) lead to declining numbers in the 70s and 80s (National Research Council 1984), livestock plays still a key role for the economies of West African countries and livestock numbers are now increasing again. Of the entire sub-Saharan Africa, 25% of the cattle, 33% of the sheep, and 40% of the

goats live in the Sahel and West Africa (Zoundi/Hitimana 2008). And this clearly has considerable effects on the vegetation cover, especially around wells. Cattle increases the pressure on perennial grasses sometimes even eliminating them, they trample seedlings and compact soil, and also affect tree cover, as trees are used as fuel and building material by herders and as fodder (National Research Council 1984, Sissoko et al. 2010). The reduction of the vegetation cover in combination with soil compaction can also indirectly trigger degradation processes. At the start of the rainy season the surface can be sealed with wet soil particles. This might enhance surface runoff and so soil erosion and a reduction of water infiltration, resulting in lower groundwater levels. (National Research Council 1984). A recent study over a period of 27 years by Miehe et al. (2010) proved that grazing intensity has a considerable long term effect on land degradation, always interacting with rainfall dynamics.

Climate and Agriculture

In the 70s it was postulated that the huge expansion of agriculture into marginal zones and other human activities like animal husbandry affected the vegetation cover in such a way that the savannahs changed to deserts. The atmospheric circulation responded and strengthened the desertification processes (Giannini et al. 2008). This hypothesis is called “Charney's hypothesis” (Charney et al. 1975) and states that land cover changes associated with human impact lead to an increase in surface albedo which causes a decrease in precipitation again leading to a decrease in vegetation cover and an even greater enhancement of the the albedo. The results of this cycle are irreversible and lead to large-scale degradation, decreasing rainfall and severe droughts (Giannini et al. 2003). Meanwhile, this hypothesis is disproved by several studies, showing that changes in the sea surface temperature (SST) explain the droughts of the 70s and 80s (Giannini et al. 2003, 2008). However, it still seems very likely that changes in the vegetation cover and hence changes in the surface albedo play a secondary role in the West African monsoon system and that the land surface response in its interaction with the atmosphere enhances effects which are remotely forced by the SST (Biasutti et al. 2009, Giannini et al. 2008, Paeth/Thamm 2007, Zeng 2003).

3.5 Focus Senegal

Climate, Environment, Land degradation

Senegal is located in the transition zone between the Guinean rainfall regime with more than 1000 mm/a in the southeast and the Sahelian zone in the north with less than 300 mm/a (fig. 2). Accordingly, the variability increases from south to north. As in other parts of the Sahel the rainfall pattern has been showing positive and negative anomalies for the last 100 years with the longest negative period from 1976 until 1993 (Mbow et al. 2008). Since then the rainfall recovered slightly but did not yet reach previous amounts (fig. 9). However, 2009 and 2010 were among the wettest years ever recorded. Additionally, the observed high temporal and spatial variability is too high to draw final conclusions about the rainfall development (Mbow et al. 2008). The seasonal and intra-seasonal rainfall variability frequently causes droughts but also flooding. In 1977 more than 3.7 million people were affected by droughts followed by a very dry period. Severe floods occurred in 1979 and 1982 affecting 950,000 respectively 1.2 million

people. Floods with less severe impacts happened in 1998 (300,000), 1999 (95,000), 2002 (284,000), 2005 (50,000) and 2007 (5,300) (Grote/Warner 2009: 9, Samimi et al. 2012). Both, droughts and high rainfall intensities with surface runoff and flooding are a cause of water scarcity which is a strong limiting factor for rain-fed agricultural.

Following the rainfall distribution, the south of Senegal is characterized by woody vegetation, various types of woodlands and savannah woodlands according to a classification by Stancioff et al. (1986) cited in Tappan et al. 2004). Northward the vegetation changes into shrubby vegetation types and steppes. Large areas in the central west are already dominated by agricultural land which is further expanded (Mbow et al. 2008, Tappan et al. 2004). UNEP (2008) mentions a decline of woody vegetation (forest in the UNEP report) from 48.6% to 45% in 2005. According to ANSD (2009a: 108) Senegal lost 50% of its tree cover. But these figures are controversially discussed and spatially heterogeneous (see chap. 3, Tappan et al. 2004). Causes for the loss and degradation of woody cover are the expansion of agriculture, wildfires, charcoal production and droughts.

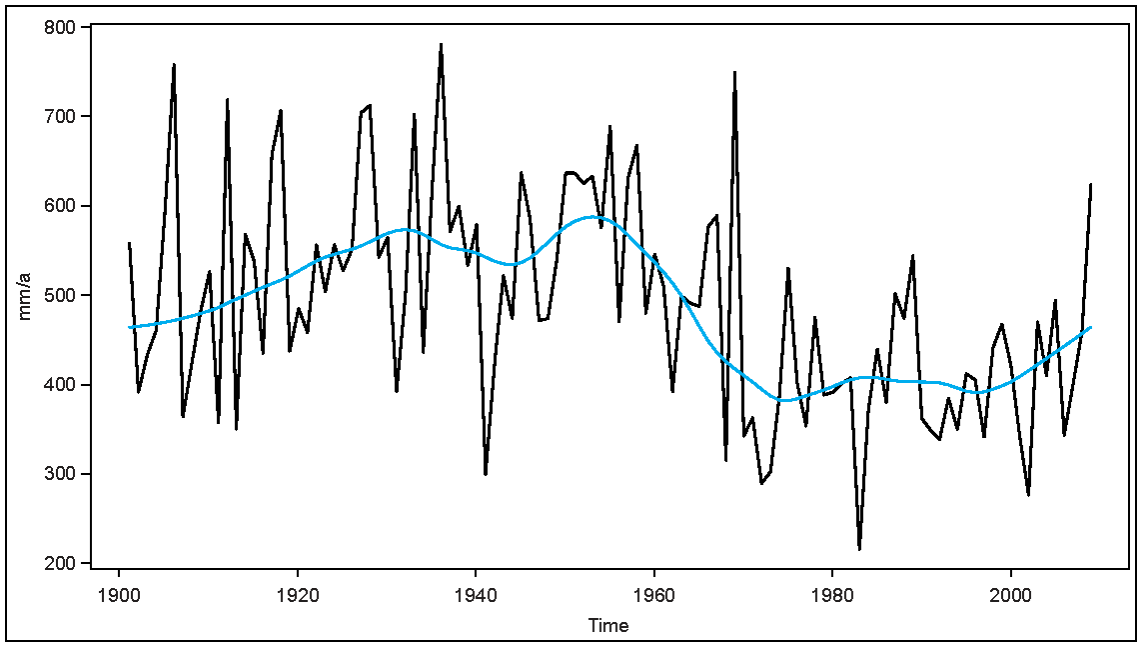

Figure 9: Development of annual rainfall for the Linguère region from 1901–2009 (data after Rudolf 1995)

According to still used but much criticized reports, Senegal is one of the Western African countries most affected by land degradation (see chap. 3.3, fig. 6). According to GLASOD 24.93% of the land in Senegal is degraded, 15.95% very severely. 51% of Senegal's population are affected in these areas. As discussed above the FAO conducts the Land Degradation Assessment in Drylands (LADA) for which Senegal is among the six pilot countries. Therefore, degradation was intensively studied during the last years. Many reports and maps were produced in cooperation with the CSE (Centre de Suivi Ecologique) showing degradation type, degree, extent, cause, rate, vegetation and topsoil loss as well as thematic maps showing the impact on productive services (fig. 10), improvements among others (http://www.lada-senegal.org/, http://www.fao.org/nr/lada/). Those national and local reports indicate that land degradation is present (CSE

2009), but also demonstrate that the authorities are aware of the problems and many programs like protected areas and reforestation help to combat land degradation in the Senegal (Ndiaye/Touré 2010).

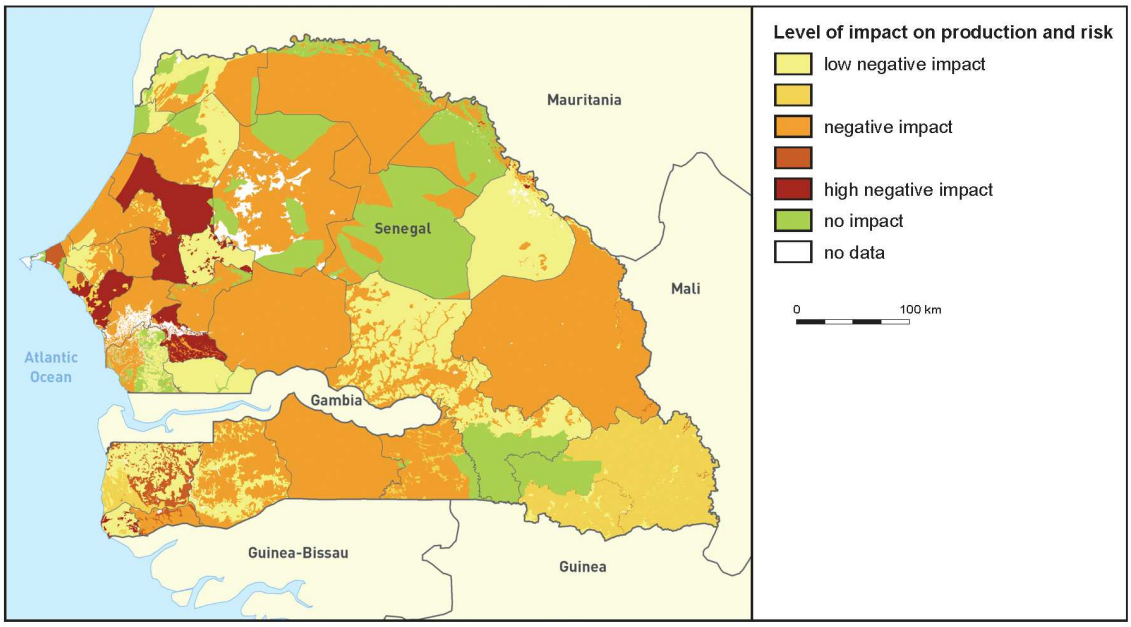

Figure 10: Land degradation in Senegal impacting the productive service (http://www.lada-senegal.org)

3.6 Focus Mali

Climate, Environment, Land Degradation

In Mali the rainfall decreases from more than 1000 mm in the Southeast to far below 100 mm in the arid parts of northern Mali (fig. 2). The Sahara-region with an arid and semi-arid climate and less than 200 mm per year covers up to 57% of the national territory. The Sahel represents 18% of the country and has a rainy season with 200–700 mm, while the southern parts (25% of Mali) receive around 1200 mm. As in most of the Sahel the rainfall shows strong annual variations underlaid by longer trends (fig. 11). During the 70s and 80s of the 20th century the rainfall dropped far below average with a moderate recovery since then. For the Mopti region it seems that the rainfall is back to the range of the 1960s with extremely wet years in 2009 and 2010. Beside of droughts, floodings are prominent in the very variable climate of Mali. During severe floodings in 2007, observed in large areas of Western Africa, in Mali approx. 50,000 people were affected (Samimi et al. 2012).

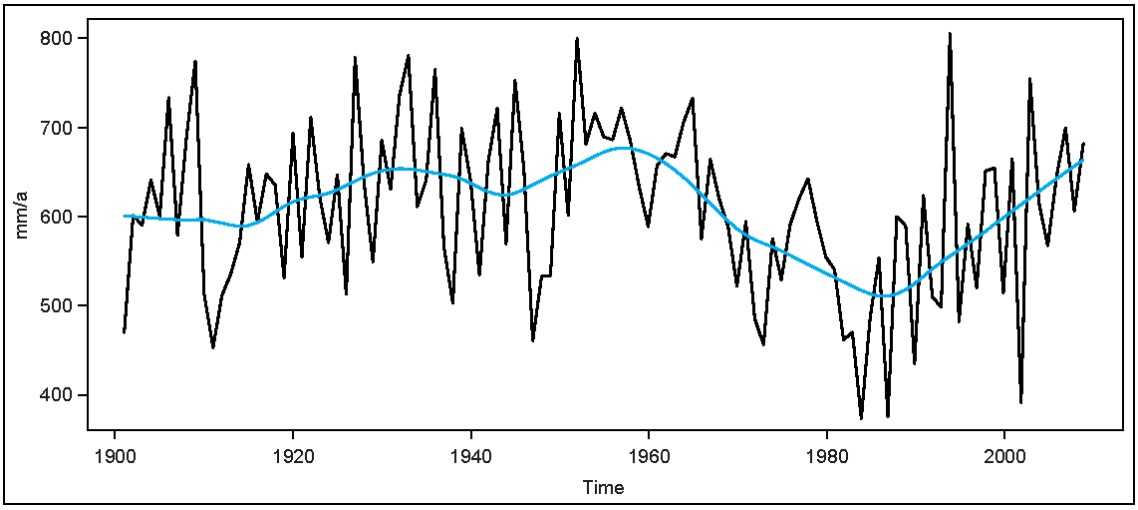

Figure 11: Development of annual rainfall for the Mopti region from 1901–2009 (data after Rudolf 1995)

Depending on the rainfall, the vegetation zones also show a south-north-gradient. In the southern parts of Mali with a mean annual rainfall exceeding 1000 mm, savannah-forest mosaics are prominent. These are by far the most fertile areas, and the majority of the population is living there. Further north the coverage of woody species gets sparser with woodlands and woody savannahs. The main Sahel is dominated by shrubs and grassland while the north of Mali is a pure desert (fig. 12).

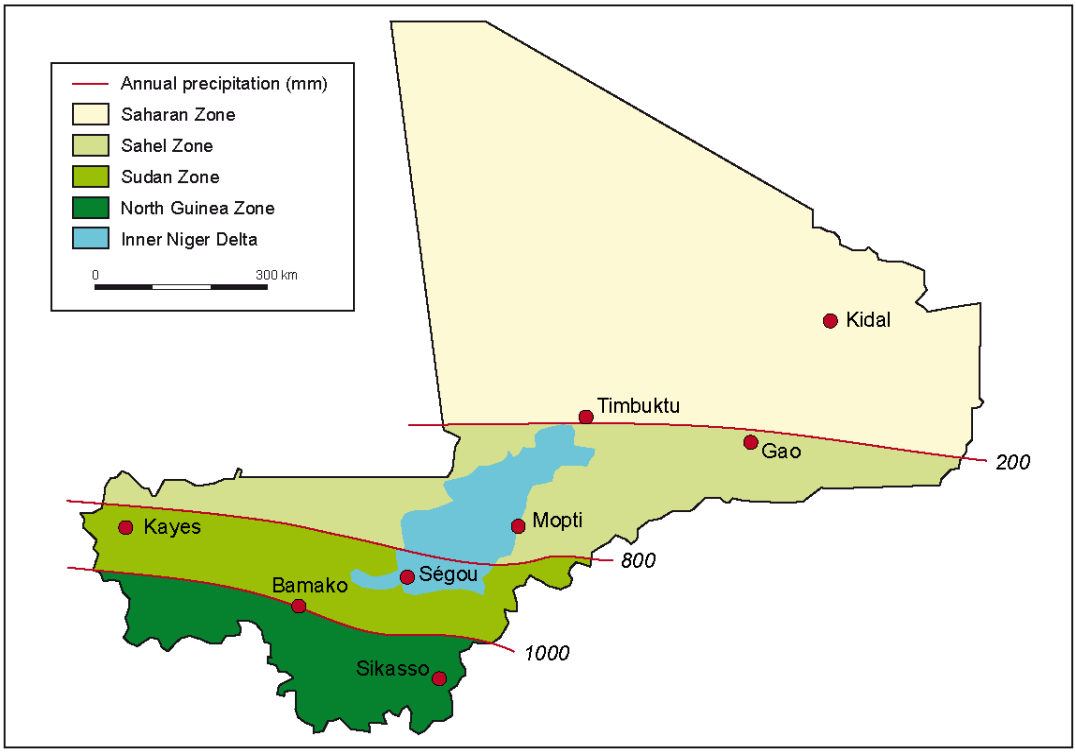

Figure 12: Principle agro-ecological zones in Mali (modified after IER/LABOSEP 2000)

Mali is facing degradation problems as well. The population growth during the last decades causes pressure on traditional agriculture and causesfarming to spread into areas which are not suitable for agriculture. Sandy and stony soils, erosion by wind and water, droughts and flood events and an increased deforestation are putting pressure on the land. Due to a lack of research the current extent of land degradation is unclear. According to the GLASOD approach (see chap. 3.3), 20.66% of Mali suffer from land degradation. 11.74% are classified as very severely degraded which means a total of 146.787 km² affecting 22.9% of the population.

4 Migration in the West African Sahel

4.1 Ruptures, persistence and new patterns of migration in and from West Africa

Martin Doevenspeck

The lack of comparative research and census data on migration has resulted in the perpetuation of a couple of myths about migration in Africa (Bakewell/de Haas 2007). In this regard, tenacious narratives of human trafficking as one of the most important migration forms, and the fear of an 'invasion' of Europe by West Africans who cross the Sahara need to be confronted with research results that paint a much more differentiated picture of migration dynamics. Castles (2009), Schapendonk (2010) and Sieveking/Fauser (2009), for example, show the multitude of different migration patterns and trajectories in (West) Africa. Research by the OECD (2006) and Spaan/van Moppes (2006) demonstrates that the majority of migrants move within the region instead of heading for Europe. The first two sections of this chapter sketch a general and historically informed picture of migration within West Africa and to Europe. This brief overview is followed by a more specific study of migration patterns in Mali, Senegal and the two study regions within these countries.

4.1.1 Migration within West Africa

The prevailing pattern of intra-regional migration in West Africa was, and in an attenuated way, still is that of a North-South movement from the Sahelian landlocked countries Niger, Burkina Faso and Mali to the coastal states, especially to Côte d'Ivoire. "These coast-bound international migration patterns have often been reproduced inside countries, with people often moving from the relatively arid and underdeveloped inland zones to the often more humid and more prosperous agricultural as well as urbanised zones, generally located in the south and, in the case of Senegal and Mauritania, west of countries" (de Haas 2007: 9).

Like many other forms of migration in contemporary West Africa, the North-South pattern goes back to the establishment of plantation economies (cotton, cocoa, coffee, groundnut) during colonization from the late 19th century onwards, and the related growth of urban seaports to export the agricultural commodities for processing in Europe. Cities such as Dakar, Abidjan, Accra or Lomé benefited from infrastructure investments, attracted migrants and became the capitals of the new nation states after independence. Simultaneously with this rural-urban migration, continued processes of agricultural colonization in the West African middle belt (Manshard 1986) and the conversion of the southern forests into plantations through migrants from the Sahel led to a comprehensive re-structuring of many rural areas in the West African coastal states.

Influenced by colonial mobility patterns, the colonial language divide and pan-African policies, three predominant migration systems can be identified for West Africa for the period between independence and the early 1980s (Robin 1992, Adepojou 2005, Ndiaye/Robin 2010):

1. centripetal movements in the West Atlantic region with Senegal (and the groundnut basin) as the pole with the highest attractiveness

2. transversal migration within the coastal zone (especially from Ghana) into the oil economy of Nigeria
3. reflexive movements between Côte d'Ivoire and to a lesser extent Ghana as receiving countries and Burkina and Mali as sending countries.

As the first system was never that important, and since Nigeria experienced an economic and political decline, it was Côte d'Ivoire that remained the sole migration pole with overriding importance during the 1980s and early 1990s. The liberal immigration and land policies of Côte d'Ivoire's long-time autocrat Felix Houphouët-Boigny allowed for chain migrations of hundred of thousands of migrants from Mali and Burkina Faso and many other neighbouring countries who in large part settled down permanently. The smallholder coffee and cacao economy of these immigrants was included in the system of circular migration (Cordell et al. 1996), with young men leaving their villages in the Sahel during the dry season to work in the southern plantations of their compatriots. But migration from the Sahel was directed not only to rural areas but also to the cities, especially to Abidjan, which became a West African melting pot, with people from the Sahel working mainly in the service and construction sector.

Civil war and economic decline in Côte d'Ivoire and its neighbouring states profoundly changed West African migration patterns from the mid-1990s on. Three main features characterize the new migration landscape: a diversification of destinations within sub-Saharan Africa, with countries such as Gabon and South Africa attracting more and more migrants from the region, the rise of pan-African Libya as a new migration pole for West Africans, and, linked to the increase in trans-Sahara migration, the development of countries such as Niger, Mali and Senegal from pure sending countries to transit countries (Bakewell/de Haas 2007).

4.1.2 Migration to Europe

Even if sub-Saharan migration to the European Union is increasing, the numbers are still very low compared to migration from the Maghreb or Eastern Europe, and do not correspond to the loud discourse of an 'invasion' (see de Haas 2008). Furthermore, the debate often ignores that Europe is not the only destination for international migration from Africa. North America (Thomas 2011), the Gulf states (Pelican/Tattah 2009), and increasingly China (Bodomo/Ma 2010) attract important numbers of African migrants. However, the increase in West African migration to Europe is closely linked to the decline of Côte d'Ivoire and the rise of Libya as a new migration pole. The UN embargo against Libya and its international isolation led to a re-orientation of the country's foreign policy with President Gaddafi re-inventing himself as an African leader. Libya's pan-African policy included massive investments in sub-Saharan Africa, military aid for the Sahel countries, a re-vitalization of the African Union, and, not least, the opening of Libya's labour market. By the early 2000s Libya was a major destination for West African migrants who were mainly given manual and unskilled work (Pliez 2000). Though Libya's immigration policy was always arbitrary and unpredictable, with regular mass expulsions and, at a later stage, the establishment of detention camps for migrants as a sign of goodwill for a Europe afraid of an 'invasion', the country was still in need of immigrant labour. The violent clashes between Libyans and sub-Saharan Africans in 2000 (Pliez 2004), and the subsequent general

anti-immigrant atmosphere, with migration becoming increasingly irregular, prompted "a partial westward shift of trans-Saharan migration routes towards Algeria, Morocco and Tunisia. From there increasing numbers have joined Maghrebis in their attempts to cross the Mediterranean. In addition, sub-Saharan migrants in Libya have increasingly tried to cross to Europe from the Libyan coast" (de Haas 2008: 1308). It does not seem to be sheer coincidence that in 2000 for the first time European border guards detained more sub-Saharan Africans than migrants form North Africa. In this regard, sub-Saharan migration to Europe can be interpreted as a connection between the revived trans-Saharan and the trans-Mediterranean migration systems. It remains to be seen what impacts the overthrow of the Gaddafi regime will have for these interconnected migration systems, as well as for migration within West Africa.

With hundreds of thousands of West Africans in Morocco, Algeria, Tunisia and Libya, there is undoubtedly a significant potential for migration to Europe. However, North Africa cannot only be considered as a springboard to Europe, since many migrants prefer to stay there. This is either because North Africa was their primary destination, or because they prefer to stay after a failed attempt to enter Europe, instead of returning to their countries of origin (de Haas 2007). Furthermore, as de Haas (2008) points out, the majority of irregular sub-Saharan migrants have nothing to do with the boat migrants who leave the North African coasts, but they are migrants who have entered Europe legally and overstayed their visas. For a long time, the choice of destination in Europe was structured by the colonial divide, with France and the UK being the main receiving countries. Since the late 1990s, states such as Italy, Spain, Portugal, and to a lesser extent Germany, also became important host countries for West Africans.

4.2 Focus Senegal

Victoria van der Land, Joel Fourier

Senegal is experiencing a high population growth at a rate of 2.4% per annum leading to a change in the population structure due to a rising share of young people in the country. Since 1950 Senegal's population has increased from 2.4 million to currently 12.9 million. Projections indicate that the population will have doubled to around 26 million people by 2050 (UN Population Division). One important factor to be considered is the high illiteracy rate of 58% (ANSD 2010) and the particularly poor education of the female population. Almost half of the people (42%) live in cities. Urban population growth is remarkable; the annual urban population growth rate for the period 2010–2015 is estimated at 3.25% (UNESA 2009). Senegal's population is highly mobile: People move within the country, mostly from rural to urban areas and emigrate to neighbouring African countries as well as to other continents, mostly to Europe.

4.2.1 Internal Migration

Internal migration still counts for the biggest part of movements in Senegal. According to the National Population Census (RGPH-III), 15.3% of the total Senegalese population lived in a place other than they were born (lifelong internal migration) in 2002, while 3.4% migrated in

the last five years prior to the survey (recent internal migration) (ANSD 2006: 47–50). Emigrants account for 1.7% of the population (ANSD 2006, 2009).[4]

In 2002, Dakar, Diourbel and Thiès were the most popular destinations for recent and lifelong internal migrants (see table 3). The regions of Kaolack, Ziguinchor and Louga lost the most inhabitants with a view to recent migration (ANSD 2006: 51). Internal migration is mostly taking place from rural to urban areas (rural exodus). Urban areas became more popular as destinations between 1988 and 2002, and this is still true for recent migration (ibid. 53).

Région de résidence	Région de résidence antérieure											Bilan
	Dakar	Diourbel	Fatick	Kaolack	Kolda	Louga	Matam	Saint Louis	Tambacounda	Thiès	Ziguinchor	
Dakar		-504	4226	10343	3022	1713	3200	2350	1640	-614	7967	33343
Diourbel	504		981	2469	-155	4656	-51	-45	-202	2778	250	11185
Fatick	-4226	-981		740	-311	347	-103	731	-287	-1332	275	-5147
Kaolack	-10343	-2469	-740		-2510	-138	-80	-504	-1128	-3121	-16	-21049
Kolda	-3022	155	311	2510		-66	62	93	23	-1127	-1610	-2671
Louga	-1713	-4656	-347	138	66		-152	-457	-215	-1139	159	-8316
Matam	-3200	51	103	80	-62	152		16	-321	-492	-3	-3676
Saint Louis	-2350	45	-731	504	-93	457	-16		-281	-486	281	-2670
Tambacounda	-1640	202	287	1128	-23	215	321	281		93	284	1148
Thiès	614	-2778	1332	3121	1127	1139	492	486	-93		2750	8190
Ziguinchor	-7967	-250	-275	16	1610	-159	3	-281	-284	-2750		-10337

Table 3: Balance of internal recent migration (Source: ANSD 2006: 52)

Women count for 57% of internal migrants. Singles and people younger than 29 years are the most likely to move (ANSD 2004: 218/221). People with lower education tend to move more frequently when we look at recent migration (ibid. 224).

Rural exodus is frequently described as the most worrying type of migration in Senegal, since it contributes to an unequal distribution of settlements and to the overcrowding of urban areas. The phenomenon of rural outmigration can be observed since the agricultural crisis in the 1970s and has considerably increased ever since (ANSD 2006: 46). Several studies regard rural-urban migration as a result of increasing land degradation and/or droughts, as well as an effect of decreasing harvests resulting in harsher living conditions in rural areas (Some 2009: 65, Bleibaum 2009, Henry et al. 2004). In addition, it is argued that rural areas often lack job opportunities and adequate infrastructure with regard to administration, sanitation as well as cultural and edu-

[4] Recent data for migration in Senegal is hardly available. The most current national data is based on the household survey ESAM-II (2001) and the third national population census RGPH-III (2002).

cational institutions. Thus rural-urban migration is often also related to aspirations for a better life (Some 2009: 65). However, the structural conditions and individual motivations for migration are manifold and this will be analyzed in the *micle* project in greater detail.

4.2.2 International Migration

Historically, Senegal was mainly considered as a country of destination for African migrants but its importance as a country of immigration has decreased over time.[5] In 2002, most of the foreign residents in Senegal were Africans (85%), originating mainly from Western African countries (74%), like Guinea (23%), Mauretania (6%) and Mali (6%). Foreign residents also came from Europe (9%), mainly France (3%) and Central African countries (8.5%) (ANSD 2004, Di Bartolomeo et al. 2010, ECOWAS 2006: 12).

Senegal has been important for transit migration to Maghreb or to European countries due to its geographical position, particularly for people from West Africa (Adepojou 2005: 2, Some 2009: 33, Di Bartolomeo et al. 2010: 4). This status has come to an end since the end of the boat migrations to the Canary Islands. In contrast, Mali and Niger are still important transit countries. However, since the mid-1970s Senegal has become an important country of emigration as consequence of difficult living conditions and as a result of the success stories of earlier Senegalese emigrants (UNESA 2011).[6] It is argued that at the beginning, international migration was a reaction to severe droughts and a financial crisis, later it became a model for social rise and a source for family reunion (Fall 2003, Gerdes 2007: 1, Bleibaum 2009).

Senegalese emigration has primarily been a migration to other African countries, not least because Senegal is a member of the Economic Community of Western African States (ECOWAS) and part of a free circulation area covering fifteen countries[7] (ECOWAS 2006: 10). In the 1990s immigration to other African countries decreased due to economic and political instabilities in the neighbouring countries and led to a change towards intercontinental migration. In 2001, more than half of the Senegalese emigrants chose destinations outside the African continent (see table 2). The main destination was Europe (46%; mostly to France, Italy and Spain) and 7.5% went to the United States and Canada. But other African countries still play an important role as destination for 44 cent of the emigrants: one third of which went to UEMOA (Union Économique et Monétaire Ouest Africaine)[8] states, with Ivory Coast as the most popular destination with almost half of the people. Another 30% immigrated to other African countries, with Gambia and

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5 The number of immigrants varies depending on the sources: Figures for immigration from the National Agency for Statistics and Demography in Senegal (ANSD) are lower than international data. Immigration rates: ANSD: 1.2% of the population in 2001; 0.8% in 2002 (ANSD 2009: 34); UNDP: 2.3% in 2000, 2% in 2005 (UNPD 2009); World Bank: 2.8% in 2005 (Ratha/Xu 2008); IOM: 1.6% of the total population were immigrants in 2010 (IOM 2010).

6 The estimates for period from 2005 to 2010 show a net migration rate of –2.3 (UNESA 2011).

7 Member states of ECOWAS are: Benin, Burkina Faso, Cape Verde, Gambia, Ghana, Guinea Bissau, Liberia, Mali, Nigeria, Senegal, Sierra Leone and Togo. Côte d'Ivoire, Guinea and Niger are suspended.

8 Member states of UEMOA are: Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo.

Mauritania as the most popular countries (ANSD 2004: 233).[9] In addition, more and more Senegalese leave for Libya, Algeria, Tunisia and Morocco for temporary immigration and in the hope for an opportunity to cross the Mediterranean Sea (Some 2009).

Destination countries	Sex of emigrants				Total	
	Male		Female			
	Number	Percentage	Number	Percentage	Number	Percentage
Africa *Thereof: UEMOA-countries*	61 207 *18 484*	43.2 *13.1*	12 759 *4 648*	47.8 *17.4*	73965 *23 132*	43.9 *13.8*
Europe	66 730	46.9	10 986	41.1	77 715	46
USA/Canada	10 228	7.2	2 404	9	12 632	7.5
Others	3 810	2.7	417	1.6	4 227	2.5
n/a	158	0.1	151	0.6	309	0.2
TOTAL	**142 131**	**100**	**26 716**	**100**	**168 847**	**100**

Table 4: Destination countries for Senegalese emigrants, 2001 (Source: Own illustration compiled on the basis of ANSD 2004: 233)

People from rural areas rather migrate to other African countries, while people from urban areas prefer Europe and the USA or Canada (ANSD 2004: 232). More than half of the migrants live in cities before leaving the country.

Emigrants are mainly male (84%), younger than 35 years old (72%) and singles (47%) (ANSD 2004). Those who move internationally tend to be better educated and to have higher levels of initial income than those who do not (migrant selectivity) (UNDP 2009: 12). However, the educational profile of emigrants differs between destination countries: while Italy and Spain are destinations for low skilled workers, Canada and the US receive mostly highly-skilled emigrants. At the beginning of the millennium, Senegalese emigrants were more likely to be employed in low-skilled jobs (Di Bartolomeo et al. 2010: 3). Regarding the return, migrants who moved to other African countries are more likely to return and after a shorter time period than migrants who left the continent (Lessault/Mezger 2010: 6).

4.2.3 Aspects of Contemporary Migration

Migration is significantly shaping the Senegalese society: at least 70% of all Senegalese households include at least one migrant family member (ANSD 2004). In the 1990s, the economic crisis and the decline of the peanut industry enhanced the trend of urbanisation and immigration to Europe. Internal migration still counts for the biggest part of movements in Senegal and is mainly directed to urban centres (ANSD 2006, Hitimana et al. 2011). The traditionally male dominated (commercial) internal and international migration becomes increasingly feminized. Today, women make up a significant share of migrants who move independently to fulfill their

[9] The data for emigrants also varies between different sources, especially between national and international data sources. The ESAM-II states a figure of 168,847 emigrants (1.7% of the population) in 2001.

own economic needs (Adepojou 2004). Migration is in many cases a collective matter where the decision for migration as well as its funding is taken collectively (ANSD 2004: 239). Seasonal labour migration is deeply rooted in West Africa far beyond colonial times. This migration type has thus also a strong tradition in Senegal and often states a (coping) strategy for rural households to diversify and secure income (de Haan and Zoomers 2005: 40). Unfortunately, data on this issue are scarce.

Emigration can lead to economic advantages for households through impulses for development by transferred remittances and remigration (Angenendt 2009: 27). The funds received from abroad have contributed to increasing the Senegalese per capita income by close to 60% compared with households that do not receive remittances from abroad (Diagne and Diane, 2008). However, the effects of the transferred funds seem to be much higher in urban than in rural areas (Gerdes 2007: 5). The recorded remittances annually transferred from Senegalese's abroad reached USD 874 million in 2007 and has almost quadrupled since 2000 accounting for 7% of the Senegalese GDP (IOM 2009: 122). Thus, the government tends to regard emigration as relief for the job market and as development factor due to remittances, people's additional qualification gained abroad and the investments taken by the returning migrants (Fall et al. 2010: 31, Gerdes 2007: 7). While supporting regular migration, the government seeks to limit irregular migration flows with the help of awareness rising campaigns and by promoting employment opportunities (Fall et al. 2010: 13). In the Senegalese general assessment, the emigrant, also called by the Wolof-word "Modou-Modou", is regarded as a symbol of success. Emigration to Europe remains thus highly desirable among young people to gain social acceptance and financial success (Fall et al. 2010: 32).

4.2.4 Study Region Linguère

The department of Linguère is one of three departments in the administrative region of Louga in the northwest of the country (see map in chap. 1). In 2006, Linguère had an estimated population of 218,940 which means 14 habitants per km² of which 81% were considered as rural population (ANSD 2007: 18). The Fulani (49%) and Wolof (42%) constitute the largest ethnic groups in the department of Linguère. Here, the proportion of the Fulani is higher than in other regions of the country, because the region is part of a silvopastoral zone and the Fulani are traditionally stock farmers or nomadic people (ibid: 23). About 36% of the population in Louga lives in poverty (IMF 2007: 13). The local economy strongly depends on agricultural activities and livestock breeding. Linguère is the department with the highest share of livestock (48%) in the region of Louga and the most widely grown agricultural product is peanuts (ANSD 2007: 55). The unemployment rate in the region is estimated at 8.4% (ibid. 41).

Louga region is characterized by high population mobility (nomadism and transhumance of the Fulani, international migration).[10] It has a distinct negative migration balance: in 2002, the balance was minus 125,702 people or 20% of the population for lifelong migration and minus

[10] The description of migration patterns refers to the region of Louga, since there is hardly specific information available for the department of Linguère.

8,316 people or 7% of the population for recent migration (ANSD 2006: 49–52). Internal migration from Louga benefits all regions of Senegal, especially urban areas like Diourbel, Dakar and Thiès (ANSD 2006, 2007). Development projects have been implemented in Louga to reduce (international) migration and thus contributing to the farmers' settlement and to an intensification of livestock for development in the region (ANSD 2007: 13). The impacts of these projects are something that needs further investigation.

4.3 Focus Mali

Clemens Romankiewicz

The landlocked République du Mali is one of the ten poorest countries in the world (rank 160 out of 169 countries) and is experiencing an exceptionally high population growth of 3.6%. Since 1950 its population has grown from 4.3 million to currently 14.5 million (INSTAT 2009, UNDP 2010). The extremely young age structure and low female education, associated with high fertility rates, are important reasons why the population is expected to more than double over the coming four decades (UNESA 2011, World Bank 2010). While the major part (66%) of the Malian population still lives in rural areas, the growth of urban centres has remained at a high level since the 1950s and was estimated at 4.8% in 2005 (World Bank 2010). According to the EMMU[11] about 200,000 migrations[12] per year were registered between 1988 and 1992, with 360,000 births and 130,000 deaths annually, which leads Bocquier and Diarra (1999) to the conclusion that migration in Mali is a major demographic phenomenon. More recently, a survey carried out in 2005[13] found out that 57% of the households had at least one household member who was a migrant at the time of the survey (WFP et al. 2006). Moreover, Malian migration patterns are a complex and vast field which can be examined from different perspectives. Hence, the following chapter will give a brief overview of migration scales and selected issues of migration performance in Mali.

4.3.1 Internal migration

In the early 1990s internal migration in Mali accounted for 51% of its total permanent migration (Boquier/Diarra 1999). More recent surveys also underline the importance of internal movements in Mali, even though the preference of destinations differs among the regions (see table 5).

[11] Enquête Malienne sur les Migrations et l'Urbanisation (EMMU) 1992–1993 (Boquier & Diarra 1999).

[12] In the study, permanent migration was defined as a change of place of residence for six months or more (Bocquier & Diarra 1999).

[13] Comprehensive Food Security and Vulnerability Analysis (CFSVA) 2005. These data only cover rural areas, where 2,074 households in 209 villages were surveyed (WFP et al. 2006).

region	migration rate (%)	destinations of migrants (%)				
		rural areas	Bamako	other cities in Mali	other countries in Africa	outside Africa
Kayes	0,16	8,9	19,6	16,3	31,5	23,8
Koulikoro	0,12	15,2	25,1	29,9	27,8	2,0
Sikasso	0,16	6,6	26,2	21,4	39,7	6,2
Ségou	0,12	7,9	46,2	24,2	21,7	0,0
Mopti	0,16	22,6	30,7	15,0	28,0	3,7
Tombouctou	0,32	6,6	50,6	16,8	24,8	1,1
Gao	0,23	4,3	25,0	30,1	35,9	4,7
Kidal	0,34	19,0	2,4	11,9	66,7	0,0

Table 5: Destinations of emigrants according to region of origin in Mali, 2005 (Ballo 2009: 122). Source: Merabet/Gendreau (2007), database: CFSVA, 20053

In Mali, approximately 80% of internal migrations between 1988–1992 were between rural and urban environments (Bocquier/Diarra 1999). As table 5 illustrates, Bamako and other Malian cities alone account for a major part of migrations from rural households in all regions except Kidal. The most outstanding role in Malian migration patterns is played by Bamako, which is the principal attraction pole for internal migrants; in 2004 33% of its population consisted of migrants (Ballo 2009). In 2009, approximately 12% of the Malian population (1.8 million people) lived in Bamako, accounting for about 40% of the Malian urban population (INSTAT 2009, Worldbank 2010). The migration flows to Bamako are also said to explain the rapid growth of the Malian urban population, which rose from 1.1 million (17%) in 1976 to 4.1 million (30,5%) in 2005 (Worldbank 2010). Nevertheless, other cities also followed the rhythm of Bamako's growth during the last thirty years (Ballo 2009).

The Ségou region, with its Office du Niger for horticulture and rice production, is a second point of attraction, as it receives more than 40% of internal migrants (Ballo 2009, Bocquier/ Diarra 1999). Sikasso, the southernmost region of the country, is characterized by very favourable conditions for rain-fed agriculture and constitutes an important rural destination for internal migration, especially from Ségou, Koulikoro and Mopti (Diarra/Cissé 2003). In Mopti, immigration and emigration are estimated to lie quite close together, with a moderate migration deficit. Emigrants are mainly oriented towards Bamako and rural destinations in the south. Migration in Mali's northern regions, like Gao, Timbuktu and Kidal, is influenced by migrants transiting the Sahara, and partly by the political conflict in the north (Sieveking/Fauser 2009). Timbuktu has the highest migration deficit in the country, with most migrants leaving for Bamako and Mopti. This emigration bias is further reinforced by a low attraction potential for immigrants (Diarra/Cissé 2003). In a condensed and over-simplistic manner, it can be said that internal migration in Mali follows its economic north-south gradient. Thus, people leave arid regions in the north for economically more developed, highly productive agricultural regions and urban centres in the south (Ballo 2009, Sieveking/Fauser 2009).

4.3.2 International Migration

Considering its net migration ratio of -2.4/1000 inhabitants in the period 2000 to 2005, Mali is one of West Africa's typical emigration countries (Ballo 2009). However, most of its migration flows are due to exchange with other West African countries. African countries account for 84% of emigration from, and 93% of immigration to Mali (Merabet/Gendreau 2007). This predominance of regional migration flows is promoted by the socio-economic mobility of certain ethnic groups, especially nomadic groups, the freedom of movement in the ECOWAS zone, and the geographical position of Mali between sub-Saharan Africa and North Africa, which makes it one of the most important transition zones for African migrants on their way to Europe (Ballo 2009, Merabet/Gendreau 2007, Sieveking/Fauser 2009).

Immigration into Mali

Immigration plays a secondary role in Malian migration patterns. In 2007 immigrants only counted for 1.5% of the population (Ballo 2009). In 1998, Mali's immigrants mainly came from Ivory Coast (44%), Burkina Faso (13%), Guinea (9%), Senegal (7%), Mauritania (4%) and Niger (3%) (Merabet/Gendreau 2007). The high proportion of immigration from Ivory Coast is mainly attributed to the rising number of returning former Malian emigrants. Especially after the coup d'état in 1999, the economic crisis in 2002, and more recently the crisis and violence after the 2010 presidential elections, xenophobia and political opposition against immigrants in this major destination of Malian migrants led to the return of more than 40,000 Malians in the years 2003–2004 (Ballo 2009, Martin et al. 2002, Sieveking/Fauser 2009). Furthermore, political stability and the dynamic nature of certain economic sectors, such as construction, transport or communications, promoted return migration to Mali (Ballo 2009). But returns and increasing deportations from Europe, other African countries, and especially North African countries have also influenced immigration to Mali during the past decade. More than 80% of the returnees between 2002 and 2008 came from Algeria, Morocco and Libya (Ballo 2009, Merabet/Gendreau 2007). The recent war against the Gaddafi regime in Libya caused more than ten thousand Malians to return to their country of origin.

Emigration from Mali

In the same way as neighbouring countries play an important role in immigration to Mali, most of the emigration flows are directed towards West Africa (see fig. 13). There seems to be an accelerating trend in emigration from Mali as from the 1990s. At the beginning of the millennium, estimations ranged from 2.5 to 4 million Malians living abroad (approximately 25% of the total population), 2 to 3 million of whom are said to live in other African countries (Ballo 2009, Merabet/Gendreau 2007, McDowell/de Haan 1997, Sieveking/Fauser 2009).

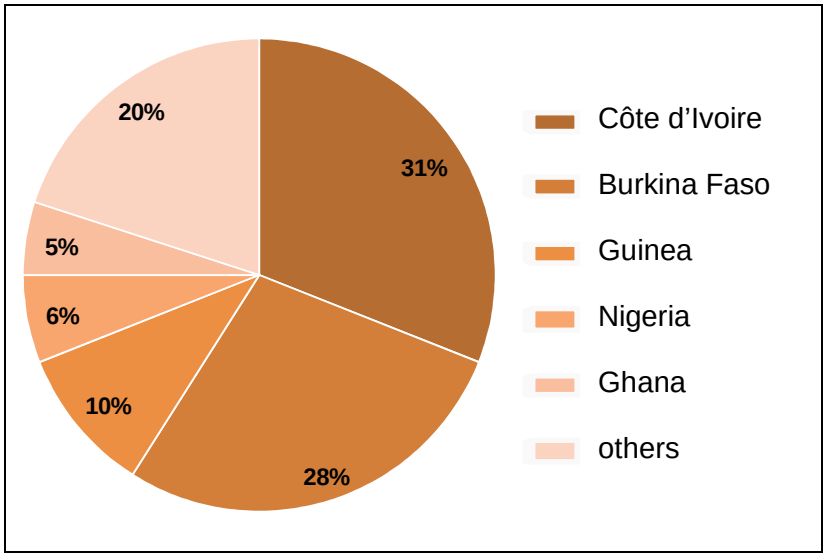

Figure 13: Malian emigrants according to destination in 2000
(Source: adapted after Ballo 2009)

The most important destination for Malian emigrants is Ivory Coast, and it is estimated that 1 to 2.5 million Malians live in this neighbouring country (Ballo 2009, Merabet/Gendreau 2007). However, the impacts of the socio-political crisis and feelings against foreigners translated into a decrease in the number of Malian emigrants to Ivory Coast between 1988–1992 (53%) and the year 2000 (32%). Furthermore, Ivory Coast was also an important destination for human trafficking from Mali.[14] By the turn of the millennium, rising numbers of migrants to Europe and the USA could be observed (Martin et al. 2002, McDowell/de Haan 1997). Approximately 200,000 Malian migrants are estimated to live in Europe, the majority of them in France (Merabet/Gendreau 2007, Sieveking/Fauser 2009). With regard to the migrants' region of origin (see also table 5), migration to countries outside Africa in 2005 was by far most significant in Kayes (23.8%), followed by Sikasso (6.2%), Gao (4.7%) and Mopti (3.7%) (Ballo 2009, WFP et al. 2006).

4.3.3 Aspects of contemporary migration

Scales of migration flows into and from Mali elaborated above are further characterized by different processes and performances. The following section briefly illustrates two of these major issues, namely circular migration and the feminization of migration.

Circular migration

Findley (1994: 540) defines a circular migrant as a person who "stays away between one and six months and upon return participates in the economic and social life of the household", whereas permanent migrants "stay away more than six months, do not return to participate as regular members in the life of the household and do not plan to return". She further distinguishes short-

[14] During the years prior to 2002, approximately 15,000 children were sold and transferred by recruiters to work in Ivorian households and plantations. Human trafficking seems to be a growing phenomenon in West and Central Africa as a way of obtaining workers for rice fields, mines and in urban centres (Ballo 2009, Martin et al. 2002).

cycle patterns of labour migration to nearby destinations for a short period of time (less than a year) from long-cycle patterns of labour circulation with more distant or even foreign destinations and a longer duration of two to three years (ibid.).

In Mali, circular migration takes different shapes. Probably the best known is the mobile lifestyle of nomadism and semi-nomadism, which is mainly characteristic of Fulani pastoralists and Tuareg nomads. Those groups perform circular migration, as they move between the Sahel region during the rainy season and areas closer to the Niger River in the south during the dry season (Ballo 2009, Krings 1982, Krings et al. 1988). In the past, there have been tendencies to abandon this mobile lifestyle due to political and social changes (for instance the expansion of irrigated rice fields, or the emigration of young Tuareg men to Ivory Coast), as well as recurrent droughts and growing population density which has resulted in many pastoralists moving to cities like Mopti, Timbuktu and Gao (Krings 1982, Krings et al. 1988). This form of circular migration persists to this day.

Another important type of circular migration is the seasonal labour migration of young men (and an increasing number of women) after the rainy season, which may last for two or three years. This migration is mainly oriented towards year-round agriculturally productive regions and cities. Ivory Coast (especially Abidjan) has always been an important destination, but greater numbers have migrated to Bamako in recent times (Findley 1994, Merabet/Gendreau 2007 Sieveking/Fauser 2009, WFP et al. 2006).

Feminization of migration

Whereas male migration has a long tradition in Malian society, the feminization of migration patterns has only emerged in this generation. According to the *Enquête Permanente Auprès des Ménages* (EPAM) of 2007, 56% of all migration flows are made up by women (Ballo 2009, Sieveking/Fauser 2009).

However, female internal migration mainly occurs between urban localities and from rural areas to Bamako, whereas international migration is still mainly restricted to men. Hence the more distant the destination, the less women are concerned (Bocquier/Diarra 1999, Sieveking/Fauser 2009, WFP et al. 2006). This is partly explained by the fact that the majority of men do not want to expose their women to Western values and thus refuse to support international migration of women (Martin et al. 2002). But also in the case of internal migration, many fear a disruption of cultural and social life, with a loss of moral authority, and therefore try to regulate female migration in their environment (Sieveking/Fauser 2009).

Whereas these practices seem to hinder the potential economic activities of women, one may keep in mind that "through the diversification of migration patterns during the drought, families demonstrated their abilities to bend rigid social structures to the needs of the situation and are expected to do this again in future droughts" (Findley 1994: 551), which implies that the Malian population will always adapt their migration patterns to the prevailing situation.

4.3.4 The Study Region of Bandiagara

The selected study area is located in the Mopti region in the centre of Mali, which in 2009 had two million inhabitants and a population density of 25 inh./km^2 (INSTAT 2009). The region is administratively subdivided into 8 *cercles* consisting of 108 *communes*. The most important urban centres are Mopti, Bandiagara, Djenné, Douentza and Ténenkou. Important aspects that guided the selection of the study region were high population mobility and noticeable trends in vegetation cover ("greening" or degradation phenomena) with the help of satellite images (see chap. 3).

Research concentrates on the dryland zone including the Dogon plateau and the Séno plain around the town of Bandiagara (see chap. 1, fig. 1), which belongs to the semi-arid Sahel-Sudan region and is characterized by an annual precipitation of around 600mm and open shrub and tree savanna (MEA 2009). Rainfed agriculture, and to a certain extent vegetable gardening are the main economic activities. Productivity essentially depends on the amount of rainfall and the availability of wells, boreholes and small dams (MEA 2009). Population growth, overexploitation of natural resources, recurrent droughts and soil erosion have resulted in the degradation of agricultural land and pasture, and the loss of vegetation cover and biodiversity in the region (ibid.).

The Dogon and Fulani are the predominant ethnic groups. Both groups are very mobile and so migration is an important part of local livelihoods. Results from EMMU[15] show that the migration deficit in the Mopti region for both international and internal movements is among the highest in the country (Bocquier/Diarra 1999). Data from a survey[16] in 2005 reveal that 61% of the interviewed households in the Mopti region mentioned one or more migrating members (WFP et al. 2006), which indicates a long tradition of labour migration (Sieveking and Fauser 2009). Besides migration to Bamako (31%) and other African countries (28%), rural areas and villages (23%) are important destinations for migrants from the Mopti region (WFP et al. 2006, Merabet/Gendreau 2007).

[15] Enquête Malienne sur les Migrations et l'Urbanisation (EMMU) 1992–1993 (Bocquier & Diarra 1999).

[16] Analyse de la sécurité alimentaire et de la vulnérabilité (CFSVA) (WFP 2006).

5 Migration Policies

Diana Hummel

The mobility of people is strongly influenced by different international, regional and national political frameworks. Policies and legal frameworks can encourage or discourage migration and thus, the political perception of population mobility and migration has determining effects on the capability of people to migrate. The following chapter gives an overview of the most important policies, institutional arrangements and legal frameworks that impact the mobility of people in Mali und Senegal.

5.1 International and Regional Policies

Several international, regional and national initiatives, treaties and events focusing on migration have had a "catalytic effect on migration discourse and policy in Africa" (Adepojou 2010: 5) over the past decade. At the international level, the report of the Global Commission for International Migration (2005), the UN High-Level Dialogue on Migration and Development (2006) and the Global Forum on Migration and Development in Brussels 2007, Manila 2008 and Athens 2009 contributed to the international policy debate on migration (ibid.).

The "International Convention on the Protection of the Rights of All Migrants Workers and Members of Their Families", adopted in 1990 by the UN General Assembly, entered into force in July 2003. It represents the most comprehensive international instrument to provide legal protection for migrants. Its primary objective is to protect migrant workers and their families, a particularly vulnerable population, from exploitation and from violation of their human rights. The Convention defines the rights of migrant workers under two main headings. Firstly, it defines that human rights of migrant workers and members of their families are applicable to all migrant workers, undocumented ones included. Secondly, it defines other rights of migrant workers and members of their families applicable only to migrant workers in a regular situation.

An important international programme is "Migration for development in Africa" (MIDA), a capacity-building programme which seeks to mobilize competencies acquired by African nationals abroad for the benefit of Africa's development. It was launched by the International Organization for Migration (IOM) in order to strengthen its capacity building efforts in assisting African countries to benefit from the investment they have made in their nationals. The overall objective is to assist in strengthening the institutional capacities of African governments to manage and realise their development goals through the transfer of relevant skills, human, financial and other resources held by Africans in the Diaspora for use in development programmes in Africa. Since many African nationals in the Diaspora are applying their qualifications and skills in developed countries in Europe and North America it is argued that such qualifications and skills should be brought back into the mainstream of development on the African continent.

In 2002 the "Africa Labour Migration Policy Initiative" was established by the International Labour Organization (ILO) in concert with the NEPAD (New Partnership for Africa's Development) agenda (ILO 2002). It aims at assisting countries (governments and social partners) in developing policy frameworks and effective practical structures and mechanisms related to chal-

lenges and opportunities of labour migration. Particular emphasis is on improving data on actual conditions and needs, identifying effective model practice, capacity building, and providing technical assistance to tripartite partners, both at national and regional levels. It also aims at facilitating the coherent development of national and regional policy, legislation and practice to regulate labour migration as a factor for development and integration.

At the regional African level, important guidelines include the African Union's Strategic Framework for a Policy on Migration (2001), and the ECOWAS (Economic Community of West African States) common approach on migration (2006). The European Union (EU) and African Union (AU) have held a series of meetings to address issues relating to regular and irregular migration between the two regions: the Euro-African conference on Migration and Development (2006), the Follow-up Meeting of the Rabat Process (2007) in Madrid, and the EU-African summit in Lisbon (2008).

Mali and Senegal participate in regional integration initiatives as member states of the African Union, the ECOWAS, the WAEMU (West African Economic and Monetary Union and the CEN-SAD (Community of Sahel-Saharan countries). One of the main objectives of CEN-SAD is to achieve economic unity through the implementation of a free trade area including the free movement of people and goods (Community of Sahel-Saharan States 2012).

The ECOWAS Protocol on the Free Movement of Persons, the Right of Residence and Establishment of May 29th 1979 is regarded as a "benchmark in sub-Saharan Africa" (Adepojou 2008: 28, Adepojou 2010: 5). It sets out standards for liberalising the intra-community mobility of labour. Within fifteen years from the date at which the protocol came into force, i.e. by 1994, the rights of entry, residence and establishment should be progressively established. However, this has not been achieved. A meeting in Abuja held in March 2000 aimed at creating a borderless sub-region and abolishing mandatory residence permits. In April 2000, the granting of the maximum 90-day period of stay to ECOWAS citizens by immigration officials at entry points took effect. The ECOWAS passport is supposed to serve as a symbol of unity and shall progressively replace national passports (Adepojou 2008: 28).

The ECOWAS common approach on migration (2006) made it possible to advance the Protocol on the Free Movement of Persons and the Right of Residence and Establishment from 1979. A special Task Force on Migration was established, and a Department for the Free Movement of Persons was created after the transformation of ECOWAS into a commission. The approach comprises the following fundamental principles:

- better implementation of the Protocol on the Free Movement of Persons and the Right of Residence and Establishment;
- combating human trafficking and providing humanitarian assistance;
- harmonizing policies and bilateral agreements with additional countries;
- promoting the adoption of migration policies by ECOWAS member states, together with harmonized migration management and sector development policies;
- protection of the rights of migrants, asylum seekers and refugees;
- ensuring the implementation of protocols relevant to international conventions;
- recognising the gender dimension of migration (Adepojou 2008: 8).

This approach was adopted at the 33rd Summit of Heads of State and Government in January 2008. Furthermore, an action plan for the ECOWAS Common Approach was formulated including a series of measures putting the principles into practice (Gnisci 2008: 93f.). [17]

5.2 Migration in Poverty Reduction Strategy Papers

One key instrument in national development policy formation relevant for Mali and Senegal are Poverty Reduction Strategy Papers (PRSPs), which refer to the different policy fields relevant for the interactions between environmental change and migration which have to be considered with respect to poverty reduction, development policies, environmental policies, as well as migration policies. PRSPs are national statements of development and poverty-reduction policy; they were introduced in 1999 by the World Bank and the IMF as a new framework to enhance domestic accountability for efforts aiming towards poverty reduction. PRSPs are regarded as a means to improve the coordination of development assistance between governments and development partners. A PRSP sets out a country's macro-economic, structural, and social policies programme to promote growth and reduce poverty. Usually, the countries draw up a PRSP every three to five years in a participatory process including a broad range of stakeholders. Core principles include a description of the participatory process, a comprehensive poverty diagnostics, priorities for macroeconomic, structural and social policies as well as targets, indicators and systems for monitoring and evaluating progress (World Bank 2011). As such, PRSPs are not simply statements of government policy, but also include contributions from national civil society actors (Black/Sward 2009: 5).

Since migration represents a significant livelihood strategy for poor people, this factor is also recognized in Poverty Reduction Strategy Papers (PRSPs) in Senegal and Mali. A recent review of PSRPs (Black/Sward 2009) reveals that they tend to focus on the idea that migration is a result of lack of development, and that African PSRPs concentrate on the need for rural development projects to prevent internal rural-urban migration flows. However, according to that study, the treatment of international migration, internal migration and immigration is differing. For example, the PRSP of Mali (2008) mentions positive elements of international migration in terms of impact on development and poverty reduction; and Senegal (IMF 2007) notes the positive effect on household incomes (Black/Sward 2009: 13f.). The PRSP of Senegal (IMF 2007) also refers to potential benefits of internal migration in terms of development and poverty reduction, insofar as it contributes to better access to employment or better paid work for poor people (ibid.: 18f.). The Malian PRSP (IMF 2008) proposes rural development initiatives as a way of addressing internal migration by better integrating young people into social life, and by developing 'job-seeking aptitudes' (ibid.: 26). The 2007 Senegal PRSP also outlines a range of ways in which emigration is significant for the country, and it sets out a series of concrete policy

[17] The formation of ECOWAS in 1975 expanded migration opportunities for West Africans. Since 1978, ECOWAS has established conventions allowing free movement of people and goods between member states. The freedom of mobility is enshrined in the ECOWAS protocol of 29 May 1979 on Free Movement of Persons, the Right of Residence and Establishment. However, the implementation of the protocol remains difficult, as past expulsions testify. As has been noted, police and border officials have taken bribes as forms of unofficial toll (Bakewell/de Haas 2007: 104).

measures to increase an exchange with the Senegalese Diaspora. The study reveals that the focus of PRSPs in sub-Saharan Africa is mostly lying on undertaking rural development projects aimed at curtailing rural-urban migration. Despite necessary improvements in rural infrastructure, the authors take a critical look at this approach, "as it ignores the importance of internal migration as a livelihood strategy for the poor, as well as the fact that increased mobility may be a natural product of rural development measures" (Black/Sward 2009: 34). Similarly, other authors such as de Haas (2007) point out the fact that development projects aimed at stopping the rural exodus often fail, or even have the opposite effect: "Poverty reduction is not in itself a migration-reducing strategy (…); alleviating absolute poverty and achieving some degree of 'development' in the form of increasing income, education and access to information not only *enable* but also *motivate* more people to go abroad. As long as aspirations increase faster than the livelihood opportunities in sending regions and countries, social and economic development will tend to coincide with sustained or increased out-migration" (de Haas 2007: 833).

5.3 "Co-Development"

In recent years, the European Union has increasingly attempted to link migration and development policies by integrating migration respective migration control issues into its relations with third countries (de Haas 2007: 827) The European Union launched several initiatives regarding the regulation of migration from West Africa. In 2002, the EU proposed to link EU development aid to the willingness of governments to readmit irregular migrants originating from their own and third countries.

Mali and Senegal have been chosen by France for 'co-development' in order to link migration and development policies. In December 2000, a Mali-France Consultation on Migration was established as a bilateral discussion at ministerial level to enhance closer cooperation between the migrants' country of origin and country of destination . Under the terms of this agreement, representatives of the two countries meet annually to deal with issues relating to the integration of Malians who want to remain in France, with co-management of migration flows to allow migrants to circulate between their home countries and abroad, and with cooperative development in core emigration localities in Mali. The programme aims to aid in core emigration regions, seeks to build infrastructure and stimulates job creation. Furthermore, it supports education, health care, infrastructure development and income generation. Malians abroad shall be mobilised for their country's economic development through small enterprises. "The programme has also helped some migrants to return voluntarily and become self-supporting – the cost of repatriation is being used to encourage voluntary return in a more humane manner while also providing livelihood for returnees, who are mostly unskilled workers" (Adepojou 2008: 40).

However, some authors criticize French co-development programmes as "*de facto* 'return and stay-at-home policies" (de Haas 2007: 827). It is argued that recent EU policies seem to employ a narrow focus on the 'return potential' as development factor. Stimulating development is regarded as the key to help the migrants stay at home. "The suspicion remains that curbing immigration is a more important goal than contributing to development" (ibid.: 829).

5.4 Migration Policies in Senegal

Until recently, Senegal had no formal migration policy and has been relatively liberal regarding the entry and residence of foreigners. During the last decades migration issues were not considered as being very significant and political action was mainly limited to international agreements. Immigration is traditionally considered as positive and is linked to free mobility within the African continent and to the socio-cultural values of hospitality (Gerdes 2007: 3, Di Bartolomeo et al. 2010: 8). Today, several ministries are in charge of migration management[18] which creates confusion concerning who's in charge of what and results in a lack of coordination in migration governance (Some 2009, Di Bartolomeo et al. 2010: 8).

International migration is a major concern of the Senegalese government, which has multiplied its efforts for cooperation, mainly with the EU and several European countries and seeks to embed migration management into a development strategy. The country has promoted the governance of legal and illegal migration flows as part of a concerted strategy together with European countries (particularly France, Spain and Italy). The Senegalese government has signed bilateral agreements with third parties which deal with all aspects of migration: regular or legal migration; irregular or illegal immigration; and development or co-development migration (Some 2009). It signed agreements with France (2006/2008), Italy (2008) and Spain (2006) concerning increasing possibilities for legal migration to Europe. In response to the large number of migrants attempting to reach the Canary Islands in recent years, the Senegalese government has entered into talks with various European countries and the EU. In October 2006, Senegal and France signed an agreement as a basis for for the faster deportation of irregular migrants. On the other hand, this agreement made it easier for professionals, students and artists to enter France legally. Other agreements were signed with Spain in the same year. Thereby, the expulsion of irregular migrants was facilitated, but an increase in development aid was agreed on as well. Furthermore, the European Commission has been financing a project of more than one million Euro to help Senegalese authorities to support control of irregular migration. Border security was also strengthened as a result of the international pressure following the increasing number of migrants attempting to reach the Canary Islands since 2006 and the national outrage over the high numbers of deaths caused by these perilous crossings. The coast is guarded relatively closely by the state, and since 2006 the European border security "Frontex" patrols Senegalese and Mauritarian waters to prevent potential migrants from the crossing (Gerdes 2007: 4).

Given the increasing remittances of migrants and their significance for the national economy, the topic of migration has become more relevant in the political discourse. The most significant domestic policy efforts in the area of emigration have been devoted to the use of emigrant potential for development. To this end, the Ministry of Senegalese Abroad (Ministère des Sénégalais de l'Extérieur) was established. Political efforts focused on convincing Senegalese abroad to

[18] Responsible for Immigration: (1) Higher Council of Senegalese Abroad; (2) Ministry of Foreign Affairs – Bureau d'Accueil, d'Orientation et de Suivi des Actions de Réinsertion des Émigrés (BAOS); (3) Ministry of the Interior; (4) Ministry of the Youth and of Employment for the Young; (5) Ministry of the Senegalese Abroad; (6) Ministry of Labour and Public Service; (7) National Commission for Managing and Following Up on Employment Offers. Responsible for Emigration: (1) Ministry of Interior, (2) Ministry of Labour and Public Service, (3) General Directorate of National Security, (4) Directorate of Air and Border Police.

make productive investments in the country. On the basis of a bilateral agreement, France financed for the first time in 1983 a programme of vocational training for imigrants abroad who wanted to return. In 1987, France and Senegal established the Bureau of Reception, Orientation and Follow-up of Actions for the Reinsertion of Emigrants (Bureau d'Acceuil, d'Orientation et de Suivi des Actions de Réinsertion des Émigrés, BAOS), which is now under the auspices of the foreign office. "The BAOS attends above all to smaller projects concerning returning emigrants, but is little-used due to administrative deficiencies, insufficient funding, and migrant's lack of confidence in the organisation" (Gerdes 2007: 4).

As Wabgou (2008: 149) emphasizes, bilateral agreements usually do not sufficiently represent the interests of the Senegalese government. Therefore, the Senegalese government should "take its own initiatives instead of waiting for proposals from France, because propositions such as these are often approved through some kind of 'negatioation', performed within a context strongly characterised and influenced by the unequal bargaining power between the relational partners". In contrast, Gerdes (2007: 4) emphasizes the active role of the Senegalese government, which supported an increase for legal opportunities for migration to Europe. "In negotiations with European states, it has emphasised the necessity of supporting development projects rather than turning to repression to reduce migration. It has, moreover, voiced support for improved protection for migrants in Africa and Europe".

In 2008, the EU invited Senegal to open negotiations for a Mobility Partnership, a partnership that addresses labour migration opportunities and irregular migration (Some 2009: 67). However, the negotiations with Senegal have stalled. Moreover, Senegal signed a convention on co-development for the reintegration of Senegalese citizens for voluntary repatriation (ANSD 2004: 208). The government of President Wade accepts the repatriation of illegal migrants and is heavily criticised for this policy internally (Grimm 2009: 31). Furthermore, Senegal is one of five Maghreb-Sahel-states (Morocco, Mauretania, Mali, and Tunisia) declared as transit state on the Euro-African Conference on Migration and Development, in 2006 in Rabat. As transit state Senegal is obligated due to a UN declaration to prevent migrants to cross the country to immigrate irregularly into another county (Marfaing/Nadi 2009: 28).

Senegal signed the ECOWAS protocol about free circulation of individuals and goods, rights of residence and establishment in 1979 (ANSD 2004: 208, Wabgou 2008: 147). However, of all of the clauses contained in the protocol, only visa-free entry for citizens of the Community has been implemented to date (Gerdes 2007: 3). The permeability of frontiers, among others due the importance of value of hospitality, as well as incoherent control mechanisms adds to the complexities of irregular and transit immigration on Senegalese territory (Di Bartolomeo et al. 2010: 8, Wabgou 2008: 147). At the end of the century a new dynamic of collaboration between Senegal and its neighbours emerged as consequence of the Senegalese emigration and its impact on national affairs: Declarations of Bamako (1999), Dakar (2000) and the conclusions of the Symposium about the new partnership with the Senegalese abroad (2001) (ANSD 2004: 208).

The *national politics* regarding migration are coordinated by the Ministry of Foreign Affairs and involve several other Ministries as well as Development Aid Institutions. National policies include four main areas of action: (1) formation of professionals, (2) fighting document falsifica-

tion, (3) intensifying border controls and (4) monthly reports on development, practices and details of the legal, political, administrative and operational framework on migration in Senegal (Some 2009: 69).

On a national level the government supports civil society and developing institution in general. Projects and programmes implemented shall create awareness among young people on the risks of clandestine migration, promote employment opportunities for young people and women, tighten regulations against passengers, and encourage, welcome and integrate voluntary repatriates in society (Some 2009: 67).

Since unemployment among young people is a strong driving force for (e)migration, the government launched various initiatives for governmental assistance which include job service for young people on job search and assistance of enterprises, subsidies on salaries, public work, credits for small enterprises and self-employment (ANSD 2009: 57).[19]

Migration issues are also incorporated in development plans, like the Poverty Reduction Strategy Paper (see chap. 5.3). Strategies related to migration are: job promotion by involving emigrants in the development of communities; improved labour management; the establishment of an effective system for managing and monitoring the Senegalese population living abroad; the strengthening of programmes for the social and economic integration of youths; promotion of the rehabilitation and reintegration of repatriates and displaced persons; and improved refugee management strategies (Some 2009).[20]

The Senegalese government encourages, for example, the immigrants' return into agriculture: The *Plan de Retour Ver l'Agriculture* (Plan REVA), was implemented in November 2006, as a response to decreasing income from agriculture and the consequential increasing rural exodus. Consequences are an increase in depopulation of rural areas, concentration of active population in urban areas with only low employment opportunities and a massive clandestine emigration. In sum, Plan REVA aims to counter irregular emigration and rural exodus by creating sustainable conditions for people to return to rural areas and to agriculture (MAS 2010, Some 2009: 70).[21]

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[19] These are some of the projects by the Senegalese Government to create and promote employment for young people to reduce to will to emigration: (1) the National Action Fund for Employment (FNAE); (2) the National Fund for Youth Promotion (FNPJ) www.fnpj.sn; (3) the Agency for the Execution of Works of Public Interest (AGETIP); (4) the Project for the Promotion of Rural Micro-businesses (PROMER); and (5) the Labour Service within the Directorate of Employment (Some 2009). Further projects are (6) the National Agency for Youth Employment (ANEJ) www.jeunesse.gouv.sn/IMG/pdf/ANEJ.pdf; (7) the Office for the Employment of the Youth from the Suburbs (OFEJBAN) – www.ofejban.sn (PEJU/GTZ); (8) Fonds National d'Aide à l'Emploi (FNAE); (9) Le Service civique national (SCN) – www.jeunesse.gouv.sn/IMG/pdf/scn-2.pdf (ANSD 2009: 57); (10) Information System for an Efficient Governance of Migrations (SIGEM) and (11) the Funds for supporting investments by the Senegalese Abroad (FAISE).

[20] Programmes with international partners are: (1) Migration for Development in Africa programme (MIDA–Senegal), (IOM); (2) Transfer of Knowledge Through Expatriate Nationals (TOKTEN)-project (UNDP); (3) Co-development Initiative (by the Senegalese President's Office) (Some 2009) and (4) Valuation of Forest Ecosystems in Senegal (IOM).

[21] Plan REVA aims to stimulate economic growth by supporting agriculture and developing an agro-industry. In addition, the programme promotes the improvement of food security and the increasing contribution of agriculture to the GDP with a high proportion on export (MAS 2010, Some 2009: 70). The Plan REVA is part of the Poverty Reduction Strategy and the Millennium Development Goals, the "Loi d'orientation agro-sylvopastorale

In Senegal, the "Transfer on Knowledge Trough Expatried Nationals" (TOKTEN) programme was created in 2002. The first phase ran until 2006 and was managed by the UNDP, the Ministry of Foreign Affairs and the African Union for Senegalese Abroad. It was seeking to encourage Senegalese expatriate professionals to come back to their country for a short period of time (1–6 months) to take up teaching assignments in local institutions or to contribute to the development of sectors in crisis such as health, food industry, medicine, etc. A new TOKTEN programme has started in 2011 and will run until 2015, managed by the Senegalese Ministry of Foreign Affairs. The programme has two main missions: firstly, the mobilization of the Senegalese Diaspora in order to support administrations; local collectivities, private sector, civil society and development projects; secondly, the creation of partnerships between organizations in the North and organizations in the host countries via the experts of the Diaspora (TOKTEN 2011).

5.5 Migration Policies in Mali

Mali modified its legal framework for the entry and stay of foreign nationals in its territory in 2004 and 2005. In doing so it abolished the French decree of 1932 and the French ordinance of 1945, which used to govern foreign national's admission and residence in some colonial territories of French Western Africa, and also abolished the law of 1966 concerning expulsion .

As an active member of ECOWAS, Mali accepts freedom of circulation, residence and establishment for member-state nationals among the 15 member countries (Findley 2004). "Mali undeniably inclines towards facilitating circulation, especially for its own nationals who, besides the freedom to circulate within the ECOWAS space, hold one of the most privileged Sub-Saharan nationalities in terms of ease of entry into Maghreb countries" (Di Bartolomeo et al. 2010: 4). Mali has also bilateral agreements allowing Malian migrants to circle between Mali and its neighbours Burkina Faso, Mauritania, Niger, and Guinea. Additionally, Malian citizens are exempted from a visa requirement for entrance to several countries such as Algeria, Morocco and Tunisia. However, the absence of visa requirements for holders of a Malian passport is also an important factor with regard to trafficking (ibid.). ECOWAS nationals are exempted from visa requirements for Mali.

The country has not adopted the principle of emigration penalization and resists pressures which might increase its commitment to migration control and readmission. According to Di Bartolomeo et al. (2010: 4) Mali remains opposed to the French idea of "chosen immigration" which is not judged being suitable for its emigration interests. In contrast to Senegal, it has so far refused to sign an agreement with France on the joint management of migration flows, which would ease repatriation of irregular migrants. In 2007 Mali signed a cooperation agreement with Spain concerning immigration, leading to a progressive acceptance of circulation control and offering a framework for the return of a large number of Malian emigrants.

(LOASP) and the Strategy of promotion of growth (Stratégie de croissance accélérée (SCA); www.sca.sn) (Some 2009: 70).

According to regional standards, Mali has a relatively open citizenship law. The right of blood has been extended to women since 1995. It gives women the right to transmit their nationality to their children. Furthermore, dual citizenship is allowed (ibid.).

During the democratization in 1991, the relations of Malians living abroad with the Malian government achieved a new level. This new relationship was made possible by the political recognition of the migrant's benefits by their country of origin due to the constitution of the Higher Council of Malians abroad (Haut Conseil des Maliens de l'Exterieur). In 2000, the General Delegation of Malians abroad (Délégation Générale des Maliens de l'Exeterieur) was created. This body is in charge of protecting the interests of expatriate Malians, fostering their participation in the country's development and following-up return aid actions. Furthermore, Malians living abroad are represented in the High Council of the authorities and in the Economic, Social and Cultural Council. They also have a parliamentary representation (Di Bartolomeo 2010: 6). In 2004 the Ministry for Malians abroad and African Integration (Ministère des Maliens de l'Exterieur et de l'Intégration Africaine, MMEIA) was formed. The MMEIA is in charge of the repatriation of migrants and is thus at the cutting edgebetween national interests, on the one hand, and the claim to represent the concerns of the migrants, on the other. With these institutions the Malian government seeks to integrate the political forces abroad, as well as the economic potential of international migration into the national development strategies (Sieveking/ Fauser 2009: 88).

Given the situation that Malians represented the largest group of Africans trying to enter Europe illegally, the EU promised additional aid to the country in September 2007 with the objective to stimulate social development and diminish international migration flows. According to an EU statement, an additional 426 million Euro will be made available between 2008 and 2013 (van Vliet/van Beek 2007: 126). In 2008, the Migration Information and Management Centre (CIGEM, Centre de'Informations et de Gestion des Migrations) was founded in Bamako on the initiative of the European Union (EU). The aim of the centre is to contribute to the definition and implementation of a Malian migration policy in response to the concerns of potential migrants, returning migrants and migrants residing abroad and which is adapted to national, regional and international dynamics. The Centre seeks to inform and guide potential migrants by providing information about legal migration possibilities and restrictions for Europe, by creating awareness for possible risks of illegal migration and by informing about work opportunities abroad. It also aims to support voluntary and involuntary returnees. Further objectives are the encouragement of activities in the realm of development policies and investments on the part of the Malian Diaspora, as well as research on migration in Mali and the neighbouring region. Main partners of the Centre are Mali, the EU, France and Spain. The start-up of the CIGEM has been financed by the European Commission as a pilot project designed to enhance Mali's capacity to deal with migration issues in cooperation with neighbouring countries and with Europe.[22] CIGEM is part of a comprehensive approach towards migration emerging from the high-level meetings in Rabat (July 2006), and Tripoli (November 2006) and from the political dialogue between Mali and the EU under Article 13 of the Cotonou Agreement. The result of these meet-

[22] CIGEM recieved 10 million Euro in funding from the 9th European Development Fund (EDF).

ings was a Joint Declaration on "Migration and Development", signed by France, Spain, ECOWAS, the European Commission and Mali in February 2007 with CIGEM as the operational outcome of that Declaration. However, aside from the official agenda of CIGEM, its implementation and the impacts on migration remain unclear. On the one hand, there is little accordance on migration policies and coordination among the main participating partners Mali, EU, France and Spain. On the other hand, legal work and study opportunities in Europe are complicated and are administered restrictively. Against this background, there is much scepticism concerning CIGEM and an opinion frequently expressed in the Malian public is that the Centre essentially serves to avert migration directed to Europe (Sieveking/Fauser 2009: 100).

In 1998, the "Transfer of Knowledge Through Expatried Nationals" (TOKTEN) programme was created in Mali. It is managed by the United Nations Development Programme (UNDP) and the Malian government.[23] Initially, it only covered higher education which had a great need for improvement at the opening of the University of Mali in 1996. Today, the TOKTEN programme scope is extended to the health sector, agricultural sector and small and medium companies. It encourages Malian expatriate professionals to come back to their country for a short period of time (1–6 months) and to take up teaching assignments in local institutions or to contribute to the development of sectors in crisis such as health and agriculture. It receives financial aid from the CIGEM, the UNDP and the European Commission (CARIM 2011).

[23] The TOKTEN programme was initiated by the UNDP and funds the services of expatriate national experts for well prepared short term assignments with selected host institutions in the government, academic and research institutions, private sector and non governmental organizations.

6 Conceptual Approach of *micle*

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The general hypothesis of the *micle* project states that migration takes place under specific social-ecological conditions. Different actions and strategies taken by individuals, groups and societies to cope with changes of their natural environment depend on "societal relations to nature" that are rooted in history and culture (Becker et al. 2011, Görg 1999). Phenomena are not defined on the basis of single ecological or social factors, but rather by complex feedback links between the 'natural' and the 'societal' realms. As such, climate and environmental changes produce specific processes that cannot be assigned to one or the other exclusive categories 'nature' or 'society'. Changes of ecosystems such as land degradation are not only a result of biophysical dynamics but also of human actions and decisions. These actions and decisions are influenced by social, cultural, political and economic settings, and environmental changes in turn influence these settings. Causes and motives for migration (and for the decision not to migrate) overlap, and thus cannot be strictly separated as the popular idea of "push and pull factors" asserts.

As has been illustrated in chapter 2, trying to understand the linkages between climate, environmental changes and migration implies severe conceptual and methodological challenges. In order to analyse the social-ecological conditions of migration, the *micle* project follows a multi-method and multi-level research design. We integrate three different approaches into the topic that cover a range of qualitative and quantitative research methods: Firstly, by the way in which migration is presented the project seeks to conceptually and methodologically separate local assessments of climate and environment in order to avoid a suggestive causality between climate, environment and migration in the research design. Secondly, issues of vulnerability, livelihood strategies and agency are analysed in order to better understand the role of migration as adaption mechanism to cope with (environmental and other) changes i.e. migration as part of leading one's life. Thirdly, changes of the natural environment will be identified in time series data for climate and environmental parameters. As most of these data relate to a global scale, they have to be downscaled to a regional and local level; and the connections between climatic changes and environmental changes must be analysed.

Mobility and Local Dimensions of Climate and Environment

Research results are shaped by the way questions are formulated. In questionnaire approaches, for example, interviewees are often subjected to intensive 'problem scanning' with respect to their migration motives, their economic situation and environmental changes. Establishing a direct link between environmental factors and migration during fieldwork is highly problematic, since the researcher hints at causal connections rather than the respondent (see Mertz et al. 2009: 810). Taking for granted a causal link between environmental changes and migration in the research design and directly asking about such links leads to a perpetuation and reification

of general narratives on climate, the environment and migration issues (Romankiewicz/Doevenspeck 2011).

Within the multi-method and multi-sited research design of *micle* and based on the theoretical synthesis described in chapter 2, in our ethnographic analysis we develop a methodology that avoids asking respondents explicit questions about the links between environment, climate and migration, let alone asking directly if climatic and environmental changes cause migration. Moreover, we deal separately with local assessments of climate and vegetation trends (West et al. 2008) on the one hand, and migration on the other, by carrying out the respective fieldwork at different times. This, we think, gives respondents the opportunity to elaborate both on the subtle and complex social, economic and political undercurrents that relate to migration and on their own conceptualisations of environment and climate beyond a migration framework (Romankiewicz/Doevenspeck 2011).

Fieldwork takes the form of multi-sited ethnography (Marcus 1995: 106), meaning that migration networks originating from the study areas are followed ("follow the people") to do semi-structured individual and group interviews and biographical interviews at the migrants' home villages, during migration and at different migration stations. "Migration processes actually induce cultural change, not only with regard to the identity of migrants themselves, but also with regard to those who have remained home" (Klute/Hahn 2007: 16). If we consider that people's identities are influenced by migration processes, then their views on and interpretations of migration in general, and on climate and vegetation in particular, may also be subject to constant change, and depend amongst other things on the individual migration experience as well as the current migration station. Consequently, people who have never migrated from the study regions must also be included in the research. Moreover, the multi-site approach is motivated by rejecting the sedentary bias inherent in migration research (see Verne/Doevenspeck, forthcoming). Conceptualising movement "as constitutive for economic, social and political relations" (Urry 2007: 43), the so-called mobility paradigm acknowledges mobility as an integral part of human life and not as a problem per se, regardless of the place where this life is lived. We therefore refer to "mobile ethnography" (Sheller/Urry 2006), embracing a set of mobile methods to focus on the process of movement and different migration stations, since "all places are tied into at least thin networks of connections that stretch beyond each such place and mean that nowhere can be an 'island' " (ibid.: 209).

Regarding the environment, we are not evaluating the effects of climate trends in the study areas as outcomes of global climate change. Instead, we argue in favour of the relevance of various trends in climate variability and the importance of its different cultural, social and political dimensions, by focusing on local people's representations, perceptions and interpretations of climate, environment and changes therein. Here, we use the same methods and address the development of temperature, rainfall and wind, soil fertility, woody cover, the diversity of tree population, capacities of pasture, and crop yields (see Mertz et al. 2010, Roncoli 2006). Village elders can give valuable information with respect to longer time periods, and transect walks with individual villagers and farmers around the settlements reveal people's assessment of changes in vegetation, availability and exploitation of woody resources, and soil fertility (see Gonzalez 2001).

Vulnerability, Livelihoods and Agency

Until few years ago, the dominant perspective in scientific discussion regarded migration as failure to adapt, that migration is "the worst scenario and the option to avoid, and that policies should strive to enable people to stay" (Piguet et al. 2011: 15). Today, migration, both internally and internationally, is frequently regarded as an adaptation strategy of households and individuals: "mobility, along with income diversification, is an important strategy to reduce vulnerability to environmental and non-environmental risks, including economic shocks and social marginalization. In many cases, mobility not only increases resilience but also enables individuals and households to accumulate assets" (Tacoli 2009: 104, see also Scheffran et al. 2011). However, as scholars of the migration & development theory argue, the propensity to migrate typically does not merely rest upon individual cost-benefit calculations, but also depends on people's aspirations (de Haas 2008). From this perspective, migration can be regarded as "a normal part of social transformation processes and a way in which people can exercise agency to improve their livelihoods" (Castles 2009). Several scholars emphasize the different levels of vulnerability and argue that the most vulnerable often lack the capability to move and are thus not able to use migration as a livelihood strategy (Adger 2006: 268, Leighton 2011, Piguet et al. 2011). It must be studied in detail, what this means for our research regions. Furthermore, migration represents not only a livelihood strategy of underprivileged people, but is also characteristic of the better off. Thus, migration must not necessarily constitute only a coping strategy, but may also constitute a way of life (Black 2006: 2, Kliot 2004: 83). Particularly for the Western African contexts, migration has been understood and investigated as an adaptation strategy. So the question arises: adaptation to what? We hypothesize that migration must be regarded within a continuum of structure and agency: it depends on structural conditions (i.e. economic, political, social, environmental conditions), but also on individual capabilities and aspirations (van der Land 2011). Against this background we investigate under which conditions and to which extent migration constitutes a household strategy to secure and improve livelihoods or an individual concept of life. Based on a triangulation methodology, research methods applied consist of participatory observation, semi-structured and in-depth interviews. Furthermore, a survey will be conducted in regions of origin and destination of migrants (Linguère and Dakar/Senegal & Bandiagara and Bamako/Mali) including items to migration patterns, attitudes, perceptions of environmental changes, land use and food security.

Climate Variability and Environmental Change

Environmental change and climate variability in the study regions Bandiagara/Mali and Linguère/Senegal are surveyed, analysed and evaluated on a local and regional scale. A special focus will be on land degradation. The work will be mainly based on time series of satellite data of variable spatial and temporal scale, and on extensive field work. Beside continuous satellite data, time series images with higher resolution will be used. The time before the dry period in the 70s and 80s is depicted by high resolution CORONA images recorded in the 60s. Since the 80s, satellite data with a resolution of at least 30 m have been available. These data will be evaluated against the background of the data from our own fieldwork, adjusted to the study region and extended by our own surveys. The work includes spatial and temporal analyses of ex-

isting climate data and remote sensing data. Climate data and data on vegetation change, both derived from satellite products (e.g. TRMM, GIMMS, SPOT VGT) are used to decouple vegetation trends from climate trends using statistical methods. Based on these results, areas with decoupled trends will be assessed in the study regions. Beside natural scientific methods to analyse processes of biotic and abiotic interactions, the experience and knowledge of the local population will be incorporated. An important aspect will be to relate our results on environmental change in the study region to the perception and evaluation of local people ("Socializing the Pixel", Geoghegan et al. 1998). This represents an important input into the ground truthing process while enabling us to better understand how various environmental changes are linked to land use and how changes influence the livelihoods of the local population.

Synthesis and Integration

An integrated analysis of the social-ecological conditions of migration must deal with various challenges: It must cross the disciplinary divide and connect natural-scientific and social-scientific methods and data. Different temporal and spatial scales need to be reflected (e.g., migration types and destinations, local rainfall and vegetation patterns within a certain period). Furthermore, we need to consider different levels of analysis – the micro level (preferences and decision making, needs satisfaction, income generation etc.), the meso level including land use patterns, provisioning structures and policies etc., and the macro level of overall structural conditions such as ownership and production patterns, economic and political power relations, and gender arrangements.

Given these challenges, the different research questions and approaches of the *micle* project described above will be integrated in an iterative proceeding, using several integration instruments such as common formulation of hypothesis, theoretical work and modelling. A conceptual framework is needed that allows formulating robust statements about the social-ecological conditions of migration. Here, we can draw on different initiatives that connect knowledge across diverse disciplines, explicitly oriented towards a comprehensive, system-based approach that conceptualizes human-nature interactions as social-ecological systems (SES) (Folke 2006, Ostrom 2009, Liu et al. 2007, Glaser et al. 2012). Most recently, some scholars in the research field of climate, environment and migration refer to the SES concept (Renaud et al. 2011: 11, Oliver-Smith 2009: 14). Indeed, the SES perspective seems to provide a productive framework for the analysis of interactions amongst (climate-induced) environmental changes and migration. However, the SES approach has not been systematically applied to the climate-environment-migration nexus so far. Based on the conceptual and empirical research, the *micle* project will contribute to the specification of the SES perspective for the climate-environment-migration nexus.

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