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Environmental change and migration in coastal regions: examples from Ghana and Indonesia

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Abstract

Coastal regions worldwide have been focal points for migration as well as affected by environmental changes for a long time. In the debate on climate change and migration coastal regions are among the “hot spot” areas that are supposed to be prone to “climate migration” in the near future. The paper analyses the situation in two different regional settings and advocates for a sound regional perspective on the relationship of environmental change and migration. Based on the conceptual framework of migrant trajectories, the paper shows how populations in Keta (Ghana) and Semarang (Indonesia), affected by similar environmental changes such as flooding and erosion, react quite differently in terms of migration and mobility. The regional perspective as well as each region’s past experiences with migration and environmental changes shows to be crucial in order to understand current reactions to environmental degradation. The Keta setting represents a typology that pronounces migration trajectories as part of long-standing interregional and international migration, the Semarang setting, however, may be classified as a rather typical modernization-induced migration scheme, linked to rapidly growing urbanisation, with “trapped populations” on the one hand and in-migration of migrant workers on the other hand.

Zusammenfassung

Weltweit sind Küstenregionen seit langem sowohl Ziel- als auch Ausgangspunkt für Migration. Sie gehören außerdem zu den Gebieten, die eine starke Dynamik hinsichtlich des Umweltwandels aufweisen. In der Diskussion um Klimawandel und Migration werden sie als „hot spots“ bezeichnet. Es wird zudem angenommen, dass sie besonders stark von sogenannter „Klimamigration“ betroffen sind bzw. sein werden. Dieser Artikel präsentiert zwei empirische Fallstudien und plädiert für eine regionale Perspektive auf das Zusammenspiel von Umweltwandel und Migration. Unter Zuhilfenahme des Konzeptes der *migrant trajectories* untersuchen die Autorinnen, wie die mit dem Umweltwandel konfrontierten Bevölkerungen in Keta (Ghana) und Semarang (Indonesien), die von ähnlichen Umweltveränderungen wie Überflutung und Erosion betroffen sind, auf unterschiedliche Migrations- und Mobilitätsformen zurückgreifen. Erst durch die Einbettung des Umweltgeschehens in eine regionale Perspektive, sowie die Einbeziehung der jeweiligen Geschichte von Migration und Umweltwandel in der Region, lassen sich die aktuellen Mobilitätsdynamiken und Reaktionen auf Umweltwandel verstehen. Der Fall Keta repräsentiert einen regionalen Typus, bei dem *migration trajectories* Teil einer schon lange bestehenden interregionalen und internationalen Migration sind. Der Fall Semarang dagegen tritt eher als typisches Beispiel für durch Modernisierungstendenzen ausgelöste Migration hervor, in Verbindung mit rapide voranschreitender Urbanisierung und ArbeitsmigrantInnen auf der einen Seite sowie „trapped populations“ auf der anderen Seite.

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1. Introduction

All over the world, coastal regions are known to be deeply entangled with regional migration regimes and with population dynamics in general. At the same time, coastal areas are in the very focus of environmental change today, with sea level rise, coastal erosion, salinization, land subsidence as well as the depletion of mangroves.

This article investigates the relationship between mobility patterns and environmental change in two coastal areas that have experienced environmental change since many decades and have been subject to a variety of adaptation programs and technologies: Keta in Southeastern Ghana and Semarang City¹ in Central Java (Indonesia). Both places are well documented in the scientific literature and promise to function as show-cases for the larger debate on the relationship between environmental change and migration, but might not be regarded as truly representative cases. The chosen regions are distant from each other. But they show a variety of common traits that make a comparison attractive.

The two regional examples have been selected exactly because of their long history of environmental change and migration. Both cases illustrate the increasing role of human impacts on ecosystems in coastal regions and the feedbacks of environmental change on urban areas and populations, especially in terms of mobility and migration. Because they have been experiencing an active integration into regional migration systems for a long time, they possibly also allow for a more detailed and sound analysis of the presumed interrelations of migration and environmental change. In contrast to many studies in this field, our research does not refer to projections or potentials of environmental or climatic change, but it deliberately focusses on two regions in which massive environmental changes have already occurred over the last decades (“rapid change”). This methodological approach meets our research interest best, because it also allows to observe the political and discursive processing such as narratives within the normative setting of the region over time.

This article presents the first results of an empirical study that has been conducted in 2014/15. It echoes

the interpretation of stories that have been told for long by scientists, local experts and migrants themselves about these regions. How did and do people in Ghana and Indonesia perceive climate change and environmental threats themselves, which coping and adaptation strategies did or do they adopt concerning mobility and immobility? Which narrations go along with the observable patterns of migration and mobility?

The article is organized along six sections: After this introduction, we first summarize the main traits of the debate on environmental change and migration and then introduce the conceptual framework of migration trajectories, an emergent field within migration studies. Built on this, we present the main trends and pattern of migration and mobility in the two selected countries in a nutshell and then highlight the main environmental changes over the past years. Section three gives an insight into the adopted set of methodologies. Section four presents the first preliminary results of the empirical work we have undertaken. The fifth section discusses the results in the light of theory and the presented literature review. The paper concludes by highlighting the main outcomes and by identifying lacunas for future research.

2. State of the art: migration and environmental change

The question as to whether and how climate change affects human mobility has been widely debated both within the policy context and in academia. *Piguet et al.* (2011), *Gemenne* (2010) and *Afifi and Jäger* (2010) produced seminal edited volumes, *Hugo* (2013) presented a 1000-page best-of reader on the conceptual debate, and the Foresight Report (2011) has guided the policy-debate.

2014 was reported as the warmest year since 1880 (NASA 2015). This fact confirmed what the IPCC report (IPCC 2013) put forward as its main message on the dynamics of climate change: the warming of the climate system is unequivocal, and the changes are unprecedented in recent millennia. The effects of these changes in the climate are expected to increase the likelihood of internal and international migration through increased frequencies of droughts and floods,

desertification, salinization of soils, coastal erosion (due to sea-level rise), more storms and extreme weather events and competition for scarce resources (Martin 2012). The threat of climate change and environmental degradation on collective resources such as fresh water, land and agriculture is enormous and will increase in the near future. Unscrupulous exploitation of natural resources such as the extraction of oil and metals – regardless of ecological risks – additionally challenge climatic variations (Klein 2014: 215ff.). High pressure on natural resources is further provoked by rapid demographic growth in many places in the world and an increasingly extractive global economy adds to the culmination of environmental crises in many parts of the world (Sassen 2014).

The debate on the nexus of climate change and migration already began in the 1990s. The questions as to when a decision to move is taken, and whether and under what circumstances a tipping-point for migration is reached, is among the hottest topics within this debate, accompanied by estimates and speculation about the numbers of future migrants. The question on the quantitative dimension is more easy to answer when concentrating on the effects of sudden climate events, such as thunderstorms and heavy rains that create devastating circumstances and threaten local livelihoods, especially in low-lying coastal areas. The annual number of newly internally displaced people as a result of natural disasters oscillated between 31.7 million people in 2010 and 22 million people in 2013 (Gemenne et al. 2014). When it comes to slow-onset environmental change the question on the dimension and the dynamics of migration is more difficult to answer. Longitudinal studies are lacking and up to today the process of decision-making itself remains a black box within many migration studies. The nexus between environmental change and migration and mobility is not straightforward, but filtered by a variety of more general developmental issues (cf. Black 2001; Black et al. 2011; Tacoli 2011).

The current debate is best characterized by three analytical pitfalls: an extremely high degree of politicization, a blurred terminology and a missing spatial differentiation and conflation of various levels of analysis, i.e. global, national and local (Hillmann et al. 2015b). Some authors also claim that the blurred terminology refers to the field itself because it is thought to be constructed strongly communicatively. The authors claim that, in many cases the distinction, which factors are perceived to be environmental ones and

decisive for migration depends very much on the perspective applied. In many cases, the discourse and the narrative going along with migration and environmental change, may be more influential for migration decisions than the environmental change itself (Aufenvenne and Felgentreff 2013: 21f).

2.1 Theoretical framework: migrant trajectories

Against the background of these pitfalls in the debate, this paper refers to the conceptual approach of migrant trajectories. It considers this concept as one way of bridging the analytical gap between various scales (global, national, local) by embedding migratory action as one form of social and spatial organization in regional settings that are under stress, i.e. environmental stress.

The term migrant trajectory (when referring to migration itself: “migration trajectories”) calls for an analysis of all phases of migration, departure(s), transit(s) and arrival(s). Migration trajectories work “as the collective and ‘visible’ outcome of many individually migrating persons” (Spaan and Hillmann 2013: 65) and do pronounce the non-linear character of migratory processes, implying “a shift in focus from the individual to a structural view on migration processes by concentrating on the outcome of collective biographical paths or as a repeated spatial arrangement of migrants” (Spaan and Hillmann 2013: 65). Migrant trajectories are defined as “composed of one or more episodes (change of countries) and one or more status (periods of residence in different countries)” (Castagnone 2011: 4f.). The focus of analysis here is on the process rather than on a single event by an individual in time and space.

Inspired by migration theories like transnationalism, trans- and transit migration and migration networks the concept of migrant trajectories aims at linking (concrete) individual migration projects with (more abstract) migration regimes. This way, a new conceptualization of the migration process is pushed forward – pronouncing the path dependency of migratory action and by taking into account materiality. “Transmigration is, however, not just a trajectory but a multiplicity of potential trajectories” (Grillo 2007: 200) – thus pronouncing fluidity and instability. Vaittinen for example stresses the link between the macro-level of collective movements and institutions on the one hand and individual human

beings on the other hand, all related through the migrant trajectory (Vaittinen 2014: 8f)².

As emphasized by *van der Velde* and *van Naerssen* (2007b: 150f.; 2015) migration trajectories further refer to spaces of belonging. They take into account geographical and mental distance as well as perception as constituting thresholds for migration in a globalized world, putting emphasis on the existence and importance of “soft” and culturally bounded factors as contributing to the dynamics of migration.

Accordingly, a growing body of literature on the relationship of migration and environmental change in developing countries refers to the influence of existing gender regimes (cf. *Awumbila* and *Tsikata* 2010). Some authors point to existing or changing power relations (cf. *Carr* 2005) and, more generally, to phases of immobility (cf. *Schapendonk* 2010) during the migration project as contingent of the mobility regime. Fragmented journeys, known as being typical for the movement of refugees (*Collyer* 2010), start becoming a normal feature also for regular migratory patterns. We interpret the migrant as part of a larger structure, a field of knowledge, of perception and integration. So does *Carr*, in his study on environmental change and migration in Central Ghana, bringing in *Foucault's* concept of power/knowledge and hereby stressing that the interpretation of the world and the environment is (re)produced by power: “Such an approach, however, moves beyond the existing literature by shifting the focus of study from conditions that drive migration [...] toward the local power/knowledge in which environment, ecology, and politics are understood. The ways migrants negotiate and transform their context, and the objectives behind such negotiation and transformation, are the condition and result of this understanding” (*Carr* 2005: 929).

Here, power relations constitute an important aspect of migrant trajectories; it admits power of agency to the migrant him- or herself, definitory power over space. Migrant trajectories position the migrant within migration regimes, as fed by migration industries in the respective regions and on different regional scales. A migration regime delineates the “interplay of juridical regulations, the political handling of migration, migration traditions and cultures of migration in different parts of the world” (*Hillmann* 2016: 160, translated by *Ziegelmayr*).

Another ‘spatial perspective’ in the debate of migration and environmental change is put forward by

Black and *Collyer* (2014). The authors claim that today “trapped populations” do exist, people that – out of a lack of resources or other restrictions – are unable to move when confronted with an environmental shock situation. Further, *Schapendonk* stresses the idea of trajectories as channelling migration. “Migrants’ trajectories are not closed-off corridors but open and process-like phenomena. They are influenced by, among others, the trajectories of other people, objects, capital, rules and information” (*Schapendonk* 2012: 32). In this paper we frame “trajectories as spatial routes connecting place of origin and places of desired destination [which] constrain or facilitate the movement of the actor in space” (*van der Velde* 2008: 117). Based on the presumption that migration is not entirely based on rational decision-making this article purposefully includes cultural factors like migration myths and narratives in the analysis. According to *Abu* et al. (2013) it is crucial to understand how people concerned perceive climate hazards and their own vulnerability towards it in order to understand migration decisions in the climate change – migration nexus. In this context the authors argue that a particular (environmental) event may be perceived as “normal” when it is experienced over a long period and therefore might not push people to migrate.

2.2 The relevance of migration in Ghana and Indonesia

As shown above, migration trajectories are rooted within migration regimes. Indeed, in Ghana there is a “long history of mobility with migration playing a central role on the livelihood and advancement strategies of both rural and urban populations” (*Awumbila* et al. 2011: 1; cf. *Manuh* 2001: 19). Due to the colonial history of the country, there is a legacy of internal north-south migration. People migrated first due to “forced migration through labour recruitment” (*van der Geest* 2011a: e72), later then, somewhat more voluntarily, for working in the cocoa plantations in the south. Generally, the European influence through slavery, missionaries and colonialism led to still existing ties between Ghana and the former colonial powers through business, religious and family ties.

For a long time Ghana was a net immigration country – immigrants stemmed from the neighbouring countries and other ECOWAS (Economic Community of West African States) member states – before changing to become a net emigration country in the 1960s (*Awumbila* et al. 2011: 1). Nowadays Ghana experienc-

es all types of migration: “internal migration, immigration, transit migration and emigration both within and outside of Africa” (Awumbila et al. 2011: 1). According to Peil (1995: 348f.) economic decline and the lack of educational and job opportunities led to international out-migration especially by young Ghanaians since the mid 1970s. Just after the country’s independence in 1957, the first president, *Kwame Nkrumah*, followed a rather liberal immigration policy, but already in 1969 the Aliens Compliance Order was installed and many immigrants were expelled out of Ghana. The oil boom in Nigeria and the economic success of the neighbouring Ivory Coast led to out-migration to those two as well as other ECOWAS member states. In 1979, ECOWAS installed a Protocol on the Free Movement of People between the respective countries.

Failing economic policies in Ghana brought economic decline and “migration re-emerged as a tried and tested strategy for many Ghanaians” (Manuh 2001: 19). High-skilled migration from Ghana especially took place in the health sector, for example to the US and the UK (Tankwanchi 2012; Teye et al. 2014).

Like Ghana, Indonesia is highly dynamic in terms of population and migration. As a former Dutch and partly Japanese colony, Indonesia gained independence in 1945 and saw massive forced migration schemes under the dictatorship of *Suharto* until 1998. From the 1950s to the 1990s Indonesia experienced a steady increase in out-migration. The net migration rate has always been negative since 1950. Between 2010 and 2015 it was around -0.8 (migrants per thousand inhabitants) (IOM 2010). Immigrants account for not even 0.1 % of the total population (The World Bank 2011: 24).

Indonesia today is characterized by strong labour migration to Asian countries, especially Malaysia, and to the Middle East (IOM 2010). These migrations are often chain migrations and the migrants’ families strongly support the migration decision in most cases. Half of those Indonesian migrant workers stay abroad illegally and some are confronted to inhuman treatment by their employers (Brown and Brownlee 2000).

Migration from Indonesia often takes place undocumented (IOM 2008) with 78 % of labour migrants being female in 2007 (IOM 2010). Between 1996 and 2007 the number of women migrating overseas has nearly doubled, while the number of male migrants

decreased – Saudi Arabia and Malaysia being the top destinations (Platt et al. 2013: 10f.). Skilled emigration targets towards the OECD countries, especially to the Netherlands, due to historical colonial ties. A big share of this international migration is organized by agencies as part of the above-mentioned migration industry (cf. Spaan and Hillmann 2013: 68f.).

In Indonesia’s history colonisation and the transmigrasi program were used by the ruling powers in order to prevent social upheaval on the main island Java and to get rid of potential sources of political instability in other areas (Brown and Brownlee 2000). The so-called transmigrasi program aimed at reducing the number of inhabitants on the main island Java by populating outer islands with Javanese people. First exercised during Dutch colonization from 1905 to 1941, the second transmigration program was launched after independence in 1950, initiating also voluntary migration (Fearnside 1997: 553f.). Many NGOs criticized the program, since it did not reduce population pressure in Java, but rather provoked social and political conflict on the outer islands.

In recent decades, foreign and national investments in the metropolitan area of Jabotabek (i.e. larger Jakarta), as well as in secondary urban centres like Bandung (West Java) and the study area Semarang (Central Java), have attracted rural populations from Java and other islands (Firman 2004: 422ff.). These migratory movements are mostly circular, leading to increasingly diversified income bases of both rural and urban households and reciprocal relationships between sending and receiving areas (Hugo 2008b: 50ff.). Regarding international migration movements, the Javanese provinces are among the main sending areas of official, registered emigration from Indonesia, mainly to the USA, the Netherlands and the Middle East (Hugo 2008a: 51; Spaan 1999). All over Indonesia poverty-reduction rates have not been in tandem with economic growth (Platt et al. 2013: 11f.) and unemployment rates are significantly higher for women.

Ghana and Indonesia both count a strong diaspora population with 719,404 Ghanaians and nearly 3 million Indonesians living outside their country of origin. The main destination countries are in the region of the respective countries with 47 % of the Ghanaian migrants living in other African countries, followed by the US (21 %), UK (11 %), Italy (6 %) and Germany (3 %). The Indonesian diaspora is mainly living in Malaysia (35 %), Saudi Arabia (13 %), the United

Arab Emirates (11 %), Netherlands (5 %) and the US (4 %; all figures from UN-ESA 2013). Both countries show great flows of remittances (The World Bank 2011: 24) – contributing to local development and reinforcing further migration.

2.3 Migration and environmental/climate change in Ghana and Indonesia

In both countries, migration due to environmental changes is not a recent phenomenon. The people in the savannah of West Africa e.g. had to deal with climatic variability and environmental stress for centuries: “Human mobility has a very central place in the adaptive strategies of farmers and pastoralists” (*van der Geest* 2011a: e70) and is an “omnipresent characteristic of the livelihoods and culture of northern Ghanaians” (*van der Geest* 2011a: e90).

Migration does not necessarily occur immediately after environmental change takes place (cf. *Abu* 2011; *Carr* 2005; *van der Geest* 2009, 2010, 2011a). But people are very aware of climate-related changes. Migration intentions show to be strongly linked to socio-demographic factors like age, sex, education, migration status etc. of the head of the household (*Abu* et al. 2013: 1). Moreover, seasonal, circular or temporary out-migration patterns are already common where land-dependent residents search for alternative incomes during difficult times and regular movement has become a part of the regional culture (*CMS* 2011: 2). Migration works as one of numerous strategies of risk diversification, used by households in an environment challenged by climate change (*Abu* et al. 2013: 2; cf. *Kwankye* et al. 2009; *Yaro* 2010: 61). *Abu* concludes that rural populations are capable of dealing with just one climate-related event at a time, e.g. flood or drought. It generally gets difficult for the resident population when several climate-related events occur at one point in time and/or cannot be predicted beforehand (*Abu* 2011: 9). *Van der Geest* shows in his longitudinal analysis that times of great environmental stress in Northern Ghana were rather times of reduced out-migration (*van der Geest* 2011a: e69). “In the late 1980s and in the 1990s, [however,] a time of environmental recovery in northern Ghana, migration increased again” (*van der Geest* 2011a: e89).

Like Ghana, also Indonesia shows a combination of anthropogenic and ‘natural’ environmental change. Increased landslides and flooding are partly caused

by the transformation of agricultural or forest land into settlements. According to the World Bank the economically most important regions of Bali, Java, Sumatra, and Papua are also most vulnerable to climate change (The World Bank 2010). In a study on province-to-province migration in Indonesia over 15 years, *Bohra-Mishra* et al. (2014) claim that climatic variations influence permanent migration, while disasters have smaller or no impacts. The study especially indicates a nonlinear effect of temperature on migration, “such that above 25°C, a rise in temperature is related to an increase in outmigration, potentially through its impact on economic conditions” (*Bohra-Mishra* et al. 2014: 9780). Indonesia’s tropical climate combined with a high dependence on agriculture and a long tradition of interprovincial migration might increase the effect of temperature rise on interprovincial migration (*Bohra-Mishra* et al. 2014).

A UNICEF report on migration and climate change in Indonesia emphasizes that climate change in Indonesia, as well as in many other parts of the world, “is likely to exacerbate and aggravate existing patterns of migration rather than to create new flows” (*Urbano* et al. 2011: 32).

As the world’s fourth most populous country and with a population of over 60 % living in coastal areas (*Purwaka* and *Sunoto* 1999) Indonesia is highly vulnerable to climate change. The population density in Java is the highest in the whole country (*Handayani* and *Kumalasari* 2015), which leads to a close interplay of urbanization, population growth, environmental change and migration.

Densely built environments create a “heat islands” effect, while the burning of forest leads to smoke over large areas (*Urbano* et al. 2011: 8, cf. UN Habitat 2010: 6f.). The country is further exposed to geological and climatic hazards like “flooding, landslides, extreme weather events, droughts” (*Bohra-Mishra* et al. 2014: 1), sea-level rise and changes in temperature at land and at sea. These changes occur as rapid and as slow environmental changes. Due to urbanisation, coastal cities grow rapidly, despite flooding and land subsidence, and more than 25 % of the country’s poor inhabitants live in coastal areas (*Handayani* and *Kumalasari* 2015), which makes them even more vulnerable to climate change (*Marfai* et al. 2008: 237).

Handayani and *Kumalasari* (2015) state in a study on Java that out-migration from areas affected by cli-

mate changes has not yet been chosen as an adaptation strategy. Coastal cities like Jakarta, Semarang and Surabaya attract migrants despite environmental hazards, and local populations show a strong attachment to their domicile. This attachment to place as well as the dependence on the sea for their livelihoods and the closeness to industrial zones as working place seem to influence the perception of migration, an important part of migrant trajectories.

3. Methodology

The research results presented in this paper are part of on-going research produced by a project consortium named “New Regional Formations – Rapid Environmental Change in Coastal Regions of Ghana and Indonesia” (NRF), bringing together a multidisciplinary team. In order to understand the interrelation of migration trajectories with (climate-induced and man-made) environmental change our empirical research analyses two regional cases that for many years have experienced a fragile ecological situation, characterized by frequent flooding and/or erosion. The two regions show high population dynamics. In our methodological framework we decided not to compare the two situations as such but to confront two regional settings in order to sharpen the perspective on common and distinct features regarding the nexus of migration and environmental change. We deliberately turn away from a conceptual approach that sees migration as caused by environmental change, respectively environmental change as a root cause for migration. In order to understand the full picture we started with explorative studies in the field and first expert interviews, while reviewing existing documentation on the two cases. Following the methodological tradition of triangulation we adopted a mix of qualitative and quantitative methods during the fieldwork. In each of the two regions a quantitative study was conducted. It consisted in a structured household survey (274 households were interviewed in Keta in January 2016; 333 households in Semarang in December 2015). The respondents were composed as follows: Keta: 58 % male-headed, 42 % female-headed households, representing 1,345 household members (47 % male, 53 % female) and Semarang: 82 % male-headed, 18 % female-headed households representing 1,417 household members (48 % male, 52 % female).

For the purpose of this study we defined “migrants” as persons who leave their household for more than

three consecutive months in order to live in another place, at least another sub-district (Ind.: Kecamatan) of Semarang City or another community of Keta Municipality respectively or further away. The respondents in the survey were the household heads who were asked about all household members who once used to live in the household and then moved away for more than three consecutive months.

We also analysed recent census data (2010) that allowed us to understand the bigger picture in terms of population dynamics.

The qualitative data were gathered via semi-structured interviews with migrant households from Keta in the capital Accra and neighbouring Togo, two destinations of migration from Keta, as well as key informant interviews with traditional and state authorities in Keta. In Semarang the qualitative interviews consisted of key informant interviews with heads of villages and sub-districts in Semarang Municipality.

The two case studies selected stand as two examples for the complex relationship between environmental change and migration in coastal areas in tropical countries. They are neither representative for the whole country of Ghana or Indonesia respectively, but rather could be interpreted as showcases of the broader picture.



Fig. 1 Location of Keta in Ghana (all maps: drafts by Ziegel-mayer and Hillmann, design by Kartographieverbund TU Berlin)

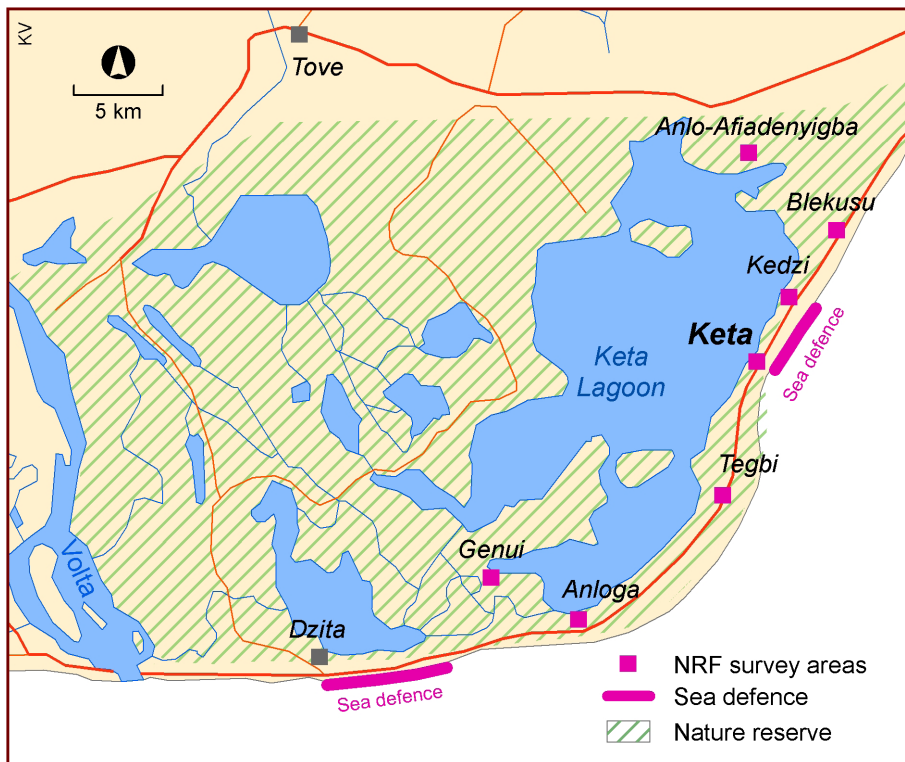


Fig. 2 Keta and its environs

3.1 Description of study site no. 1: Keta (Ghana)

Keta is a place with an outstanding tradition of migration and environmental change (Akyeampong 2001). The local population of the Anlo-Ewe, the dominant ethnic group in the area, lives in a sometimes ambiguous relationship with nature which on the one hand provides their livelihoods and on the other hand is a threat in forms of droughts or floods. They are also aware of the (negative) consequences of large development projects for their environment (Akyeampong 2001: 2). The Anlo-Ewe migrated from Notsie, which today belongs to Togo to the south-eastern Ghanaian coast in the 17th century. This ethnic group cherishes its own migration saga (Kumassah 2009). The Anlo-Ewe originally were no maritime people and continue to have a fierce attachment to land (Akyeampong 2001: 215). Local perceptions of environmental change can be traced back to coastal erosion from the early 20th century onwards causing loss of property and land in Keta, experienced as a loss of regional pride and encouraging emigration (Akyeampong 2001: 217, 219). Already in the 1980s two thirds of the town were destroyed by the sea (Akyeampong 2001: 206).

Keta Town is located on a small sand bar between the Gulf of Guinea in the south and the Keta Lagoon in the north (Fig. 1, Fig. 2). The town has a long history as an

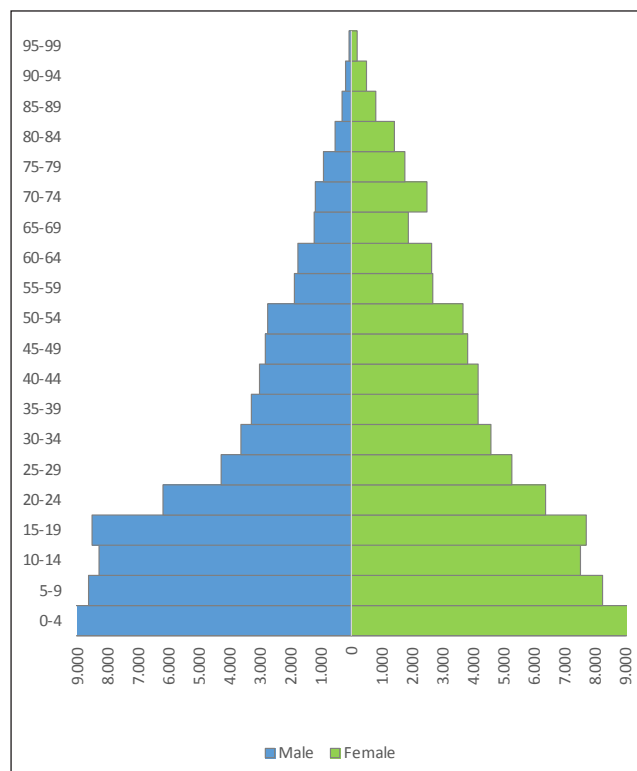


Fig. 3 Keta's population pyramid, 2010; (source: Keta Municipality 2010: 35; design by Ziegelmayer)

important market place with traders from neighbouring regions and countries and a small port. However, in the 1960s the city experienced an economic decline, as a result of a mix of political, economic and environmental reasons. One was the opening of the new harbour in Tema westwards, another the cutting of a canal through the sandbar near the market in order to open the lagoon into the sea and decrease the flooding pressure. This intersection unexpectedly led to a large flooding in Keta town as the canal grew bigger than planned for. Additionally, in 1968 the regional capital was transferred from Keta to Ho and in 1969 the Aliens Compliance Order expelled many foreigners doing trade at Keta market (Akyeampong 2001: 183f.). These factors, in combination with the destruction by the erosion, induced a period of economic decline in the town of Keta that lost its market functions. This development was accompanied by out-migration in the last decades (Interview chief (traditional authority)).

The Volta Region, where the study area Keta is located, shows a population growth of 2.5 % from 2000-2010, corresponding with the national rate (GSS 2012: 21). The age structure of the resident population in Keta Municipality with about 150.000 inhabitants shows a very young population: 35 % under the age of 15, 53 % between 15 and 59, and 12 % older than 59 years (Fig. 3). This population structure seems likely to see strong out-migration of the young economically active population in the near future.

In comparison with other regions in Ghana, the Volta region with Keta Municipality features the second highest out-migration, with a net migration rate (per 1000 inhabitants, from 2000 to 2010) of -258.60, after the Upper West Region with -302.50 (GSS 2013: 212).

3.2 Description of study site no. 2: Semarang (Indonesia)

In contrast to Keta, Semarang City (Fig. 4, Fig. 5) is a city of 1.5 million inhabitants, which regularly experiences tidal and river flooding and other environmental changes such as land subsidence and landslides. Nevertheless it features a population growth rate of 1.4 % per year, “higher than the surrounding areas” (Mulyana et al. 2013a: 7) indicating the city’s “importance in attracting migrants from surrounding areas” (Mulyana et al. 2013a: 7). The main livelihoods in Semarang city are industrial workers (25 %) and construction workers (13 %), government employees/armed forces (16 %), services (10 %) and farmers (5 %). Semarang is a city of trade, hotels and gastronomy. About a third of its population lives in poverty, with substantial local differences. Neighbourhoods such as Kemijen show a majority of the population living in poverty (Mercy Corps et. al. 2010: 15f.). Figure 5 shows the study site indicating the flooded areas as well as the sub-districts with negative net migration rate near the coast and in the city centre according to the census.

Semarang City reveals an even higher percentage of inhabitants in the productive age than the Ghanaian case: 70 % are between 15-59 years old, 24 % under 15 years and only 7 % older than 59 years (Fig. 6), indicating on-going in-migration of migrant workers from surrounding rural areas into the city.

4. Results

This section presents the results revealed by the quantitative and qualitative research. It highlights the regional embeddedness of migration trajectories and environmental change in the two study areas.

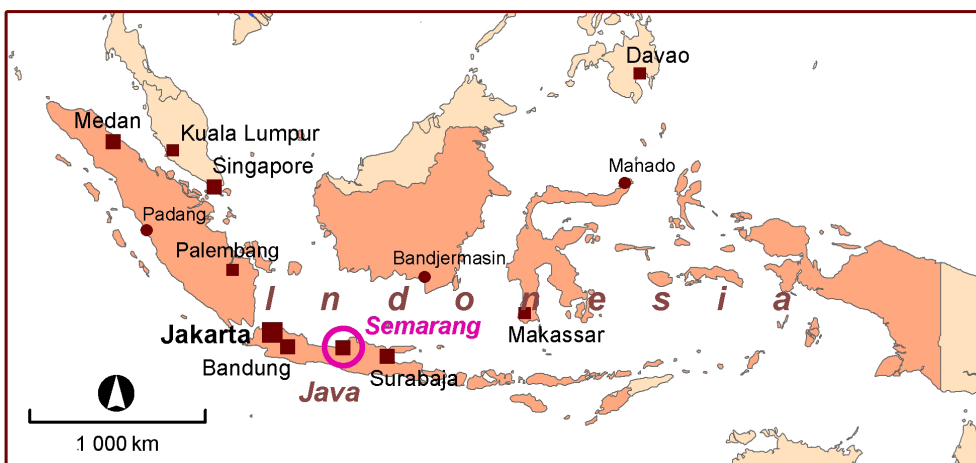


Fig. 4 Location of Semarang in Indonesia

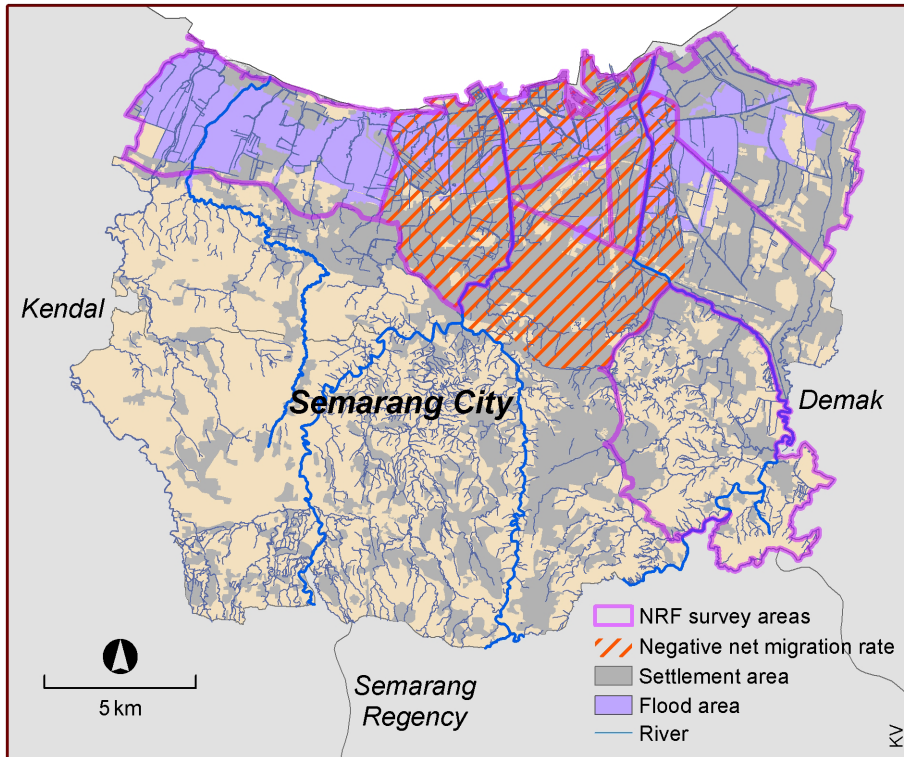


Fig. 5 Semarang and its environs (migration data according to BAPPEDA and BPS Kota Semarang 2012: xiv)

4.1 Case study Keta (Ghana)

Environmental change in Keta consists of various phenomena. Coastal erosion affects the whole Ghanaian coastline with Keta as one of the most threatened areas with 2.66 m of loss of coastline per year (Apeaning Addo 2014: 9). Additionally, a sea-level rise (SLR) of approximately 3 mm/year (Boatema et al. 2013) affects Keta. The local population is increasingly aware of SLR (Interview resident resettlement area and community elder). Furthermore, changing rainfall patterns influence agriculture in the area: rainfall is “erratic, it falls at times you don’t expect it” (Boatema et al. 2013). Apart from this ‘natural’ environmental change there is a wide range of man-made environmental change as for example depletion of mangroves (Awumbila and Tsikata 2010) and the overfishing by big European and Asian trawlers (Interview resident resettlement area and community elder; Interview chief (traditional authority)). The depletion of mangroves of course affects the on-going coastal erosion and is an indicator for the entangled effects of man-made environmental changes in the area. Additionally, the consequences of the Ako-sombo Dam led to changing sedimentation (Akyeampong 2001: 170ff.). This affected the fishery livelihoods in the Lower Volta, including Keta Lagoon, and led to out-migration towards the Volta Lake (Awumbila and Tsikata 2010: 125; Interview Keta Municipality).

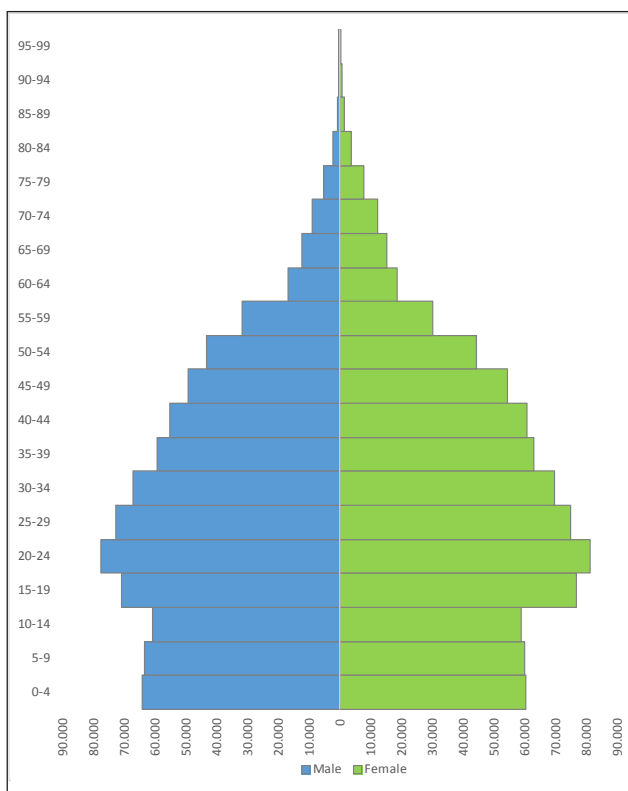


Fig. 6 Semarang’s population pyramid, 2010; (own calculations, after BPS 2010, design by Ziegelmayer)

A major sea defence (see Fig. 2) built with US financial support during 1999-2004 is supposed to protect the coastline – but is likely to shift problems of erosion further east (Angnuureng et al. 2013: 107). The resident population is positive about this intervention and still hopes that the road that was destroyed by erosion and rebuilt as part of the project will reopen the way for traffic to neighbouring Togo and provide access to more markets (Kumassah 2009). Up to now however, the Keta market, for example, has not regained its former economic role. The chief in neighbouring Blekusu, east of Keta, which is not protected by the sea defence, claims, in contrast, that high tide affecting his community has become stronger since the defence was built (Interview chief in Blekusu) and the community lost more houses in summer 2015 due to erosion and flooding. In March 2016 construction works for a sea defence were supposed to start in the area of Blekusu (Ketu South District).

Analysing contemporary migrant trajectories in this changing environment, our survey reveals that 65 % of all interviewed households have experienced out-migration of some of their members. 53 % of those out-migrants were male and 47 % female³. A small share of these migrants was accompanied even by children leading to more than 800 out-migrants including children in the interviewed households.

Most of the migrants were son or daughter of the household head (38 %), followed by “other relative” (24 %) and brother/sister of the household head (21 %). Most of these migrants had completed middle school (34 %), followed by graduates from senior high school (26 %) and those who only had primary school education (20 %). When leaving most migrants were between 10 and 19 (45 %) or 20-29 years (37 %)⁴ old. An interviewed chief refers to the age structure of out-migrants with mostly youths leaving and puts migration in relation to lifecycles; “when we retire we come home, but the active population is outside and is not helping us to develop our area, because when you’re young, you can develop your area”.

We claimed that migrant trajectories put forward a view on migration as a non-linear process. Indeed, about a sixth of the out-migrants were return migrants who left Keta and then came back for a period of more than three consecutive months. Also qualitative research evidenced the important role of return migration. Some international migrants recently came back to invest in tourism, into health

facilities or a “pure water” production factory in Keta Municipality (Interview resident resettlement area Kedzi, community elder; Interview community elder Anloga) thereby contributing to local development. Development studies also point to the growing importance of chieftaincy for regional development (Kleist 2011), referring to the institutional aspects of migration trajectories.

The fact that 12 % of all out-migrants in the interviewed households indicated several destinations also stresses the process-like character of these migrant trajectories. The majority first moved to big cities, mainly Accra. For 16 % of these multiple migrants (two destinations or more) the second destination was another continent, indicating step-wise migration (cf. Castagnone 2011) with Accra being the starting point for the later international migration.

Looking at single and multiple migrants, the NRF survey indicates the destinations shown in Table 1. In spatial terms, these figures clearly show the regional embeddedness of migrant trajectories from Keta with a major orientation towards the capital Accra and 86 % of all out-migrations being internal within Ghana. The above-mentioned long migration history of Keta is also confirmed by the survey, with 27 % of

Table 1 Destinations of out-migrations from Keta (NRF Survey 2015)

Destination	Share of all out-migrations (%)
Big cities, mainly Accra	53
Other Ghanaian regions	13
Other places in Volta Region	11
Neighbouring countries (Togo, Ivory Coast)	6
Other African countries (mainly Nigeria)	5
Keta Municipality	5
Neighbouring municipalities	5
Other continents	2
Total	100%

the migrants who migrated more than 10 years ago, 18 % migrating 6-10 years ago and a recent peak of out-migration during 2008-2013 (31 %) ⁵ and only 3 % migrating less than one year ago.

In contrast to conventional knowledge of mainstream migration literature (cf. The World Bank 2014), the remittances of those out-migrants indicated above did not seem to play a major role within the migration process: 50 % did not remit, 22 % sent money, 19 % sent money and goods, 5 % sent goods, mainly food.

Besides this high significance of out-migration towards places outside Keta Municipality, the survey indicates high internal mobility within the municipality. One reason for this internal mobility is coastal erosion. 18 households out of a total of 91 households which moved within Keta Municipality mentioned the destruction of their house by the sea as the reason to move. This hints at short distance migration of whole households as one adaptation strategy to coastal environmental changes like erosion. Out-migration of single individuals, however, rarely seems to be directly related to environmental change. A total of four out-migrants, a share of 1 % of all out-migrants, left their former house due to flood or destruction of the house by the sea according to the interviewed households.

Mobility within Keta Municipality is directly linked to environmental change when taking into account the governmental resettlement program, of which 5 % of the interviewed households have been part. Residents who lost their houses due to coastal erosion get new bungalows on the northern side of the town. That land there has been reclaimed from the lagoon, the reclamation thus adding to man-made environmental change.

The dominant reasons mentioned for the continuous out-migration from Keta were missing work opportunities and an incomplete educational infrastructure. Against the background of Keta's past as a prosperous town, today's lack of industries in the region is reported to be one main driver for out-migration. One of the reverends stated that youths often consulted him before leaving and asked him to pray for them so that they would find a job in Accra. According to him, many youths would prefer to stay in Keta if there were jobs for them (Interview reverend).

In addition to this lack of job opportunities an interviewed chief draws a closer look on education

as a motivation for migration. Although there are educational facilities up to the secondary level in Keta and some tertiary institutions, this "education makes us un-useful in our own environment", as the chief states. Students are not trained to be successful in fishing or agriculture, the dominant economic activities in the area, and those who want to pursue their education at university level have to leave for the bigger cities. There is neither a university in Keta nor a training institute for fishing or agriculture that could provide adequate education for the area (Interview chief (traditional authority)).

The fact that international migration outside Africa plays a minor role in the survey supports the argument that there is a weak link between ongoing environmental change at the coast and international migration. Migration in a context of environmental change rather seems to be internal. As one respondent clearly stated, "those who have left for Europe and the US went there to work. They did so as a result of work and not because of the destruction of the sea" (Interview resident Kedzi resettlement area, community elder).

As put forward under 2.1, migration myths and narratives are pivotal in order to understand migration trajectories in Keta. The Anlo-Ewe belong to the Ewe group that is known for a long tradition of fishermen migration along the West African coast (cf. *Akyeampong* 2001: 133ff.; *Odotei* 2002a, 2002b). Until today, fishing is one of the main economic activities in the area and respondents in the interviews often refer to the migration tradition of fishermen from Keta: "Our people here are fishermen, a lot of them do fishing. And they migrate a lot. They migrate towards the west coast of West Africa. Some even move as far as to Canary Islands, Senegal, Gambia and all that, they fish, they stay over a year, then they come back. Some finally settle in Abidjan and all other places" (Interview Keta Municipality).

This long tradition of (fishermen) migration in the area explains partly today's rather positive perception of migration as indicated in the survey. Migration is seen as bringing (economic) benefits to the individual household (64 %) as well as to the community (76 %), but people are also aware of conflicts within the community due to migration (55 %). Referring to the gender regimes inherent in migration trajectories, the survey indicates a balanced picture: 44 % agree that migration is dangerous for women while 48 % disagree with this opinion.

4.2 Case study Semarang (Indonesia)

Environmental change in Semarang combines anthropogenic and 'natural' factors: tidal and river flooding (cf. Marfai et al. 2008; Anita and Latief 2013), mangroves destruction since the 1990s, urban growth leading to suburbanisation processes (cf. Wilonoyudho 2010, Handayani and Rudiarto 2014, Handayani and Kumalasarri 2015) and extensive groundwater extraction worsening the land subsidence situation (Marfai and King 2007, Marfai et al. 2008). In addition to these anthropogenic influences, the topography of Semarang City with a very low coastline and a steep mountain area (Helmi et al. 2014: 27) makes it prone to flash floods. Further, management of tidal flood has been one of the main goals of the Central Java Provincial Government. In cooperation with the Dutch government, the Banger Pilot Polder is constructed (Mercy Corps et al. 2010). The already difficult situation of a fragile water regime gets worse through the increasing conversion of forestland to settlements in the hilly areas so that water can no longer drain away. 36 % of the interviewed households had already experienced river flooding (= *banjir*), 17 % had



experienced tidal flood (= *rob*). 8 % of the interviewed households have experienced land subsidence.

Photo 1 shows a house where the floor has been raised by its owners in order to prevent (tidal) flooding in the house. Many owners lift up either the whole house or the floor depending on their financial means. 46 % of the interviewed household had already lifted up the floor of their house at least once, in average about five years ago and for the majority about one to two metres. Those who cannot afford these protection measures either abandon the house as it is shown on the right side of the picture, or they are obliged to live with repeated flooding inside their house.

Figures for migration in Semarang Municipality indicate a negative net migration rate for half of the 16 sub-districts (Bappeda and BPS Kota Semarang 2012: xiv). The net migration rate for the whole municipality, however, is positive: 38.13 (recent migration) and 167.86 (lifetime migration)⁶ for 2010 (*Fig. 5*). Despite its environmental challenges, Semarang Municipality has the highest positive net migration rate in Central Java (own calculation based on BPS 2012: 21)⁷, a province with high out-migration. These official migration data, however, have to be handled with care as they do not show the high numbers of undocumented migrations. The projected population for 2030 is 2.1 million (Handayani and Rudiarto 2014: 80). The three neighbouring regencies show negative net migration rates⁸ indicating rural-urban migration movements towards Semarang City.

Our survey indicates a rather sedentary population with more than half of the interviewed households having lived at their current place of living for more than one generation, and for those who moved to the current place of living, 28 % moved internally within Semarang City. We counted 265 out-migrants in 39 % of the interviewed households and 129 in-migrants in 28 % of the households.

The out- and in-migrants belong overwhelmingly to the economically active population. The majority of out-migrants was likely to be the son or the daughter of the interviewed household head (65 %). The in-migrants were either son-/daughter-in-law (27 %), other relative (23 %) or spouse (14 %) which makes us think of marriage constituting one major reason for in-migration.

Photo 1 Those who can afford it lift up their house to protect it from flooding, Tambak Lorok, Kelurahan Tanjung Mas (Photo: Ziegelmayr, 09/08/2015)

The majority of the migrants was married⁹ and the out-migrants' main occupation was mainly employee (22 %), unpaid family worker (16 %), self-employment (12 %) and factory worker (9 %). The in-migrants were employees (20 %), unpaid family workers (16 %) or factory workers (14 %). Most of the out-migrations are quite recent: 70 % moved within the last 10 years. In-migration is also quite recent with 72 % within the last 10 years. An important aspect of migration movements are remittances to the families back home. The survey points at 42 % of the migrants remitting, mostly money. The survey in Semarang indicates family as a major reason for out-migration (55 %), followed by work (30 %) and education (7 %), the same order of importance holds true for in-migration to Semarang.

One important aspect of migration trajectories are narratives around migration. In Semarang the perceptions of migration by the respondents are rather ambiguous: 49 % perceived migration rather negative and stated that "you should never leave your place of origin", about half of our sample see no further benefits for the household in the migration of household members. This indicates that the migration of one household member is not a major strategy to improve the situation of the whole household. However, 60 % agreed that migration brings benefit to the community.

A major part of mobility in Semarang is taking place within the municipality. 24 % of in-migrants moved from another sub-district within Semarang to their current place of living. The out-migrations are given in Table 2.

These results might be explained by the perception of internal migration within Indonesia being better than international migration – as stated by 67 % of the respondents. Handayani and Kumalasari (2015) refer in this context to a Javanese value of staying with the family (*mangan ora mangan ngumpul*). In this regional setting attachment to place turns out to be an important denominator for the outline of migrant trajectories.

According to our survey Semarang hosts only a few migrants who experienced multiple journeys. The in-migrants mostly come from other places in Central Java (36 %), neighbouring regencies (17 %), other islands (11 %) or other provinces in Java (8 %). Studies on the neighbouring regencies show cases of fishermen who migrated to Semarang's industrial centre looking for work after a decline in fish catch due to environmental hazards like "flood, coastal inundation and subsidence" (Handayani and Kumalasari 2015: 123).

Table 2 Destinations of out-migrations from Semarang (NRF Survey 2015)

Destination	Share of all out-migrations (%)
Other sub-districts of Semarang City	32
Other Indonesian islands	16
Other places in Central Java	14
Neighbouring municipalities	13
Big cities, esp. Jakarta	12
Other provinces in Java	8
Other countries	3
unknown	1
Total	100

As for the organisation of the individual migration projects, only 29 % of the in-migrants received assistance for their migration, most of them by household members of the household they are now living in or from other migrated relatives. Only 28 % of the out-migrants had received assistance by household members or other relatives.

5. Discussion

As shown by the two case studies the interrelation of environmental change and migration cannot be regarded as mono-causal. In order to understand current migration trajectories as well as immobility in contexts of environmental change, the integration of past migration experiences as well as the perception and expectation of former environmental changes among the local population into the analysis are crucial.

Referring to one of the study regions, the southeastern coast of Ghana around the Keta Lagoon, Arthur and Arthur identify flooding during the rainy season as a major source for temporal migration along the Ghanaian coast (2011: 10). In a World Bank Report Yaro (2010) states that some fishermen from the coastal zone have migrated to Atakpamé in neighbouring Togo or to Accra because fishing or farming in their home communities did not secure their livelihood any longer.

This corresponds to our findings concerning regional migration along the West African coast.

In the case of this coastline, the observable man-made environmental change due to big development projects or infrastructural projects with the aim to adapt to climate change, sometimes goes along with governmentally controlled population resettlement policies. Large-scale infrastructure projects such as the Akosombo and Bui dam led to resettlement programs that did not correspond to the people's needs. Over half of the resettled population left the new resettlement townships within four years after project implementation (Hart 1980, cited in Miescher and Tsikata 2009/2010: 25). The construction of the dam led to environmental and social decline for the communities at the Lower Volta. Awumbila and Tsikata (2010) show in a detailed case study on gender, land tenure and mangrove exploitation in South Tongu District (Lower Volta), on the western border of the study area Keta, how the dam construction severely affected the livelihoods in the communities in the Lower Volta. It remains to be shown how the construction of the Sea Defence which is protecting part of the coastal populations for now, will affect livelihoods in the surrounding areas due to changing water streams and sedimentation and thereby stronger erosion further east.

Regarding the Indonesian case the results of our NRF survey suggest higher out- than in-migration for Semarang, contradicting official migration data. This fact hints at a high number of undocumented migrations, but could also be attributed to the rather neat definition of migration as movement from at least one sub-district (Kecamatan) to another¹⁰. In comparison with the Ghanaian case and putting into account the various environmental changes, Semarang – even if being subject to frequent and increasing floodings – does not experience strong out-migration related to environmental change. In contrast, the city presents itself as a highly dynamic urban centre that still attracts migrants (workers) and where the local population tries to adapt to the degradation. Its inhabitants raise the floors of their houses, build small dams etc. (Marfai et al. 2008: 237; Handayani and Kumalasari 2015); “[...] for many houses in the coastal area in Semarang, the houses have a particular room under the roof called as tataban to keep their valuable goods during the flood” (Kumalasari 2014, cited in Handayani and Kumalasari 2015). As Mulyana et al. point out, this strong in-migration into an area with various environmental challenges might lead to difficulties, especially for newly

arriving migrants. Recent migrants might be less resilient to climatic changes due to their limited integration in the community and therefore less social capital to adapt to challenges due to climate change (Mulyana et al. 2013b: 4). As Marfai et al. (2008) show in a study on two coastal villages of Semarang City, one reason for less out-migration than expected from coastal areas threatened by flooding might be a lack of financial resources which does not allow to move away. This situation hints to the existence of a large proportion of the population that the recent literature has classified as “trapped populations” (Black and Collyer 2014).

In both case studies the role of remittances, representing one link between local communities and migrants, was not as significant as we expected it to be within a highly dynamic migratory setting. Also, the perception of what migration might bring as benefits to the household and to the community was challenged in our survey: While two thirds of the Ghanaian respondents saw out-migration as a rather positive event, only a quarter of the Indonesian respondents welcomed migration as a possible strategy to improve the household's situation. However, more than half of the Indonesian respondents agreed that migration brings benefit to their community, a result that points to a regionally highly diversified perception of migration as a coping strategy concerning environmental stress.

With regard to the assumptions of the theoretical literature on migrant trajectories (cf. Spaan and Hillmann 2013; Vaittinen 2014; van der Velde and van Naerssen 2007b; Schapendonk 2012), in both cases our interviews revealed that the ‘mental distance’, here understood as the emotional involvement attributed to eventual mobility and migration, played a considerable role in shaping migratory flows. Migration and mobility, especially international migration, proved to be an acknowledged part of survival options in the Ghanaian case. In the Indonesian case people showed to be much more attached to their place of residence by feelings of belonging as well as belief-systems. Here the concept of mental thresholds as put forward by van der Velde and van Naerssen (2007b) seemed to be at work. Additionally, immobility and “trapped populations” stood out as a constitutional part of the nexus between environmental change and migration. Missing resources among the resident population were one explanation for the reluctance of households to consider out-migration of their current (frequently flooded) neighbourhood. Here, in contrast to

the Ghanaian situation, resettlement was neither an option for the resident population, nor a solution that was pushed forward by governmental programs.

6. Conclusions

The two case studies presented in this paper show that Ghana's and Indonesia's coastal areas are both exposed to environmental changes but that populations concerned react quite differently. The pronounced regional analysis, which sets the focus on the role of migration trajectories within the changing migration regimes can be helpful to better understand this complex relationship. By using the two cases as examples of different contexts of coastal environmental changes, a tentative typology of how populations react in terms of migration and mobility can be deduced.

Keta in Southern Ghana may work as an example of a small town that is embedded into a longstanding migration history with its own migration saga and linked until today to international, regional and internal migration networks. The town is still characterized by fishing and agriculture as main livelihoods and could not compensate the former loss of regional functions. In this case migrant trajectories are embedded into a culture that perceives migration as part of life and welcomes the mobility of women and men. Due to the long history of migration in the area today's migrants can often rely on contacts at the destinations facilitating the migration project. Strong international ties and skilled migration are frequent. Additionally, former emigrants cooperate with the local institutions such as the municipality or the traditional chiefs and do set up local infrastructure. In the context of environmental change, short-distance migration within the municipality seems to be one adaptation strategy.

Semarang City on the other hand represents a booming urban centre with growing industries and an expanding service sector. The city attracts (labour) migrants from the surrounding areas. The place shows a rather sedentary population and some out-migration mostly within Indonesia. International migration is an exceptional feature. The populations that live in the areas most affected by flooding are extremely vulnerable and dependent on immediate incomes in the informal sector or neighbouring industries. The places in which they live have been subject to seasonal flooding for a very long time. In this setting out-migration, especially international migration, does not seem to

be an (adaptation) option but is rather perceived as a threat by the local population.

In both regional cases, a straightforward causality between environmental changes at the coast and out-migration could not be identified. Migrants, however, were able to perform as actors within changing regional realities and, depending on their perceptions and interpretations, migration became an option, not only in reaction to environmental change. The Keta setting represents a typology that pronounces migration trajectories as part of long-standing interregional and international migration, the Semarang setting might be classified as a rather typical modernization-induced migration scheme, linked to rapidly growing urbanisation, with "trapped populations" on the one hand and in- and out-migration of (labour) migrants on the other hand. The authors see an important lacuna in research in the further exploration of the entanglement of man-made environmental change, urbanization patterns and migrant trajectories.

Notes

- ¹ The research area is mainly Semarang City (Kota Semarang) and not the neighbouring Regency with the same name (Kabupaten Semarang) which is located south of Semarang City in inland Central Java.
- ² *Vaittinen* refers here to *Kynsilehto's* note on skills (2011: 1548).
- ³ The figures refer to all household members who left the household to live elsewhere for more than three consecutive months. The NRF survey did not apply any time constraints concerning the year of out-migration but deliberately asked for all out-migrants who have left the household.
- ⁴ N.b.: Unfortunately, there are 38 % of the migrants where the age when leaving is missing because the interviewed household heads did not know it.
- ⁵ The explanation of this recent peak of out-migration remains one focus of the ongoing research.
- ⁶ The Indonesian census differentiates between "lifetime migration" (district of birthplace differs from district of current residence) and "recent migration" (district of residence five years ago differs from district of current residence).
- ⁷ The other regencies/municipalities with positive net migration rate (no. of migrants per year per 1,000 inhabitants) in Central Java are Sukoharjo (15.19 recent migration), Salatiga (11.59 recent migration) and Karanganyar (5.45 recent migration).
- ⁸ Net migration rates: Regency Semarang -294.64 (lifetime migration), -34.93 (recent migration); Demak: -78.98 (life-

time migration), -14.13 (recent migration); Kendal: -81.10 (lifetime migration), -5.46 (recent migration)

⁹ Out-migrants: 72 % married, 25 % never married, 2 % divorced; in-migrants: 62 % married, 35 % never married, 3 % widow(er).

¹⁰ We used this definition of migration in order to include population mobility within Semarang City which might be very relevant in the case of environmental change. This does not conform with the Indonesian census data that count only movement to outside Semarang city as migration.

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