

Environmental Change and Migration:

A Review of West African Case Studies

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Introduction

West Africa is considered one of the world's regions that is presumed to be highly affected by climate and environmental changes in the future (IPCC 2007). The majority of the rural population in the region depends on small-scale agriculture, crop production and livestock farming, and therefore on the natural environment. Environmental changes can thus constitute a severe threat to people's livelihoods. Mobility in West Africa has a long tradition and the seasonality of rainfall influences the mobility patterns. Agricultural activities depend on only one rainy season in which the workload in agriculture is high. The seasonal movements of pastoralists with their animals to pasture grounds or the labour migration of farmers during the dry season are well-established patterns of migration (Davies 1996; Ellis 1998; Rain 1999). Main destinations are urban areas or more productive rural areas, either within the country or in neighbouring countries. The most established inter-regional mobility pattern in West Africa was and still is the North-South movement from the Sahelian landlocked countries of Burkina Faso, Mali and Niger to the coastal states, particularly to the economically strong Côte d'Ivoire. These patterns date back at least to the colonial area in the 19th century when plantation economies (e.g. cocoa, coffee, cotton, groundnut) attracted labour migrants from neighbouring countries and cities as Dakar, Abidjan, Lome and Accra benefited from investments for the export of goods to Europe (Hummel *et al.* 2012; Bakewell and de Haas 2007). Dryland West Africa has harsh environmental conditions and long established mobility patterns, but that does not necessarily mean that the two are related.

This review analyses 15 empirical case studies that focus explicitly on the complex linkages between environmental factors and human mobility in West African drylands - in the semi-arid Sahel zone and the savannah (see Table 13.1). This includes studies on Senegal, Mali, Burkina Faso, Niger, and (Northern) Nigeria, Ghana and Benin. In contrast to existing reviews on African case studies (e.g. Jónsson 2010; Morrissey 2014) it focuses specifically on West African drylands with relatively homogenous climatic and cultural conditions compared to other regions. Environmental parameters investigated in the case studies comprise slow-onset changes such as a rising temperature, increasing rainfall variability and land degradation as well as the severe droughts during the 1970s and 1980s. In addition, the review provides a systematic analysis on the similarities and differences of concepts, methods and results of the most relevant case studies on the environment-migration nexus, aiming at drawing conclusion and identifying directions for the research on the environment-migration nexus in the region.

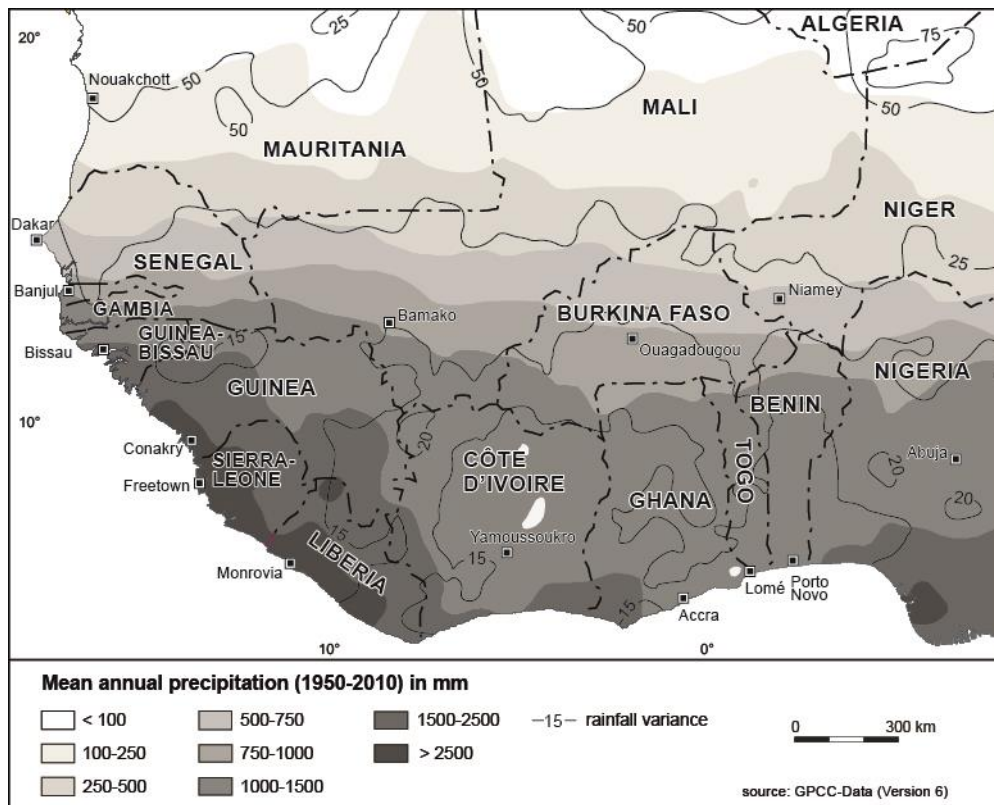


Figure 1: Map of West Africa with mean annual precipitation.

Source: Modified by authors based on: Martin Brandt, Heiko Paeth, Cyrus Samimi (2013): Vegetationsveränderungen in Westafrika - Spiegel von Klimawandel und Landnutzung. Geographische Rundschau 9: 36.

Approaching the environment and migration nexus in West African drylands – concepts and theories

The great Sahel droughts of the 1970s and 80s and the assumed direct effects of climate and environmental change on human migration shaped the image of the entire Sahel region as a serious hotspot of environmental displacement. Contemporary political concerns of (uncontrollable) large-scale population movements as a consequence of unbearable environmental conditions in dryland West Africa influence and dominate the focus in research as well as conceptual approaches applied in empirical investigations on the linkages between migration and environmental change. Empirical studies can basically be classified into two conceptual categories (Suhrke 1994; Jónsson 2010): a) A push-pull framework (maximalist view) derived from the approach of neoclassical economics in migration theory that assumes (unidirectional) migration to be a result of economic-spatial differences, or analogously here, driven by spatial differences in environmental conditions. b) Approaches that regard the environment a contextual component and emphasize and elucidate the multiple dimensions and levels, the complexity, and multicausality of population movements (minimalist view).

Table 13.1: Overview of the reviewed case studies

AUTHOR(S)	TITLE	PUBLICATION YEAR	STUDY COUNTRY
Henry, S., Boyle, P. and Lambin, E.F.	Modelling inter-provincial migration in Burkina Faso, West Africa: the role of socio-demographic and environmental factors	2003	Burkina Faso
Henry, S., Piché, V., Ouédraogo, D. and Lambin, E.F.	Descriptive analysis of the individual migratory pathways according to environmental typologies	2004	Burkina Faso
Henry, S.; Schoumaker, B. and Beauchemin, C.	The importance of rainfall on the first out-migration: a multi-level event-history analysis in Burkina Faso	2004	Burkina Faso
Kniveton, D.; Smith, C. and Wood, S.	Agent-based model simulations of future changes in migration flows for Burkina Faso	2011	Burkina Faso
Findley, S.E.	Does drought increase migration? A study of migration from rural Mali during the 1983–1985 drought	1994	Mali
Pederson, J.	Drought, migration and population growth in the Sahel: The case of the Malian Gourma: 1900–1991	1995	Mali
van der Land, V.	The environment-migration nexus reconsidered: Why capabilities and aspirations matter	2015	Mali, Senegal
Romankiewicz, C.; Doevenspeck, M.; Brandt, M. and Samimi, C.	Adaptation as by-product: migration and environmental change in Nguith, Senegal	2016	Mali, Senegal
Bleibaum, F.	Senegal. Case study report	2009	Senegal
Afifi, T.	Economic or environmental migration? The push factors in Niger	2011	Niger
Mounkaïla, H.	De la migration circulaire à l’abandon du territoire local dans le Zarmaganda (Niger)	2002	Niger
van der Geest, K.	North-South migration in Ghana: What role for the environment?	2011	Ghana
Rademacher-Schulz, C.; Mahama, S.	“Where the rain falls” project. Case study: Ghana. Results from Nadowli District, Upper West Region	2012	Ghana
Doevenspeck, M.	The thin line between choice and flight: environment and migration in rural Benin	2011	Benin
Dillon, A.; Mueller, V. and Salau, S.	Migratory responses to agricultural risk in Northern Nigeria	2011	Nigeria

Even though authors of recent empirical investigations widely acknowledge the complexity and multicausality of migration, this classification can be useful “to illustrate how conceptual frameworks shape the kinds of data and analyses researchers produce” (Jónsson 2010: 8). The theoretical-conceptual approaches and research designs applied in most of the reviewed West African case studies are framed to a greater or lesser extent by plausible basic assumptions of environmental push and pull factors of migration. The following exemplary quote illustrates the underlying premises in the investigations: “Since rain-fed agriculture is the main source of livelihood in rural Burkina Faso, intuitively it makes sense that environmental factors (e.g. rainfall and land degradation) will influence socio-economic conditions and may lead people to emigrate” (Henry and Schoumaker *et al.* 2004: 424).

Several studies do not specify the theoretical-conceptual approach that guided their research (e.g. Mounkaila 2002; Bleibaum 2009; Afifi 2011), however, implicitly they mainly follow the push-pull idea. In the case studies of Henry *et al.* (2003; 2004a; 2004b) and van der Geest (2011), even though considering a variety of demographic, socio-economic, and environmental parameters in their statistical model/analysis, the respective approaches basically involve testing the explanatory power of environmental and socio-economic area characteristics (as push or pull factors) for migration. Whereas Pedersen (1995) looked at the demographic effects of exceptional droughts in Mali of which migration is only one parameter, Findley’s (1994) analysis frames migrants as social and economic members of a household and presents socially and spatially differentiated movements as drought coping strategies. In contrast, both Doeverspeck (2011) and Romankiewicz *et al.* (2016) stress the importance of making use of the multiple approaches contemporary migration theory offers. They put the environmental dimension in the context of migration shaped by social capital and migration networks. Three case studies (Dillon *et al.* 2011; Rademacher-Schulz and Salifu Mahama 2012; van der Land 2015) use the Sustainable Livelihood Approach (SLA) to analyse the importance of migration as a (household’s) survival, risk reducing, or adaptation strategy towards climatic or environmental stress. Van der Land (2015) combines the SLA and a capability approach and thus, in contrast to other studies, not only considers the household level, but also highlights individual aspirations and preferences in migration decisions. Kniveton *et al.*’s (2011) Agent Migration Adaptation to Rainfall Change-model incorporating the theory of planned behaviour involves multiple sets of migration drivers and the assumption that migration away from affected areas is an adaptation strategy.

Apart from the variety of theoretical-conceptual approaches applied in the reviewed papers, the empirical studies rely on different definitions and classifications of human mobility. They depend on the type of analysis (quantitative/qualitative) or the availability and quality of data sources. Studies referring to migration information from censuses usually use a migration definition of an absence of at least 12 months (Pedersen 1995; Henry *et al.* 2003; van der Geest 2011). Other studies that use survey data differentiate for instance between seasonal/circular (less than 6 months) and temporary/permanent migration (more than 6 months) (Findley 1994; Rademacher-Schulz and Salifu Mahama 2012), or short-term (3-10 months), temporary (10 months-5 years), and permanent migration (>5 years) (van der Land 2015). Henry *et al.* (2004) exclusively look at the first outmigration from the village after age 15. On the other hand, Romankiewicz *et al.* (2016) follow the IOM definition of migration (IOM 2004) and suggest to encompass any kind of population movement irrespective of length, boundaries crossed or causes. Moreover, the environmental parameters considered vary among the case studies. Almost all studies refer to respective rainfall variability in time and space. Rademacher-Schulz and Mahama (2012) and Dillon (2011) also include temperature as a variable. Authors that go beyond a general description of so-called environmental stressors and thus quantify environmental parameters in their study, include a combination of explanatory factors. Such factors are rainfall, land degradation (soil fertility), and crop yields (Henry *et al.* 2003; Henry and Schoumaker

et al. 2004), annual rainfall and land use change (Romankiewicz *et al.* 2016), and vegetation cover (NDVI), crop yields, and rainfall (van der Geest 2011).

The analysis of theoretical-conceptual approaches shows that most empirical case studies on West African Drylands are still guided and entrenched in traditional push-pull frameworks. Only few authors point out and apply alternative approaches in order to make sense of observed contemporary migration phenomena in West Africa beyond an interpretation of environmental displacement. Moreover, the variety of migration definitions and combination of environmental parameters applied in the studies, make it difficult to compare the results.

Methods: Diversity, trends, challenges and opportunities

The studies use an impressive variety of methods to analyse the relation between environmental change and migration in dryland West Africa. All six types of research methods that Pigué (2010) distinguishes have been applied in the region: 1) ecological inference based on area characteristics; 2) sample surveys; 3) time series; 4) multilevel analysis; 5) agent-based modelling (ABM); and 6) qualitative and ethnographic work. Some of Pigué's categories actually include several different research tools. For example, qualitative research methods might include individual interviews, focus groups, expert interviews and participatory research approaches.

Table indicates the methodological approach and the spatial and temporal dimensions applied in the reviewed case studies. The table shows that most studies combined two or more methods that complement each other. This helps to validate or triangulate findings. A particularly common mix has been the combination of a sample survey and qualitative research tools. Table 1 also shows that the focus is mostly on past and current population movements: few studies have extrapolated into the future, which is a challenging exercise (Brown 2008; Gemenne 2011; McLeman 2013). With regards to the spatial dimension, the table shows that almost all studies are based on data from migrant source areas, where the environmental push factors were at play. About half the studies under review also included data from migrants' destination areas.

Jónsson's (2010) review of African case studies on environmental migration identifies several methodological challenges. The scholarly work reviewed in this chapter also faces these challenges to varying degrees. First, many studies are too narrowly focused on environmental drivers. This is especially the case for studies that use a macro-level push-pull framework that fails to take micro and meso-level contextual factors into account that has been highlighted in the previous section of this review. Several studies (e.g. Bleibaum 2009; Afifi 2011) asked directly for the impact of environmental drivers on migration while others (e.g. van der Geest 2011; Rademacher-Schulz and Salifu Mahama 2012; van der Land 2015; Romankiewicz *et al.* 2016) followed a broader approach by inquiring a wide variety of potential reasons for people to migrate, including environmental factors. A second challenge or weakness is that many studies lack a longitudinal perspective: they provide snap-shots that fail to grasp the historical context of migration and longer-term dynamics of the environment. Third, there is an issue with the reliability and validity of data. This is particularly the case for interview data about migration reasons. It also applies, however, to secondary data about mobility (e.g. population census data and people's recall of migration years) and the environment (e.g. rainfall data). There is a general paucity of reliable migration data in West Africa, especially at sub-national level. National census data often concludes – if at all – only limited information about migration. In addition to the challenges Jónsson identified, several reviewed studies chose to interview the head of the households (e.g. Bleibaum 2009; Doeverspeck 2011; van der Geest 2011). Most of the household heads, however are

Table13.2: Overview of methods and spatio-temporal dimensions.

Author(s)	Publication year	Study country	1 Ecological inference	2 Surveys	3 Time series	4 Multi-level	5 ABM	6 Qualitative research	Source area	Destination area	Past or present	Future
Henry et al.	2003/2004ab	Burkina Faso	X	X	X	X			X	X	X	
Kniveton et al.	2011	Burkina Faso					X		X			X
Findley	1994	Mali		X					X		X	
Pederson	1995	Mali		X				X	X		X	
van der Land	2015	Mali, Senegal		X				X	X	X	X	
Romankiewicz et al.	2016	Mali, Senegal	X					X	X	X	X	
Bleibaum	2009	Senegal		X				X	X	X	X	
Affi	2011	Niger		X				X	X	X	X	
Mounkaila	2002	Niger		X				X	X		X	
van der Geest	2011	Ghana	X	X	X	X		X	X	X	X	
Rademacher-Schulz & Mahama	2012	Ghana		X				X	X		X	
Doevenspeck	2011	Benin		X				X		X	X	
Dillon et al.	2011	Nigeria		X	X	X			X		X	
Total			3	12	3	3	1	9	13	7	13	1

- Kniveton et al. (2011) use survey and time series data from Henry et al. (2003, 2004) to construct their agent based model.
- Pederson's (1995) work is based on a literature review and statistical data from demographic and nutrition surveys. These were not designed to study migration-environment linkages specifically.
- The surveys in the EACH-FOR studies (Bleibaum 2009; Affi 2011) had a low sample size (N = approximately 30) and contained several open-ended questions yielding qualitative data. The other qualitative work in these two studies consisted of expert interviews.
- The study by Mounkaila (2002) has no methods section. Most of the findings seem to be based on a desk study and, following Piguet's (2010) description of research approaches, are categorized under qualitative research. Mounkaila has also conducted a survey in two 'source area' villages.
- In the work by Rademacher & Salifu Mahama (2012), PRA tools play a central role. These are classified under qualitative methods here.

men, which can cause gender imbalances in the results, especially with regard to questions about perceptions and migration reasons. Rademacher-Schulz & Mahama (2012) address this challenge by interviewing wives of male household heads in approximately half the sample. The seemingly simple, but potentially complicated question ‘who to interview?’ is crucial in migration research. Household heads may not know or want to reveal the migration motives of the different household members. It often depends on the research focus whether the choice should fall on individual migrants, their household heads or others. Another challenge is that the results of case studies are hard to compare due to the different research approaches, including methods used, scale levels, sample sizes, and amount of time spent in the field. Therefore, a systematic analysis of research findings on the environment-migration nexus, as is attempted in this chapter, has its limitations.

Besides challenges, there are also opportunities that have not yet been fully exploited. For example, increasingly granular datasets depicting environmental change have become freely available in the past years. For dryland West Africa, where drought and desertification are key issues, a more thorough analysis of these datasets can help to better understand the environmental drivers of migration. Moreover, methods for studying migration-environment linkages in dryland West Africa have improved considerably since the first studies on this topic appeared in the 1990s. Particularly there is a move towards more mixed-method research that produces more robust findings. Several challenges remain and new opportunities for analysis arise.

Ambiguous findings on the impact of environmental factors on migration behaviour

The agreed aspects on the linkages between the environment and migration

The reviewed case studies focus on different aspects of the relationship between the environment and migration and apply different concepts, data and methods. This makes it difficult to compare and to draw consistent conclusions even from case studies that focus on the same region. Nevertheless, all studies agree at least on three relevant aspects for the research on environment and migration in the region: a) environmental conditions and changes favour temporary migration, b) migration is a well-established activity to diversify income, and c) migration is multi-causal.

Climatic conditions in the region, such as the long dry season and highly variable inter- and intra-annual rainfalls, favour temporary migration from the rural areas. For many people in the region seasonal or temporary labour migration from rural areas is a common activity and well-established strategy to diversify income. Particularly migration during the dry season is often an economic activity complementary to agriculture and crucial to ensure the households food security. This has been widely acknowledged in literature on West African drylands (e.g. Mortimore 1989; Davies 1996; Ellis 1998; de Haan 1999; Breusers 1999; Mortimore and Adams 1999; Rain 1999; de Haan *et al.* 2002; Ellis 2003; McLeman 2014). Nevertheless, the studies agree that migration in the region is multi-causal. Environmental factors are usually not the only driver of migration, but cultural, economic, environmental, political and social aspects also influence the migration decision. While the studies agree on these basic aspects, there is little consensus on the role and weight of environmental change and stress as a driver of migration – compared to other aspects, on the necessity or the degree of urgency to migrate and on the impact of environmental factors on the duration and destination of migration.

The multi-causality of migration as a major challenge

Economic and environmental factors as main reasons for migration

The studies on the environment-migration nexus in West Africa acknowledge that a variety of variables influences the migration decision and that migration is complex and context-dependent. However, this complexity of migration seems to be a major conceptual and methodological obstacle to the research on the environment-migration nexus. Afifi for instance recognises that “it is hard to link migration to the environment” (Afifi 2009: 17) and Doevenspeck notes that it is very difficult to achieve a clear differentiation between the different impact factors (Doevenspeck 2011: e61). Concluding that migration is complex and context-dependent is a very unsatisfying result (Nicholson 2014; van der Land 2015; Romankiewicz *et al.* 2016). The relationship between environmental and economic drivers of migration seems to be particularly complex. This is because environmental stress might be an indirect driver of migration through economic needs. Often it is not environmental factors themselves, which influence the migration decision but rather their consequences or related structural constraints, such as reduced productivity or food insecurity (Mounkaïla 2002; Afifi 2011; Rademacher-Schulz and Salifu Mahama 2012). At the same time labour migration in West African drylands not only ensures food security but is also a means to increase assets and improve economic well-being and livelihoods (Ellis 2003). Nevertheless, some of the reviewed studies assume environmental problems as driver of economic motivated migration, while the migrants themselves do not relate their migration to environmental problems. Interviewees in Afifi’s EACH-FOR study on Niger state economic factors, such as poverty and unemployment, as main causes of migration. Afifi reckons that the underlying causes of the economic motives were declining crop yield or death of animals due to the droughts and water shortage. He even suggests the term “environmentally induced economic migration” (Afifi 2011: e116). In Findley’s (1994) study on the effect of the 1980s drought in Mali surprisingly only very few of the household heads explicitly report drought or famine as the reason for migration. Instead, economic reasons, marriage or other family reasons were the main migration motives. Other studies show that better economic prospects in other regions influence the migration decision and patterns. In the EACH-FOR study on Northern Ghana, people mentioned better agro-ecological conditions in the destination area more often as reasons for migration than the unfavourable conditions for farming at home (van der Geest 2011a: e85). Henry *et al.* relativize the role of the environmental conditions by stating that “Burkinabe migrants are not likely pulled by rainfall conditions in Cote d'Ivoire but are rather attracted by job opportunities in plantations of cafe and cacao” (Henry and Piché *et al.* 2004: 414). The micle-project finds that economic motives are the main migration motives for both Senegalese and Malian migrants. Environmental reasons played a role as underlying causes for 71% of the Senegalese, while this applies only to 13% of the Malians. Malians relate their economic motivated migration rather to consumption, like buying clothes or dowry (Hummel 2015; van der Land 2015). The “Where the rain falls”-project finds for Ghana that people migrated mainly for economic and food security reasons. The most common reasons for migration were the decline in crop production for own consumption; shifts in the rainy season; unemployment; longer drought periods followed by unreliable harvest; and increase in drought frequency (Rademacher-Schulz and Salifu Mahama 2012). With respect to gender, earlier studies showed that male migration was dominated by economic motives and women rather migrated for marriage and family reasons (Findley 1994; Petit 1997). While this tendency is still valid, women also seem to migrate increasingly for economic reasons (de Haan *et al.* 2002; Sieveking and Fauser 2009; van der Land 2015). It is, however, not clear, if this is due to deteriorating environmental conditions or due to an increasing acceptance of women migrating for economic reasons.

Economic motives for migration thus include different levels of voluntariness or necessity. Rademacher-Schulz and Mahama show in their Ghana study that 75% of their survey participants perceive migration as a normal income-generating strategy, whereas 36% perceive and use it as a

strategy only in times of crisis (Rademacher-Schulz and Salifu Mahama 2012). Van der Geest (2011) suggests for Northern Ghana that only 24% of the migrants in his sample moved for reasons that indicate a high level of urgency and distress. They stated “food insecurity” or “hunger” as migration reasons. For most migrants, the level of urgency was lower and their migration rather attempts to improve their livelihoods (van der Geest 2011). He concludes that “[t]he picture that emerges for northern Ghana is not one of distress migration in the face of environmental disaster but rather of migration as a way of dealing with structural environmental scarcity.” (van der Geest 2011: e69). The reviewed studies suggest that this conclusion applies for the whole region. The underlying motives for people’s economic migration are manifold and migration is often a voluntary decision, which goes beyond risk prevention and adaptation to environmental stress. Better income opportunities and the desire for progress and prosperity - inspired by the prestige and economic achievements of previous migrants - as well as the aspirations for a better life and a different lifestyle are important motives for people’s economic migration (van der Land 2015; Romankiewicz *et al.* 2016).

The importance of individual characteristics, structural conditions and social determinants for migration in environmental fragile areas

Studies, which consider multiple variables as driver of migration, find that environmental factors are often not the main driver of migration in the region. Instead, they show that individual characteristics (e.g. level of education, religion, ethnicity and the economic activity), structural conditions (e.g. infrastructure and lacking (non-farm) income opportunities on site; better income opportunities elsewhere) or social determinants (e.g. conflict, envy, migration tradition and relative deprivation) strongly influence migration.

For Burkina Faso Henry, Schoumaker and Beachemin (2004) find no evidence of a general effect of rainfall conditions on people’s first out-migration from rural areas. Instead, they find that migration mostly depends on individual characteristics such as the educational level, the type of economic activity or the ethnic group to which the individual belongs (Henry and Schoumaker *et al.* 2004: 454). In an earlier study on inter-provincial migration in Burkina Faso in the 1980s Henry *et al.* (2003) also show that socio-demographic variables, such as literacy and economic activity, have more power to explain migration than environmental factors, such as rainfall variability, drought frequency and soil degradation (Henry *et al.* 2003: 134). Individual characteristics not only determine the migration propensity but also the migration motives. The micle-project for instance shows that individual characteristics, such as gender, age, economic activity and educational level, strongly influence people’s reasons to migrate (van der Land and Hummel 2013; Hummel 2015; van der Land 2015). Environmental factors predominantly influence the migration of middle aged male farmers with no or a low formal education (van der Land 2015).

Van der Geest (2010; 2011) finds in his EACH-FOR case study on Ghana, that migration propensities tend to be higher in districts that experience more resource scarcity – depending on annual rainfall, vegetation cover, crop yields and, to a lesser extent, rural population density. However, he suggest that religion and a higher level of education, migration tradition, and poorly developed infrastructures could be important influencing variables to explain the higher out-migration from the Upper West region compared to the Upper East, two regions with similar resource scarcity (van der Geest 2011: e80). Similarly Doevenspeck (2011) finds for the northwest of Benin that environmental problems, such as soil degradation, poor harvests and food security are not necessarily the main migration determinants, but that economic reasons, sourcery/envy and conflicts influence migration (Doevenspeck 2011: e63).

Moreover, several studies on migration in West Africa show that social networks, social capital and identity play a role in the migration decision (Hampshire 2002; de Haan *et al.* 2002; Doevenspeck 2011; van der Land 2015; Romankiewicz *et al.* 2016). Particularly, recent studies suggest that environmental stress might have been the principal cause for migration during the 1970s and 1980s, and that these migrations still influence current migration behaviour (Gonin and Lassailly-Jacob 2002; Doevenspeck 2011; van der Land 2015; Romankiewicz and Doevenspeck 2015; Romankiewicz *et al.* 2016). Established networks facilitate migration and lead to social prestige and relative wealth of the migrants and their families. This in turn encourages other member to migrate and leads to a perpetuating effect, even if the initial causes of migration do not remain (Massey *et al.* 1993; de Haas 2010). Some studies even suggest that men and women use unfavourable environmental conditions as excuse for other more delicate or less accepted migration reasons, such as sorcery or to escape traditional norms in the village, to be economically independent and to postpone or avoid arranged marriages (Gonin and Lassailly-Jacob 2002; Doevenspeck 2011; van der Land 2015).

The impact of environmental factors on spatial and temporal migration patterns

Only a few studies consider the impact of environmental stress on migration patterns. The use of different definitions with respect to duration and destination of migrations makes it difficult to compare the findings. The impact of environmental factors on migration patterns is controversial. Several studies suggest that factors, such as economic opportunities, social networks or the person's life phase, education and professional prospects, and the type of residence permits and labour contract influence the duration and destination of migrations (Henry and Piché *et al.* 2004; Doevenspeck 2011; van der Geest 2011; van der Land 2015; Romankiewicz *et al.* 2016). In general, migration in the region is mainly temporary, often seasonal, and takes mainly place within the country or to neighbouring countries (Adepoju 2005, 2008; Bakewell and de Haas 2007; Afifi 2011; van der Geest 2011; Rademacher-Schulz and Salifu Mahama 2012; Mueller and Romankiewicz 2013; van der Land 2015).

Studies which investigated the changes in migration flows during the severe droughts in the beginning of the 1970s and 1980s, find that droughts tended to limit migration flows. Studies on northern Ghana and Mali found for instance that migration flows had been lower during the severe droughts during in the 1970s and 1980s compared to the years before 1970 and after 1984 (Gonin and Lassailly-Jacob 2002; van der Geest 2011). Two further studies on Mali show that migration at least did not increase during the drought period in the 1980s (Findley 1994; Pedersen 1995). Particularly these earlier studies tended to find that environmental stress favours short-term and short-distance migration. Findley finds for the region of Kayes in Mali that short-cycle migrations more than doubled during the droughts in the 1980s. Migration during that time shifted from permanent (more than six months absent) to short-term migration (less than six months absent) and destinations shifted from intercontinental destinations to destinations in Mali and other African countries (Findley 1994: 544). In contrast, Henry *et al.* (2004) find for migration during the 1970-1998 period that short-term migration did not rise following a severe rainfall deficit. They however, define short-term migration as up to two years. Recent studies find that acute or anticipated stress changes the usual temporal migration patterns. A study on Ghana observes an accelerated migrant departure rate during the rainy season in 2011– and not during the dry season as this is usually the case for short-term seasonal migration. They assume that people leave earlier due to acute food shortage and/or in anticipation of a bad harvest (Rademacher-Schulz and Salifu Mahama 2012; Rademacher-Schulz *et al.* 2014). Similarly, interviewees in van der Land's study on Mali and Senegal indicate to leave earlier and to stay longer in migration in years with (expected) poor yields (van der Land 2015). Dillon *et al.* find in their model for Northern

Nigeria that households are more inclined to send men out of the village to reduce the risk and retain women in the household in response to ex post covariate shocks – thus as risk management (Dillon *et al.* 2011). Similarly, Henry *et al.* (2004) find that women are less likely to move after bad rainfall conditions (Henry and Schoumaker *et al.* 2004). In addition, the short-term increase of numbers of migrating household members seems also a common strategy to respond to environmental stressors (van der Land 2015; Hummel 2015).

Today, studies on the region agree that rural households generally consists of two groups: members who stay and members who migrate (Mounkaïla 2002; van der Land 2015; de Haan *et al.* 2002). More and more women migrate and often takes turns of migrating and staying with other family members. The long-term migration of some members to urban areas and neighbouring countries seems to become increasingly common (e.g. Rademacher-Schulz *et al.* 2014; van der Land 2015). Several studies suggest that temporary long-term migration might become the main activity and marginalise the agricultural activity (Hampshire 2002; Mounkaïla 2002; Afifi 2011; van der Land 2015; Romankiewicz *et al.* 2016). This means that people's dependency on agriculture and the natural environment decreases, while at the same time their dependency on the financial assistance from the migrant family members increases. Studies however disagree on whether a change from seasonal to long-term migration is a consequence of more and more deteriorating environmental conditions (Mounkaïla 2002; Afifi 2011; Rademacher-Schulz *et al.* 2014) or a consequence of economic development, social transformation processes and changes in lifestyle (van der Land 2015; Romankiewicz *et al.* 2016). Permanent out-migration of entire households seems to be rare in the region (Mortimore 1989; Hampshire 2002; van der Land 2015).

Migration takes usually place from the North to the South or to coastal and urban areas and thus, to areas with higher soil fertility and rainfalls but also better economic prospects. Many studies find that the economically attractive Cote d'Ivoire is often a main destination from people from Mali, Burkina Faso and Ghana (Hampshire 2002; Henry and Piché *et al.* 2004; Afifi 2011; Rademacher-Schulz and Salifu Mahama 2012; van der Land 2015). International migration outside the African continent is less common and considered as prestige migration rather than a consequence of deteriorating environmental conditions (Afifi 2011; Tacoli 2011; van der Land 2015). The entry costs for international migration to Europe or North America are high and therefore it seems unlikely that people would migrate to non-African destinations because of worsening climate conditions (Henry *et al.* 2003; Afifi 2011; van der Geest 2011; van der Land 2015; Romankiewicz *et al.* 2016). With respect to migration within the country and to neighbouring countries, the impact of environmental factors is less clear. Afifi suggests that migration within the country and to neighbouring countries is "a matter of survival" and determined by the search for better livelihoods, (Afifi 2011: e111). With respect to the migration destination, Henry *et al.* (2004) show for Burkina in line with Findley's findings on drought in Mali that temporary migration to other countries was less common among males after periods with low rainfall levels. In contrast, other studies suggest that migration during times of stress mainly was and might be directed – in the case of model simulation - to neighbouring countries, particularly when considering migration from urban centres and the South of the Sahel (Pedersen 1995; Kniveton *et al.* 2011). Most studies however suggest that people choose the destination by various other factors than environmental ones, such as social networks, employment options, better educational or economic prospects, etc. (e.g. Henry and Schoumaker *et al.* 2004; Doevenspeck 2011; van der Geest 2011; van der Land 2015; Romankiewicz *et al.* 2016).

Conclusion

The review of case studies on the linkages of the environment and migration in West African drylands shows that the studies use different concepts of mobility and environmental factors and apply a broad variety of different methods. This influences the results and makes it difficult to compare the findings, even when focussing on a region with relatively similar climatic and environmental conditions. Population mobility has a long tradition in the region and the seasonality of rainfall has been shaping the mobility patterns for generations. Temporary migration is a well-established activity to diversify income and to cope with the harsh environmental conditions in the region. Permanent out-migration of entire households, however, seems to be rare. Although the financial support of the migrants is crucial for most households in rural areas, people have many different reasons to migrate. These reasons often go beyond risk prevention and adaptation to environmental stress. Several studies suggest that environmental factors are often not the main driver of migration in the region. Instead, individual characteristics (e.g. level of education, religion, ethnicity and the economic activity), structural conditions (e.g. infrastructure and lacking (non-farm) income opportunities on site; better income opportunities elsewhere), social determinants (e.g. conflict, envy, migration tradition and relative deprivation) or individual aspirations (e.g. for progress, prosperity and a different lifestyle) strongly influence the migration decision.

Despite these findings, many studies on the environment-migration nexus still use simplistic push/pull frameworks assuming that environmental stressors are the main determinants of migration. Future research on the environment-migration nexus will have to pursue a broader approach, which considers the variety of people's migration motives and drivers of migration in environmental fragile environments. This is important in order to assess the role of environmental factors in the migration decision as well as the level of urgency, necessity, usefulness and/or normality of human mobility in West African contexts.

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