

Linking environmental change, preferences and migration in coastal areas of Ghana and Indonesia

by

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Abstract

Coastal regions are associated with large and growing concentrations of human populations, driven especially by economic growth and in-migration. This rapid coastal development contributes significantly to coastal degradation and, at the same time, leads to an increased exposure of a high number of people to increasing threats of coastal hazards, which holds especially true for the developing country context (Nicholls et al. 2007; Neumann et al. 2015). Therefore, this dissertation tries to shed some light on linkages between migration and coastal environments in two coastal regions in Ghana and Indonesia.

More precisely, *research 1* addresses the question whether coastal environmental threats are drivers of out-migrations from the two study regions, which experience serious coastal changes like shoreline erosion, land subsidence and recurring floods. A household survey with migrants and non-migrants has been conducted. Measures of these rather gradual coastal changes—ranging from individual perceptions to expert categorizations—indicate that these environmental conditions do not help to explain migration decisions in the studied regions. Only the perception of storms, which have great impacts in the Ghanaian study region, were found to be robustly linked to previous out-migrations. This result leads to the hypothesis that—while gradual environmental changes are not likely to have a direct impact on out-migrations—rather rapid ongoing environmental changes might have.

As the experienced gradual coastal changes were not found to be likely determinants of out-migrations from the two study regions, *research 2* tries to explore which other factors are linked to those decisions to understand how to anticipate migration flows. It especially focuses on individual preferences as they are theoretically very likely to influence individual migrations but have not been much tested empirically. Time preferences and attitudes toward risks were measured by both survey questions and incentivized experimental tasks. The generated payoffs were transferred via mobile phone credits, which can be regarded as a de facto currency in the study areas. The results suggest that risk preferences are important factors for migration decisions, similar to age and education of the respondent. Time preferences were found to be of similar importance. Interestingly, in Indonesia, the effect of risk and time preferences on out-migration can only be found for the female subpopulation, which emphasizes the complex and context-dependent nature of migrations.

As migrations are not only expected to be impacted by coastal environments but at the same time also impact on them, *research 3* addresses the question whether migrants differ from non-migrants in their behavior toward the coastal environment. As it is very difficult to link respondents to specific marine and coastal resources, which are mostly governed by common-property or open-access regimes in the study region, I use two promising proxies for actual behavior. The first addresses underlying attitudes toward coastal environments, while the other one focuses on cooperative

behavior in a common-pool resource experiment as cooperation is important for the successful management of resources. Findings are ambivalent: while the migrant status does not seem to influence the two proxies per se, there is an effect via the selective nature of migrant streams. Furthermore, whether someone is a fisher is impacting directly on the effect of migrant status on the two proxies: migrant fishers were found to behave in a less environmentally friendly manner than non-migrant fishers.

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List of Abbreviations

2-MEV	Two-dimensional Model of Ecological Values
AIC	Akaike Information Criteria
BIC	Bayesian Information Criteria
BNPB	Indonesia National Agency for Disaster Management
CPR	Common-pool resource
EA	Environmental attitudes
EC	Environmental change
GPS	Global Positioning System
HH	Household
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
NELM	New Economics of Labor Migration
OLS	Ordinary least squares
ZMT	Leibniz Centre for Tropical Marine Research

List of publications and conference contributions

Manuscript 1:

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Is environmental change a primary cause of migration? The International Society for Ecological Economics 2016 Conference, Washington, DC. 26.–29.06.2016.

Human out-migration from coastal areas in Ghana and Indonesia: The role of environmental factors, CESifo Venice Summer Institute “Climate Change and Migration.” 22.–23.07.2016.

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Coauthored by: Achim Schlüter

Conference contributions:

Environmental Change, Preferences and Out-Migration: Empirical Evidence from Indonesia, International Conference on New Regional Formations: Rapid environmental change and migration in coastal areas, Yogyakarta, Indonesia, 07.–08.03.2016.

The role of risk and time preferences in predicting out-migration: Empirical evidence from Ghana and Indonesia, Leibniz Environment and Development Symposium (LEADS), Berlin, Germany, 05.–07.12.2016.

Out-Migration from Flood-Prone Areas in Ghana and Indonesia: The Role of Individual Preferences, International Conference on Migration and Environmental Change, Berlin, Germany, 08.–09.12.2016.

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“Analyzing potential effects of migration on coastal resources in Southeastern Ghana”

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Coauthored by: Achim Schlüter, Marie Fujitani

Conference contributions:

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I. INTRODUCTION

1. Introduction

1.1 Background

Coastal regions provide many invaluable ecosystem services, which include shoreline protection, storage of nutrients and high biodiversity. They filter pollutants and are important habitats for many different organisms (Martínez et al. 2007). They have also always been attractive locations for human settlements as they are rich in resources, crucial for trade and transportation, suited for cultural and recreational activities and climatically and physically inviting. More than 20 years ago, Hinrichsen (1997) pointed out that everyone in the world is linked to coastal regions—at least indirectly through their provision of ecosystem services and their contribution to global biological health—with the result that basically, “all of humankind is coastal” (p. 39).

Because of their attractiveness and the experience of considerable development in the last decades, coastal regions are today associated with rapidly growing concentrations of human population, economic activities and large settlements. They are not only significantly more densely populated than the hinterland (Small & Nicholls 2003; Balk et al. 2009) but also exhibit faster population growth and urbanization, driven especially by economic growth and in-migration (McGranahan et al. 2007; Neumann et al. 2015). Today, it is estimated that around half of the world’s population lives within 150 kilometers of the coast (Foresight 2011).

The experienced coastal developments, including population movements toward the coast, are expected to continue in the future (Small & Nicholls 2003). Already today, the majority of megacities can be found in coastal areas and urban land expanded much more in coastal than in non-coastal regions. In the 1990s, Bangladesh, for example, was found to experience a rapid growth in low-lying coastal regions that was twice as high as the national average. Coastal urban areas in China even grew three times more than the national average—a growth that is mostly linked with coastward migrations (McGranahan et al. 2007). Even though urbanization trends and demographic changes vary between regions, global meta-analyses confirm that coastal regions in general experience considerably higher rates of urban land expansion than non-coastal zones (Seto 2011).

Unsurprisingly, this development puts a high pressure on coastal and marine ecosystems. Pollution and refuse from growing urban centers and industries degrade coastal waters; most fisheries are considered to be at least heavily exploited and the composition of fish communities has changed due to selective fishing. Mangrove destruction is widespread, a significant proportion of wetlands disappeared in the last hundred years and most coral reefs are under threat. As coastal areas are often organized as common-property or open-access systems, they are especially vulnerable to population movements into or out of the ecosystem (Curran et al. 2002).

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Rapid coastal development, however, not only contributes to coastal degradation but also leads to an increased exposure of a high number of people to existing coastal hazards—which holds particularly true for the developing country context (Nicholls et al. 2007; Neumann et al. 2015). Even though many countries in the world face environmental problems, low-lying coastal communities in the developing world are considered especially vulnerable. In the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), experts expect the sea to rise between 52 and 98 cm until 2100, which will tremendously increase the risks of floods in coastal regions (Church et al. 2013). Changes, however, can already be noticed today: many regions are facing an increased exposure to flooding and inundation due to sea-level rise, coastal erosion, shoreline changes or saltwater intrusion. The degradation of coasts also removes natural barriers to high water levels during storms, and more and more people will be exposed to flooding caused by storm surges in the future. Hence, high-impact disasters are also possible in these regions. The IPCC has estimated that the largest impacts are likely to be experienced in Asia and Africa, especially under a scenario of increased storm intensities and sea-level rise, which includes regional rises due to increased subsidence levels. Without better adaptation and defense techniques, a 40 cm rise of the sea is assumed to result in more than 100 million people experiencing floods (Nicholls et al. 2007). Such a coastal change has very likely tremendous direct and indirect effects on the increasing coastal population. Already in 1990, the IPCC's First Assessment Report warned that “the greatest single impact of climate change could be on human migration—with millions of people displaced by shoreline erosion, coastal flooding and severe drought” (IOM 2009, p.13). The Fourth Assessment Report picked up the topic of migration and highlighted that migration patterns and networks are important adaptation options to deal with environmental impacts (Adger et al. 2007).

Thus, coastal regions are at the center of two key challenges for today's societies: environmental change and migration. Coastal ecosystems are not only affected by the increasing coastward migration but migration might also serve as an adaptation strategy for households affected by coastal environmental changes.

1.2 Motivation and Research Questions

This dissertation wants to shed more light on the reciprocal relationship between coastal changes and migrations and its interaction with other socioeconomic factors. It focuses on specific questions within this complex interrelationship, depicted in Figure 1.1.

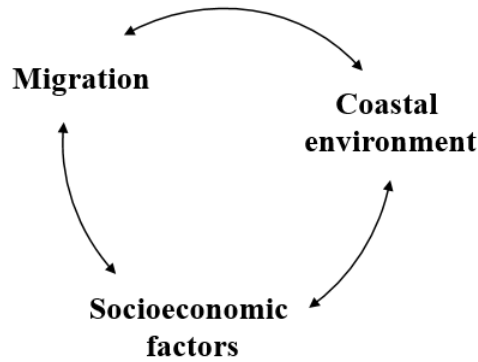


Figure 1.1 The interrelationship between migrations, coastal environments and socioeconomic factors

More specifically, *research 1* looks at the contribution of coastal changes to out-migration decisions and tries to disentangle them from other migration-influencing socioeconomic factors. Despite the potential link between coastal environments and migrations, for a rather long time migration theories have neglected environmental factors as a cause for migration (Black et al. 2011). The term “environmental refugee”—describing individuals displaced by environmental degradation or disasters—came into regular use only 30 years ago (El-Hinnawi 1985), and in the early 1990s the international community slowly began to recognize the potential implications of environmental change on human migration. Estimations of the number of environmental refugees were quite gloomy (Myers 1997; Myers 2002; Christian Aid 2007) and have later been criticized for being inflated and too deterministic (Black 2001; Piguet 2010). Instead, migration is nowadays understood as a complex phenomenon that is “always the result of a multi-causal relationship between environmental, political, economic, social, and cultural dimensions” (Piguet 2010, p.517). Environmental factors *can* be the main reason for migration but more often they are rather contributing to varying degrees. Thus, the impact of the environment is expected to vary from non-significant to immense, making it important to disentangle environmental migrants from migrants mainly driven by other factors (Hugo 2011).¹ The interaction of the environment with other factors that are strongly associated with individual migrations makes the environment–migration issue more complex than the simple assumption that coastal changes equal out-migration from coastal areas—

¹ One exception might be when environmental factors are extreme and actually the main reason for migration—forcing people to move.

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especially if the experienced coastal changes are rather gradual and of low impact. Therefore, I do not only ask whether coastal changes contribute to out-migration decisions but also how important these are relative to other, commonly observed, determinants of migration decisions. Furthermore, I want to test whether the often-hypothesized effect of environmental change on out-migration depends on other, intermediating factors (which include, for example, the individual willingness to take risks).

As migration is generally a powerful force playing an important role in shaping (not only coastal) regions, I aim to examine other underlying drivers of observed migrations in the study regions in *research 2*. Even though there is already an extensive literature on drivers of migration, which basically can be dated back to the 1880s when the German demographer Ernst Georg Ravenstein published his so-called “Laws of Migration” (Ravenstein 1885), I want to add another layer of knowledge by focusing especially on individual preferences like risk tolerance and patience. Even though the migration research has moved from mainly focusing on macrolevel factors to the inclusion of network-, household- and individual-level factors, very personal factors like personality traits or preferences have not been much considered in the empirical literature—not least because of the unavailability of preference data in existing migration studies. However, undoubtedly, not everyone facing the same coastal changes will exhibit the same migratory behaviors—even when the socioeconomic background is similar. Migration decisions—and not only those driven by the environment—are likely to depend also on an individual’s very personal level of risk tolerance and on her level of time preference (and thus her valuation of future benefits relative to earlier benefits); however, only very few studies have yet considered individual preferences as potential migration drivers. Risk tolerance and time preferences are of additional interest for this research because they might not only be highly linked to migrations but also might be important mediating factors for the link between coastal environments and migrations. *Research 2*, thus, pays further attention to both risk and time preferences and their link to out-migrations from coastal regions to extend knowledge about the nature of coastal migrations in the two study regions.

Research 3 then tries to shed some light on the effect of migrations on coastal resources. The relationship between migrations and coastal environments or, for that matter, any other environment, is not as straightforward as often assumed. As mentioned before, human migrations to and along coasts are one key reason for the increased dynamics in coastal regions and are expected to play an important role in shaping the use and management of coastal resources in ways that go beyond additional pressure from simple population growth (Curran et al. 2002). Some scholars suggest that migrants are per se exceptional resource degraders (e.g., Codjoe & Bilsborrow 2012) or act as roving bandits who are not attached to their place and have no incentive to invest in the long-term sustainability of the resource (Berkes et al. 2006). Other scholars, however, acknowledge that the relationship is again interacting with many other socioeconomic factors. The selective nature of

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migrants highlights the impact of migrations on the environment through the different socioeconomic composition of migrant streams. Furthermore, migrants might indirectly impact on coastal resources through the potentially negative impact of migrations on social capital that is needed for the successful management of (de facto) open-access resources that are often found in coastal settings. *Research 3*, thus, aims to contribute to the question whether migrants really are exceptional resource degraders, whether they impact on coastal resources through their specific socioeconomic factors or whether no difference between migrants and non-migrants in their behavior toward coastal and marine resources can be found.

The dissertation is organized as follows: The current **Part I** provides a general introduction and explains the background that motivated this study. The following paragraphs further discuss research design and methodology used in the three different researches and give information about the study regions. **Part II** (Manuscripts) presents the three research papers, which answer the different research questions. Finally, in **Part III** (Concluding Remarks) I present a summary of research results, a concluding discussion of these findings and provide a general insight on strengths and limitations of this work.

1.3 Research Design and Methodology

The main topic of this dissertation is related to migrations in coastal regions and their interrelationships with socioeconomic factors and individual preferences regarding risk and time. In this section, I further reflect on methodological choices and methods used for every research part addressed above. Figure 1.2 provides an overview of the used methods.

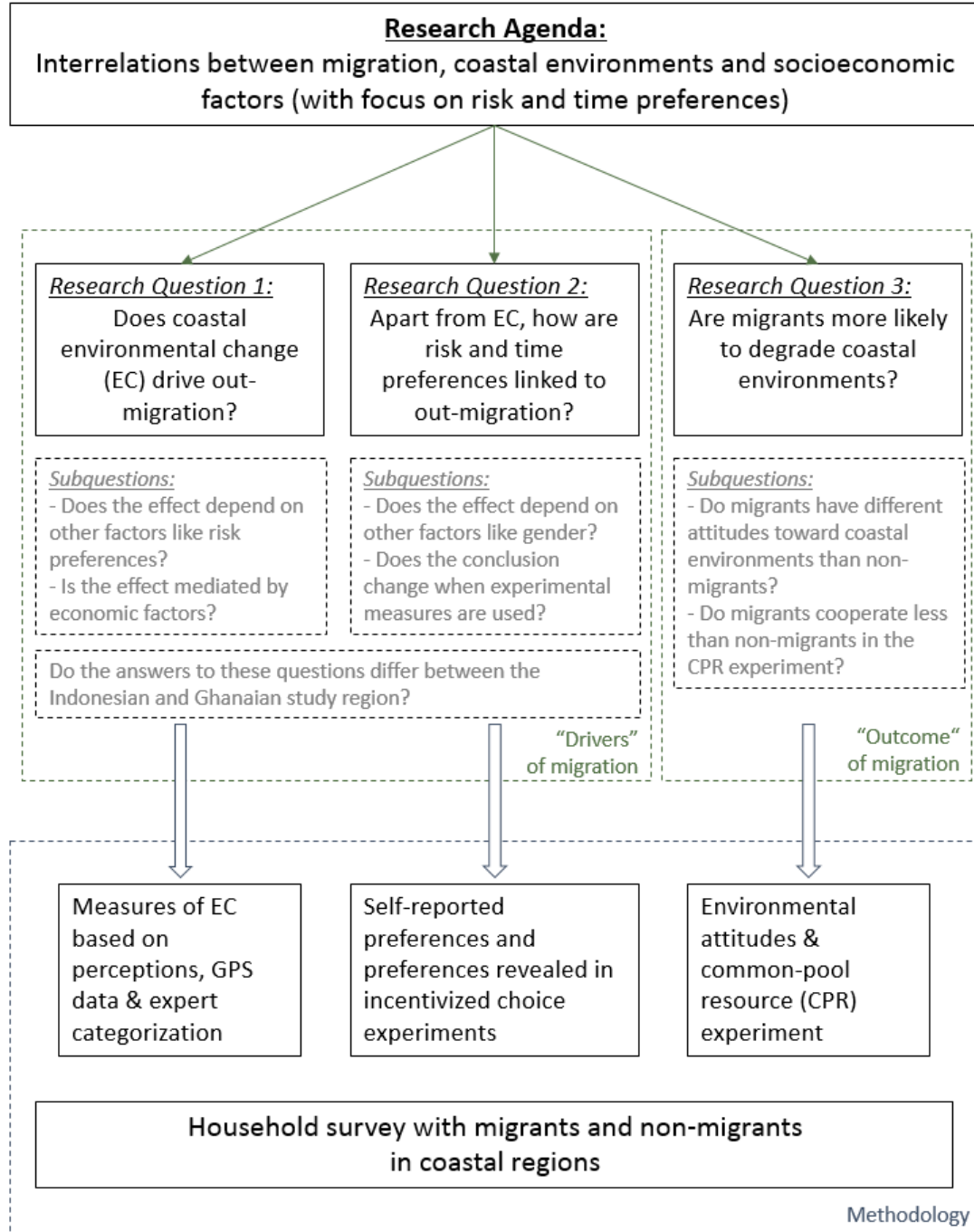


Figure 1.2 Research summary

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As can be seen, the empirical basis for all three research questions is a household survey, which was conducted among migrants and non-migrants in coastal areas. Thus, two relatively medium-sized coastal regions, characterized by ongoing local environmental change and a long-standing tradition in regional migration, were selected: Keta municipality in Southeastern Ghana and Semarang on Indonesia's main island, Java. While experiencing coastal threats was a necessary precondition to answer the question addressed in *research 1*, experiencing migrations was necessary for the research in general.

Even though these two study regions are both experiencing coastal changes, they are generally very different from each other. Thus, I do not intend to compare the regions directly or to pool the obtained data into one big dataset but to answer the research questions in both regions separately.

Applying the same methodology in two different regions of the world required a few adjustments that, however, were rather easy to handle and to implement. The sampling procedure can serve as an example: Whereas Keta was small enough for a systematic random sampling strategy, Semarang proved to be too large and without official population registers available for this research. Therefore, it was decided to use high-quality satellite pictures and random GPS points to select the Indonesian households.² Despite this additional effort to conduct the same research in two different regions, this approach is particularly helpful in understanding whether answers to the research questions are influenced by specific contexts. Looking at two different coastal regions, no matter how different they might be, may also add new perspectives or may emphasize different aspects, which would have not otherwise been considered as this approach gives the “possibility to reflect on one case in the light of the other” (Hillmann & Spaan 2017, p.31). Ultimately, attempting to answer the different research questions in two different regions is a first step for assessing the external validity of findings.

1.3.1 Study regions

Therefore, all three research questions were addressed in one or both of the two study regions. The countries chosen for this research—Ghana and Indonesia—are former colonies which experience a similar level of human development, as measured by the Human Development Index. Both countries show a growing middle class and a predominately young population with an average population growth between 1.5 and 2.5 percent per year. Around half of the countries' populations live in urban areas. However, not unexpectedly, urbanization rates differ significantly between regions in both countries and are driven by the predominant direction of internal migration flows: Whereas Ghana experiences internal migration from the north to the coastal south, Indonesia experiences migration

² More on the sampling procedure can be found in section 1.3.2.

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flows from the outer islands to the coastal urban areas on Java, putting additional pressure on coastal infrastructures and environments (Hillmann & Spaan 2017).

Keta, Ghana

The Keta municipality is located in the coastal savannah vegetation zone in Southeastern Ghana and has a population of nearly 150,000 inhabitants (Ghana Statistical Service 2014). The great majority of people belong to the Anlo (98.8%) who are part of the Ewe-speaking population in Ghana (Keta District 2001).



Figure 1.3 Map of Keta, Ghana

The municipality is located within a unique lagoon system; it has the Atlantic coast to the south, the Volta in the west and the Togolese border nearby in the east. In 1853, missionaries from the North German Mission arrived in Keta (the capital of the Keta municipality), and a previously unknown urbanization process started. After the British colonial powers designated Keta as the only port east of the Volta in 1916, it prospered as an important market town. Strengthened by its famous market, Keta continued to grow and was chosen as the regional capital of the new Volta Region on independence in 1957. For several reasons—like the closure of the port in 1962, the relocation of the regional capital in 1968 or the mass expulsion of immigrants in 1969—Keta's economy has stumbled since the 1960s, and the importance of its market declined rapidly. Today, most livelihoods depend on petty trading, subsistence farming and fishing (Akyeampong 2001).

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It was chosen as a study region because it has been the site of acute coastal erosion since about 1907, which contributed to the economic decline during the 20th century.³ A first public engineering report from 1929 concluded that erosion processes are very severe and relocation the only useful solution (Nairn et al. 1998). The erosion of the coast, thus, generated a search for space and new livelihood opportunities and by Ghana's independence in 1957, more than half of Keta was robbed by the sea. Not only natural causes like increased storm intensity, soft geology, climate change and low-lying topography but also human activities like the building of the Akosombo dam⁴ on the Volta River in 1964 or illegal sand mining has contributed to the deterioration of the coast (Boateng 2012). At the end of the 20th century, annual recession rates ranged from 2 m/year in the northeast to 8 m/year in the southwest (Nairn et al. 1998). Land became extremely scarce and the distance between the ocean and the Keta Lagoon rarely exceeds 3 km. At various sections, especially affected by the environmental change, the lagoon and the sea were within 15–30 m of each other, only separated by a thin tongue of sand (Akyeampong 2001).



Figure 1.4 Pictures of Keta: a) eroding street, b) damaged houses, c) aerial picture of Keta with sea defense structure⁵

In 2001 and 2002, several groins were constructed in specific sections of the municipality's coast as part of the Keta Sea Defense Project to reduce sediment drifts along the coast, to provide flood relief and eventually to stop the erosion (Boateng 2009). The success of the Keta Sea Defense Project—consisting of revetment, groins and beach fill—is disputed, especially as it seems to be the case that the project increases recession rates to the east of the municipality (Appeaning Addo et al. 2012; Angnuureng et al. 2013; Appeaning Addo 2015). On the individual or household level, only few

³ While the eroding coast certainly played a role in Keta's decline, it also has to be noted that Keta had previously achieved economic growth despite acute coastal erosion since 1907 (Akyeampong 2001).

⁴ It is often held responsible for the decrease in sediments carried to the coast.

⁵ Picture a: Carina Goldbach, 2014; picture b: Carina Goldbach, 2015; picture c: Research Planning Inc (available at: <http://www.researchplanning.com/projects/environmental-assessment-keta-sea-defense-works-project-ksdw/>, accessed 25.06.2015)

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adaptation strategies are adopted. Thirty-five percent of households have reported to undertake something to protect their house or their belongings from coastal threats; most of these stated to have improved their house or its surrounding area and/or tried to build a physical barrier.

Keta, however, does not only experience ongoing environmental change but also shows a highly dynamic migration system. West Africans per se are extremely mobile populations with Ghanaians certainly being no exception (Randall 2005). The free movements of people, goods and capital in this subregion are especially encouraged by the Economic Community of West African States. Ghana, next to Côte d'Ivoire, became the key traditional country of migration which experienced a transition from a migrant-receiving to a migrant-sending country in the 1960s (Adepoju 2003). Migration has a long-standing tradition in Ghana, especially when it comes to internal rural-to-urban migrations. Also in the Volta region, despite the Anlo-Ewe's attachment to their source communities and home lands, migration is considered one of the most popular livelihood strategies of households, especially encouraged by environmental degradation and population growth induced pressures (Tsegai 2005).⁶

Semarang, Indonesia

Semarang with its 1.6 million inhabitants is essentially bigger than Keta. It is a coastal urban area located at Java's northern coast, lying between Jakarta and Surabaya, the two major cities of Indonesia. During colonial times, Semarang emerged as a successful and important port, and is still an important regional center today (Knaap 2015).



Figure 1.5 Map of Semarang, Indonesia

As transportation hub with a vital industrial and manufacturing center it attracts people who seek employment and education opportunities. Semarang's rapid growth, however, was not supported by appropriate infrastructure and its characteristic coastal features not taken into account.

⁶ Or as local chief Togbui Kumassah put it, "We are very mobile people. But we are also very conscious about our heritage and home land" (interview from 29.07.2014).

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Consequently, coastal risks “became the chronic problem of Semarang City” (Miladan 2016, p.14). It does not only experience the most significant erosion processes on Central Java, which, very similar to Keta, threaten the development of coastal communities; it also has to deal with periodically occurring tidal inundation (Marfai 2011). Heavy rainfalls in combination with Semarang’s location between high mountains and the coast and its neglected drainage system cause additional flood-related problems during the rainy season. Substantial land subsidence due to excessive groundwater extractions and extensive construction works worsens the situation and between the years 2003 and 2007 the sea level was found to rise on average 6.6 cm per year. Five centimeters of this sea level rise could be accounted for by land subsidence (Setiadi et al. 2012). So far, there is no prospect of an end to these conditions; and the constant land subsidence and frequent inundation are expected to further damage infrastructure and settlements and thus to impact severely on coastal communities (Harwitasari 2009). Typical for coastal regions, a large part of the population of Semarang has settled there. Consequently, many people have been experiencing the threat of tidal inundation with various depth of seawater flooding (Marfai et al. 2008).



Figure 1.6 Pictures of Semarang: a) subsiding house, b) tidal flood in Tanjung Mas (one community of Semarang), c) residents during flood event in 2016⁷

As urban institutions are increasingly aware of the coastal threats, several hydrological projects have been implemented since the 1990s, including several pump systems and polders. Even though some improvements can be noticed, these projects have not managed to overcome inundation problems yet (Miladan 2016). There are also some local projects in place: some communities jointly cultivate mangroves, others regularly clean drainages, few build dikes. On the household level, 70% of

⁷ Picture a: Carina Goldbach, 2014; picture b: Wahyu Sulistiyawan, 2013, *Tribun Jateng* (<http://www.tribunnews.com/images/regional/view/557041/banjir-rob-genangi-semarang-utara>, accessed 09.12.2016); picture c: Dhana Kencana, 2016, *Anadolu Agency* (<http://aa.com.tr/en/world/indonesia-port-city-battles-to-save-homes-from-floods/572213>, accessed 15.08.2016)

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households reported to undertake efforts to protect themselves and their belongings from environmental threats; the majority of affected households lift their floors or houses. Other common adaptation techniques include building small dikes, pumping systems or ditches, evacuating, praying or simply enduring the short periods of inundation with valuables lifted above the ground. While one could discuss these adaptation strategies in greater detail, this dissertation will not focus on other potential adaptation strategies besides out-migration.

Not only Ghana but also Indonesia shows a highly dynamic migratory system. In Indonesia, the state-sponsored transmigrasi programs, beginning in 1905 and culminating during the Suharto-regime, had a very significant impact on migration patterns. The program transported millions of people from overcrowded islands to outer islands. Soon, Java became a main sending area of migrants (Fearnside 1997). Thus, internal migration is no new phenomenon in Indonesia, and already in 1930 11.5% of the inhabitants lived outside their birth district. In 2000 this percentage was nearly twice as high (Lottum & Marks 2012). Besides the historical impact of the transmigrasi programs, Java experiences widespread internal labor migration and increasing urbanization. Labor migration to the Middle East and other Asian countries is also a key form of the rising out-migration and underlines the general trend of increasing international emigration of Indonesian people, mainly coming from Java (Hugo 2008). Semarang, however, a thriving coastal urban area, is found to have less (net) out-migration than other cities on Java. Instead, it also attracts people from neighboring areas as it is typical for urban coastal areas (Mulyana et al. 2013).

All in all, this subchapter illustrates the different contexts in which the links between coastal environments, migrations and preferences have been tested, and which should be kept in mind when interpreting eventual findings.

1.3.2 Household survey

A key challenge in answering the before-mentioned research questions is the persistent lack of high-quality data. While there are some attempts to address the environment–migration nexus on the macrolevel with the help of aggregated international migration flows and data on countries' climate, there is nearly no reliable census data or smaller-scale surveys—covering both topics—available, especially in the context of developing countries, which are often also the most vulnerable to environmental/coastal changes. This can be partly explained by the fact that only very few social scientists working on migration also collect data on the natural environment, and at the same time, only a few natural scientists work also on migration.⁸ This lack of high-quality data was and most often still is a serious issue (IOM 2009). Not only is there a persistent lack of high-quality data on both (coastal) environments and individual migrations, there are also only very few data sets

⁸ This gap in research, however, has attracted more and more interdisciplinary cooperation, like the project “New Regional Formations: Rapid environmental change and migration in coastal areas of Ghana and Indonesia”, of which I am a part.

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providing information both on migration behaviors and individual preferences. Thus, addressing the research questions in this dissertation required the collection of microlevel data.

Looking at the environment–migration nexus, there are some case studies that have already focused on specific environmental challenges and linked them to individual migration decisions; however, only a few have used quantitative research methods (Moriniere 2009; IOM 2009). While qualitative studies provide useful insights, they are experiencing another methodological challenge: there is no satisfying definition that covers migrants leaving due to experienced environmental changes. Disentangling the role of environmental changes from other factors that commonly drive migration is a challenge that often cannot be overcome by qualitative studies, especially when the environment is not clearly the primary driver of observed migrations. Similarly, it is difficult to disentangle the effect of being a migrant on coastal environments from other socioeconomic characteristics that might also have an impact. Therefore, quantitative data can add to existing research on the environment–migration link and complement other qualitative research.⁹ As quantitative methods are also helpful in measuring and comparing risk and time preferences, a household survey including experimental tasks was conducted to collect relevant data in both study regions—thus, combining information about coastal changes, migrants, their individual preferences and more.

Another challenge was then, however, linked to the problem of getting information about migrants. Because *research 1* addresses the question whether the coastal changes experienced in the study regions are linked to out-migration decisions, this household survey needed to include information about out-migrants, who—by definition—do not live in the study communities anymore. Many household surveys solve this challenge by either using the intention of individuals to move away or by getting the information about migrated individuals from household members who were left behind. While both procedures facilitate the data collection, they also have their shortcomings. First, it can be questioned whether intentions are a good predictor of actual behavior. Van Dalen and Henkens (2008) addressed this question by carrying out an emigration study in the Netherlands by asking for the intention of people to emigrate in the near future. Two years later, they tracked all the respondents down and found that only 24% of those with migration intentions had actually migrated. De Groot et al. (2011) and de Jong (2000) obtained similar results for different samples. As this discrepancy between intentions and actual behavior is still quite large, the focus of this dissertation is on actual migrations to avoid relying on proxies like migration intentions. Second, obtaining information about the migrants from a proxy respondent like the household head in the origin region was not reasonable for this research as information on individual preferences (*research 1*),

⁹ However, as every method—including quantitative methods—obviously has shortcomings, other parts of the research project use qualitative research methods. Findings based on these methods confirm our findings for research question 1 (Hillmann & Ziegelmayer 2016).

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perceptions (*research 2*) and attitudes (*research 3*) cannot be provided by anyone other than the migrant herself.

Ultimately, household heads were interviewed as well as a randomly selected household member. This household member, who could nevertheless also be the household head, was labeled as non-migrant. If the household head reported that a person, who lived in the household, had moved out of the community, then this member was labeled a migrant and contacted via phone. If there were more than one migrant in a household, only one of them was randomly selected.¹⁰

Migrants are all those who a) had lived in one of the sampled households, b) had moved within the last 10 years and c) had lived outside the community for three months or more at the time of the interview. Confining the time of migration to three months until 10 years before the household survey makes sure that household members who are only very temporarily away from the household were not counted as migrants. It also reduces potential recall bias when migrants are asked about the time of migration and its circumstances. Furthermore, it reduces the potential issue of reverse causality, which is further discussed especially in *research 2*.¹¹

Thus, the underlying sample consists of non-migrants who still live in one of the two study regions and migrants, who have left the study communities. As traveling to the different migrant destinations and interviewing every migrant face-to-face would have been very cost- and time-consuming, migrants were contacted and interviewed via phone.

Phone interviews are a well-accepted approach for collecting quantitative data in industrialized countries because—just as in this case—costs and travels decrease, geographically dispersed individuals can be reached and interviewers can work from one central place without their appearance affecting the interview. In general, research has shown that answers obtained on the phone are as valid as those obtained in a personal interview. However, phone interviews also have some shortcomings. For one, they had to be kept rather short to avoid respondent fatigue.¹² Furthermore, they are often expected to lead to 30 or 40% of refusals and were for a long time considered to be of less use in developing countries where phone coverage was poor until recently (Bernard 2006). An increase in network coverage in most developing countries, the availability of rather cheap mobile phones and the increased possibilities for mobile phone users, however, have led to a surge in mobile phone users in developing countries (Dabalen et al. 2016). Consequently, and despite some initial concerns regarding the aforementioned shortcomings, nearly every

¹⁰ More information about the sampling procedures can be found in Part II within the different research papers.

¹¹ Originally, it was planned to limit the time of out-migration to the last five years; however, pretests have revealed that then the number of migrants would have been quite low relative to the number of non-migrants.

¹² Bernard (2006) recommends not more than 20 minutes, which I considered to be the maximum amount of time the survey should use per migrant. Interviews with the household head, however, were conducted in person and took on average substantially longer.

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respondent in the sample owned a mobile phone and the few who did not could be reached on a mobile phone they shared with family or friends. In total, only 14 migrants could not be contacted due to missing, incomplete or obsolete numbers. Once the enumerator could talk to the migrant, however, every migrant agreed to participate in the survey, which took between 20 and 30 minutes. Only one respondent asked to quit the interview after some while as it was too time-consuming. Therefore, refusals are of no real importance for this survey. Interviews by phone have proven to be a good tool and were welcomed by participants as they could easily schedule the interview at a time of their convenience.

Ultimately, all three researches are based on the same study regions and sample and revolve around movements in coastal regions. Methodologies further have in common that they are of a quantitative nature, that variables of interest like environmental change, preferences and environmental attitudes are measured in different ways and that—when possible—experimental tasks were combined with survey data. Apart from these commonalities, however, methodologies have been adapted to address the different research questions and to be suitable for the different contexts in which this research was conducted. In the last subsections of this introductory section, I reflect on these different methodological choices.

1.3.3 Research 1

The first part of this dissertation focuses on the influence of environmental changes in coastal areas on individual out-migration decisions. While it is often acknowledged that major sudden environmental disasters like earthquakes, tsunamis or hurricanes force people out of their homes, these displacements are often rather temporary, and thus different from voluntary migrations due to a slowly changing environment. Gradual environmental changes, not to mention gradual coastal degradation, have been neglected, and only a few quantitative studies explicitly focused on these changes. The majority of these studies, however, has mainly examined the impacts of rainfall (IOM 2009). This research—focusing on rather gradual but severe coastal changes—is thus, adding to the literature.

A methodological problem that often prevented research on gradual changes is the issue of measurement. Non-rainfall-related studies are often criticized for using rather questionable or indirect measures of environmental degradation (for example, Ezra and Kiros' (2001) totally subjective measure of community vulnerability to drought or Shrestha and Bhandari's (2007) use of reported change in time to collect firewood as a proxy for environmental insecurity). To answer research question 1, this research thus uses more direct, both rather subjective and objective measures of the experienced gradual coastal changes in both study areas. The first measure this research uses is based on the perceptions of respondents because these are considered central for how people respond to environmental threats and because they can differ substantially between

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individuals, even when they are from the same household (Mortreux & Barnett 2009; Koubi et al. 2016).¹³ Nevertheless, individuals' perceptions might be biased or incomplete and it is frequently argued that studies would benefit from more objective measures (IOM 2009). Therefore, GPS coordinates of the interviewed households were used to measure the household's distance to the coast as a proxy for its exposure to coastal changes. On top of these measures on individual and household level, the sampled communities have been categorized according to their recent exposure to floods (Indonesia) and shoreline erosion (Ghana). This classification of communities into different hazard categories is based on the knowledge of experts. In the Indonesian case, these experts are from the Indonesia National Agency for Disaster Management (BNPB), which assessed the communities' flood risk based on flood data from previous years; in the Ghanaian case, they are geologists from the Leibniz-Centre for Tropical Marine Research (ZMT) in Bremen, which have been part of the same research project and who reconstructed Keta's past shoreline changes. Ultimately, as both subjective and more objective measures of environmental changes have their advantages and disadvantages, I can draw on three different measures of the experienced coastal changes to increase the validity of the measures.

Ideally, I would have conducted a panel household study, first interviewing a bigger number of households in the communities of the two study regions and then coming back after some time has passed for a follow-up survey. However, time constraints due to the duration of this Ph.D. project have prevented this idea, especially because gradual changes are the focus of this research, which are very prominent in Keta and Semarang, but by definition need some time to have significant impacts. Even though erosion processes of up to 20 cm per year or a yearly subsidence of 10 cm are very severe, they will probably not lead to many migrations between the baseline and the follow-up survey if the follow-up survey is conducted too shortly after the baseline. Therefore, this research relies on cross-sectional data, including retrospective data on migrations as "past moves should be explained by characteristics at the time of those moves, not at the time of the survey" (DaVanzo 1981, p.122). The coastal changes were, thus, also represented by measures that are based on past changes. The inclusion of objective measures ensures that analyses are not driven by reverse causality as it is unlikely that migrations within the last 10 years before the survey had an impact on the experienced coastal changes.

1.3.4 Research 2

As mentioned before, the second research focuses more on the whole range of factors that could influence migration decisions in these coastal regions—besides coastal degradation. It especially adds to the literature on risk and time preferences, which are considered to be important factors for migrations but which have not yet been included very often in empirical migration studies. One

¹³ Because the pretest revealed that people from Keta also feel very threatened by storms and storm surges, this rather sudden-onset coastal factor was also included in this research.

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reason for this is again data availability as preferences are less straightforward to measure. While information about standard socioeconomic factors is often collected in censuses or household surveys, very individual preferences are seldom considered.¹⁴ Again, there is the need for a survey that not only includes information about migrations but which at the same time is concerned about the individual preferences at the individual level.

So far, the few studies that do consider risk preferences mostly rely on stated preferences or hypothetical gambles (e.g., Jaeger et al. 2010; Dohmen et al. 2011; Gibson & McKenzie 2011; Akgüç et al. 2016). The same holds true for the even fewer studies on time preferences and migration decisions (e.g., Nowotny 2010; Arcand & Mbaye 2013). This part of the dissertation therefore also uses stated risk and time preferences, which have been elicited with the help of Likert-scale questions in the questionnaire. On top, however, we use incentivized experiments, which have become more and more popular in the field of economics and which have been widely used, especially in the lab with students. Even though we are aware that these experimental tasks can only measure a very particular aspect of risk and time preferences, they produce easily comparable measures useful for the hypothesis testing nature of this research. Furthermore, they appear to be valuable, complementary measures to simple survey questions as they have some methodological advantages: First, when using hypothetical questions without real money payoffs, respondents may have fewer incentives to make a cognitive effort to elicit their true preferences and thus make different decisions than in their daily lives. Second, without monetary incentives, respondents might misrepresent themselves, which could cause biased indicators, especially when asked about preferences that carry normative values. Those normative expectations might also vary within different cultural contexts (Hamoudi 2006). Hence, basic incentivized experiments with real and relatively large expected payoffs were additionally used to elicit the respondent's actual preferences and to diminish bias through normative expectations. We further argue that preferences elicited in this monetary domain are likely to be relevant for actual migration decisions. Both risk and time preference elicitation tasks have been used in other non-migration studies, and are explained in detail in Chapter 3.

The experimental earnings generated in these tasks were then transferred via mobile phone credits instead of cash payments for several reasons. First, because migrants lived outside the study communities, the experimental tasks have also been conducted via phone without face-to-face interactions, which would have made cash payments unnecessarily complicated. Second, respondents could choose to wait for their earnings in the time preference task, which means that part of the respondents received the payoff up to one week after the survey took place. This delay usually increases uncertainties and trust issues as well as transaction costs. Payouts via mobile

¹⁴ One exception, however, is the German Socioeconomic Panel, which includes questions on the willingness to take risks.

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phones, however, reduce trust issues because every respondent received the payoff this way regardless of her choice in the preference tasks (and thus always without the presence of an enumerator). Furthermore, transaction costs between earlier and later transfers become very similar. These issues are of special importance for the time preference experiment, as they ensure that that experiment is not actually measuring trust issues or different transaction costs but rather the individual valuation of future vs. present payoffs (Javaid 2016).

As briefly mentioned before, most respondents owned a cell phone and the few respondents who did not, gave the number of a trusted relative who instead received the payoff. Further note that respondents do not only use mobile phone credits to cover the provision of mobile phone services but also use them as a currency in local shops as mobile money often plays a bigger role than traditional banks in rather rural communities. An article in *The Economist*, hence, labeled these “pre-paid mobile-airtime minutes as a de facto currency,” especially important for some African countries—among them Ghana (*The Economist* 2013).

Again, longitudinal data would have been of advantage, but as already mentioned, have neither been available for the variables of interest in the two study regions nor collectible without difficulties. This is especially a concern for *research 2* as out-migration decisions happened before the measurement of the respondents’ preferences and might thus have impacted on individual preferences. Even though economists usually assume that preferences are “deep parameters” and thus rather invariant (e.g., Lucas 1976; Andersen et al. 2008; Dietrich & List 2013) and even though previous empirical studies have found that both risk and time preferences are uncorrelated to major life events like migration (Andersen et al. 2008; Jaeger et al. 2010; Meier & Sprenger 2015; Akgüç et al. 2016), we try to weaken the still possible issue of reverse causality by also collecting information on future intentions to move, which serve as a proxy for actual future migrations but which are clearly not affected by reverse causality. The inclusion of intentions will improve the analyses of the link between preferences and migrations by adding another approach that can help to confirm (or refute) findings.

1.3.5 *Research 3*

The final part of this research is concerned with the impact of migrations on coastal environments and resources. It is, however, very difficult to link respondents who are not all fishers to specific marine and coastal resources. While this might be easier for agricultural settings where every household is linked to a certain part of land, it is much more complicated in coastal settings, especially when fishery resources are governed by common-property or open-access regimes as it is in the case of Ghana (e.g., Aheto et al. 2012). Thus, instead of focusing on actual coastal resources or actual resource consumption patterns, *research 3* aimed to evaluate whether migrants in general value marine and coastal resources differently than non-migrants. It, therefore, relies on proxies for

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actual behavior. Not many studies that have been focusing on the link between migrants and natural resources were looking at coastal settings and those that did were either mostly not assessing the link at the individual level or were using qualitative methods. Therefore, I decided to rely on two different proxies that seem to be promising in assessing potential differences between migrants and non-migrants.

According to the Theory of Planned Behavior, actual behavior depends on the intention to perform this particular behavior, which again is (at least partly) influenced by the person's attitudes toward the behavior in question (Ajzen 1991). Attitudes, thus, are expected indirectly to influence actual behavior. Therefore, attitudes toward coastal and marine resources serve as a first valuable proxy for actual behavior toward these resources. Traditionally, they were seen as a unidimensional construct that range from "concerned about the environment" to "unconcerned" (Milfont & Gouveia 2006; Dunlap et al. 2000; Dunlap & Van Liere 1978). We, however, decided to follow the more recent two-dimension tradition because it accounts for the dilemma people are facing when they are confronted with the desire to protect the environment and the need for some exploitation of the environment. Therefore, we use the two-dimensional Model of Ecological Values (2-MEV) proposed by Wiseman and Bogner (2003), which has been validated in different geographical areas, including West Africa (Borchers et al. 2014; Binngießer & Randler 2015), and which focuses on the two key dimensions of environmental attitudes. The first dimension is rather biocentric and reflects conservation and protection of the coastal environment while the latter dimension is a more anthropocentric dimension that reflects the exploitation of coastal resources.

Because comparing environmental attitudes and values of migrants and non-migrants is only one indirect indicator for real-life environmental behavior, we complemented these data with a second proxy based on a basic common-pool resource (CPR) experiment. This measure adds to the research as the underlying experiment is widely used to understand extraction behavior in CPR situations, which are frequently found in the coastal realm. It illustrates the social dilemma that is often inherent in these settings. Standard economic theory predicts that individuals appropriating from a common resource pool will extract the maximum, which will ultimately lead to unsustainable resource use and to the "tragedy of the commons" (Hardin 1968). Thus, it is expected that extraction decisions of rational individuals will lead to outcomes that are not optimal for the group. However, contrary to these pessimistic predictions, there are many real-life examples of effectively managed CPRs and CPR experiments have shown that people often cooperate in CPR situations caring about fairness and reciprocity (Werthmann et al. 2010). The system of social norms and regulations in which the individual is usually embedded affects her decision to cooperate. Migrants might disrupt these institutions, which are necessary for cooperation among individuals within CPR situations. As cooperation is crucial for regulating CPRs, the level of cooperation shown in those experiments can

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be generally seen as a proxy for proenvironmental behavior (Ostrom et al. 1994; Fehr & Leibbrandt 2011).

Both indicators, 2-MEV and the CPR experiment, serve as proxies for actual resource use patterns and will help to assess whether migrants might differ in their behavior toward coastal environments from non-migrants. Because the Indonesian study area, Semarang, is a very urban and densely populated city with fewer direct connections to coastal resources, this research has focused on the rural study region in Ghana, Keta municipality, only.

II. MANUSCRIPTS

Chapter 2: Out-migration from coastal areas in Ghana and Indonesia – The role of environmental factors

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Chapter 3: Risk aversion, time preferences and out-migration.

Experimental evidence from Ghana and Indonesia

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Abstract

It has long been hypothesized that individual risk and time preferences impact on migration propensities, but empirical evidence is scarce due to a lack of reliable data on migrants' preferences. Therefore, this paper has sought to advance research on preferences and migration decisions by using original household survey data from two developing countries that are both characterized by a longstanding tradition in regional migration. In coastal communities in Ghana and Indonesia, individual risk and time preferences have not only been elicited through survey questions but also through experimental tasks with real and relatively large monetary payoffs. There is evidence that out-migrants from both study regions are significantly less risk averse and have a lower time preference than non-migrants. Overall, the results indicate that the considered individual preferences are as important as employment status, education or networks, which have mainly been the focus of migration theories.

3.1 Introduction

Migration is a powerful demographic force, which is highly interlinked with development in most economies, and there is little doubt that a better understanding of migration decisions supports the effective design of migration policies. Thus, over the last 125 years, economic theories have aimed to explain both internal and international population movements.

Many of these theories rely on the assumption that migration decisions are based on a cost–benefit analysis. However, costs and benefits of migration are typically uncertain, which makes migration a rather risky undertaking. In addition, migration costs are generally seen as a mainly irreversible initial investment before any benefits can be reaped in the future (Gibson & McKenzie 2011). Given the uncertainty involved and the temporal divergence of costs and benefits, it can be easily hypothesized that migration decisions are affected by individuals' willingness to take risks as well as by their time preferences.

While the theoretical argument for the relationship between risk and time preferences and migration is not new, there are only a few studies addressing these relationships empirically (Hamoudi 2006; Jaeger et al. 2010; Gibson & McKenzie 2011; Bauernschuster et al. 2014; Williams & Baláz 2014; Akgüç et al. 2016). These studies mostly use self-reported preferences, which do not have real economic consequences. However, using preference questions without real monetary payoffs might cause biased indicators because respondents have fewer incentives to make a cognitive effort to elicit their true preferences and because they may decide to misrepresent themselves—especially when asked about preferences that carry normative values. A monetary payoff, however, will serve as an additional incentive to consider answers more carefully, which may ultimately result in a higher external validity.

Therefore, this paper attempts to contribute to the literature by using incentivized experiments to elicit risk and time preferences to link them to out-migration decisions. A household survey has been conducted in communities of two developing countries—Ghana and Indonesia—which are both characterized by highly mobile populations. For both study regions, there is robust evidence that out-migrants are significantly less risk averse and have a lower time preference than non-migrants. Overall, results also indicate that these individual preferences are as important as employment status, education or networks, which have mainly been the focus of migration theories.

3.2 Literature

Traditional neoclassical migration theories typically relied on the assumption that migrations are driven by regional wage and income differentials. These early models have not yet considered the role of individual preferences and uncertainties, e.g., linked to the probability of employment or the costs of migration. These factors were rather expected to affect everyone in the same way (Todaro

1969; Harris & Todaro 1970). Lack of empirical support for this theory relying only on geographical differences has resulted in the incorporation of microlevel socio-demographic characteristics (Sjaastad 1962; Becker 1964). A neoclassical model of individual choice emerged, which emphasized that migrants could no longer be seen as a homogeneous group but rather move to places where they can maximize utility, given their personal characteristics (Sjaastad 1962; Massey et al. 1993). Heterogeneity between individuals, and thus individual characteristics like age, human capital, gender and similar traits, was now seen as an important migration-explaining factor.

Individual risk preferences as potentially important determinants of migration were first considered by Stark (1981). Initial risks of individual rural–urban migration are quite high: attempts to work in high-paying sectors may be unsuccessful, jobs in low-paying sectors are vulnerable to market fluctuations and it is possible that rural–urban migrants end up unemployed. Thus, future benefits are considered uncertain, which complicates individual cost–benefit calculations and emphasizes the importance of individual risk aversion in migration decisions. However, it is also assumed that these risks diminish with time and may be lower than typical agricultural risks after an initial high-risk period (Stark & Levhari 1982). Therefore, the direct link between risk aversion and migration is ambiguous. On the one hand, risk-averse individuals might be more willing to migrate to reduce their lifelong income-associated risks. On the other hand, the high initial risks and uncertain future incomes might already deter risk-averse individuals from migrating.

Out-migration of an individual, however, might not only be the result of an individual cost–benefit analysis but the result of a household’s strategy to diversify risks. The “New Economics of Labor Migration” (NELM) put forward the idea that out-migration of one household member can serve as a strategy to diversify the household’s income portfolio and hence to minimize income risks and to overcome market constraints (Stark & Bloom 1985; Stark 1991).

While risk preferences are the most widely considered preferences in the migration literature, there are other preferences that are also likely to impact on migration decisions. Stark’s (1981) hypothesis of an individual intertemporal trade-off of risks does indirectly also introduce time preferences as a potentially important factor in migration decisions. Migrations are also generally associated with a costly and mainly irreversible initial investment—including, for example, transportation, information and psychological costs—before any benefits can be reaped (Gibson & McKenzie 2011). Individuals who have a rather long planning horizon and low time preferences are more likely to be willing to wait for lower-risk periods and future benefits to come. Thus, it can be expected that patient individuals with a low time preference are more likely to engage in migration than less patient, more myopic individuals.

Despite the consensus that migration is a risky and intertemporal decision, empirical evidence on the link between risk and time preferences on the one hand and migration on the other is still limited

(Hamoudi 2006; Jaeger et al. 2010; Gibson & McKenzie 2011; Bauernschuster et al. 2014; Williams & Baláz 2014; Akgüç et al. 2016). Studies concerned with this linkage mostly drew on extensive microdatasets, which began to include questions about the respondent's willingness to take risks. Using the Mexican Family Life Survey, Hamoudi (2006) concluded that risk-averse children are more likely to leave the household while their rather risk-loving siblings remain living with their parents. He argued that parents, as decision-makers, send the more risk-averse off-spring away, as these are assumed to be more trustworthy risk-sharing partners. Conroy's (2009) results, also based on the Mexican Family Life Survey, suggested that risk-averse women are more likely to migrate away from regions with higher income variances in the Mexican context. Relying on the extensive Survey on Rural–Urban Migration in China, Akgüç et al. (2016) found that rural–urban migrants in China are substantially less risk averse than non-migrants. Based on the German Socio-Economic Panel, which first included self-reported measures of the willingness to take risks in 2004, Jaeger et al. (2010) and Bauernschuster et al. (2014) also came to the conclusion that risk-loving individuals are more likely to move within Germany. Using the same panel data, Bonin et al. (2009) found that international in-migrants are less risk-tolerant than the native German population. This finding, however, can be explained by general ethnic differences and selectivity issues because a welfare state like Germany might have received more risk-averse migrants. A key question, therefore, is whether migrants differ in their preferences compared with the populations they originate from. While these studies rely on self-reported measures of risk tolerance, Hao et al. (2014) were to our knowledge the first study that used an incentivized field experiment and found that migrants and non-migrants from different source areas do not differ in their attitudes toward risks.

Empirical evidence for the importance of time preferences is even more scarce (Nowotny 2010; Arcand & Mbaye 2013). Again, those studies use measures based on survey questions or hypothetical gambles; however, they cannot rely on extensive national surveys as these typically do not yet include self-reported measures of time preferences. Therefore, Nowotny (2010) focused on the Austrian–Slovakian border region and found that a higher time preference rate, i.e., the more impatient a person is, decreases the willingness to migrate. Gibson and McKenzie (2011) confirmed this finding with a survey among top students in the Pacific and so did Arcand and Mbaye (2013), who assessed the effect of time preferences on the willingness to pay illegal smugglers in Senegal.

3.3 Methodology

3.3.1 Study site and sampling

To investigate the effect of preferences, a household survey was conducted among migrants and non-migrants who originally come from the same region. This approach ensures that the context is similar for every respondent. Ultimately, two relatively medium-sized coastal regions, characterized by a longstanding tradition in regional migration, were selected to pinpoint the impact of site-

specific factors on migrations and to assess whether the effect of preferences differs in different parts of the world, the Keta municipality in Southeastern Ghana and Semarang in Central Java, Indonesia.¹⁵

The first study region, the Keta municipal district, is located in the Volta region in rural Southeastern Ghana and has a population of nearly 150,000 inhabitants with the great majority belonging to the Ewe-speaking population of Ghana (Ghana Statistical Service 2014). The Keta municipality experiences heavy erosion and economic decline, but also a highly dynamic migration system. The free movements of people, goods and capital in this subregion are especially encouraged by the Economic Community of West African States. Ghana, next to Côte d'Ivoire, became the key traditional country of migration (Adepoju 2003). Thus, today 40% of Ghanaian households report having at least one member who is a migrant (Ackah & Medvedev 2012). In the Volta region, despite the Ewe's attachment to their source communities and homelands, rural-to-urban migration is also considered one of the most popular livelihood strategies of households, especially encouraged by environmental degradation and population growth-induced pressures (Tsegai 2005).

Semarang, the second study region and the provincial capital of Central Java, has around 1.6 million inhabitants and is, thus, substantially bigger than the Keta municipality. It is a coastal urban area at the Northern coast of Java, located between Jakarta and Surabaya, the two major cities of Indonesia. During colonial times, Semarang emerged as a successful and important port and is still seen as an important regional center today (Knaap 2015). Not only Ghana but also Indonesia generally shows a highly dynamic migratory system. In Indonesia, the state-sponsored transmigrasi programs, beginning in 1905 and culminating during the Suharto regime, had a very significant impact on migration patterns. The program brought millions of people from overcrowded islands to outer islands. Soon, Java became a major sending area of migrants (Fearnside 1997). Thus, internal migration is no new phenomenon in Indonesia, and already in 1930 11.5% of the inhabitants lived outside their birth district. In 2000 this percentage was nearly twice as high (Lottum & Marks 2012). Besides the historical impact of the transmigrasi programs, Java experiences widespread internal labor migration and increasing urbanization. Even though labor migration to the Middle East and other Asian countries is also a key form of the rising out-migration and underlines the general trend of increasing international emigration of Indonesian people, mainly coming from Java (Hugo 2008), Semarang is found to have less (net) out-migration than other cities on Java, most likely due to its thriving urban development (Mulyana et al. 2013).

¹⁵ Please note that this research has been conducted as part of an overarching project that focuses on coastal environmental changes and migrations. Therefore, the study regions have not only been chosen because of their migration systems but also because both regions experience severe coastal erosion and inundation. The link between those environmental threats and migrations, however, is the topic of another empirical research paper.

In each of the two regions, households in several communities were randomly selected: in Semarang, high-resolution satellite pictures and randomly generated GPS points were used to select households; in the Keta municipality, however, households were selected using a systematic random sampling¹⁶ strategy. In every selected household, the enumerator first interviewed the household head, before she used the generated household roster randomly to select a household member above the age of 18 years.¹⁷ This selected household member, which could also be the household head, was then asked to participate in the main part of the survey. Because this study did not want to focus solely on migration intentions or the individual's willingness to migrate but on actual migration, one randomly chosen migrant of the household was additionally interviewed by phone—in the case where there was a migrant reported by the household head.

In line with the Foresight report, migration is understood as a movement from one place to another for a period of three months or more (Foresight 2011). This study does not focus on international migration only but also considers everyone a migrant who moves within the country—to another region, district or community. Not only did a first survey reveal that only very few randomly selected migrants actually cross borders, but also other studies have shown that the majority of migrants move internally (IOM 2015). While it is quite common to get information about the migrant from a proxy respondent like the household head, migrants in this study have been contacted and interviewed directly. Therefore, we were able to avoid proxy errors and measure the individual preferences of migrants directly. Apart from risk and time preferences, migrants were asked to provide information about certain potentially migration-driving characteristics for the time when they left. This enables the comparison of these characteristics of non-migrants and migrants before their out-migration (Carletto & de Brauw 2007). In addition, migrants were only included when they had left within the last 10 years to reduce recall bias.¹⁸

Ultimately, in Semarang, 240 households were interviewed out of which 105 households (43.75%) listed at least one migrant. In the Keta municipality, 190 households participated in the survey, out of which 101 (53.16%) had at least one migrant. As expected, the great majority of migrants in the sample moved internally: only 4 percent of migrants from Semarang and only 7 percent of migrants from the Keta municipal district actually left the country. Nearly a third of movements happened between communities of Semarang, while only 7 percent of migrants moved within the Keta

¹⁶ This was done by randomly selecting a first household followed by approaching every next k^{th} household from the starting one, with k , the sampling interval, being calculated as: $k = \text{total number of households in community} / \text{total number of desired households interviewed in that community}$. Furthermore, the number of households surveyed from every community was proportional to the community's population within the Keta municipality.

¹⁷ This was done by assigning a number to every household member and selecting one of them by rolling a die.

¹⁸ However, the magnitude of recall bias is generally considered to be small. The advantage of this approach is again that it can be applied and has already been applied in many contexts where high-quality data are not available (Gray & Bilsborrow 2014).

municipality. This finding is not very surprising because Semarang is essentially bigger, its communities more diverse and economically stronger than those in the Keta municipality. That might also be the reason why most migrants from Semarang stay within the region (Central Java), whereas migrants from the Keta municipality tend to leave the region (Volta region), mostly to move to the greater Accra region.

3.3.2 Data

A major obstacle in linking individual preferences to migratory behavior is the availability of reliable data. Many migration studies rely on data from national surveys; however, most of them do not include questions on preferences. Others get information about the migrant from the household head and are thus not able to account for very personal preferences. Others track migrants down, which is very time and cost consuming and thus only feasible for smaller qualitative studies. Therefore, for this study, original data were collected by interviewing migrants directly in a cost- and time-efficient way by phone, which enables the direct measurement of every respondent's preferences.¹⁹

3.3.2.1 Survey questions

So far, the great majority of papers addressing the relationship between preferences and migration relies on stated preferences because those are generally cheaper to collect and do not need further instructions. Therefore, this study uses standard Likert-type questions in which respondents were asked to state their willingness to take risks in general.²⁰ Respondents were also asked to rate how patient they are in general. The focus, here, lies on the respondent's *general* preferences and not on specific preferences linked to explicit actions or scenarios to capture a more comprehensive notion of risk and time preferences. General measures are typically considered to be more relevant when investigating broader decisions like migration because these decisions are commonly linked to several dimensions of risk (Akgüç et al. 2016).

3.3.2.2 Incentivized experiments

On top, incentivized tasks have been chosen for several reasons. First, unlike their age or educational level, respondents may be less aware of their personal preferences. With monetary incentives, however, respondents are expected to make more cognitive effort to elicit their true preferences. Second, incentives reduce the potential problem of social desirability biases in self-reports in which respondents might prefer to misrepresent themselves—especially when asked about preferences that carry normative values (Hamoudi 2006). Finally, to our knowledge, incentivized tasks with real-

¹⁹ Contrary to initial concerns, household heads were not reluctant to hand out mobile phone numbers of migrants and even facilitated the procedure by informing the migrant about our request for a phone interview and by assuring them that we have the necessary research permits and support letters of the local universities. Finally, less than 2% of respondents refused to be interviewed.

²⁰ Respondents were also asked about their willingness to take risks in financial matters and leisure and sports, but because these self-reported measures are highly correlated with the self-reported willingness to take risks in general, they were not further considered for this research.

money payoff have so far only been used in one previous study focusing on risk preferences and migration and are still largely underrepresented (see Hao et al. 2014). Hence, basic experiments with real and relatively large expected payoffs were additionally used to elicit the respondent's actual preferences. Thus, all respondents were presented with two incentivized tasks. Instructions and examples were identical across respondents. Because migrants were interviewed by phone, non-migrants also completed the tasks by phone to keep answers comparable. Even though phone interviews were the most suitable approach to get direct responses from migrants regardless of their current residence and worked really well, it also meant keeping the tasks simple enough to be understood by respondents without the possibility of visualization. In the end, the respondents were paid according to their decisions in a randomly selected task (see also Healy et al. 2016). This procedure was communicated clearly beforehand. Ultimately, the generated payoff was transferred via mobile phone credits, which the respondent could either cash in or use as phone credits.

Risk

The risk-aversion experiment is based on Binswanger's (1980) experiment in rural India. He offered eight alternatives to the respondents, where each alternative consisted of a good luck and bad luck outcome with a probability of 50–50 (Binswanger 1980). In this study, and also in line with Hamoudi (2006), Ng (2013) and others, respondents were presented with a series of binary choices between a sure amount and a probability-based alternative, in which respondents could receive one of two amounts with a chance of 50–50 (see Figure 3.1). While the sure amount was held constant throughout the questions, the expected payoff of the probability-based alternative changed over the course of the series to detect different individual risk preferences. Notably, to reduce the influence of cultural differences on the results, the probability-based alternative was not labeled as a gamble, which has a negative connotation in the Islamic context of Semarang.

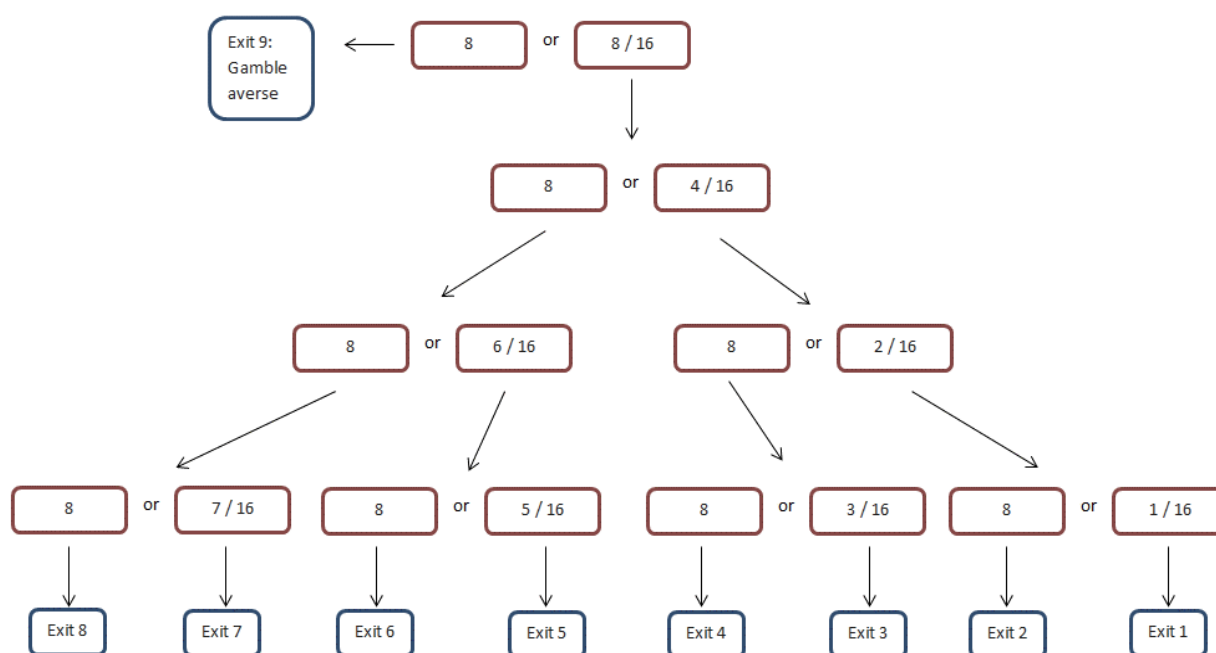


Figure 2.1 Staircase method for eliciting risk preferences (Payoff denoted in Ghana Cedis)

Furthermore, an initial binary choice between a sure amount of 8 Ghana Cedis and a dominant equal-probability option that would pay at least 8 Ghana Cedis was included (see also Hamoudi, 2006).²¹ A quarter of the respondents from Semarang and a fifth of the sample from the Keta municipality chose the sure amount and declined to change their minds even after the enumerator explained the choice set again. These individuals may be labeled as gamble or hyper-risk averse because they are different from those who were willing to take the probability-based alternative first but then the safer options afterward. Every respondent choosing the sure amount in this initial choice set was asked why she did so. The great majority in both study sites stated that they were indeed unwilling to take the risk while only a few named other reasons such as not trusting the other option or being afraid to look greedy. Thus, from now on these respondents will be called “gamble averse.” Respondents who passed this filter question were presented with three more choice sets with differing expected payoffs. The exact choice set depended on the respondent’s choice in the previous options (see Figure 3.1). This dynamic staircase design was chosen because it optimizes the information of each choice by taking less time than the use of choice lists. However, the accuracy of the measure is not impaired (Toubia et al. 2013; Falk et al. 2013). Thus, after passing the filter question and by just making three more choices, the respondents could be grouped into nine risk categories, ranging from

²¹ In the Indonesian case, the sure amount was 40 000 Rupiahs. These values are economically meaningful, because a survey previously conducted in both study areas revealed that an average Indonesian household member earns around 33 000 Rupiahs per day, while a Ghanaian respondent earns on average 6 Cedis per day. On average, Indonesian respondents have received 45 000 Rupiahs (ca 3.4 USD) and Ghanaian respondents 11.6 Ghana Cedis (ca. 3 USD) at the end of this study.

1 (= least risk averse) to 8 (= most risk averse) and 9 (= “gamble averse”).²² Time efficiency and simplicity were crucial for the success of this task because the phone interviews had to be kept as short, easy to understand and less tiring as possible.

Time

The approach to elicit time preferences is similar to the risk-preference task. Again, a staircase method was used. Respondents were presented with a series of binary choices between receiving a certain amount the next day and receiving a larger amount later in the future, which is a common method for measuring time preferences (Chabris et al. 2008). While the sooner amount was held constant throughout the questions, the later amount changed over the course of the series to detect different individual time preferences (see Figure 3.2).

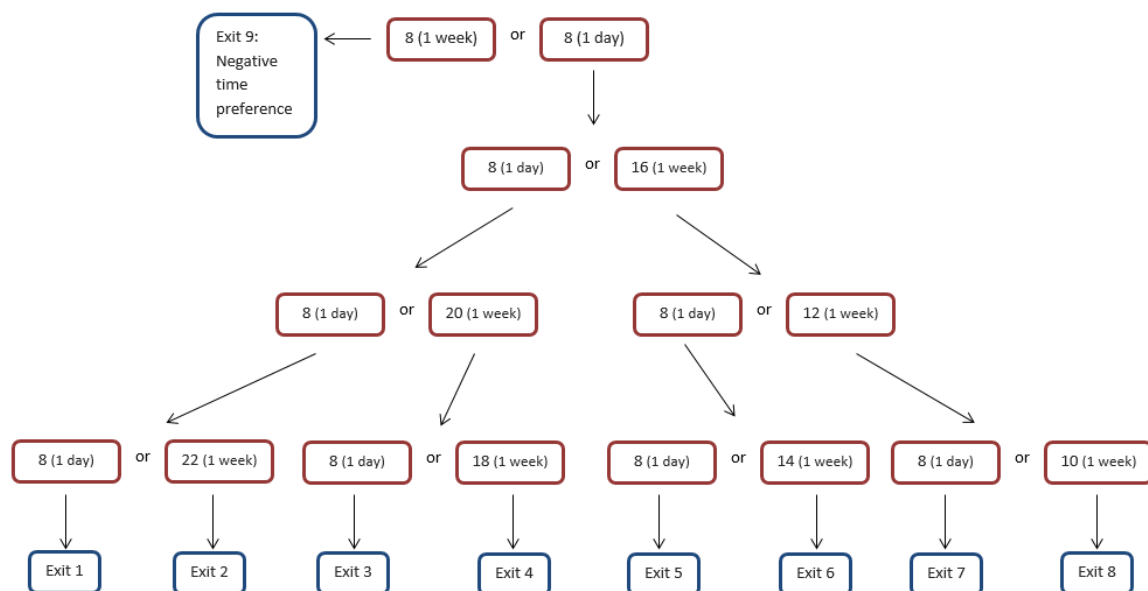


Figure 3.2 Staircase method for eliciting time preferences (Payoff denoted in Ghana Cedis)

The sooner amount was not paid out immediately but also at a future point in time to reduce differences in transaction costs and risks associated with the two payment options (Harrison et al. 2002). Again, a first filter question was asked by the enumerator. This question presented the respondent with the choice between receiving 8 Ghana Cedis the next day and receiving 8 Ghana Cedis in one week.²³ If the respondent preferred to wait a week, the choice set was explained again. Still, 7% of the respondents from Semarang and 20% of the respondents from the Keta municipality chose the latter option and preferred to delay receiving money without compensation. They could have done so because they are extremely patient, because they use the task as a savings device, or

²² If the respondent ended choosing the probability-based option, a coin was tossed to determine which of the two amounts would be transferred to the respondent.

²³ Again, in the Indonesian case, the respondent was offered 40 000 Rupiahs.

because they are simply irrational. When directly asked why they decided to wait for the same amount of money that they could have received earlier, the majority stated that they want the enumerators to save it for them. From now on these respondents will be called “negative time discounters,” as they prefer to delay receiving money without compensation (Ng 2013). While the task had now ended for negative time discounters, the other respondents were presented with three additional binary choices. Again, the respondents could be grouped into different categories, ranging from 1 (= most impatient/highest time preference) to 8 (= most patient/lowest time preference) and 9 (= “negative time discounters”).

3.4 Descriptive Analysis

This section will take a first look at the elicited individual risk and time preferences. The distributions of respondents’ choices are presented in Figure 3.3 and 3.4. Neither risk nor time preferences differ substantially across our study regions; however, it can be noticed that respondents from Semarang are not only more “gamble averse” than respondents from the Keta municipality, which is not surprising given their religious background, but also less patient.²⁴

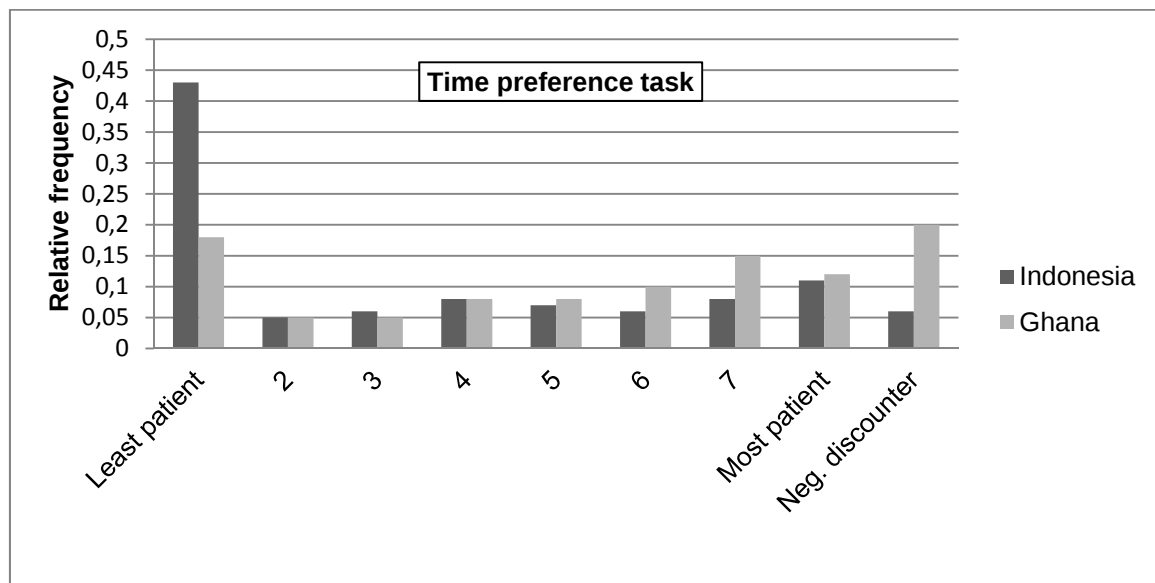


Figure 3.3 Relative frequency distribution of the time preference task for the two study regions in Indonesia and Ghana

²⁴ In both study regions, women and older respondents were statistically less likely to be willing to take risks. In addition, in the Keta municipality, the willingness to take risks increased with the household income. The self-reported patience increased with age in both regions.

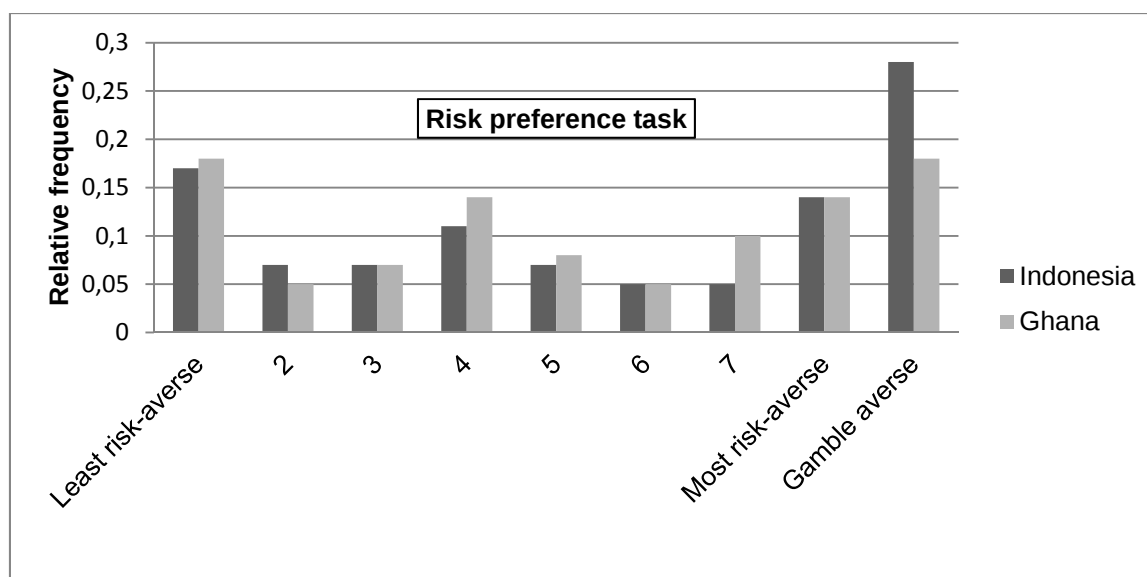


Figure 3.4 Relative frequency distribution of the risk preference task for the two study regions in Indonesia and Ghana

Statistical correlations serve as a formal assessment of the degree to which these indicators measure the same underlying construct as stated preferences (see Table 3.1). The results indicate that individuals who reported to be more risk averse also took significantly fewer risks when real money was at stake. This holds true for both study regions. For time preferences, the correlation is less clear. While stated and revealed time preferences in the Keta municipality are not significantly correlated, a strong correlation can be found for respondents from Semarang. Those Indonesian respondents who state that they are more patient are also more likely to actually forego imminent money to receive a greater amount in the future.

Table 3.1 Correlation of stated and revealed preferences

Indonesia/ Ghana	Risk, survey	Risk, task	Time, survey	Time, task
Risk, survey	1.00			
Risk, task	0.168***/ 0.118**	1.00		
Time, survey	-0.035 / 0.086	-0.131**/ -0.046	1.00	
Time, task	-0.094*/ -0.016	-0.301**/ 0.046	0.114**/ -0.019	1.00

Note: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

These results indicate that the risk-aversion experiment is likely to measure the same underlying construct as the risk-aversion question in the survey. This correlation is less clear for time preferences in the Ghanaian study, which indicates that the time preference measures might actually measure different domains of patience: While the stated time preference measures asked for the general patience of the respondent, the incentivized measure has focused on a specific financial choice.

3.5 Regression Analysis

Because migration responses are the result of a complex combination of several factors, we use a model where individual, household and community-level factors are all simultaneously considered to isolate the net effect of individual preferences.

Thus, the model for testing the relationship between individual preferences and the decision to migrate is

$$\log\left(\frac{\pi_i}{1-\pi_i}\right) = \alpha + \beta \text{ risk preference}_i + \gamma \text{ time preference}_i + \delta_j X_{ij} + u_i, \quad (2)$$

where π_i is the probability of out-migration of individual i , X_{ij} stands for a set of j independent variables and α is a constant. u_i are the residuals.

At the community level, control variables include the community's population density as well as its percentage of employed inhabitants. In addition, the percentage of the population without an own toilet is included as a wealth proxy. These variables are only available for Indonesia. For the analysis of the Ghanaian data, community fixed effects are included to account for larger-scale community factors influencing migration. At the household level, control variables include a dummy for female-headed households and household size, which are expected to impact positively on the propensity to migrate, as well as the number of children in the household and the ownership status, which are expected to be negatively correlated with migration decisions.²⁵ Another important variable resulting from the NELM theory is the relative household income. Stark and Bloom (1985) emphasize that households engage in income comparisons and may send out a migrant due to their relative deprivation within the community. To acknowledge that not only households but also bigger networks might be important for migration decisions, a control variable indicating an individual's network was added.

Furthermore, the most common individual characteristics like sex, age, marital and employment status, education and previous migration experience were included. Together, these controls account for the most important migration drivers found in previous studies. A further definition, as well as means and standard deviations of the variables used in this paper, are provided in Table 3.2.

²⁵ The number of children in the household is expected to be negatively correlated with the decision to migrate because parents and other household members are needed to help with raising the children. The household size, however, is seen as an indicator for household-level labor abundance and expected to be positively correlated with migration propensities (Ackah & Medvedev 2012).

Table 3.2 Definition and summary statistics of variables for Indonesian sample (Ghanaian sample in parenthesis)

Variable name	Definition	Mean	Std. Dev.
Migrant Status	= 1 if migrant, = 0 otherwise	0.31 (0.31)	0.46 (0.46)
Risk aversion, stated	“In general, I am very willing to take risks,” Likert Scale from 1 = Agree strongly to 5 = Disagree strongly	2.29 (2.77)	0.77 (1.33)
Time preference (Patience), stated	“In general, I am a patient person,” Likert Scale from 1 = Disagree strongly to 5 = Agree strongly	3.65 (4.13)	0.83 (0.98)
Risk aversion, revealed	Based on incentivized tasks, from 1 (= least risk averse) to 8 (= most risk averse) and 9 (= gamble averse)	5.51 (5.24)	3.08 (2.90)
Time preference, revealed	Based on incentivized tasks, from 1 (= most impatient) to 8 (= most patient) and 9 (= negative time discount)	3.69 (5.48)	2.88 (2.89)
Age ^a	Age in years of respondent	36.63 (37.83)	14.45 (16.72)
Age ^{2a}	Age squared	1550 (1709)	1261 (1527)
Sex ^a	= 1 if female, = 0 otherwise	0.57 (0.53)	0.49 (0.49)
Married ^a	= 1 if married, = 0 otherwise	0.69 (0.42)	0.46 (0.49)
Education ^a	Years of education	11.13 (9.94)	3.64 (4.81)
Migration experience ^a	= 1 if has lived somewhere else between age 18 years and now, = 0 otherwise	0.30 (0.69)	0.45 (0.46)
Unemployed ^a	= 1 if unemployed, = 0 otherwise	0.35 (0.37)	0.48 (0.48)
Ownership ^a	= 1 if house is owned by respondent or spouse, = 0 otherwise	0.53 (0.10)	0.49 (0.30)
Female-headed HH ^a	= 1 if household (HH) head is female, = 0 otherwise	0.15 (0.44)	0.36 (0.49)
No. of children in HH ^a	Number of children of age 15 years or younger living in household	0.73 (0.98)	1.03 (1.33)
Household size ^a	Total number of household members	4.60 (5.82)	1.99 (2.81)
Relative HH income ^a	Household income relative to average community income	1 (1)	0.67 (0.91)
Network ^a	Index between 0 and 5, based on how many questions were answered with “yes” when asked about having friends or family members abroad, in different parts of the country or in different communities in Semarang or the Keta municipality, respectively	1.95 (3.93)	1.17 (0.96)
Log. Pop. Density	Logarithm of the community’s population density per square kilometer	8.76	1.09
Employment ratio	Percentage of population employed	0.55	0.038
Toilet	Percentage of population having no toilet or using public toilet	0.12	0.08
Migration plans	= 1 if respondent has plans to leave community within the next five years	0.06 (0.32)	0.24 (0.47)

Note: ^a if migrant: at the time of migration

The models are estimated using logistic regressions. Because the independence of observations cannot be assumed and individuals from one household are expected to be more similar, all models were adjusted for clustering at the household level. This adjustment for clustering corrects for any household-level correlation resulting from the clustered sampling strategy. Finally, we account for the fact that there is only information for one migrant (non-migrant) per household regardless of the

total number of migrants (non-migrants) by weighting the observations based on the inverse of the probability of selection.

3.5.1 Semarang, Indonesia

The results for Semarang are presented in Table 3.3. Three models were tested: the first model includes the measures for individual risk and time preferences without any covariates to avoid biases caused by multicollinearities. The second model, however, extends this specification by adding age and sex of the respondents, which are often considered to be the most important migration factors. The third model includes all previously mentioned variables.

As Model 1 shows, both measures of risk aversion are associated with a lower migration propensity, while the stated time preference measures were found to be positively correlated with migration, indicating that patient individuals are more likely to be migrants. This is consistent with our hypothesis as well as with previous results in the literature and this conclusion does not change when more control variables get added in Models 2 and 3. While the other preference measures were found to be significantly correlated with out-migration, the revealed time preferences were not. However, if the negative time discounters get excluded from the sample, the correlation between revealed time preferences and out-migration becomes significant in all specifications (see also robustness check section).

Table 3.3 Logistic regression results, Semarang, Indonesia

	Model 1		Model 2		Model 3	
	(1) Migrant Status	(2) Migrant Status	(3) Migrant Status	(4) Migrant Status	(5) Migrant Status	(6) Migrant Status
Risk aversion, stated	-0.625*** (0.20)		-0.453* (0.27)		-0.518* (0.27)	
Time preference (Patience), stated	0.211 (0.16)		0.537** (0.22)		0.728*** (0.24)	
Risk aversion, revealed		-0.144*** (0.04)		-0.179*** (0.06)		-0.176** (0.08)
Time preference (Patience), revealed		0.053 (0.05)		0.053 (0.07)		0.064 (0.07)
Age			0.873*** (0.24)	1.018*** (0.26)	0.991*** (0.25)	1.230*** (0.26)
Age ²			-0.017*** (0.00)	-0.019*** (0.00)	-0.020*** (0.00)	-0.024*** (0.00)
Sex (Female = 1)			-0.481 (0.35)	-0.610* (0.34)	-0.183 (0.40)	-0.391 (0.42)
Married (= 1)					0.556** (0.25)	0.432* (0.25)
Education					-0.029 (0.07)	-0.049 (0.07)
Migration experience (= 1)					0.017 (0.44)	0.219 (0.45)
Unemployed (= 1)					-1.414*** (0.42)	-1.126*** (0.42)
Ownership (= 1)					-0.500 (0.48)	-0.293 (0.41)
Female-headed HH					0.152 (0.46)	0.338 (0.45)
No. of children in HH					-0.439** (0.21)	-0.405* (0.24)
Household size					0.122 (0.10)	0.405* (0.24)
Relative HH income					0.130 (0.31)	-0.104 (0.34)
Network					0.482*** (0.17)	0.570*** (0.18)
Log. Pop. Density					-0.061 (0.19)	0.025 (0.17)
Employment ratio					-11.403** (4.90)	-10.433** (4.40)
Toilet type					-0.583 (2.18)	0.021 (2.13)
Constant	0.947 (0.72)	0.874*** (0.34)	-10.089*** (3.65)	-10.560*** (3.46)	-5.310 (4.86)	-15.041*** (4.89)
<i>BIC</i>	920.887	911.286	593.416	584.745	545.362	549.400
<i>AIC</i>	909.697	900.106	571.036	562.384	474.552	478.652
<i>Pseudo-R²</i>	0.039	0.047	0.406	0.413	0.533	0.528
<i>Percent correctly classified^a</i>	69.75%	70.165%	78.83%	79.22%	85.67%	82.68%
<i>Percent reduction in error</i>	3.64%	4.96%	32.29%	33.55%	53.68%	46.21%
<i>N</i>	308	307	308	307	307	306

Note: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, ^a Classification of models calculated without p -weights.

Overall, the results of the control variables are consistent with previous studies. Age, which was found to have a curvilinear effect on migration, is highly significant. The probability of migration first increases with the age of the respondent, reaches its peak at the age of 26 years and decreases afterward.

The full Model 3 reveals a significant correlation between marriage and migration, which indicates that married individuals are more likely to migrate. Another robust and significant coefficient is found for the unemployment status of an individual: an unemployed person is less likely to move away, which is an important but rather unexpected result. This finding, however, could be explained by the specific context of our Indonesian study region, Semarang, which is an economically thriving city with a busy harbor and industry sector and which might offer more opportunities for unemployed people than many surrounding migration destinations.

The number of children in the household, and to a lesser extent also the household size, has a significant impact on the decision to migrate.²⁶ As expected by theory, living in a bigger household is associated with a higher propensity to leave, while living with more children in a household is associated with a lower propensity to migrate.²⁷ Not only households but also broader networks play a role in explaining migration in Semarang. The coefficient does not only turn out significant at the 1% level but is also quite important in size. Respondents from Semarang that have a rather good network are more likely to migrate than those who have fewer friends and family in other places outside of their community. Furthermore, migrants are more likely to originate in communities with a lower employment ratio.

When looking at marginal effects on the probabilities of migrating, we find that the investigated preferences revealed by incentivized tasks are not only consistently significant but also meaningful in size. The probability of being a migrant is around 15 percentage points higher for individuals willing to take risks than for those unwilling to take risks. The *ceteris paribus* difference in the probability of being a migrant between the most patient individual in the sample and the most impatient, based on revealed time preferences, is 11 percentage points.

To evaluate the accuracy and goodness-of-fit of the models, we include the Akaike (AIC) and Bayesian Information Criteria (BIC) as well as McFadden pseudo- R^2 . The pseudo- R^2 cannot be interpreted as the common ordinary least-squares R^2 ; nevertheless, higher values of R^2 indicate a better model fit.²⁸ In addition, we report the percentage of correctly classified cases, which is a commonly used goodness-of-fit measure and assesses how well the predictions fit the observed outcome, as well as the percent reduction in error.²⁹ Regardless of the measure, it could be seen that

²⁶ The results do not change when one of these two variables is dropped due to multicollinearity issues.

²⁷ Other household level variables, like individual or household income in absolute terms, never turn out significant when included. We do not include them here due to their correlation with relative household income.

²⁸ Some state that a McFadden pseudo- R^2 between 0.2 and 0.4 is already very good.

²⁹ In specification (1)—when only two preference factors are included—69.75% of cases are correctly classified. This may seem impressive; however, it does not tell us anything about the proportion of correctly classified cases beyond the number that would be correctly guessed by choosing the most frequent outcome. Because 212 out of 308 respondents are non-migrants, just by chance 68.61% of outcomes would be predicted correctly. Thus, White (2013) recommends using this information and calculating the proportional reduction

risk and time preferences are already quite useful for explaining the outcome. Nevertheless, including sex and age of respondents increases the model fit drastically.

3.5.2 Keta municipality, Ghana

The results for the Keta municipality are presented in Table 3.4. Overall, the models support common findings. Again, risk aversion regardless of its measurement was found to be negatively and significantly linked to out-migration. The coefficients of time preference measures show the expected correlation; however, they do not turn out to be significant. Revealed time preferences only become significant at the 10%-level in specification (6). Nevertheless, it can already be stated here, that robustness checks show that the coefficients of revealed time preference become significant at the 5%-level once negative time discounters were excluded from the sample—just like in the Indonesian case.

Looking at the control factors again, younger and male individuals were found to be more likely to be migrants. Please note that age was not found to be curvilinear in the Ghanaian case, with the result that no quadratic term was included in the analysis. The individual employment situation, previous migration experience as well as the number of years of education is significantly and positively correlated with the decision to migrate. Unemployed people are more likely to leave the study region and look for a job in bigger cities, while every additional year of schooling increases the predicted probability of out-migration. As expected, previous migration experience facilitates further migration decisions.

Again, migrants are more likely to come from bigger households as well as from relatively deprived households, which provides some support for the hypothesis that households with a lower relative income send out migrants to diversify risks and to generate income somewhere else (Stark & Bloom 1985). Networks, which turned out to be imperative in Semarang, are not found to be correlated with out-migration from the Keta municipality.

in error, which is reported in Table 4.2 as well, and which shows that specification (1) reduces the error by 3.64%.

Table 3.4 Logistic regression results, Keta municipal district, Ghana

	Model 1		Model 2		Model 3	
	(1) Migrant Status	(2) Migrant Status	(3) Migrant Status	(4) Migrant Status	(5) Migrant Status	(6) Migrant Status
Risk aversion, stated	-0.552*** (0.12)		-0.338** (0.14)		-0.335** (0.18)	
Time preference (Patience), stated	0.000 (0.13)		0.096 (0.15)		0.214 (0.16)	
Risk aversion, revealed		-0.109** (0.05)		-0.098* (0.04)		-0.123** (0.06)
Time preference (Patience), revealed		0.045 (0.05)		0.071 (0.05)		0.101* (0.06)
Age			-0.075*** (0.01)	-0.081*** (0.01)	-0.069*** (0.01)	-0.074*** (0.01)
Sex (Female = 1)			-0.371 (0.30)	-0.410 (0.29)	-0.705** (0.33)	-0.786** (0.33)
Married (= 1)					0.345 (0.41)	0.405 (0.42)
Education					0.088* (0.05)	0.096** (0.05)
Migration experience (= 1)					0.862** (0.41)	0.956** (0.38)
Unemployed (= 1)					0.909** (0.37)	1.019*** (0.38)
Ownership (= 1)					-1.413* (0.86)	-1.200 (1.05)
Female-headed HH					0.334 (0.32)	0.201 (0.31)
No. of children in HH					-0.252 (0.17)	-0.233 (0.16)
Household size					0.207*** (0.06)	0.214*** (0.05)
Relative HH income					-0.257* (0.15)	-0.246* (0.13)
Network					0.132 (0.19)	0.150 (0.19)
Constant	2.024*** (0.64)	0.872** (0.42)	3.530*** (0.80)	3.332*** (0.51)	-0.231 (1.36)	-0.433 (1.28)
Community Dummies	No	No	No	No	Yes	Yes
<i>BIC</i>	848.925	815.430	676.945	674.343	669.513	666.628
<i>AIC</i>	816.309	782.814	658.825	656.223	593.409	590.524
<i>Pseudo-R²</i>	0.067	0.072	0.208	0.212	0.327	0.331
<i>Percent correctly classified</i> ^a	71.59%	72.92%	74.37%	75.45%	79.78%	80.51%
<i>Percent reduction in error</i>	9.55%	13.79%	19.54%	20.16%	35.63%	37.93%
<i>N</i>	277	277	277	277	277	277

Note: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, ^a Classification of models calculated without p -weights.

Again, marginal effects on the probabilities of migrating show that effects of preferences elicited by incentivized tasks are meaningful and similar to the findings from the Indonesian study region. Compared with the most risk-averse individuals, the most risk-loving individuals are nearly 12 percentage points more likely to migrate, while the most patient individuals are also 12 percentage points more likely to migrate compared with their most impatient counterparts—based on the respective incentivized task.

3.5.3 Robustness checks

A final methodological issue is concerned with the stability of preferences over time. As previously mentioned, panel data were not available for the two study regions and the collection of new panel data was not feasible due to time constraints. The use of cross-sectional data, however, might lead to the problem of reverse causality because the observed migrations had occurred before the survey was conducted and, thus, before preferences were elicited. Positive feedback caused by successful migration could make migrants less risk averse or at least more likely to see themselves as people who are more willing to take risks (Jaeger et al. 2010). A central issue is, thus, whether migrants moved because they were more risk-tolerant or had a lower time preference, or whether their migration experience had affected risk and time preferences. In the latter case, the links between preferences and migrations should be seen only as statistical associations that, however, still have interesting implications for sending and receiving regions.

However, economists usually assume that preferences are rather invariant (Andersen et al. 2008). Sahm (2012) confirmed that risk aversion slightly increases with age but that risk preferences are otherwise relatively stable. Conroy (2009) emphasized that an increase with age, nevertheless, would only affect the analysis if risk-aversion preferences differed across individuals depending on migration experiences. So far, there is no evidence that migration alters general personality traits like risk or time preferences. Andersen et al. (2008), for example, examined the stability of preferences in regard to major life events, like migration, but did not observe a systematic influence on preferences. Jaeger et al. (2010) used the advantage of a panel dataset and tested whether the impact of risk preferences on migration depends on the point in time in which preferences were measured. However, they found no significant difference in the effect of risk attitudes on migration decisions and concluded that chances are very small that those analyses are driven by reverse causality. Williams and Baláz (2014) justify the use of cross-sectional data by referring to novel neuroscience research, which emphasized the great impact of genetics on economic risk taking. Akgüç et al. (2016), also using cross-sectional data, found that risk preferences were robust to a large external shock, which “supports the robustness of risk tolerance as a stable measure and its role in determining migration decisions rather than vice-versa” (Akgüç et al. 2016, p.172). While the majority of studies focuses on the stability of risk preferences, some other studies have confirmed that time preferences are uncorrelated to changes in socio-economic characteristics as well as to changes in income or employment situations (see, for example, Ng 2013; Meier and Sprenger 2015). In a recent study, Gibson et al. (2016) have addressed the specific problem of a potential impact of migrations on individual preferences: Using a 10-year follow-up survey, they could not detect any significant impact of migrations on risk and time preferences. For these reasons and in line with other works on preferences and migration decisions, we assume that risk and time preferences are

rather “deep parameters” (Lucas 1976)—hence mostly exogenous to past (migration) decisions—and that causality is likely to run from preferences to migration.

Nevertheless, we try to account for the potential endogeneity of preferences by (i) testing their impact on the reported migration intentions of non-migrants and, additionally, by (ii) reducing the time span between migration and survey and, thus, by only including those migrants which left within the previous year (see Tables 3.5 and 3.6). Looking at migration plans, there are not many respondents from Semarang reporting to have any, but we find a significant correlation between revealed preferences and migration plans for the sample from the Keta municipality. Nevertheless, it should be noted that no effect of stated preferences can be found and that also most of the control factors turn out to be insignificantly correlated with migration plans. Even though it can be questioned how far reported migration plans will result in actual out-migration, results confirm the previously found link between preferences and actual out-migrations and thus indicate that this link is not overly driven by reverse causality. Reducing the time span between actual out-migration of the respondents and the survey also confirms the previously found correlation between preferences and out-migration, which strengthens our assumption that general risk and time preferences are exogenous to individual migrations.

Table 3.5 Robustness checks, Semarang, Indonesia

	(i) Plans to migrate	(ii) Only very recent migrations ³⁰	(iii) Community fixed effects	(iv) No clustering	(v) Dropping gamble averse	(vi) Dropping negative time discounters
Alternative specification 1						
Risk preferences, stated	Only 6% of non-migrants	-0.951** (0.38)	-0.650** (0.30)	-0.487* (0.27)	-0.561* (0.33)	-0.467* (0.28)
Time preferences (Patience), stated	report to have plans to move to a different community.	0.972** (0.40)	0.760*** (0.26)	0.664** (0.26)	0.566** (0.29)	0.622** (0.27)
Alternative specification 2						
Risk preferences, revealed		-0.213** (0.10)	-0.199** (0.08)	-0.170** (0.07)	-0.030 (0.05)	-0.111** (0.06)
Time preferences (Patience), revealed		0.248** (0.12)	0.084 (0.07)	0.055 (0.07)	0.079 (0.12)	0.153** (0.07)
Control Variables	-	Yes	Yes	Yes	Yes	Yes
Community Dummies	-	Yes	No	Yes	Yes	Yes
N	-	225	306	306	220	289

Note: The dependent variable for (ii)–(vi) is migrant status. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

³⁰ The survey was conducted in May and June 2015 in Indonesia and in October and November 2015 in Ghana. All migrants leaving before 2014 have been dropped.

Table 3.6 Robustness checks, Keta municipal district, Ghana

	(i) Plans to migrate	(ii) Only very recent migrations	(iii) No Community fixed effects	(iv) No clustering	(v) Dropping gamble averse	(vi) Dropping negative time discounters
Alternative specification 1						
Risk preferences, stated	-0.098 (0.19)	-0.322* (0.21)	-0.340** (0.17)	-0.335** (0.17)	-0.201* (0.10)	-0.539** (0.22)
Time preferences (Patience), stated	0.279 (0.24)	0.328 (0.23)	0.180 (0.15)	0.214 (0.16)	0.199 (0.20)	0.236 (0.22)
Alternative specification 2						
Risk preferences, revealed	-0.108** (0.07)	-0.077* (0.04)	-0.118** (0.06)	-0.123** (0.06)	-0.121* (0.06)	-0.132* (0.07)
Time preferences (Patience), revealed	0.173** (0.08)	0.249** (0.10)	0.098* (0.06)	0.101* (0.06)	0.073 (0.06)	0.177** (0.08)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Community Dummies	Yes	Yes	No	Yes	Yes	Yes
N	190	192	277	277	203	222

Note: The dependent variable for (ii)–(vi) is migrant status. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

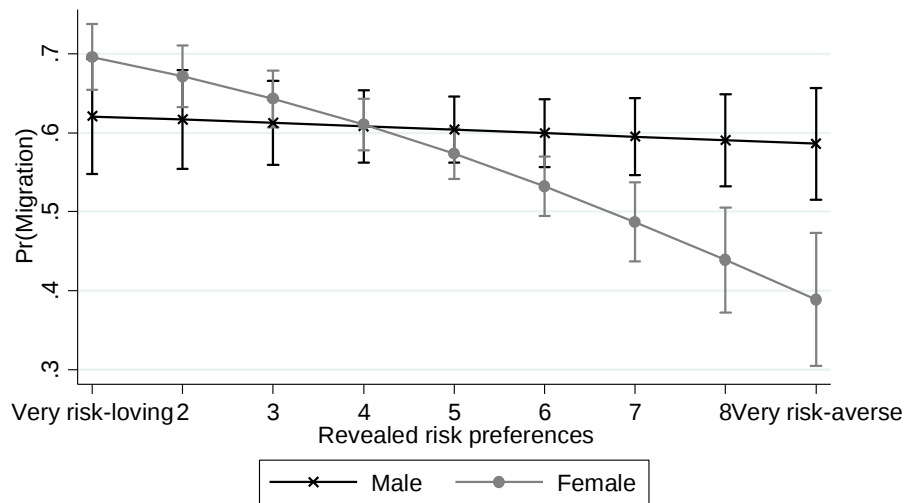
In further specifications, it was tested (iii) whether the exclusion of community fixed effects, (iv) the omission of clusters at the household level or the exclusion of (v) gamble-averse respondents or (vi) negative time discounters impact on the effect of preferences on migration (see Tables 3.5 and 3.6). Taken together, all results regarding the impact of preferences on out-migration were found to be rather robust. One notable finding, however, is that the previously insignificant coefficients of revealed time preferences in Semarang turn out to be significant at the 5% level whenever the 18 respondents, which ended up in the category of negative time discounters, are excluded. The same change in significance could be found for the Ghanaian subsample. The exclusion of negative time discounters is reasonable because there are, as argued previously, several and quite different reasons, including the lack of understanding of the task, for not “passing” the filter question and ending up in this category. Therefore ultimately, revealed time preferences are significantly correlated to migrations in both study regions

3.5.4 Interaction effects

Even though rather robust effects of preferences can be found in the different study areas, we are interested in further analyzing whether these effects were moderated by other factors. Therefore, a supplementary set of interaction terms was tested to discover conditional effects.³¹ The only robustly significant interaction effect found is linked to the gender of respondents in the Indonesian sample. When taking a closer look at the effect of risk aversion, it is found that the negative impact of risk aversion is significantly stronger for females than for males (see Figure 3.5). Very risk-loving

³¹ Therefore, it was tested whether any of the control factors mediate the impact of preferences on migrations. In this paper, we only report those interactions that turned out to be significant.

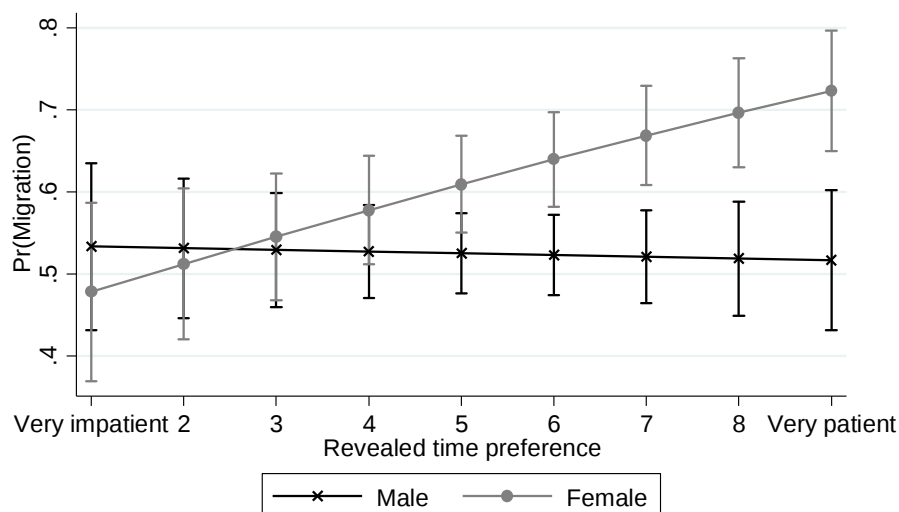
females have a 30 percentage points higher likelihood to be a migrant than very risk-averse females, while very risk-loving men are only three percentage points more likely to move than very risk-averse men, holding all other variables at their observed values.



Note: All other variables held at their observed values in the dataset.

Figure 3.5 Predicted probability of migration conditional on revealed risk preferences and sex of respondent with 90% CIs for the subsamples from Semarang, Indonesia.

Not only does the gender of the respondent seem to play an important role for the effect of risk aversion on out-migration, it does also impact on the effect of time preferences (see Figure 3.6). Very patient women are found to be around 24% more likely to move than very impatient females. The predicted migration probabilities of men, however, do not depend on their time preferences.



Note: All other variables held at their observed values in the dataset.

Figure 3.6 Predicted probability of migration conditional on revealed time preference and sex of respondent with 90% CIs for the subsamples from Semarang, Indonesia.

Overall, these interactions indicate that the effect of preferences on individual migration decisions differ significantly between men and women in Semarang, and matter much more for the female subsample. However, no such interaction effects could be found for the Ghanaian region.

3.6. Discussion and Conclusion

Migration is often a risky endeavor, not only in financial terms but also because of changing social relations, cultural adjustments and other uncertainties; risk preferences are, thus, likely to impact on individual migration decisions. In addition, individual time preferences and, thus, preferences for current vs. future consumption, are also expected to affect the willingness to migrate because benefits of such a decision are expected to manifest only after the individual has borne the costs. This paper has sought to advance research on the relationship between individual risk and time preferences and migration through research in two developing countries. In coastal communities in Ghana and Indonesia, migrants and non-migrants were randomly selected to participate in a survey about actual migration decisions. Preferences were elicited through survey questions as well as experimental tasks with monetary payoffs, which create incentives to make an effort to reveal true preferences and which limit normative biases.

Interestingly, we find that stated risk preferences are significantly correlated with risk preferences elicited by incentivized tasks. This indicates that eliciting risk preferences through experiments did not add much to standard survey questions about the willingness to take risks. A similar conclusion was drawn by Dohmen et al. (2011), who analyzed the German Socio-Economic Panel and found that risk preferences in surveys are actually a “useful all-around measure” (p. 543). However, a different picture emerges if we compare time preferences. Stated and revealed measures are only found to be correlated in the Indonesian study region, but virtually no correlation could be found for the Ghanaian sample. While questions about personal patience could have been interpreted in different ways, incentivized tasks clearly focus on a specific financial choice. We assume that this financial aspect and thus the preference for current vs. future payoff are very relevant for actual out-migration. Therefore, revealed time preference measures seem to be more appropriate than stated measures of patience, especially when linking them to migration decisions.

Taken together, a significant link between risk and time preferences, elicited by incentivized tasks, and out-migration decisions could be found in both study regions—despite the very different contexts of migrations. The preferences add substantial explaining power to the standard controlling factors from different migration theories, like age, education or employment status. Experimental tasks suggest that individuals, categorized as risk-averse, were 12 and 15 percentage points less likely to be a migrant than their rather risk-loving counterparts in Ghana and Indonesia, respectively. People who were willing to forego money to have a bigger payoff in the future were on average 12

and 11 percentage points more likely to be a migrant than their less myopic fellows in Ghana and Indonesia, respectively.

Moreover, further analysis showed that the effect of risk and time preferences are gendered and, thus, different for the male and female subsamples in Indonesia. No effect of preferences was found for the male subpopulation in the Indonesian region while no such differentiation could be found in the Ghanaian sample, which raises new questions. Specifically, it is not clear why preferences do not seem to matter for male migrations in Indonesia. A possible answer might lie in the different gender hierarchies. Especially in Indonesia, gender hierarchy emphasizes men as community and household leaders, as well as central decision-makers who provide financial resources to the household. If they fail to do so in their current location, they may be expected to move and look for a job in another place. Thus, if social pressures are high enough, men—as the main breadwinners—might migrate regardless of their actual risk and time preferences to earn a living. Females, instead, can choose to stay; and only the more patient and less risk averse choose to leave their communities.

These results show that preferences and, therefore, very personal characteristics play a crucial role in explaining individual migration decisions. There are, however, some possibilities for the extension of future research. First, migration decisions are not made without any knowledge about destinations. Thus, individuals differ not only in their willingness to take risks but also in their knowledge about the destination. However, this level of uncertainty at the moment of the migration decision was not considered. Second, even though there is evidence that preferences do not change with migration, and that causality is likely to run from preferences to migration, the potential problem of reverse causality could be further investigated using panel data. Thus, future panel studies in developing countries would be helpful to address this problem and improve the preference–migration literature. Third, this study uses only an aggregated measure of migration. Future research could investigate different types of migrations by increasing the sample size substantially. Despite these limitations, this study provides helpful insights into who migrates and who stays because results suggest that risk aversion and time preferences are as important as employment status, education and age in both study regions.

Chapter 4: Analyzing potential effects of migration on coastal resources in Southeastern Ghana

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Abstract

Coastal areas are under increasing pressure from rapid human population growth, yet empirical research on the effect of migration (as one major element of population dynamics) on coastal and marine resources is scarce. We contribute to this literature with an original household survey in a coastal region of Southeastern Ghana in which environmental attitudes and values toward coastal resources of 277 migrants and non-migrants were measured. In addition, respondents took part in a one-shot common-pool resource (CPR) experiment. Results suggest that migrants were less concerned about the utilization of coastal resources than non-migrants. Migrants were also found to behave less cooperatively in the CPR experiment. Further analysis, however, reveals that these findings hold true only for the subgroup of fishers, and could not be found for other occupational groups. These findings support the hypothesis that migrants do not *per se* value coastal resources less or cooperate less in CPR situations, but that socioeconomic characteristics, and particularly their occupational status and their relation to the resource, matter.

4.1 Introduction

Marine and coastal ecosystems are among the most diverse in the world and provide numerous benefits. At the same time, they are under increasing pressure from a large and rapidly growing human population (Curran 2002), and currently nearly half of the world population lives within 150 km of the coast (Foresight 2011).

More than two centuries ago, Thomas Malthus argued that uncontrolled population growth would ultimately be limited by a depletion of natural resources (Malthus 1798). These Malthusian predictions, however, have not been consistently supported by empirical evidence (Templeton & Scherr 1999; Leach & Fairhead 2000; Chenoweth & Feitelson 2005). The mixed evidence on the link between population and environment and a growing concern that the complexity of this link was not fully taken into account, led to the emergence of theories and empirical research in the 1990s that has not only focused on general population growth but also on the special case of localized population increase due to migration (Bilsborrow & Okoth-Ogendo 1992; Marquette 1997; Curran 2002). This line of inquiry emphasizes that human migration plays an important role in shaping the use and management of natural resources in ways that go beyond simple population growth (Curran et al. 2002).

More specifically, migration is hypothesized to impact natural ecosystems in several ways. First, it is clear that migrants are not a random sample of the population but rather highly selective representatives. Not just anyone makes the decision to migrate and particular individuals are more likely to move away than others. There are surprisingly consistent results across many different contexts in different parts of the world, and in general, it is found that age and human capital predict migration decisions well (e.g. Stark & Taylor 1991; Greenwood 1997; Massey et al. 2010). However, there are also many other reasons for migration, including environmental push and pull factors (Piguet 2013; Castles 2002), which highlight the reciprocal character of the link between migration and the environment. Altogether, this observable migrant selectivity emphasizes the importance of non-random characteristics of migrants in understanding their impacts on the environment. Consequently, different characteristics of migrant populations will most likely lead to different environmental consequences in otherwise similar ecosystems. Furthermore, migrants might sort themselves into specific areas that are characterized by open-access and high biodiversity, and which are attractive destination areas for mobile people. Once migrants settle in these areas, social networks may lead to the appearance of more migrants, resulting in a positive feedback loop, which increases pressure on these areas (Cripps & Gardner 2016; Carr 2009).

Even though this issue has initially not often been considered (Curran & Agardy 2002), it is supported by several empirical findings. Bremner and Perez (2002), for example, highlighted the importance of selectivity issues in migration–environment relationships after analyzing the in-

migration of Asian fishers on the Galapagos Islands that was often blamed for the subsequent sea cucumber crisis in the mid-90s. In 1998, a law was passed that greatly restricted migration to the islands because government and communities were concerned about the ongoing deterioration of natural resources. However, Bremner and Perez (2002) concluded that it was not the number of additional fishermen that caused the sea cucumber to disappear but rather the particular characteristics of the incoming migrants, which were generally young, male, with very good fishing skills and stable financial background who could afford to introduce new gears and technologies. Another case study from Goa showed that selective in-migration related to the tourism boom in the 1990s and the selective out-migration of young men to the Gulf States has resulted in a significant change of land use, from artisanal agriculture to intensive tourism with many constructions on the coast (Noronha et al. 2002). Nawrotzki et al. (2012) examined migrants' and non-migrants' access to natural resources in Madagascar and found that in areas of high natural resources, migrants were much better educated than non-migrants. Better educated people had moved to these regions to "apply innovative knowledge of techniques for natural resource extraction" (Nawrotzki et al. 2012, p.16).

A second argument for the potentially differential effect of migrants on the environment compared with local residents that have over time developed place-based values and cultural connections is based on the assumption that migrants will value local resources less—regardless of their selective nature. Migrants' practices may have worse environmental outcomes, which often lead to the assumption that migrants are "exceptional resource degraders" (Cripps & Gardner 2016; Codjoe & Bilsborrow 2012; Pichón 1997). This could be due to a general difference in attitudes toward the environment or due to a shorter time horizon of migrants when they intend to stay only temporarily. This makes them fail to consider the long-term effects of resource conservation, causing them to invest less into long-term productivity and sustainability of local resources. Freely accessible resources, for example, are often considered to be prone to roving banditry, a concept introduced by Mancur Olson. Mobile resource users can move from location to location, sequentially exploiting local resources. Such a roving banditry is mostly explained by missing attachments to a place, which is considered to be necessary for a sustainable management of the resource. Berkes et al. (2006) suggest that this rapid exploitation outpaces the ability of local institutions to respond and eventually leads to ecological deterioration. In addition, "when new users arrive through migration, they do not share a similar understanding of how a resource works and what rules and norms are shared by others" (Ostrom et al. 1999, p. 280). Thus, migrants might also use more unsustainable technologies due to a lack of knowledge of the specific context of their destination area.

There is only limited evidence that migrants differ from local people in inherently valuing local resources less. Codjoe and Bilsborrow (2012) came to the conclusion that migrant farmers in Ghana do not expand the land used for agriculture more than non-migrants and they found weak evidence

for the use of more land-intensive practices that degrade agricultural land over time. In another study in Ghana, migrant farmers were also found to engage in harmful “soil mining,” which is detrimental to the long-term sustainability of the Ghanaian agricultural ecosystem. This difference between migrant and non-migrant farmers, however, was found to be mainly driven by a shorter time horizon of migrants due to tenure insecurity (Codjoe 2006). Kramer et al. (2002) examined human migration and marine resource use in coastal villages in Indonesia and found that the migration status had no significant impact on the weekly fish catch. Cassels et al. (2005), on the other hand, found that migrant households in Indonesia are significantly more likely to be located near coral reefs of poor quality than to be located near any other coral reef type. Even though causality is unclear, they concluded that migrant status is associated with lower quality coral reefs. Further investigation revealed that there is also a strong and positive relationship between migrant status and fishing effort. Cinner (2009) found that migrants in Papua New Guinea were less involved in fishing activities. However, he acknowledged that this might result from different tenure rights, which prevent migrants from accessing the resource in the first place.

A third way the literature has considered the impact of migration on the natural environment are the differences in the rules and norms of migrants and locals. Thus, social capital is considered to be an important mediating factor for understanding the effect of migration on natural resources. Social capital—such as trust, reciprocity, common rules and norms—can help to overcome collective action problems associated with common-pool resources (CPRs), which are often found in coastal and marine ecosystems (Ostrom et al. 1999; Pretty & Ward 2001). It is frequently assumed that in-migration diminishes social capital because it disrupts social bonds of solidarity, reciprocity and trust within communities, which are critical for limiting free-rider problems. A breakdown of these important institutions is of particular concern because it can cause locals to also abandon their rules and norms and join the excessive exploitation of resources. Such a breakdown could cause the “tragedy of the commons” (Ostrom et al. 1999; Hardin 1968).

Even though social capital is expected to be an important intervening factor, few studies of the migration–environment literature have focused on it. Katz (2000), for example, focused on resource-mining at the agricultural frontier in Guatemala and concluded that communities with in-migrants had weakened social bonds and decreased capacity to take collective action. Similar results have been found in Mexico (Izazola et al. 1998) and Ecuador (Bilsborrow 1992). In a more recent study, Cripps and Gardner (2016) concluded that a collapse of social capital seems to have happened in a Madagascan marine protected area. An influx of migrants not only led to lack of respect of indigenous customary institutions among these outsiders but also contributed to a weakening of these institutions among locals. Considering the social embeddedness of migrants, Aswani (2002) found that when migration into communities of the Solomon Islands was combined with intermarriage, social ties within the community were stronger and enabled the sanctioning of

individual non-compliance with fishing rules. Communities with less intermarriage among migrants and locals, however, were more likely to experience weakened social bonds, which lead to de facto open-access resource regimes.

This finding emphasizes that migration might not necessarily affect the environment in a negative way. Effects of in-migration depend especially on the extent migrants are embedded in the set of social relations of the local population. Migrants who feel part of the community and those who intend to remain are more likely to invest in the long-term productivity of local resources (Codjoe & Bilsborrow 2012). Although we focus on the effects on natural ecosystems of in-migration, we are of course aware that migration of individuals also influences resources in the areas they emigrate from. Out-migration reduces pressures on local resources at least temporarily and might thus serve as an adaptation strategy to prevent overexploitation of resources (Cripps & Gardner 2016; Andersen et al. 2014). At the same time, remittances received by households in the home community can help to switch to alternative, less resource-dependent livelihoods and practices (Gammage et al. 2002). This paper, however, continues to focus on the potential effects of in-migration in coastal areas.

Despite the predominance of CPRs in marine and coastal ecosystems and the increasing rates of migration to coastal regions, migration has rarely been discussed in the conservation literature and the knowledge about impacts of migration remains poorly developed—especially in marine and coastal environments (Cripps & Gardner 2016). One reason for the mainly land-based literature on migration and environment is that links between terrestrial resources and migrants are easier to notice whereas changes in marine and coastal resources tend to be less easily accessible (Cassels et al. 2005).

Given the limited empirical research on migration and coastal ecosystems, this study contributes to the literature by testing several hypotheses. We explore, first, whether migrants' environmental attitudes (EA) toward coastal and marine resources are worse than those of non-migrants and, second, whether migrants behave less cooperatively in a CPR experiment, which, while constrained by the limitations of transferability, can be seen as a proxy for environmental behavior. In addition, we test whether differences, if any are found, are driven by the migrant status *per se* or rather are confounded by the fact that migration is correlated with specific demographic characteristics.

4.2 Methodology

Because it is difficult to link individual actions to specific impacts on marine and coastal resources, this study instead evaluates whether migrants in general value marine and coastal resources differently than locals. According to the theory of planned behavior, positive environmental attitudes toward these resources can be seen as a precursor to a favorable environmental behavior (Fishbein & Ajzen 1975; Ajzen 1991). Thus, we tried to assess how far EA differ between non-migrants and

migrants who originally come from the same region. In a second step, this study aims to acknowledge that migrants do not necessarily impact resources because they have inherently worse attitudes toward the coastal environment but because migrants might disrupt institutions that are necessary for formal and informal collective action of individuals within open-access resource regimes. As argued previously, cooperation is crucial for regulating CPRs and is a key pathway toward collective environmentally beneficial behavior. Therefore, we conducted a standard CPR experiment to test for the respondents' willingness to cooperate toward limiting their appropriation from the common pool. Other socioeconomic characteristics of respondents were collected to help to account for the potential impact of the selective nature of migration.

4.2.1 Study site and sampling

Ghana's coastline of more than 500 kilometers is home to a quarter of the total population, and an important economic resource for the whole country (National Development Planning Commission Ghana 2010). However, it faces serious threats, which mostly result from "anthropogenic activities such as overexploitation of fisheries resources, illegal and unregulated fishing methods, population increase, agriculture, pollution, erosion and sand winning" (Lawson 2016, p.899). This study, thus, was conducted in one coastal area of rural Southeastern Ghana. The selected study region, Keta municipality, has a population of about 150,000 inhabitants with the great majority belonging to the Anlo-Ewe, which is the main ethnic group in the Volta region (Ghana Statistical Service 2014). Keta experiences a highly dynamic migration landscape. West Africans *per se* are extremely mobile populations (Randall 2005) with Ghana, next to Côte d'Ivoire, being the key traditional country of migration (Adepoju 2003). Keta municipality is situated on a small sand strip between the sea and the Keta lagoon, which leaves little arable land. Thus, marine resources are important economic and dietary resources for the local population. We utilized a household survey to determine whether migrants leaving the study area have different EA or a different level of cooperation than respondents who stayed in Keta. In seven communities of the Keta municipality, households were selected using a systematic random sampling³² strategy. In every selected household, the enumerator first interviewed the household head, before she used the generated household roster randomly to select a household member above the age of 18 years.³³ This selected household member, who could also be the household head, was then asked to participate in the main part of the survey. Because we were interested in migrants originating from the same coastal setting, for households reporting out-migrants, a randomly selected out-migrant was also interviewed.

³² This was done by randomly selecting a first household followed by approaching every next k^{th} household from the starting one, with k , the sampling interval, being calculated as: $k = \text{total number of households in community} / \text{total number of desired households interviewed in that community}$. Furthermore, the number of households surveyed from every community was proportional to the community's population within the Keta municipality.

³³ This was done by assigning a number to every household member and selecting one of them by rolling a twelve-sided die until an assigned number was rolled.

4.2.2 Data

In line with the Foresight report (2011), migration was understood as a movement from one place to another for a period of three months or more. Because Curran et al. (2002) have already argued that “migration should be defined in the broadest sense” (p.267) when analyzing migration–environment issues, this study did not focus on international migration only but considered everyone a migrant who left the community within the last 10 years.

Ultimately, 190 households participated in the survey out of which 101 (53.16%) had at least one migrant. As migrants have moved to many different places outside their home community, they were contacted and interviewed in a time- and cost-efficient way by phone. Phone numbers were provided by the household head. In total, migrants from 14 households could not be contacted due to missing, incomplete or obsolete numbers. Once the enumerator was able to talk to the migrant, however, every migrant agreed to participate in the survey, which took between 20 and 30 minutes.

Table 4.1 Destination of migrants

Destination	% of migrants
Within Keta municipality	6.98%
Within Volta region	20.93%
Within country	65.12%
- to Accra	- 36.78%
International	6.98%

As Table 4.1 shows, the great majority of interviewed migrants moved internally, mostly to the Greater Accra Region in which both Accra, Ghana’s capital, and Tema, Ghana’s biggest harbor city, are situated. Only 7 percent of migrants actually left the country while another 7 percent moved within the municipality of Keta. The relatively low movement of people within the municipality of Keta is not surprising as land is scarce and the economic situation and employment opportunities are very similar across the municipality. Figure 4.1 shows a flow map of sampled out-migrants and further illustrates their different destinations, mainly along the Ghanaian coast.

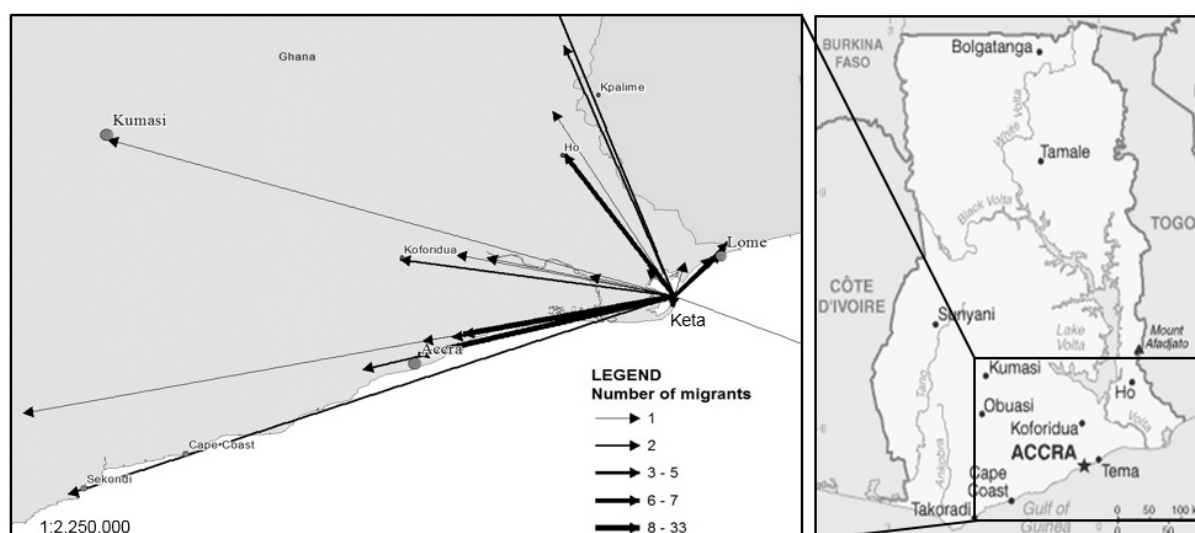


Figure 4.1 Flow map of migrants from Keta, Ghana

4.2.2.1 Environmental attitudes

Environmental attitudes—an important measure in the environmental psychology literature—were collected as it is commonly assumed that they underlie ecological behavior (Milfont & Duckitt 2004). The EA construct—as defined by Schultz et al. (2004, p.31)—is “the collection of beliefs, affect, and behavioral intentions a person holds regarding environmentally related activities or issues.” Traditionally, they were seen as a unidimensional construct that ranges from “concerned about the environment” to “unconcerned” (Milfont & Gouveia 2006; Dunlap et al. 2000; Dunlap & Van Liere 1978). Recently, however, EA is often viewed as a multidimensional construct based on two or three dimensions (Milfont & Duckitt 2006). We followed the two-dimension tradition as it accounts for the dilemma people are facing when trying to balance environmental protection with the need for some exploitation of the environment. Thus, Wiseman and Bogner (2003) proposed the two-dimensional Model of Ecological Values (2-MEV) that has been validated in different geographical areas, including West Africa (Borchers et al. 2014; Binngießer & Randler 2015), and focuses on two key aspects of the EA, *Preservation* and *Utilization*. The first dimension is biocentric and reflects conservation and protection of the environment, while the latter is a more anthropocentric dimension that reflects the consumption of natural resources. Because this study focuses on coastal communities, we adapted the EA measures to the specific context of marine resources.³⁴

For *preservation* aspects, we were interested in whether participants believed (i) that marine resources will last forever (regardless of human impact), (ii) that marine resources are not valuable for their own sake, (iii) that conservation of marine resources is important even if it lowers peoples’

³⁴ Therefore, we added the term “marine” to the different attitudes questions proposed by Wiseman and Bogner (2003) to specify the resources under consideration.

standard of living, (iv) whether it makes them sad to see marine environments destroyed and (v) whether they enjoy spending time at the coast just for the sake of being out in nature.

For the *utilization* dimension, we were interested in whether the participants believed that (vi) it is all right for humans to use marine environments as a resource for economic purposes, (vii) that people have been giving far too little attention to how human progress has been damaging the marine environment, (viii) that economic development is more important than marine conservation, (ix) whether human happiness and human reproduction are less important than a healthy ocean and (x) whether marine resources will collapse if human activities continue on their present course. For summary statistics of these items please see Table 4.2.

Table 4.2 Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	
Migrant (Yes = 1)	0.31	0.46	0	1	
CPR extraction	14.58	4.91	0	20	
Age (years)	37.83	16.72	18	88	
Sex (Female = 1)	0.53	0.49	0	1	
Spouse from community (Yes = 1)	0.34	0.47	0	1	
Household size	5.82	2.81	1	15	
Education, years†	9.94	4.81	0	21	
Fisher (Yes = 1)	0.06	0.25	0	1	
Connection to community	4.21	0.89	1	5	
Trust in community	2.90	1.46	1	5	
Risk aversion	2.77	1.33	1	5	
General patience	4.13	0.98	1	5	
Percentage (%)					
Income (in GHS)†	<100 (51.26%)	100–200 (17.33%)	200–300 (11.19%)	>300 (20.22%)	
EA (in %)	Disagree strongly	Disagree	Neutral	Agree	Agree Strongly
Preservation items					
(i) Marine resources will last forever (regardless of human impact). (R)	10.83	18.05	5.42	31.41	34.30
(ii) Marine resources are not valuable for their own sake. (R)	12.64	44.77	6.86	17.69	18.05
(iii) Conservation of marine resources is important even if it lowers peoples’ standard of living.	7.94	38.63	12.64	21.66	19.13
(iv) It makes me sad to see marine environments destroyed.	2.53	6.86	2.89	38.63	49.10
(v) I enjoy spending time at the coast just for the sake of being out in nature.	5.66	15.87	5.22	33.90	39.35
Utilization items					
(vi) It is all right for humans to use marine environments as a resource for economic purposes. (R)	1.45	5.43	2.54	47.10	43.48
(vii) People have been giving far too little attention to how human progress has been damaging the marine environment.	4.33	11.19	7.22	42.96	34.30
(viii) Economic development of communities is more important than marine conservation. (R)	3.62	22.83	17.75	35.14	20.65
(ix) Human happiness and human reproduction are less important than a healthy ocean.	4.69	35.02	22.38	19.13	18.77
(x) Marine resources will collapse if human activities continue on their present course.	8.33	21.74	9.06	23.91	36.96
Note: (R) reverse coded items for index, † measured at time of migration					

All these items were measured with a five-point Likert response format ranging from “disagree strongly” to “agree strongly” including a “neutral” category. A pretest in the study region indicated that respondents were very motivated to participate in a survey and considered each item carefully. Therefore, we included the “neutral” option fully to cover respondents’ opinions; on average 9.6% of respondents selected the neutral option.

Items were both positively and negatively worded to reduce the potential effect of acquiescence bias (Nunnally 1978). Items were reverse coded as necessary and combined into two averaged scales representing *preservation* and *utilization*. For representation purposes, we normalized the scales to a 0 to 1 range, with 1 indicating the most environmentally concerned attitude.

We then used confirmatory factor analysis to check the validity of the structure of the two EA scales and find a tolerable fit to the data. All but one item turned out to affect significantly ($p < 0.1$) the respective scale. The insignificant item 6 (“It is all right for humans to use marine environments as a resource for economic purposes”) was thus excluded from the index. The reliability of measures was checked by assessing the internal consistency through Cronbach’s alpha and the homogeneity through average interitems correlations (Briggs & Cheek 1986). Though a Cronbach’s alpha value of 0.7 is often used as a cutoff (Nunnally 1978), coefficients of around 0.60 are also characterized as good (see Clark & Watson 1995) and coefficients greater than 0.4 can be considered acceptable if the sample size exceeds 100 (see Milfont & Gouveia 2006).

Table 4.3 Reliability measures for the two EA indices.

	Mean	Standard deviation	Cronbach’s alpha	Average interitem correlation
Index: Preservation	0.528	0.199	0.587	0.303
Index: Utilization	0.561	0.182	0.624	0.277

The results indicate quite reliable constructs (see Table 4.3). The relatively low alphas may also result from a short scale, as it has been shown that the alpha coefficient increases with the number of items, and that especially indexes composed of less than seven items will have rather moderate coefficients (Spiliotopoulou 2009; Voss et al. 2000). Average interitem correlations—as another reliability indicator and homogeneity measure—are generally considered to be optimal when ranging between 0.2 and 0.4 (Milfont & Gouveia 2006; Piedmont 2014). This study’s EA scales’ average interitem correlations of 0.303 and 0.277, therefore, indicate acceptable homogeneity. Items are well related but not too similar to each other to make single items redundant.

4.2.2.2. CPR Game

Questionnaires asking about EA can only capture stated preferences. Nevertheless, ultimately revealed preferences in terms of actual behavior finally matter for the environment. Because data on real-life environmental behavior were not available, we complemented the EA data with a standard one-shot CPR game. To understand respondents' cooperation behavior in marine resource settings better, the CPR game was used to describe their behavior in situations in which the individual outcome did not only depend on the respondent's own decision but also on the decisions of others. The level of cooperation shown in those experiments can be generally seen as a proxy for proenvironmental behavior (Ostrom et al. 1994; Fehr & Leibbrandt 2011). Even though the validity of such experiments is controversially discussed (Torres-Guevara & Schlüter 2016), the measured level of cooperation can still be seen as a precondition for the preservation of CPRs. In addition, the experiments were incentivized in order to trigger people to behave as in real life, where income is also at stake (Camerer & Hogarth 1999; Hertwig & Ortmann 2001).

In this standard one-shot CPR game, the respondents decided how much they wanted to extract from a CPR that they shared with three other members from the community they live in. Because static CPR games require simultaneous but independent decisions, the inclusion in a survey is relatively easy to handle (see also Fehr et al. 2003). The groups of four players were ex-ante matched before the enumerator carefully explained the experiment to each respondent. Instructions and provided examples were identical across respondents who were not aware of the identity of the other group members. The game itself was simplified to ensure that the setting is understandable via mobile phone and to minimize confusion about the intentions of other group members. In addition, non-migrants were interviewed by phone to avoid an influence of the mode of interview. After the game had been explained to respondents, they were asked two control questions, which 88% of respondents answered correctly.

Regardless of whether the respondent answered the control questions correctly, the main points of the game were summarized and the respondent was asked to make a decision. To reduce confusion about the setting and to facilitate the comprehension of the game via phone, it was framed as a fisheries extraction scenario from a common pond that contained 80 units of fish (following Werthmann et al. 2010). Each group member could decide about the allocation of 20 units that could be either left in the pond or extracted from the common resource. Fish units extracted by an individual generated a private gain of one token (where one experimental token = 0.5 GHS or 50 Pesewas = 0.13 USD). Every fish unit not withdrawn from the CPR, however, generated two tokens, which were shared equally among the group members. Thus, fish units not appropriated from the common pond increased in value and benefited the whole group by yielding a reward to each player in the form of 0.5 tokens. Therefore, the individual payoff function for this experiment can be described by equation (1):

$$\pi_i = e_i + 0.5 (80 - \sum_{j=1}^4 e_j) \quad (3)$$

where e_i indicates the number of fish units extracted by individual i from the common pool.

In this setting, free riding and extracting the maximum possible number of fish units are the dominant strategies. However, all players would reach the social optimum if everyone were to abstain from extracting. Once the enumerator received the individual decisions from all four group members, she calculated the individual payoffs and informed the respondents about the decisions of the other group members and their ultimate payments. Payments were then transferred via mobile phone, which is a very common procedure in Ghana. On average, after completing the questionnaire and taking part in the experiment, respondents earned roughly 11.5 GHS (about 3 USD). At the time of the survey, the official daily minimum wage was 7 GHS which makes the average payouts relatively large and meaningful.

4.3 Results

First, we looked at the EA index by comparing scores received by migrants and non-migrants. Figure 4.2 shows the distributions of scores for both the preservation and utilization dimensions, which seem to be quite similar for both groups. A t -test confirms that migrants' EA scores do not differ significantly from non-migrants'.³⁵

³⁵ Utilization: Non-migrants: M = 0.57, SD = 0.19; Migrants: M = 0.54, SD = 0.17; $t(274) = 1.06$, $p = 0.29$
Preservation: Non-migrants: M = 0.54, SD = 0.21; Migrants: M = 0.50, SD = 0.16; $t(275) = 1.38$, $p = 0.17$

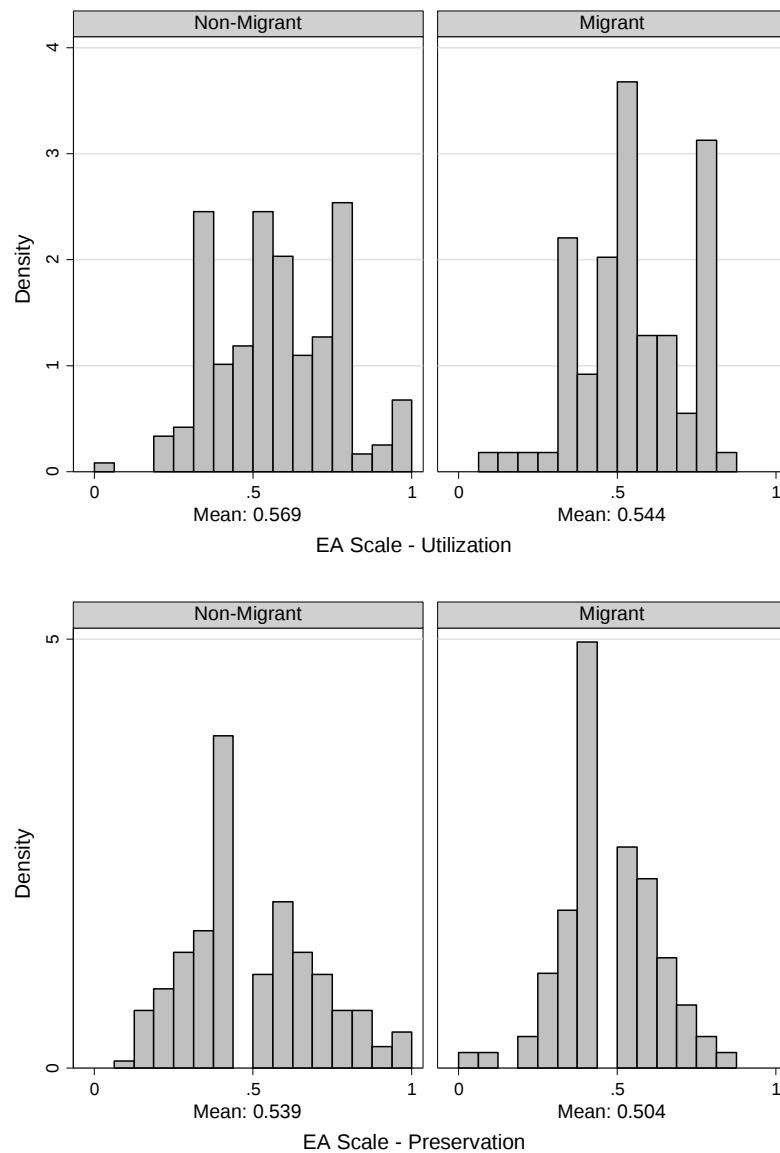


Figure 4.2 EA Index for Non-migrants and Migrants

These results indicate that migrants and non-migrants in our sample do not necessarily differ in terms of EA toward marine resources.

Next, we focused on the extraction decisions in the CPR experiment. Figure 4.3 shows the distribution of extracted fish units among migrants and non-migrants. For both groups, we find peaks around 10, 15 and 20 units, which were chosen more often than numbers not divisible by five. Because the experiment was played by phone, it is not unexpected that respondents tended to choose numbers that are easily relatable to the maximum amount of 20 units. Interestingly, we find that the peak around 10 units is less pronounced in the migrants' subsample and that migrants are leaning

toward higher extraction rates. A *t*-test shows that migrants acted less cooperatively than non-migrants and on average extracted around 1.5 fish units more.³⁶

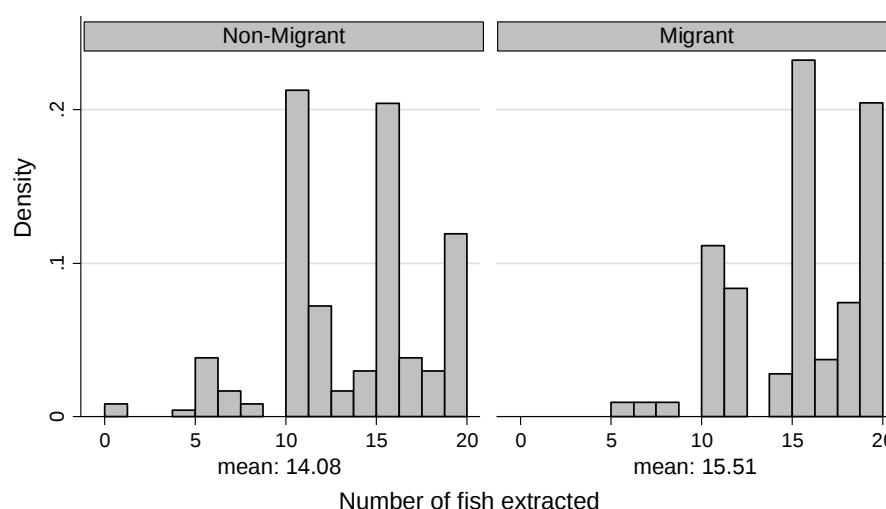


Figure 4.3 Numbers of extracted fish in the CPR game, by migrant status

While migrants do not seem to have different EA than non-migrants, they were still found to show a different extraction behavior in the CPR game. These results are not necessarily contradictory because lower proenvironmental attitudes are not necessarily a prerequisite for acting less cooperatively in a CPR game. Furthermore, as mentioned previously, migrants generally differ from non-migrants in many ways. This is also the case in our sample; we found these migrants to be more likely to be young, male and more willing to take risks than non-migrants (see also Chapter 3). Thus, the difference in extraction rates between migrants and non-migrants might be related to socioeconomic characteristics rather than to a difference in willingness to cooperate.

Therefore, we further investigated both EA and the extraction decision through Ordinary Least Squares (OLS) regression analysis (see Table 4.4 and 4.5). We successively add several control factors that might help to explain the EA scores or CPR extraction behavior of the respondents (see also Table 4.2 for summary statistics and please note that educational level and income of migrants relate to their time of migration).

All models were adjusted for clustering at the household level because the independence of observations cannot be assumed and individuals from one household are expected to be more similar.

³⁶ Migrants: $M = 15.51$, $SD = 4.5$; Non-migrants: $M = 14.08$, $SD = 5.28$; $t(225) = -1.96$, $p = 0.051$

Table 4.4 OLS regression models for EA Index

	Preservation dimension			Utilization dimension			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Migrant status	-0.036 (0.02)	-0.025 (0.02)	-0.013 (0.03)	-0.025 (0.02)	-0.038* (0.02)	-0.047** (0.02)	-0.036 (0.02)
Age		0.001 (0.00)	0.002** (0.00)		-0.001 (0.00)	-0.000 (0.00)	-0.000 (0.00)
Gender (Female = 1)		-0.040 (0.03)	-0.015 (0.03)		-0.010 (0.02)	0.022 (0.02)	0.023 (0.02)
Spouse from community (= 1)			0.015 (0.03)			-0.051** (0.03)	-0.051** (0.03)
Household size			-0.002 (0.00)			-0.007 (0.00)	-0.007* (0.00)
Education, years†			0.004* (0.00)			0.007** (0.00)	0.006* (0.00)
Income†							
<100 GHS			(dropped)			(dropped)	(dropped)
100–200 GHS			0.020 (0.04)			0.041 (0.03)	0.046 (0.03)
200–300 GHS			0.002 (0.04)			0.088** (0.03)	0.092*** (0.03)
>300 GHS			0.033 (0.04)			0.052* (0.03)	0.058** (0.03)
Fisher (= 1)			0.060 (0.07)			-0.049 (0.04)	-0.008 (0.05)
Connection to community			0.014 (0.02)			0.015 (0.01)	0.015 (0.01)
Trust in community			-0.014 (0.01)			-0.007 (0.01)	-0.007 (0.01)
General risk aversion			-0.004 (0.01)			-0.022** (0.01)	-0.23** (0.01)
General patience			0.031** (0.01)			0.006 (0.01)	0.006 (0.01)
Migrant × Fisher							-0.114* (0.06)
Constant	0.539*** (0.02)	0.514*** (0.04)	0.320*** (0.12)	0.569*** (0.01)	0.609*** (0.04)	0.525*** (0.09)	0.537*** (0.09)
Community Dummies	No	No	Yes	No	No	Yes	Yes
R^2	0.007	0.024	0.106	0.004	0.009	0.178	0.186
AIC	-106.322	-107.127	-97.577	-155.735	-153.217	-170.700	-170.474
N	277	277	277	276	276	276	276

Note: Cluster-robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, † measured at time of migration

Regression results indicate that only a few variables help to explain the *preservation dimension* of the EA index. Specification (3) shows that there is weak evidence that older, better educated or more patient respondents have a slightly higher EA score once the full set of control variables had been added.

Focusing on the *utilization dimension*, we also find that some control factors help to explain differences among the respondents. Those, for example, who were married to someone from their current community are unexpectedly found to have a lower score and thus less environmentally favorable attitudes than those whose spouse is not from the current community. Premigration educational level and income, however, increase the *utilization score* significantly, whereas self-reported general risk aversion decreases the score. Once these control variables are added in specifications (5) and (6), being a migrant becomes significantly associated with a lower utilization

score, even though no significant link can be detected in the univariate specification (4). As this might be caused by interaction effects, we tested whether the effect of the migrant status varies with one of the control variables. Indeed, we find that migrant fishers have a much lower average utilization score (0.43) than migrants who are not fishers (0.55) or fishers who are non-migrants (0.55). Therefore, in specification (7), we include an additional interaction term that accounts for this non-linear relationship. We conclude that migrants do not necessarily have a lower EA *per se* when it comes to the utilization of marine resources, but that the effect of migration on EA also depends on whether the migrant is a fisher.

Because the socioeconomic characteristics of respondents seem to matter for the effect of migration on environmental outcomes, we also further analyze the CPR extraction rates. Thus, in the next OLS regressions, we use the number of extracted fish units as the dependent variable and include the same set of control factors. However, only respondents that passed the control questions were included, leading to a reduced sample size of 227 respondents.

The univariate regression in specification (1) supports the *t*-test results: migrants were found to significantly extract around 1.6 fish units more than non-migrants ($p < 0.05$), thus, acting less cooperatively toward their community than non-migrants. However, when successively including control factors, the significance of this effect either vanishes (specification (2) and (3)) or decreases to the 10% level. The inclusion of control variables, nevertheless, helps to explain different extraction behaviors of respondents. For example, there is evidence that age, being female and household size are negatively correlated with the respondent's extraction decision. Interestingly, we also find that fishers took around three fish units less than non-fishers. As expected, specification (4) shows that respondents who had a higher trust in their community took significantly fewer fish units out of the commonly shared resource. As one would expect, the opposite is found for relatively risk-averse respondents.

The inclusion of control factors leading to (mostly) insignificant effects of migrant status on extraction behavior indicates that the significant effect found in the univariate analysis might be driven by the fact that the migrant subsample differs systematically from the overall population. Therefore, the correlation between migrant status and extraction decision might be an indirect proxy for underlying factors like age, gender, being a fisher or risk attitude.

We include interaction terms, as it might be the case that the relationship between migration status and behavior in the CPR scenario depends on whether one is a fisher (as suggested by the EA findings) or on other mediating factors, like on the respective trust people have in their community. Specification (5) shows that, indeed, while being a fisher is correlated with less extraction, migrant fishers are found to extract considerably more. Different levels of trust in the community or other interaction terms, however, did not mediate the impact of migrants.

Table 4.5 OLS regression models for extraction decision in CPR game

Extraction decision in CPR game						
	(1)	(2)	(3)	(4)	(5)	(6)
Migrant status	1.645** (0.65)	0.796 (0.71)	0.811 (0.72)	1.410* (0.74)	1.164 (0.77)	-0.097 (1.62)
Age		-0.044** (0.02)	-0.045** (0.02)	-0.050* (0.02)	-0.046** (0.02)	-0.051** (0.02)
Sex (Female = 1)		-2.291*** (0.65)	-2.272*** (0.70)	-2.272*** (0.69)	-2.465*** (0.67)	-2.540*** (0.66)
Spouse from community (= 1)			0.122 (0.69)	-0.098 (0.65)	-0.126 (0.65)	-0.001 (0.66)
Household size			-0.242** (0.10)	-0.325*** (0.10)	-0.327*** (0.10)	-0.329*** (0.10)
Education, years†			0.055 (0.08)	0.089 (0.07)	0.107 (0.08)	0.084 (0.07)
Income†						
<100 GHS			(dropped)	(dropped)	(dropped)	(dropped)
100–200 GHS			-0.542 (0.99)	-0.557 (0.95)	-0.671 (0.95)	-0.596 (0.96)
200–300 GHS			-0.442 (0.95)	0.448 (0.92)	0.369 (0.93)	0.470 (0.93)
>300 GHS			1.004 (0.86)	0.847 (0.84)	0.588 (0.85)	0.751 (0.85)
Fisher (= 1)			-3.055** (1.20)	-2.713** (1.14)	-4.352*** (1.60)	-2.730*** (1.18)
Connection to community				-0.427 (0.39)	-0.455 (0.38)	-0.440 (0.38)
Trust in community				-0.603*** (0.19)	-0.585*** (0.19)	-0.702*** (0.23)
General risk aversion				0.741*** (0.25)	0.752*** (0.25)	0.748*** (0.25)
General patience				-0.589* (0.34)	-0.544 (0.34)	-0.607* (0.34)
Migrant × Fisher					5.591** (2.07)	–
Migrant × Trust in community					–	0.504 (0.49)
Constant	13.943*** (0.40)	17.142*** (0.97)	20.260*** (2.45)	23.012*** (3.44)	20.074*** (3.06)	23.386*** (3.44)
Community Dummies	No	No	Yes	Yes	Yes	Yes
R ²	0.017	0.096	0.218	0.285	0.297	0.291
AIC	1366.721	1353.170	1346.169	1327.916	1327.126	1328.880
N	227	227	227	227	227	227

Note: Cluster-robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, † measured at time of migration

Furthermore, we test whether differences in attitudes or CPR extraction decisions are more pronounced between non-migrants and those migrants which have left not only the community but also the Volta region. Therefore, we exclude every migrant who has just moved within the Volta region and thus has not left the Anlo-Ewe dominated region. However, results do not change notably, which indicates that the distance of the move does not play a major role in our sample (Table B4.1 and B4.2 in Appendix B).

4.4 Discussion

Altogether, we do not find convincing evidence for a different extraction behavior of migrants, or a worse cooperative behavior toward their community, *per se*. We rather find that the highly selective nature of migrants is the underlying driver of the difference in behavior in the CPR experiment.

While there was no detectable difference in the preservation dimension of the EA index, we found a negative correlation between migrants and the utilization dimension of the index once all control variables are considered. This indicates that, on average, migrants have stronger preferences to dominate marine and coastal resources. However, a check of potential interaction effects revealed that the link between migrant status and utilization dimension is influenced by being or not being a fisher: While the average utilization score of both fishers (0.55) and migrants (0.55) was only slightly lower than the score for the reference category of non-migrant/non-fisher (0.57), a migrant-fisher's score was significantly lower (0.43). The significant effect of migrant status on the EA score was, therefore, mostly driven by the few migrant fishers and does not hold for migrants in general. Fishers had a different preference toward the utilization of resources, most notably when they were not working in their home community. This finding cannot confirm that migrants have inherently different attitudes toward the environment, as some papers suggested, but rather that their attitudes depend strongly on their respective socioeconomic background, as for example, suggested by Bremner and Perez (2002).

Findings from the CPR experiment went in a similar direction. While migrants were found to act less cooperatively by extracting more than non-migrants, this linkage was mostly driven by factors associated with both migration decisions and CPR extractions. Once we controlled for these variables, such as age, gender and general risk aversion, no robust difference between migrants and non-migrants could be detected. This finding supports studies emphasizing the importance of migrant selectivity: migrants extracted more than non-migrants from the commonly shared resource because of their different socioeconomic composition. They were generally younger, male, and more willing to take risks—all attributes that were found to affect the extraction decision positively. Therefore, we cannot confirm that migrants from our study region cooperated less than non-migrants at home and, thus, negatively affected social capital *because* they are migrants. Rather, results suggest that the factors associated with acting less cooperatively are also associated with individuals who are disposed to migrate.

Another striking finding was again related to the occupation of respondents: we found that non-migrant fishers extracted much less than respondents with different occupations. An interaction effect revealed a considerable difference between migrant fishers and non-migrant fishers. The effect of being a migrant was thus especially pronounced for the subsample of fishers. While fishers extracted around 4.4 units less than non-fishers in the home communities, migrant fishers extracted

on average 1.2 units more than other migrants. One potential explanation for the fact that fishers cooperated more and extracted less than non-fishers at home might be the mode of fishing commonly applied in the region. Fishers in the Keta municipality mostly use beach seine nets, which need to be operated in larger groups and whose catch is commonly shared among the crew. Therefore, fishers might be more used to cooperate in resource extraction dilemmas than non-fishers (Gehrig & Schlüter 2016). Because cooperation is a common behavior in their fishing community, they might apply the same heuristic in the experimental setting. For migrated fishers, however, this link turned around and they acted less cooperatively than non-fishers. Here, the cooperation problem often experienced by fishers, might have rather led to a race to the bottom.

These differences in EA toward utilization of coastal resources as well as in extraction behavior both indicate that migrant fishers behaved less proenvironmentally than fishers in their home communities. These findings are in line with Mancur Olson's concept of "roving bandits," which suggests that mobile fishers move from one unprotected resource to another without having the incentive to invest in conserving institutions. Already existing local institutions are often unable to respond to this roving banditry in time with the consequence of ecological deterioration (Berkes et al. 2006). This is the case in West Africa, where migrant fishers are common, but where nearly no institutions capable of managing these fishers are in place (Duffy-Tumasch 2012).³⁷ Duffy-Tumasch (2012) found that there is a very distrustful environment between Ivorian government officials and Ghanaian migrant fishers that prevented successful resource governance. In other case studies, however, Ghanaian migrant fishermen were found successfully to replicate the fishing institutions that regulate responsibilities and access in their home communities (Overa 2001; Marquette et al. 2002). Nevertheless, it was also found that those dynamic institutions are fragile and broke down when demands for the resource increased or tensions rose (Marquette et al. 2002).

However, results based on whether the respondent was a fisher must be interpreted cautiously because only 7% of our randomly selected sample worked as a fisher, which is not enough to make generalizations toward the whole population (statistics on the percent of fishers among the working population are unavailable). Despite that, it gives an indication of how the relationship between migration and attitudes toward natural resources might differ based on the occupation of the respondent. This heterogeneous sample could be the reason why we did not find a general direct effect of migrant status, but only a rather indirect one via their different socioeconomic characteristics and occupations. Furthermore, instead of using a neutral framing, this CPR experiment was framed as a shared fishing site. Framing, however, is also known to influence

³⁷ Earlier, it has been taken for granted that many West African fishers leave due to population pressures that result in overfished home shores and reduced fishing spaces. This was especially expected for the Anlo-Ewe in Ghana due to overpopulation and erosion-related land shortage of the Volta region (Jorion 1988; Akyeampong 2001). However, this view has been contested and research has shown that fishers in this region migrate rather due to economic, social and natural pull factors (Overa 2001).

decisions of participants (see, e.g., Levin et al. 1998; Cookson 2000; Liberman et al. 2004), and might, thus, have also partly influenced the difference in extraction behavior between fishers and non-fishers because fishers are more familiar with this coordination problem and employ different heuristics than non-fishers. However, while framing could help to explain the difference between fishers and non-fishers, it does not necessarily explain the difference between migrant-fishers and fishers at home.

Future research should, thus, limit the sample to fishers who have a direct impact on coastal and marine resources to validate whether there is indeed a difference between migrant and non-migrant fisher people from the Keta municipal district and to make sure that findings are not driven by framing the experiment as a fishery-specific context. Furthermore, future studies could try to improve the quantitative measure of a migrant's embeddedness in the set of social relations that is expected to diminish the effect of migration upon natural resources.

4.5 Conclusion

The results of this study have relevant implications for the environment–migration literature, for future research in this field and for coastal management in the study region. Even though coastal areas are under increasing pressure from a rapidly growing human population (McGranahan et al. 2007; Neumann et al. 2015), empirical research on the effect of migration on coastal and marine resources is scarce. This study found no direct evidence for a difference between migrants' and non-migrants' attitudes and values toward coastal environments, and only limited evidence for a difference in their cooperation behavior in a CPR situation. Results rather highlighted that socioeconomic differences between migrant and home populations play an important role in migration–environment relationships.

With regard to research methods, this study complemented the existing empirical literature by using the 2-MEV as well as a standard one-shot CPR experiment which have, to our knowledge, not been used in the migration–environment literature before. These established tools can help to provide new insights into two important factors—EA and values, and cooperative behavior—which are considered to be crucial for actual ecological behavior. An extension of these tools to other populations or to specific resource user groups could help to improve future research, to complement qualitative data and to get a clearer picture of the migration–environment nexus.

Finally, these findings could have implications for policies in the study region. The results of this study suggest that policy initiatives aiming to reduce potential effects of migrants on natural resources could focus especially on those subgroups found to have more extractive EA and less cooperative behavior, for example, migrant fishers. Furthermore, local and national governments could build on existing institutions of fishers to improve trust and to include small-scale fishers in

the implementation of conservation policies. Ecosystem-based management should accommodate the movements of mobile small-scale fishers in the region as they seem to have very different attitudes and values than immobile fishers.

4.6 Appendix B: Supplementary tables

Table B4.1 OLS regression models for EA Index, non-migrants and migrants who have left the Volta region

	Preservation dimension			Utilization dimension			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Migrant status	−0.034 (0.02)	−0.022 (0.03)	−0.012 (0.03)	−0.033 (0.02)	−0.045* (0.02)	−0.054** (0.03)	−0.043 (0.03)
Age		0.001 (0.00)	0.001* (0.00)		−0.001 (0.00)	0.000 (0.00)	−0.000 (0.00)
Gender (Female = 1)		−0.031 (0.03)	−0.007 (0.03)		−0.017 (0.02)	0.012 (0.02)	0.013 (0.02)
Spouse from community (= 1)			0.006 (0.03)			−0.052** (0.03)	−0.052** (0.03)
Household size			−0.002 (0.00)			−0.008* (0.00)	−0.007* (0.00)
Education, years†			0.005* (0.00)			0.007** (0.00)	0.006* (0.00)
Income†							
<100 GHS			(dropped)			(dropped)	(dropped)
100–200 GHS			0.019 (0.04)			0.043 (0.03)	0.049 (0.03)
200–300 GHS			−0.002 (0.05)			0.085** (0.03)	0.089*** (0.03)
>300 GHS			0.034 (0.04)			0.045 (0.03)	0.052* (0.03)
Fisher (= 1)			0.053 (0.07)			−0.061 (0.04)	−0.019 (0.05)
Connection to community			0.014 (0.02)			0.011 (0.01)	0.011 (0.01)
Trust in community			−0.010 (0.01)			−0.005 (0.01)	−0.005 (0.01)
General risk aversion			−0.000 (0.01)			−0.021** (0.01)	−0.22** (0.01)
General patience			0.035** (0.01)			0.008 (0.01)	0.007 (0.01)
Migrant × Fisher							−0.130* (0.0)
Constant	0.539*** (0.02)	0.512*** (0.04)	0.292*** (0.12)	0.569*** (0.01)	0.605*** (0.04)	0.534*** (0.09)	0.544*** (0.09)
Community Dummies	No	No	Yes	No	No	Yes	Yes
R^2	0.005	0.018	0.103	0.006	0.011	0.177	0.184
AIC	−90.920	−90.101	−78.957	−143.782	−141.086	−153.343	−153.436
N	253	253	253	252	252	252	252

Note: Cluster-robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, † measured at time of migration

Table B4.2 OLS regression models for extraction decision in CPR game, non-migrants and migrants who have left the Volta region

Extraction decision in CPR game						
	(1)	(2)	(3)	(4)	(5)	(6)
Migrant status	1.348* (0.69)	0.486 (0.77)	0.726 (0.80)	1.610** (0.81)	1.275 (0.83)	0.600 (1.62)
Age		-0.042* (0.02)	-0.046** (0.02)	-0.047** (0.02)	-0.042* (0.02)	-0.047** (0.02)
Sex (Female = 1)		-2.289*** (0.63)	-2.552*** (0.68)	-2.807*** (0.65)	-2.824*** (0.66)	-2.849*** (0.65)
Spouse from community (= 1)			0.136 (0.71)	0.002 (0.66)	-0.028 (0.65)	0.053 (0.67)
Household size			-0.251** (0.11)	-0.332*** (0.10)	-0.340*** (0.10)	-0.340*** (0.11)
Education, years†			0.001 (0.08)	0.032 (0.08)	0.050 (0.08)	0.029 (0.08)
Income†						
<100 GHS			(dropped)	(dropped)	(dropped)	(dropped)
100–200 GHS			-0.576 (1.01)	-0.460 (0.98)	-0.600 (0.97)	-0.480 (0.98)
200–300 GHS			-0.364 (0.95)	0.604 (0.91)	0.512 (0.92)	0.621 (0.92)
>300 GHS			1.228 (0.95)	1.023 (0.91)	0.703 (0.90)	0.980 (0.91)
Fisher (= 1)			-3.336** (1.29)	-3.029** (1.17)	-4.703*** (1.59)	-3.030** (1.21)
Connection to community				-0.726** (0.31)	-0.749** (0.31)	-0.735** (0.30)
Trust in community				-0.651*** (0.19)	-0.629*** (0.19)	-0.704*** (0.23)
General risk aversion				0.764*** (0.25)	0.778*** (0.25)	0.768*** (0.25)
General patience				-0.567* (0.33)	-0.526 (0.33)	-0.577* (0.33)
Migrant × Fisher					4.790** (1.99)	–
Migrant × Trust in community					–	0.331 (0.50)
Constant	13.943*** (0.40)	17.058*** (1.01)	18.051*** (1.82)	21.915*** (2.68)	21.665*** (2.69)	22.192*** (2.71)
Community Dummies	No	No	Yes	Yes	Yes	Yes
R ²	0.014	0.088	0.211	0.280	0.292	0.290
AIC	1239.503	1227.280	1223.301	1201.245	1200.094	1202.851
N	207	207	207	207	207	207

Note: Cluster-robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, † measured at time of migration

4.7 Appendix C: Experimental Instructions

Task 3. This is the last task we have for you today: Again, there is no right or wrong answer. Maybe you want to get a pen and paper in case you want to write down a detail.

You are in a group with three other persons. You don't know their identity and they don't know yours. Please imagine now that there is a pond in your neighborhood that contains 80 fish. You have the possibility to catch a maximum of 20 fish. Every fish you don't want to catch will stay in the pond. The other three members of your group have to make the same decision.

Please note, that you can only catch fish once!

After your decision, we will estimate how much money you have earned. Your earnings will be composed of two things:

- 1. Your private earnings: For every fish you take, you will earn 0.5 GHS. No one except you earns anything from the fish you took out of the local pond. If you extract, for example, 6 fish you would get 3 GHS. If you decide to catch 11 fish you would get 5.5 GHS and so on.
- 2. Your group earnings: Every fish left in the pond by your group is worth 1 GHS, which you have to share equally with the other three group members from your community. For example: If 20 fish are left, your group earns 20 GHS. You share it, which means that you would get 5 GHS on top of your individual earnings. If 50 fish are left in the pond, your group would earn 50 GHS, and you would get 12.5 GHS and so on.

Now just two short questions, which do not affect your earnings:

- Does the amount of money you get depend on the decisions of your group members?
 - ☐ Yes
 - ☐ No
- → The right answer is yes: The more fish your group members leave in the local pond, the more money the group earns, and the higher is the amount of money you get on top of the fish you caught. But this means also: The more fish your group members take, the less fish will be left in the pond and your group earnings will be reduced.
- Please imagine: After everyone in your group decided how much he or she wants to take out, there are 40 fish left in the pond. How much do you earn from these fish (on top of your private earnings)?

→ The right answer is 10 GHS. The 40 fish would bring your group 40 GHS, which you have to share with the other group members. Therefore, you have your private earnings from whatever you took out of the pond, plus the 10 GHS from what your group left in the pond.

To summarize:

- Every fish you take will bring you, and only you, 0.5 GHS.
- Each of the 80 fish, which is not taken out by you or your group members, will bring 1 GHS to the group and will be shared equally.
- All four members will decide at the same time, so you don't know what the others did.

Any questions?

Please answer them as discussed in the training. If you don't know how to answer, please ask me.

F3a. How many fish do you want to take?
It is okay to take your time to think about it.

Any number between 0 and 20 is allowed.

→

III. CONCLUDING REMARKS

5. Concluding remarks

5.1 Summary of findings and conclusions

The main purpose of this dissertation was to investigate the interactions between coastal environments, migration and individual preferences. For this purpose, I carried out three different studies with migrants and non-migrants in coastal communities of Ghana and Indonesia.

The first part of the research focuses explicitly on the impact of environmental factors on migration decisions and investigates whether rather gradual changes influence internal or international moves. Data from the survey among those who still live in the study region and those who have moved away were combined with household-level GPS data and community-level expert data. The results suggest that the experienced gradual coastal changes do not help to explain out-migration decisions in both Keta and Semarang while many other socioeconomic factors, among them risk and time preferences, do. I would have further expected that particularly rather risk-averse individuals or those who value future consumption relatively more than current consumption are also more likely to move away when experiencing coastal changes. However, there was no evidence that preferences themselves impact on the link between coastal changes and migration decisions. While there are a few mediating factors found, among them gender and networks in Indonesia and the household's number of children in Ghana, one very interesting finding is that the only sudden-onset event considered in this research, storms in Ghana, is found to have a direct effect on out-migration. Storms hit the communities unexpectedly and with great power, destroying buildings, roofs and boats, making it difficult for fishermen to fish. Storms are only a problem in Ghana and, thus, there is no comparable sudden-onset measure for the Indonesian case study. Therefore, it is very likely that the effect of environmental events strongly depends on the nature of these events. Long-term, gradual changes like sea-level rise, small-scale floods, erosion and land subsidence are more easily anticipated and communities experiencing these coastal threats have already experienced them for a rather long time.

Altogether, results from the two study regions suggest that the costs associated with coping with and adapting to slow-onset environmental changes might be lower than those associated with migration, which include, for example, transport, psychological and social costs as well as uncertainties about the economic success of the migration.

In the second research, I focused further on the link between risk and time preferences and out-migration. *Research 1* showed already that preferences elicited through standard survey questions turned out to be helpful in explaining individual migrations. Preferences seem to be directly linked to migration decisions, independent of experienced coastal changes. As preferences have not been much examined in the empirical migration literature, *research 2* picked up on them and considered

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them in greater detail. Therefore, we not only included stated preferences but also elicited revealed preferences through incentivized experiments, which have been commonly used in the current economic literature, but which had not yet been linked to migrations. A first interesting result from this study is that the measure of risk preferences revealed by incentivized experiments is highly correlated to the measure of risk preferences as stated in the questionnaire. This shows that survey questions and incentivized tasks seem to measure the same underlying concept. The findings also show that incentivized experiments can be successfully conducted through phone interviews and that there is a significant link between risk and time preferences and out-migration—especially strong in Indonesia. The preference measures do not only turn out to be significant but also meaningful in size. Experimental tasks suggest that individuals, categorized as risk-averse, were 12 and 15 percentage points less likely to be a migrant than their rather risk-loving counterparts in Ghana and Indonesia, respectively. People who were willing to forego money to have a bigger payoff in the future were on average 12 and 11 percentage points more likely to be a migrant than their less myopic fellows in Ghana and Indonesia, respectively. Interestingly, for the Indonesian case, further analysis showed that the effects of risk and time preferences could only be found for the female subpopulation. This finding might be related to different gender roles in both regions. The results indicate that preferences play crucial roles in migration decisions and should be further considered. They also emphasize that migrants are not a homogeneous part of the population and differ from non-migrants in more than easily observable factors. The different composition of migrant streams—younger, better educated and likely more risk-tolerant and patient—will have consequences for both sending and receiving areas, in both environmental and non-environmental ways.

Thus, in *research 3*, we investigated whether migrants might have an impact on coastal environments. Even though coastal areas are under increasing pressure from a rapidly growing human population, empirical research on the effect of migration on coastal environments is scarce. While migrations are not likely to influence shoreline erosion, storms or floods, which are characteristic of the study regions, they might, however, influence coastal and marine resources. These resources are especially important for communities in Keta, Ghana. For that, we collected data on respondents' environmental attitudes toward coastal and marine resources and complemented it with experimental data obtained with standard CPR measures. We find no convincing evidence for an inherent difference between migrants and non-migrants in either environmental attitudes or cooperation levels in a common-pool situation. While we find a significant difference in cooperation levels between migrants and non-migrants, this difference is found to depend on whether the respondent is a fisher or not. Non-migrant fishers behave *more* cooperatively than other non-migrants; migrant fishers, on the other hand, behave *less* cooperatively than other migrants. Similarly, we find that there are differences in valuing the utilization of

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resources based on socioeconomic characteristics. Consistently, this difference in the values depends strongly on whether the respondent is a fisher. The results highlighted that socioeconomic differences between migrant and home populations play important roles in migration–environment relationships. Therefore, migrants do not seem to be *per se* environmental degraders.

Overall, it can be stated that there are many interactions between migrations, preferences and coastal environments; none, however, seems to be easily generalizable. This is not very surprising as all factors are part of equally complex systems. Understanding how to anticipate or stem migration flows, however, is an ongoing dilemma for policy makers. All in all, it can be stated that the link between coastal environmental changes and out-migration decisions is less visible in the study regions than previous empirical literature would have suggested, that risk and time preferences seem to be robustly correlated to migration decisions especially when being measured by experiments, and that migrants might not be *per se* coastal resource degraders but rather likely to impact through their selective nature or depending on their occupation. These findings might have some implications for policy makers: first, they emphasize that gloomy predictions of mass migrations due to environmental changes are most likely exaggerated and very context-dependent. People in coastal regions seem to be quite resilient and willing to adapt to predictable coastal changes. This does not mean that no out-migration is taking place or that environmentally or climatically challenging situations never contribute to migrations. It rather illustrates that people in Keta and Semarang likely rather move due to other reasons. Policy makers could thus focus on helping affected coastal populations to adapt and—as it has already started doing in both study regions—invest in bigger-scale solutions.

The results also help to better understand the selective nature of migration: non-migrants seem to be less risk-tolerant in both study regions. Thus, communities experiencing net out-migration do not only have a population that is likely to be on average older and less educated but one that is also less risk-averse. Risk-averse people, however, often tend to undertake less risky and generally safer, more conservative actions—especially when it comes to investing in human capital or allocating savings. Selecting safer options generally means that—in the equilibrium—lower but more predictable outcomes are chosen. Thus, more risk-averse individuals are often found to end up with lower incomes (Guiso & Paiella 2004). Policy makers should be aware that net sending regions might be economically weaker not only because of a change in age structure but also because of this change in preference composition. They could foster translocal connections between sending and receiving areas, encourage remittances or provide alternative or more attractive livelihoods in those regions to counteract a potentially negative effect of out-migrations on the regional development.

The results also emphasize that population changes due to migrations will most likely have other implications than population changes caused by changes in birth or mortality rates: migrants are a

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non-random part of the population whose different characteristics like higher willingness to take risks can have implications for sending and receiving regions, including their coastal environments. Policy initiatives aiming to reduce potential effects of migrants on natural resources could focus especially on subgroups that were found to have less proenvironmental attitudes and values, and less cooperative behavior, for example, migrant fishers. Initiatives and integration into the social fabric of the new communities seem to be promising pathways.

5.2 Strengths and limitations

In this subsection, I begin by briefly summarizing some strengths of this dissertation, followed by some noteworthy limitations. Specific strengths and limitations have already been discussed in the respective chapters. Now, I want to focus on some broader aspects that do not stem only from one specific study but that can be linked to the broader research.

A strength of this dissertation is that it combines coastal environments and migrations in general, and contributes to a better understanding of the interlinkages between these coastal environments, individual preferences and migrations. Even though many coastal regions experience environmental threats and face both in- and out-migrations, there is still the need for empirical studies that contribute to a better understanding of these interrelations—especially important considering the important role of migrations in shaping coastal regions.

A second strength is the focus on two different coastal areas, which are located in Western Africa and Southeastern Asia—two regions especially considered to be affected by population dynamics and coastal changes (Nicholls & Hoozemans 2005). Although the study regions are rather small, conducting the same research in two different regions enabled a comparison of results in different contexts in a way that helps to explain differences in observed interlinkages. For example, we found unemployed individuals to be more likely to move in Keta, but less likely to move in Semarang. This finding can be easily explained by the different context in which it was obtained. In Keta, job opportunities are rare and moving to bigger cities increases employment options drastically. Semarang, however, is a thriving and large city where it is less hard to find a job than in the surrounding area. The main focus of *research 1* and *research 2*, however, was on environmental changes, preferences and migration and the main conclusions do not differ much between the two regions. One notable difference, however, is the impact of gender on the effect of preferences on migrations, which is discussed in Chapter 3. A comparison of these results is also already a first step in the direction of producing more generalizable knowledge. Finding a similar effect in both study regions gives additional prominence to the validity of the results and helps to generalize the transferability to other contexts.

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Furthermore, the different research questions are answered with the help of quantitative methods and econometric analyses, which help to disentangle the different effects and which can complement existing qualitative studies. The use of quantitative research methods adds especially to the literature on the bilateral link between environment and migration, which is traditionally dominated by rather qualitative studies. While data availability or measurement problems have mostly been the reason for most qualitative studies, this research is characterized by using various and partly novel measures to answer the different research questions. These complementary measures allow comparison of patterns and confirmation of results from different angles and perspectives. To address the first research question, both objective and subjective measures of past coastal changes were collected as both types have different advantages and disadvantages. Furthermore, there was the chance to distinguish slow- and sudden-onset coastal changes, which are likely to have different implications for migration decisions. The second research question was also answered with the help of two different measures: stated risk and time preferences obtained by standard questions in the survey were complemented by incentivized experimental tasks, which are often used in behavioral economics but have not yet been used in the scarce literature on preferences and migration. Again, *research 3* is based on two different measures that are novel in the migration–environment literature but seem to be very helpful in investigating potential differences in behavior toward coastal and marine resources between migrants and non-migrants. Environmental attitudes, widely used in the environmental psychology literature, and CPR extraction rates in a CPR experiment, widely used in behavioral economics, were used as a proxy for environmental behavior.

Another strength of this research is associated with the underlying dataset, which contains all factors necessary to link coastal environments, preferences and migrations. Instead of relying on public census data (which has not been available on an individual level in the two study regions anyway), I collected new information about both migrants and non-migrants. Different from readily available datasets, this approach especially enabled the inclusion of experimental measures into the questionnaire. The inclusion of experimental tasks can be easily done whenever experiments do not require sequential, pair-wise interactions of participants.³⁸ For this research, the tasks have not only been included in the questionnaire (as bringing together migrants to play a dynamic CPR game would have been logistically too complicated), but they have also been played via phone only. I am not aware of another study that has done so. Even though experimental complexity was limited by this interview mode, experiences of the enumerators and results of the tasks suggest that they produced meaningful measures and can be useful for future research. On a side note, the inclusion of incentivized tasks did not only add to the research but has also facilitated access to migrants’

³⁸ Despite the advantages and the feasibility of including experiments in surveys, this method is not often used. Fehr et al. (2003) believe that this could be attributed to the different traditions of research communities in social sciences, which either rely on surveys or on experiments, but infrequently on both.

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phone numbers. Some households, which had first been hesitant to give out phone numbers of migrants, changed their mind once they heard about (or received) payoffs from the tasks. The combination of fun and payoffs of the experiment has thus contributed to the willingness to help us get in contact with migrants to interview them too.³⁹

The implementation of an own survey, however, led to some data-related limitations. A first data limitation is that, due to the sampling strategy, households that have moved as a whole are not considered in the sample. While this is not very problematic for *research 2* or *3*, it should be kept in mind when interpreting results from *research 1*. Households that are particularly affected by coastal changes might be more likely to move away as a whole than others. If they have not left behind any household member in our study region, then none of these migrated persons had the chance to be selected into this dissertation's sample. A further discussion of this potential bias and why it might be less critical in our case studies can be found in Chapter 2.

Another data limitation is related to the lack of panel data. However, no data from the past were available and conducting the same survey twice within the time frame of my Ph.D. was not feasible. Even if I had conducted the survey in the beginning of the three years period of the project, had no problems to track the same respondents down for a follow-up survey and had then used the information of the baseline to predict who had migrated until the second survey, the time in between both surveys would have probably been too short to obtain a satisfactory number of migrants in the sample without increasing the sample size drastically. Therefore, I relied on cross-sectional survey data, which include retrospective information. Because the lack of panel data is especially important for *research 2*, the problem, related literature and potential solutions were further discussed in Chapter 3.

5.3 Future outlook

Considering the data limitations just mentioned in the previous subchapter, future research that combines the different factors of interest—like individual risk and time preferences or perceptions of coastal changes—would benefit from collecting original panel data and conducting the experimental tasks at at least two different points in time. To do so, the baseline should cover enough respondents to ensure that a satisfying number of them had migrated at the second time of the survey. Furthermore, it had to be made sure that respondents from the baseline can be tracked down after some years, even when the whole household had moved. These panel data would also add interesting insights to the research on the stability of individual preferences or perceptions of environmental changes over time.

³⁹ It must be noted that household heads, however, were mostly very open and willing to help me and the enumerators.

5. Concluding remarks

Furthermore, with a sufficiently large sample, the definition of migration could be narrowed down and instead of treating every type of migration the same, future research on coastal migrations could account for spatial and temporal variations to test how far the links between coastal environments, individual preferences and migrations differ with different migration types (e.g., short distance vs. long-distance moves; return, circular and permanent migrations; regular vs. irregular moves). Even though most environmentally related migrations are expected to happen internally, it would be valuable to compare internal with international migration dynamics.

Regarding the impacts of environmental conditions, research could focus more on the distinction between sudden and slow-onset (coastal) environmental changes linking them to migration patterns in different contexts as they are very likely to cause different migratory responses. As the experienced coastal changes in Keta and Semarang are of limited direct impact on economic activities of the coastal populations, it would also be interesting to conduct a similar study focusing on both gradual and rapid economically relevant environmental events.

Following up on the importance of risk preferences, future research could consider that migration decisions are not made without any knowledge about destinations. Thus, individuals differ not only in their willingness to take risks but also in their knowledge about the destination. However, this level of uncertainty at the moment of the migration decision has not been considered yet. Further research could also investigate differences between general measures of risk tolerance and mobility-specific measures.

Pursuing the research conducted in *research 3*, it would be meaningful to repeat the survey and CPR experiment with different samples. A next interesting step would be to sample only fishers because results have shown that the impact of migration on proxies for coastal changes varies greatly with the occupation of the respondent. It could also be especially reasonable to repeat the research in typical migrant destination areas, comparing locals with in-migrants, which would ensure that both groups are experiencing the same environmental context.

IV. APPENDIX D: SURVEY

Survey Keta ⁴⁰					
Date:		Start time:		End time:	

Identifier	HH number/ ID		Respondent ID: (HH number/ personal number)	_____/____
	HH number in previous survey			
	Name of HH head			
	Call name of HH head			

Location	Address	
	Community name	
	GPS-Code	
	Contact number	

Interview	Name of interviewer	
	Results	1 Interview; 2 Dwelling not found; 3 Absent; 4 refused

⁴⁰ The survey had been translated to Bahasa Indonesia before it was conducted in Semarang.

Section A: Introduction and informed consent

Hello. My name is [.....] and I'm a student from [.....].

We are running a survey which aims to gather more information on how people here make a living and what changes they experience in the environment affecting their households. We are also interested to know whether people move away from here and why. This project is between academic institutions from Germany and the University of Ghana, involving several researchers. Last year a first team was already interviewing you. Now we randomly chose you for a second interview.

Your responses will be treated confidentially, and will only be used for the purposes of this study. Nobody except me and a small group of other researchers in this project will know your name and the answers you give will be processed in such a way that they cannot be linked to your name. In the reports we will ensure that participants in this survey cannot be identified.

I would greatly appreciate your participation in this survey. The interview will take approximately **20 minutes** to complete. You can ask any question during the interview and you could refuse to answer questions, or terminate the interview at any time. If you have any questions or concerns about this study, you may contact Dr. Joseph Teye/ Prof. Awumbila, Center for Migration Studies, University of Ghana in Legon. In case of questions or comments, you can reach the Center for Migration studies under 0302-xxxxxx.

Are there any questions you would like to ask at this moment? Do you declare to have understood the purpose of this study and agree to participate in this survey?

YES [] NO []

APPENDIX D: SURVEY

B: GENERAL PERSONAL AND HOUSEHOLD INFORMATION

Please speak to the HH head to answer the first parts of this survey!

Including yourself, please give me the names of the persons who currently live and eat in your household.

#	B1. Name Please start the list with you, the head of this household. Then list other members, from the oldest to the youngest, if possible.	B2. What is [Name]'s relationship to the household head?	B3. How old is [Name]?	B4. What is [Name]'s gender?	B5. How long has [Name] lived in this community?
		1 Head of HH 2 Spouse 3 Son/Daughter 4 Son/Dau in law 5 Grandchild 6 Parent 7 Grandparent 8 Brother/Sister 9 Parent in law 10 Other relative 11 Not related	Years	1 Male 2 Female	Years (9999 if whole life)
M1					
M2					
M3					
M4					
M5					
M6					
M7					
M8					
M9					
M10					

For enumerator only: Please fill in

B6. Total number of household members	
B7. Number of men living in HH, 16 years and older	
B8. Number of women living in HH, 16 years and older	
B9. Number of children living in HH, 0 – 15 years	
B10. Number of elderly persons living in HH, 64 years and older	

APPENDIX D: SURVEY

Now, we would like to get more information about you.

B11. What is your marital status? <i>Read out</i>		B12. What is your religion?		B13. What is your ethnic identity?
Never married/ single	1	Muslim	1	
Living together	2	Protestant	2	
Married	3	Catholic	3	
Divorced	4	Other Christian	4	
Separated	5	Hindu	5	
Widow(er)	6	Buddhist	6	
		Traditional	7	
		Other: _____	8	
		None	9	

↓

B14a. What is the highest level of school you have completed or the highest degree you have received?	
Non	1
< primary	2
Primary	3
Middle/ JSS	4
Secondary/ SSS	5
Tech/Vocational	6
Bachelor	7
Master	8
PhD	9



B14b. So, how many years of education have you completed?
years

B14c. What is the highest level of school a household member has completed or the highest degree a household member has received?	
Non	1
< primary	2
Primary	3
Middle/ JSS	4
Secondary/ SSS	5
Tech/Vocational	6
Bachelor	7
Master	8
PhD	9



B14d. So, how many years of education has this household member completed?
years

APPENDIX D: SURVEY

B15a. What is your main occupation?	
Self-employed	1
Worker in the private sector	2
Government worker	3
Casual worker	4
Farmer (crop or livestock)	5
Fisherman	6
Student	7
Housework	8
Retired	9
Unemployed	10
Other:	11

↓

B15b1. What is your monthly income? (Approximately)	
< 50 GHS	1
> 50 but ≤ 100 GHS	2
> 100 but ≤ 200 GHS	3
> 200 but ≤ 300 GHS	4
> 300 but ≤ 500 GHS	5
> 500 but ≤ 1000 GHS	6
> 1000 GHS	7

↓

B15b2. So do you earn more than 140 GHS/ month?	
No	1
Yes	2

→

B15c. What is the total monthly household income? (Approximately)
GHS

B16a. Do family members who live outside of this community support you financially or otherwise? <i>Read out</i>	
No ► <i>jump to B17</i>	1
Yes, with goods	2
Yes, financially	3
Yes, both	4

↓

B16b. If yes, how often? <i>Read out</i>	
Every month	1
Every 2-6 months	2
Every 7-12 months	3
For special occasions	4
irregularly	5
Other:	6

↓

B16c. If supported financially: How much do you receive on average? (Per month or per year)		
	Per month	1
	Per year	2

GHS

↓

B17. What is the ownership status of this house? <i>Read out</i>	
Owned (by yourself or spouse)	1
Owned (by other HH member)	2
Rented	3
rent-free arrangement	4
Given by government	5
Other: _____	6

↓

B18. Does anyone from the household own land elsewhere?		
No	1	
Yes	2	

→

Please show card A:

B19. The next question deals with optimism. Optimists are people who look to the future with confidence and who mostly expect good things to happen. How would you describe yourself? How optimistic are you in general?						
Not at all optimistic			Very optimistic			
1	2	3	4	5	6	7

↓

C: ADAPTATION

Now we are also interested in the environment you live in and how it affects your life.

C1a. Please think about the time you have lived in this community. Have <u>you</u> ever experienced one of the following events? <i>Read out – one answer per line</i>		C1b. <i>If yes:</i> How much has it affected your daily life? Please rate the effect on your life on a scale from 1 to 7, where 1 means not affected at all, and 7 means highly affected. <i>Please show card B</i>
Type of event	No..... 1 Yes, once..... 2 Yes, more often... 3	
a) Flooding on land		
b) Flooding in house		
c) Loss of land through erosion		
d) Storm		
e) Other?: _____		

C2. If you think about the next 2 years: how likely is it that you will be affected by these events? How high is the risk? Rate each event on a scale from 1 to 10, where 1 is no risk and 10 is extremely high risk.

Read out – one answer per line

Please show card C

Type of event	Not likely at all Extremely likely											
	1	2	3	4	5	6	7	8	9	10		
a) Flooding on land	O	O	O	O	O	O	O	O	O	O	→	
b) Flooding in house	O	O	O	O	O	O	O	O	O	O	→	
c) Loss of land through erosion	O	O	O	O	O	O	O	O	O	O	→	
d) Storm	O	O	O	O	O	O	O	O	O	O	→	
e) Other: _____	O	O	O	O	O	O	O	O	O	O	→	

C3. How do you rate your environmental risks compared with an average person in this community?

Read out

I have a lower than average risk.	1
I have an average risk.	2
I have a higher than average risk.	3

→

APPENDIX D: SURVEY

C4. In your opinion, how much damage would a flood cause to your home and belongings?

GHS

C5. Please think about common practices people use to protect their houses and belongings from floods. In your opinion, how efficient are these practices in preventing damages?

Read out

Very efficient	1
Somewhat efficient	2
Neither	3
Somewhat inefficient	4
Very inefficient	5



C6. In your opinion, how much money would you have to spend to protect your house if there is a flood in your neighborhood? (*An approximate number is enough*)

GHS

C7. Have you or your household undertaken anything to protect yourselves or your property from the mentioned threats?

No ► *jump to C9* 1

Yes 2



C8a. If yes, what have you undertaken? What is your household's main strategy?

Improve foundation/ house	1
Raise furniture/ pack valuables away	2
Use physical barrier	3
Use drainage ditch	4
Changes around the house	5
Improve roof	6
Plant trees	7
Pray	8
Other:	9



C8b. Apart from your first mentioned strategy: Do you do something else to protect your household from environmental hazards? (*Several answers possible now. If no other strategy, leave blank*) ► *jump to C10*

Improve foundation/ house	1
Raise furniture/ pack valuables away	2
Use physical barrier	3
Use drainage ditch	4
Changes around the house	5
Improve roof	6
Plant trees	7
Pray	8
Other:	9



First mentioned

Second mentioned

Third mentioned

C9. If no, why not? (Name up to three reasons if you have any)

1.

2.

3.

APPENDIX D: SURVEY

C10. Would you move to another place because of the environment?	
No	1
Yes ► <i>jump to C11</i>	2

↓

C10b. Why not? (Name up to three reasons if you have any)	
1.	
2.	
3.	

C11. Do you save money specifically in order to deal with environmental damage/threats?	
No	1
Yes	2

↓

C12a. In your opinion, what causes environmental threats like floods?	

C12b. What is the best way to deal with environmental threats?	

C12c. Are you satisfied with the way you are able to deal with environmental threats like floods?	
No	1
Yes	2

↓

C12d. What would help you to deal with environmental threats like floods?	

Please indicate your agreement with the following statements

*Read out – one answer per line
Please show card D*

	Agree strongly	Agree	Neutral	Disagree	Disagree strongly	
C13. The national or local government is responsible to protect the community from environmental threats.	1	2	3	4	5	
C14. The national or local government is going to take care of our environmental problems.	1	2	3	4	5	
C15. The environmental situation has worsened over the last years.	1	2	3	4	5	
C16. It is very expensive to protect your property from the damages caused by the environment.	1	2	3	4	5	
C17. In general, I am very willing to take risks.	1	2	3	4	5	
C18. I abstain from things today so that I will be able to afford more tomorrow.	1	2	3	4	5	

APPENDIX D: SURVEY

C19. Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people? Please answer on a scale of 1 to 5, where 1 means that you have complete distrust and 5 means that you have complete trust. <i>Show card E</i>	Complete distrust	Some distrust	Neither trust nor	Some trust	Complete trust	
	1	2	3	4	5	

Thank you very much that you took the time to answer our questions and help us with this research.

In a second part we would also like to contact family members or other persons who lived with you but moved to another place outside of this community within the last **10 years**, and are staying there at least for 3 consecutive months. They will be compensated for their time to answer our questions.

Please list them now. We would be very thankful if you could also give us a telephone number which we might use to reach them. Of course, this information will still be treated confidentially!

Please: Only list those who left the community!

C21. Name	C22. Telephone Number	C23. Year of Moving Away	C24. Current place of residence

On top, I would like to randomly choose one of the persons currently living in your household and continue to ask some general questions, less related with the environment.

Instructions for enumerator: Please go back to Table B1 and assign a number to each household member, age 18 and older who lives in the community (at least) for the last 5 years (including the household head!). Then roll the dice in order to determine which household member you are going to interview in the next section.

C29. Selected household member: _____

Please ask the household head whether he could give us his/her phone number and when we should try to call the selected household member.

- ☐ Now
- ☐ Later, namely _____

Thank you very much!

APPENDIX D: SURVEY

D: General information, selected household member

Survey Environmental Change and Household Strategies

Date:		Start time:		End time:	
-------	--	-------------	--	-----------	--

Identifier	Name of respondent			
	Living in HH number	Respondent ID (HH number/ personal number)	____/____	
	HH number in previous survey			
	Name of HH head			

Interview	Name of interviewer				
	Results	1 Interview; 2 Absent/ not answering; 3 refused; 4 other			

Introduce yourself again, if you haven't introduced this survey and yourself to the selected person:

Hello. My name is [.....] and I'm a student from [.....].

We are running a survey which aims to gather more information on how people here make a living and what changes they experience in the environment affecting their households. We are also interested to know whether people move away from here and why. This project is between academic institutions from Germany and the University of Ghana, involving several researchers. Last year a first team was already interviewing your household. Now we randomly chose you for a second interview.

Your responses will be treated confidentially, and will only be used for the purposes of this study. Nobody except me and a small group of other researchers in this project will know your name and the answers you give will be processed in such a way that they cannot be linked to your name. In the reports we will ensure that participants in this survey cannot be identified.

I would greatly appreciate your participation in this survey. The interview will take approximately **20 minutes** to complete. You can ask any question during the interview and you could refuse to answer questions, or terminate the interview at any time. If you have any questions or concerns about this study, you may contact Dr. Joseph Teye/ Prof. Awumbila, Center for Migration Studies, University of Ghana in Legon. In case of questions or comments, you can reach the Center for Migration studies under 0302-xxxxxxx.

Are there any questions you would like to ask at this moment?

Do you declare to have understood the purpose of this study and agree to participate in this survey?

YES [☐] NO [☐]

APPENDIX D: SURVEY

D1a. Respondent ID (transfer from previous page)	
D1b. Name of the respondent	
D1c. Living in Household Number	

D2. <i>Just fill in. Only ask if not sure:</i> What is the respondent's gender?	
Male	1
Female	2

↓

D3. What is your religion?	
Muslim	1
Protestant	2
Catholic	3
Other Christian	4
Hindu	5
Buddhist	6
Traditional	7
Other: _____	8
None	9

↓

D4. What is your ethnic identity?

D5. What is your nationality?

D6. How old are you? (<i>Age at last birthday</i>)
_____ years

D7a. What is your marital status? <i>Read out</i>	
Never married/single	1
Living together	2
Married	3
Divorced	4
Separated	5
Widow(er)	6

↓

D7b. If married: Are you (currently) married to someone from this community?	
No	1
Yes	2

↓

D8. How many children do you have?	
D8a. Total number of children	
D8b. Number of children, age 0-15	

For enumerator only: Please transfer answers from table B6 – B10	
D8c. Total Number of Household members	
D8d. Number of men living in HH, 16 years and older	
D8e. Number of women living in HH, 16 years and older	
D8f. Number of children living in HH, 0 – 15 years	
D8g. Number of elderly persons living in HH, 64 years and older	
D8h. Age of household head	

APPENDIX D: SURVEY

D9. What is the ownership status of this house? <i>Read out</i>	
Owned (by myself or spouse)	1
Owned (by other HH member)	2
Rented	3
Rent-free arrangement	4
Given by government	5
Other: _____	6

↓

D10a. What is the highest level of school you have completed or the highest degree you have received?	
Non	1
< primary	2
Primary	3
Middle/ JSS	4
Secondary/ SSS	5
Tech/Vocational	6
Bachelor	7
Master	8
PhD	9

↓

D10b. So, how many years of education do you have completed?

years

D11. What is your main occupation?	
Self-employed	1
Worker in the private sector	2
Government worker	3
Casual worker	4
Farmer (crop or livestock)	5
Fisherman	6
Student	7
Housework	8
Retired	9
Unemployed	10
Other: _____	11

↓

D12a. What is your monthly income?	
< 50 GHS	1
> 50 but ≤ 100 GHS	2
> 100 but ≤ 200 GHS	3
> 200 but ≤ 300 GHS	4
> 300 but ≤ 500 GHS	5
> 500 but ≤ 1000 GHS	6
> 1000 GHS	7

↓

D12a2. So do you earn more than 140 GHS/ month?

No	1
Yes	2

D12b. *Transfer from question B15c if HH head has already answered the following question:*
 What is the total monthly household income? (Approximately)

GHS

→

D13. How would you rate the wealth of your household in comparison to others in this community? <i>Read out</i>				
Much less wealthy than most	Less wealthy than most	Similar to others	Wealthier than most	Much wealthier than most
1	2	3	4	5

→

APPENDIX D: SURVEY

D14. How satisfied are you with... <i>Read out – one answer per line</i>	Very unsatisfied	Somewhat unsatisfied	Neutral	Somewhat satisfied	Very satisfied
D14a. Your income?	1	2	3	4	5
D14b. The community you live in?	1	2	3	4	5
D14c. Your work situation?	1	2	3	4	5

→

D15. In your opinion, how much were you affected by environmental events within the last 5 years? Please indicate your opinion on a scale from 1 to 10, where 1 stands for “not affected at all” and 10 for “extremely affected”.
Read out – one answer per line

Type of event	Not affected at all				Neutral				Extremely affected		
	1	2	3	4	5	6	7	8	9	10	
D15a. Flood	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	→
D15b. Loss of land through erosion	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	→
D15c. Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	→

We are also interested in migration from and to Keta. Thus, we would like to ask you some questions related to migration.

D16a. Please think about the time between your 18th birthday and today. Have you ever lived in a different community for more than 3 months? <i>Read out</i> <table border="1" style="width: 100%;"> <tr> <td>No</td> <td>1</td> </tr> <tr> <td>Yes, different community in Keta Municipality</td> <td>2</td> </tr> <tr> <td>Yes, different place in Ghana</td> <td>3</td> </tr> <tr> <td>Yes, in another country</td> <td>4</td> </tr> </table> ↓ 	No	1	Yes, different community in Keta Municipality	2	Yes, different place in Ghana	3	Yes, in another country	4	D16b. If yes, who else did you move with? <i>Several answers possible</i> <table border="1" style="width: 100%;"> <tr> <td>Parents</td> <td>1</td> </tr> <tr> <td>Siblings</td> <td>2</td> </tr> <tr> <td>Spouse/ partner</td> <td>3</td> </tr> <tr> <td>Children</td> <td>4</td> </tr> <tr> <td>Friends</td> <td>5</td> </tr> <tr> <td>No one</td> <td>6</td> </tr> <tr> <td>Other</td> <td>7</td> </tr> </table> ↓ 	Parents	1	Siblings	2	Spouse/ partner	3	Children	4	Friends	5	No one	6	Other	7	D16c. Do you have plans to leave this community? <i>Read out</i> <table border="1" style="width: 100%;"> <tr> <td>No</td> <td>1</td> </tr> <tr> <td>Yes, to a different community in Keta Municipality</td> <td>2</td> </tr> <tr> <td>Yes, to a different place in Ghana</td> <td>3</td> </tr> <tr> <td>Yes, to another country</td> <td>4</td> </tr> </table> ↓ 	No	1	Yes, to a different community in Keta Municipality	2	Yes, to a different place in Ghana	3	Yes, to another country	4
No	1																															
Yes, different community in Keta Municipality	2																															
Yes, different place in Ghana	3																															
Yes, in another country	4																															
Parents	1																															
Siblings	2																															
Spouse/ partner	3																															
Children	4																															
Friends	5																															
No one	6																															
Other	7																															
No	1																															
Yes, to a different community in Keta Municipality	2																															
Yes, to a different place in Ghana	3																															
Yes, to another country	4																															

D16d. If answered “no” in D16a: Why do you stay in this community?
If answered “yes” in D16a: Why are you now staying here and not somewhere else?

1.
2.
3.

APPENDIX D: SURVEY

Networks	No	Yes	
D17a. Do you have immediate family members living <u>outside of Ghana</u> ? ¹	1	2	
D17b. Do you have other family members or friends living <u>outside of Ghana</u> ?	1	2	
D18a. Do you have immediate family members living in <u>another district of Ghana</u> ? ¹	1	2	
D18b. Do you have other family members or friends living in <u>another district of Ghana</u> ? ²	1	2	
D18c. Do you have family members or friends living in <u>another community in Keta municipal district</u> ?	1	2	

¹Immediate family members are for example parents, siblings, children, spouse, grandparents, in-laws

²other family members are for example aunts, uncles, cousins etc.

Attitude to migration	Encourage to stay	Not stated	Encouraged to move	Not applicable*	
<i>Read out – one answer per line</i>					
D19a. What is your parents' attitude to migration?	1	2	3	99	
D19b. What is your spouse's attitude to migration?	1	2	3	99	

* for example no parents or spouse, parents are dead, no contacts etc.

E: Preferences

Please indicate your agreement with the following statements	Agree strongly	Agree	Neutral	Disagree	Disagree strongly	
<i>Read out – one answer per line</i>						
E1a. In general, I am very willing to take risks.	1	2	3	4	5	
E1b. I am very willing to take risks in financial matters.	1	2	3	4	5	
E1c. I am very willing to take risks during leisure and sport.	1	2	3	4	5	
E2a. I abstain from things today so that I will be able to afford more tomorrow.	1	2	3	4	5	
E2b. I am a patient person.	1	2	3	4	5	
E3. I am a trustworthy person.	1	2	3	4	5	
E4a. I would buy things at a higher price if it helped to protect the environment.	1	2	3	4	5	

APPENDIX D: SURVEY

E4b. I try to reduce my impact on the environment.	1	2	3	4	5	
E5a. I feel very connected to (name of community).	1	2	3	4	5	
E5b. (Name of community) is my home.	1	2	3	4	5	
E6. Everyone should at least migrate once in their life.	1	2	3	4	5	
E8. It is difficult to integrate into a new community.	1	2	3	4	5	

Environmental part:

Please indicate your agreement
with the following statements

Read out – one answer per line

	Agree strongly	Agree	Neutral	Disagree	Disagree strongly	
E9a. Marine resources will last forever (regardless of human impact).	1	2	3	4	5	
E9b. Marine resources are not valuable for their own sake.	1	2	3	4	5	
E9c. It makes me sad to see marine environments destroyed.	1	2	3	4	5	
E9d. Conservation of marine resources is important even if it lowers peoples' standard of living.	1	2	3	4	5	
E9e. Human happiness and human reproduction are less important than a healthy ocean.	1	2	3	4	5	
E9f. People have been giving far too little attention to how human progress has been damaging the marine environment.	1	2	3	4	5	
E9g. It is all right for humans to use marine environments as a resource for economic purposes.	1	2	3	4	5	
E9h. Economic development of the community is more important than marine conservation.	1	2	3	4	5	
E9i. If things continue on their present course, we will soon experience a collapse of marine resources.	1	2	3	4	5	
E9j. I enjoy spending time at the coast just for the sake of being out in nature	1	2	3	4	5	

E10a. <u>Generally speaking</u> , would you say that most people can be trusted, or that you can't be too careful in dealing with people? Please answer on a scale of 1 to 5, where 1 means that you have complete distrust and 5 means that you have complete trust. <i>Read out</i>	Complete distrust	Some distrust	Neither trust nor	Some trust	Complete trust	
	1	2	3	4	5	
E10b. Using the same scale from the previous question, I would like to ask you, how much you trust your community.	1	2	3	4	5	
E10c. And how much do you trust people you know personally?	1	2	3	4	5	

APPENDIX D: SURVEY

The main part of our interview is over. Now we would like to ask you to complete some tasks which are important for our research. The tasks involve decisions that you can make in any way you want. This time you can earn real money which we will send in form of phone credits to your phone! Your earnings will be between 1 and 20GHS and will be transferred to you afterwards. This part will not take longer than 10 minutes.

F: Preference Tasks

I will first explain the decision problem to you. Then you will make your decisions. Again, there are no right or wrong answers. If you have any questions please don't hesitate to ask me.

How much money you will earn and at which point in time will depend on your decisions in the tasks. Thus, please carefully consider your decisions! In the end, one task will be chosen randomly and you will be paid according to your decisions in that task.

TASK 1:

You are given two options of receiving money. In the first option you are guaranteed 8 GHS. In the second option you are guaranteed one of two amounts, each with equal chance. Which of the two amounts you receive, will depend on the flip of a coin.

F1a. Lets start: In the first option you are guaranteed 10 GHS. In the second option you receive 8 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Go to F1b	1	→	
Second option (8 GHS or 16 GHS)	Go to F1c	2		

F1b. Are you sure you want to have the 8 GHS instead of the chance to get 8 GHS or 16 GHS?

Sticks to first option (8 GHS)	Exit 9	1	→	
Now prefers second option (8 GHS or 16 GHS)	Go to F1c	2		

F1c. Now the values change slightly: In the first option you are guaranteed 8 GHS. In the second option you receive either 4 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Go to F1e	1	→	
Second option (4 GHS or 16 GHS)	Go to F1d	2		

F1d. Again there is a change: In the first option you are guaranteed 8 GHS. In the second option you receive either 2 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Go to F1h	1	→	
Second option (2 GHS or 16 GHS)	Go to F1i	2		

F1e. In the first option you are guaranteed 8 GHS. In the second option you receive either 6 or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Go to F1f	1	→	
Second option (6 or 16 GHS))	Go to F1g	2		

APPENDIX D: SURVEY

F1f. In the first option you are guaranteed 8 GHS. In the second option you receive either 7 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Exit 8	1	→ ☐
Second option (7 GHS or 16 GHS)	Exit 7	2	

F1g. In the first option you are guaranteed 8 GHS. In the second option you receive either 5 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Exit 6	1	→ ☐
Second option (5 GHS or 16 GHS)	Exit 5	2	

F1h. In the first option you are guaranteed 8 GHS. In the second option you receive either 3 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	EXIT 4	1	→ ☐
Second option (3 GHS or 16 GHS)	EXIT 3	2	

F1i. In the first option you are guaranteed 8 GHS. In the second option you receive either 1 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	EXIT 2	1	→ ☐
Second option (1 GHS or 16 GHS)	EXIT 1	2	

F1. For enumerator only: Where did the respondent exit?

Exit 1	1	→ ☐	<i>If exit 9: Why did you choose the 8 GHS?</i>
Exit 2	2		
Exit 3	3		
Exit 4	4		
Exit 5	5		
Exit 6	6		
Exit 7	7		
Exit 8	8		
Exit 9	9		

TASK 2:
This task is similar to the previous one. Again you are given two options of receiving money. In the first option we will pay you tomorrow. In the second option you are paid in one week from now. Please indicate which option you choose.

F2a. Please consider the following: Would you rather receive 8 GHS tomorrow or 8 GHS in 1 week?

8 GHS tomorrow	Go to F2c	1	→ ☐
8 GHS in one week	Go to F2b	2	

APPENDIX D: SURVEY

F2b. Are you sure you want to have the 8 GHS in one week instead of tomorrow?			
8 GHS tomorrow	Exit F2c	1	→
8 GHS in one week	EXIT 9	2	

F2c. Would you rather like to receive 8 GHS tomorrow or 16 GHS in one week?			
8 GHS tomorrow	Go to F2e	1	→
16 GHS in one week	Go to F2d	2	

F2d. Would you rather like to receive 8 GHS tomorrow or 12 GHS in one week?			
8 GHS tomorrow	Go to F2h	1	→
12 GHS in one week	Go to F2i	2	

F2e. Would you rather like to receive 8 GHS tomorrow or 20 GHS in one week?			
8 GHS tomorrow	Go to F2f	1	→
20 GHS in one week	Go to F2g	2	

F2f. Would you rather like to receive 8 GHS tomorrow or 22 GHS in one week?			
8 GHS tomorrow	Exit 8	1	→
22 GHS in one week	EXIT 7	2	

F2g. Would you rather like to receive 8 GHS tomorrow or 18 GHS in one week?			
8 GHS tomorrow	Exit 6	1	→
18 GHS in one week	Exit 5	2	

F2h. Would you rather like to receive 8 GHS tomorrow or 14 GHS in one week?			
8 GHS tomorrow	EXIT 4	1	→
14 GHS in one week	EXIT 3	2	

F2i. Would you rather like to receive 8 GHS tomorrow or 10 GHS in one week?			
8 GHS tomorrow	EXIT 2	1	→
10 GHS in two weeks	EXIT 1	2	

F2. For enumerator only: Where did the respondent exit?							
Exit 1	1	→	<table border="1"> <tr> <td colspan="2"><i>If exit 9:</i> Why did you choose the 8 GHS in one week?</td> </tr> <tr> <td colspan="2" style="height: 100px;"></td> </tr> </table>	<i>If exit 9:</i> Why did you choose the 8 GHS in one week?			
<i>If exit 9:</i> Why did you choose the 8 GHS in one week?							
Exit 2	2						
Exit 3	3						
Exit 4	4						
Exit 5	5						
Exit 6	6						
Exit 7	7						

APPENDIX D: SURVEY

Exit 8	8
Exit 9	9

We asked now the most important questions and a very happy that you took your time to help us. There is one more question which would take 5 more minutes and again requires a decision which can earn you money. Would you like to answer it or would you prefer to quit the interview now since we have already used a lot of your time?

Continue	1	► Go to F4	→	
Stop	2	► Go to G1		

Task 3. This is the last task we have for you today: Again there is no right or wrong answer. Maybe you could get a pen and paper in case you want to write down a detail.

You are in a group with 3 other persons. You don't know their identity and they don't know yours. Please imagine now that there is a pond in your neighborhood which contains 80 fish. You have the possibility to catch a maximum of 20 fish. Every fish you don't want to catch will stay in the pond. The other three members of your group have to make the same decision. Please note, that you can only catch fish once!

After your decision we will estimate how much money you have earned. Your earnings will be composed of two things:

- 1. Your private earnings: For every fish you take, you will earn 0.5 GHS. No one except you earns anything from the fish you took out of the local pond. If you extract, for example, 6 fish you would get 3GHS. If you decide to catch 11 fish you would get 5.5 GHS and so on.
- 2. Your group earnings: Every fish left in the pond by your group is worth 1 GHS which you have to share equally with the other 3 group members. For example: If 20 fish are left, your group earns 20GHS. You share it, which means that you would get 5GHS on top of your individual earnings. If 50 fish are left in the pond, your group would earn 50GHS, and you would get 12.5 GHS and so on.

Now just two short questions in between, which do not affect your earnings:

- Does the money you get depend on the decision of your group members?
 - ☐ No
 - ☐ Yes
- -> The right answer is yes: The more fish your group members leave in the local pond, the more money does the group earn, and the higher is the amount of money you get on top of the fish you caught. But this means also: The more fish your group members take, the less fish will be left in the pond and your group earnings will be reduced.
- Please imagine: After everyone in your group decided how much he or she wants to take out, there are 40 fish left in the pond. How much do you earn from these fish (on top of your private earnings)?
 - -> The right answer is 10 GHS. The 40 fish would bring your group 40GHS which you have to share with the other group members. Therefore, you have your private earnings from whatever you took out of the pond, plus the 10 GHS from what your group left in the pond.

APPENDIX D: SURVEY

To summarize:

- Every fish you take will bring you, and only you, 0.5 GHS.
- Each of the 80 fish, which is not taken out by you or your group members, will bring 1 GHS to the group and will be shared equally.
- All four members will decide at the same time, so you don't know what the others did.

Any questions?

Please answer them as discussed in the training. If you don't know how to answer, please ask me.

F3a. How many fish do you want to take?
Please take your time to think about it.

→

Any number between 0 and 20 is allowed.

G. Determination of payment and payment method

G1. We will roll a dice now to select which task will determine your payment. *Please roll a dice to select a task:*

Dice shows 1 or 2	→	Task 1 ► Go to G2
Dice shows 3 or 4	→	Task 2 ► Go to G3
Dice shows 5 or 6	→	Task 3 ► Go to G4

Number of task which got selected:

G2. Task 1 was selected. Please take a look which exit the respondent took and determine his payment.

Exit	Determination of payment			
1	First roll the dice!	Dice shows 1, 2 or 3	→	1 GHS
		Dice shows 4, 5 or 6	→	16 GHS
2	8 GHS			
3	First roll the dice!	Dice shows 1, 2 or 3	→	3 GHS
		Dice shows 4, 5 or 6	→	16 GHS
4	8 GHS			
5	First roll the dice!	Dice shows 1, 2 or 3	→	5 GHS
		Dice shows 4, 5 or 6	→	16 GHS
6	8 GHS			
7	First roll the dice!	Dice shows 1,2 or 3	→	7 GHS
		Dice shows 4,5 or 6	→	16 GHS
8	8 GHS			
9	8 GHS			

→

The respondent receives:

GHS

*Please tell the respondent how much he will receive.
► Jump to G5*

APPENDIX D: SURVEY

G3. Task 2 was selected. Please take a look which exit the respondent took and determine his payment.

Exit	Determination of payment
1	10 GHS in one week
2	8 GHS tomorrow
3	14 GHS in one week
4	8 GHS tomorrow
5	18 GHS in one week
6	8 GHS tomorrow
7	22 GHS in one week
8	8 GHS tomorrow
9	8 GHS in one week

→

The respondent receives:

GHS
On: (Date)

Please tell the respondent how much he will receive.
► Jump to G5

G4. Task 3 was selected: We will now check how many fish the other members of your group took, calculate your earnings and notify you soon how much you have earned. ► *Jump to G5*

The number of fish the respondent took:	
The number of fish group member 1 took:	
The number of fish group member 2 took:	
The number of fish group member 3 took:	
Total number of fish taken by group	

Private earnings: (amount of fish taken by respondent * 0.5GHS)	
Group share: (80 – total number of fish taken by group) * 1GHS/4	
Total earnings (add private earnings and group share)	

Please tell the respondent how much he will receive and why.

G5. Please let us now know to which number we should send your earned phone credits. As you know, the amount and date will depend on your previous decisions.

Thank you very much for your cooperation!

APPENDIX D: SURVEY

H: MIGRANT PART

H1. For enumerator: Please look at table C21. Are there any migrants listed who moved away within the last **10** years?

No	► no migrant part	1	
Yes	► Please continue with H2	2	

Please assign a number to each person listed in C21. Then roll the dice and select the person you are going to interview

H2. Name:

H3. Phone Number:

Call the person and introduce yourself and the project.

Survey Environmental Change and Household Strategies

Date:		Start time:		End time:	
-------	--	-------------	--	-----------	--

Identifier	Name of respondent			
	Formerly living in HH number HH number in previous survey		Respondent ID (HH number/ personal number)	_____/_____
	Name of HH head			

Interview	Name of interviewer			
	Results	1 Interview; 2 Absent/ not answering; 3 refused; 4 other		

Introduction and informed consent

Hello. My name is [.....] and I'm a student from [.....].

We are running a survey which aims to gather more information on households in the Keta municipality. We are also interested to know whether people move away from there and why. This project is between academic institutions from Germany and the University of Ghana, involving several researchers.

Your responses will be treated confidentially, and will only be used for the purposes of this study. Nobody except me and a small group of other researchers in this project will know your name and the answers you give will be processed in such a way that they cannot be linked to your name. In the reports we will ensure that participants in this survey cannot be identified.

I would greatly appreciate your participation in this survey. The interview will take approximately **20 minutes** to complete. You can ask any question during the interview and you could refuse to answer questions, or terminate the interview at any time. If you have any questions or concerns about this study, you may contact Dr. Joseph Teye/ Prof. Awumbila, Center for Migration Studies, University of Ghana in Legon. In case of questions or comments, you can reach the Center for Migration studies under 0302-xxxxx.

Are there any questions you would like to ask at this moment?

Do you declare to have understood the purpose of this study and agree to participate in this survey?

YES [] NO []

H4. Do you have time now or do you prefer if we call back at a more convenient time?

☐ Now

☐ Later: _____

Thank you for taking the time to answer a few questions!

D1a. Respondent ID (transfer from previous page)		
D1b. Name of the respondent		
D1c. Formerly living in Household Number		
D1d. Have you lived in the HH of (name of HH head) before?	1 No	
	2 Yes ► jump to D2	
D1e. If no, where have you lived in Keta Municipality? Clarify.		
Address:		

APPENDIX D: SURVEY

D2. Just fill in. Only ask if you are not sure: What is your gender?	
Male	1
Female	2

↓

D3. What is your religion?	
Muslim	1
Protestant	2
Catholic	3
Other Christian	4
Hindu	5
Buddhist	6
Traditional	7
Other:	8
None	9

↓

D4. What is your ethnic identity?

D5. What is your nationality?

We are especially interested to know more about your move away from (name of community).

D5b. When did you leave the community?	In the year ____ to ____
D5c. Why did you leave community? Please name up to three reasons.	1. _____
	2. _____
	3. _____

Please look back on the time of your migration and think about your situation in Keta.

D6. How old were you (when you left)?

D7a. What was your marital status (when you left)? Read out	
Never married/ single	1
Living together	2
Married	3
Divorced	4
Separated	5
Widow(er)	6

↓

D7b. If married: Are you currently married to someone from the community you live in now?	
No	1
Yes	2

D8. How many children did you have (when you left)?	
D8a. Total number of children	
D8b. Number of children, age 0-15	

APPENDIX D: SURVEY

Who, including you, lived together in the household in your home community at the time you left? Please name them and indicate how old they were at that time. *First name enough*

Name	Age	Sex

For enumerator only: Please transfer answers from the previous table

D8c. Total Number of Household members	
D8d. Number of men living in HH, 16 years and older	
D8e. Number of women living in HH, 16 years and older	
D8f. Number of children living in HH, 0 – 15 years	
D8g. Number of elderly persons living in HH, 64 years and older	
D8h. Age of household head	

D9. What was the ownership status of the house you lived in (name of community)? *Read out*

Owned (by myself or spouse)	1
Owned (by other HH member)	2
Rented	3
rent-free arrangement	4
Given by government	5
Other: _____	6

↓

D10a. What was the highest level of school you have completed or the highest degree you have received when you left?

Non	1
< primary	2
Primary	3
Middle/ JSS	4
Secondary/ SSS	5
Tech/Vocational	6
Bachelor	7
Master	8
PhD	9

↓

D10b. So, how many years of education did you have completed when you left?

 years

APPENDIX D: SURVEY

D11. What was your main occupation when you left?	
Self-employed	1
Worker in the private sector	2
Government worker	3
Casual worker	4
Farmer (crop or livestock)	5
Fisherman	6
Student	7
Housework	8
Retired	9
Unemployed	10
Other: _____	11

D12a. What was your monthly income when you left?	
< 50 GHS	1
> 50 but ≤ 100 GHS	2
> 100 but ≤ 200 GHS	3
> 200 but ≤ 300 GHS	4
> 300 but ≤ 500 GHS	5
> 500 but ≤ 1000 GHS	6
> 1000 GHS	7

D12b. What was the total monthly household income when you left?
(Approximately)

GHS

D12a2. So did you earn more than 140 GHS/ month?	
No	1
Yes	2

D11b. Had you already found work at your destination when you left?	
No	1
Yes	2

D12c. Do you support your family in Keta (municipality)? <i>Read out</i>	
No ► <i>jump to D13</i>	1
Yes, with goods	2
Yes, with financially	3
Yes, both	4

D12d. If yes, how often? <i>Read out</i>	
Every month	1
Every 2-6 months	2
Every 7-12 months	3
For special occasions	4
irregularly	5
other	6

D12e. If supported: How much do you give on average? (Per month or per year)		
Per month		1
Per year		2

D13. How would you have rated the wealth of your household in comparison to others in Keta municipality at the time you left? <i>Read out</i>				
Much less wealthy than most	Less wealthy than most	Similar to others	Wealthier than most	Much wealthier than most
1	2	3	4	5

APPENDIX D: SURVEY

D14. How satisfied were you with... (at the time you left)	Very unsatisfied	Somewhat unsatisfied	Neutral	Somewhat satisfied	Very satisfied
<i>Read out – one answer per line</i>					
D14a. Your income situation?	1	2	3	4	5
D14b. The community you live in?	1	2	3	4	5
D14c. Your work situation?	1	2	3	4	5

→

D15. In your opinion, how much were you affected by environmental events within the last 5 years before you left Keta? Please indicate your opinion on a scale from 1 to 10, where 1 stands for “not affected at all” and 10 for “extremely affected”.

Read out – one answer per line

Type of event	Not affected at all		Neutral						Extremely affected			
	1	2	3	4	5	6	7	8	9	10		
D15a. Flood	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	→
D15b. Loss of land through erosion	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	→
D15c. Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	→

D16a. Please think about the time between your 18th birthday and today. Have you ever lived in a different community for more than 3 months before you left your community in Keta?

Read out

No	1
Yes, different community in Keta Municipality	2
Yes, different place in Ghana	3
Yes, in another country	4

↓

D16b. Who joined your move? *Several answers possible*

Parents	1
Siblings	2
Spouse/ partner	3
Children	4
Friends	5
No one	6
Other	7

↓

D16e. Do you have plans to move back to (name of community)?

No	1
Yes	2

↓

APPENDIX D: SURVEY

D16f. <i>If yes: Why? If no: Why not? Please name up to 3 reasons.</i>
1.
2.
3.

Networks <i>Read out – one answer per line</i>	No	Yes	
D17a. Did you have immediate family members living <u>abroad</u> (when you moved away)? ¹	1	2	
D17b. Did you have other family members or friends living <u>abroad</u> (when you moved away)? ²	1	2	
D18a. Did you have immediate family members living in <u>another district of Ghana</u> (when you moved away)? ¹	1	2	
D18b. Did you have other family members or friends living in <u>another district of Ghana</u> (when you moved away)? ²	1	2	
D18c. Did you have family members or friends in another community in Keta municipal district (when you moved away)?	1	2	

¹Immediate family members are for example parents, siblings, children, spouse, grandparents, in-laws

²other family members are for example aunts, uncles, cousins etc.

Attitude toward migration <i>Read out – one answer per line</i>	Encourage to stay	Not stated	Encouraged to move	Not applicable	
D19a. What was your parents` attitude to migration?	1	2	3	99	
D19b. What was your spouse`s attitude to migration?	1	2	3	99	

APPENDIX D: SURVEY

E: Preferences						
Please indicate your agreement with the following statements <i>Read out – one answer per line</i>	Agree strongly	Agree	Neutral	Disagree	Disagree strongly	
E1a. In general, I am very willing to take risks.	1	2	3	4	5	
E1b. I am very willing to take risks in financial matters.	1	2	3	4	5	
E1c. I am very willing to take risks during leisure and sport.	1	2	3	4	5	
E2a. I abstain from things today so that I will be able to afford more tomorrow.	1	2	3	4	5	
E2b. I am a patient person.	1	2	3	4	5	
E3. I am a trustworthy person.	1	2	3	4	5	
E4a. I would buy things at a higher price if it helped to protect the environment.	1	2	3	4	5	
E4b. I try to reduce my impact on the environment.	1	2	3	4	5	
E5a. I feel very connected to (name of community).	1	2	3	4	5	
E5b. (Name of community) is my home.	1	2	3	4	5	
E6. Everyone should at least migrate once in their life.	1	2	3	4	5	
E7. I regret that I left (name of community).	1	2	3	4	5	
E8. It is difficult to integrate into a new community.	1	2	3	4	5	
Please indicate your agreement with the following statements <i>Read out – one answer per line</i>	Agree strongly	Agree	Neutral	Disagree	Disagree strongly	
E9a. Marine resources will last forever (regardless of human impact).	1	2	3	4	5	
E9b. Marine resources are not valuable for their own sake.	1	2	3	4	5	
E9c. It makes me sad to see marine environments destroyed.	1	2	3	4	5	
E9d. Conservation of marine resources is important even if it lowers peoples' standard of living.	1	2	3	4	5	
E9e. Human happiness and human reproduction are less important than a healthy ocean.	1	2	3	4	5	

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E9f. People have been giving far too little attention to how human progress has been damaging the marine environment.	1	2	3	4	5	
E9g. It is all right for humans to use marine environments as a resource for economic purposes.	1	2	3	4	5	
E9h. Economic development of the community is more important than marine conservation.	1	2	3	4	5	
E9i. If things continue on their present course, we will soon experience a collapse of marine resources.	1	2	3	4	5	
E9j. I enjoy spending time at the coast just for the sake of being out in nature	1	2	3	4	5	

E10a. Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people? Please answer on a scale of 1 to 5, where 1 means that you have complete distrust and 5 means that you have complete trust. <i>Read out</i>	Complete distrust	Some distrust	Neither trust nor	Some trust	Complete trust	
	1	2	3	4	5	
E10b. Using the same scale from the previous question, I would like to ask you, how much you trust your community.	1	2	3	4	5	
E10c. And how much do you trust people you know personally?	1	2	3	4	5	

F: Preference Tasks

The main part of our interview is over. I would like to ask you to complete three tasks which are important for our research. The tasks involve decisions, which you can make in any way you want. This time you can earn real money! Your earnings will be between 1 and 20 GHS and will be transferred to you in form of phone credits afterwards.

I will first explain the decision problem to you. Then you will make your decisions. Again, there are no right or wrong answers. If you have any questions please don't hesitate to ask me.

How much money you will earn and at which point in time will depend on your decisions in the tasks. Thus, please carefully consider your decisions! In the end, one task will be chosen randomly and you will be paid according to your decisions in that task.

TASK 1:

You are given two options of receiving money. In the first option you are guaranteed 8 GHS. In the second option you are guaranteed one of two amounts, each with equal chance. Which of the two amounts you receive, will depend on the flip of a coin.

F1a. Lets start: In the first option you are guaranteed 10 GHS. In the second option you receive 8 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Go to F1b	1	→	
Second option (8 GHS or 16 GHS)	Go to F1c	2		

APPENDIX D: SURVEY

F1b. Are you sure you want to have the 8 GHS instead of the chance to get 8 GHS or 16 GHS?

Sticks to first option (8 GHS)	Exit 9	1	→	
Now prefers second option (8 GHS or 16 GHS)	Go to F1c	2		

F1c. Now the values change slightly: In the first option you are guaranteed 8 GHS. In the second option you receive either 4 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Go to F1e	1	→	
Second option (4 GHS or 16 GHS)	Go to F1d	2		

F1d. Again there is a change: In the first option you are guaranteed 8 GHS. In the second option you receive either 2 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Go to F1h	1	→	
Second option (2 GHS or 16 GHS)	Go to F1i	2		

F1e. In the first option you are guaranteed 8 GHS. In the second option you receive either 6 or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Go to F1f	1	→	
Second option (6 or 16 GHS))	Go to F1g	2		

F1f. In the first option you are guaranteed 8 GHS. In the second option you receive either 7 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Exit 8	1	→	
Second option (7 GHS or 16 GHS)	Exit 7	2		

F1g. In the first option you are guaranteed 8 GHS. In the second option you receive either 5 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	Exit 6	1	→	
Second option (5 GHS or 16 GHS)	Exit 5	2		

F1h. In the first option you are guaranteed 8 GHS. In the second option you receive either 3 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	EXIT 4	1	→	
Second option (3 GHS or 16 GHS)	EXIT 3	2		

F1i. In the first option you are guaranteed 8 GHS. In the second option you receive either 1 GHS or 16 GHS, each with equal chance: Which option do you choose?

First option (8 GHS)	EXIT 2	1	→	
Second option (1 GHS or 16 GHS)	EXIT 1	2		

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F1. For enumerator only: Where did the respondent exit?		
Exit 1	1	→
Exit 2	2	
Exit 3	3	
Exit 4	4	
Exit 5	5	
Exit 6	6	
Exit 7	7	
Exit 8	8	
Exit 9	9	

If exit 9: Why did you choose the 8 GHS?

TASK 2:
This task is similar to the previous one. Again you are given two options of receiving money. In the first option we will pay you tomorrow. In the second option you are paid in one week from now. Please indicate which option you choose.

F2a. Please consider the following: Would you rather receive 8 GHS tomorrow or 8 GHS in one week?			
8 GHS tomorrow	Go to F2c	1	→
8 GHS in one week	Go to F2b	2	

F2b. Are you sure you want to have the 8 GHS in one week instead of tomorrow?			
8 GHS tomorrow	Exit F2c	1	→
8 GHS in one week	EXIT 9	2	

F2c. Would you rather like to receive 8 GHS tomorrow or 16 GHS in one week?			
8 GHS tomorrow	Go to F2e	1	→
16 GHS in one week	Go to F2d	2	

F2d. Would you rather like to receive 8 GHS tomorrow or 12 GHS in one week?			
8 GHS tomorrow	Go to F2h	1	→
12 GHS in one week	Go to F2i	2	

F2e. Would you rather like to receive 8 GHS tomorrow or 20 GHS in one week?			
8 GHS tomorrow	Go to F2f	1	→
20 GHS in one week	Go to F2g	2	

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F2f. Would you rather like to receive 8 GHS tomorrow or 22 GHS in one week?

8 GHS tomorrow	Exit 8	1	→	
22 GHS in one week	EXIT 7	2		

F2g. Would you rather like to receive 8 GHS tomorrow or 18 GHS in one week?

8 GHS tomorrow	Exit 6	1	→	
18 GHS in one week	Exit 5	2		

F2h. Would you rather like to receive 8 GHS tomorrow or 14 GHS in one week?

8 GHS tomorrow	EXIT 4	1	→	
14 GHS in one week	EXIT 3	2		

F2i. Would you rather like to receive 8 GHS tomorrow or 10 GHS in one week?

8 GHS tomorrow	EXIT 2	1	→	
10 GHS in two weeks	EXIT 1	2		

F2. For enumerator only: Where did the respondent exit?

Exit 1	1	→	If exit 9: Why did you choose the 8 GHS in one week?
Exit 2	2		
Exit 3	3		
Exit 4	4		
Exit 5	5		
Exit 6	6		
Exit 7	7		
Exit 8	8		
Exit 9	9		

We asked now the most important questions and a very happy that you took your time to help us. There is one more question which would take 5 more minutes and again requires a decision which can earn you money. Would you like to answer it or would you prefer to quit the interview now since we have already used a lot of your time?

Continue	1	► Go to F4	→	
Stop	2	► Go to G1		

Task 3. This is the last task we have for you today: Again there is no right or wrong answer. Maybe you want to get a pen and paper in case you want to write down a detail. You are in a group with 3 other persons. You don't know their identity and they don't know yours. Please imagine now that there is a pond in your neighborhood which contains 80 fish. You have the possibility to catch a maximum of 20 fish. Every fish you don't want to catch will stay in the pond. The other three members of your group have to make the same decision. Please note, that you can only catch fish once! After your decision we will estimate how much money you have earned. Your earnings will be composed of two things:

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- 1. Your private earnings: For every fish you take, you will earn 0.5 GHS. No one except you earns anything from the fish you took out of the local pond. If you extract, for example, 6 fish you would get 3GHS. If you decide to catch 11 fish you would get 5.5 GHS and so on.
- 2. Your group earnings: Every fish left in the pond by your group is worth 1 GHS which you have to share equally with the other 3 group members from your community. For example: If 20 fish are left, your group earns 20GHS. You share it, which means that you would get 5GHS on top of your individual earnings. If 50 fish are left in the pond, your group would earn 50GHS, and you would get 12.5 GHS and so on.

Now just two short questions in between, which do not affect your earnings:

- Does the money you get depend on the decision of your group members?
 - ☐ No
 - ☐ Yes
- -> The right answer is yes: The more fish your group members leave in the local pond, the more money does the group earn, and the higher is the amount of money you get on top of the fish you caught. But this means also: The more fish your group members take, the less fish will be left in the pond and your group earnings will be reduced.
- Please imagine: After everyone in your group decided how much he or she wants to take out, there are 40 fish left in the pond. How much do you earn from these fish (on top of your private earnings)?

-> The right answer is 10 GHS. The 40 fish would bring your group 40GHS which you have to share with the other group members. Therefore, you have your private earnings from whatever you took out of the pond, plus the 10 GHS from what your group left in the pond.

To summarize:

- Every fish you take will bring you, and only you, 0.5 GHS.
- Each of the 80 fish, which is not taken out by you or your group members, will bring 1 GHS to the group and will be shared equally.
- All four members will decide at the same time, so you don't know what the others did.

Any questions?

Please answer them as discussed in the training. If you don't know how to answer, please ask me.

F3a. How many fish do you want to take?
Please take your time to think about it.

Any number between 0 and 20 is allowed.

→

G. Determination of payment and payment method

G1. We will roll a dice now to select which task will determine your payment. *Please roll a dice to select a task:*

Dice shows 1 or 2	→	Task 1 ► Go to G2	Number of task which got selected:
Dice shows 3 or 4	→	Task 2 ► Go to G3	
Dice shows 5 or 6	→	Task 3 ► Go to G4	

G2. Task 1 was selected. Please take a look which exit the respondent took and determine his payment.

Exit	Determination of payment			
1	First roll the dice!	Dice shows 1, 2 or 3	→	1 GHS
		Dice shows 4, 5 or 6	→	16 GHS
2	8 GHS			
3	First roll the dice!	Dice shows 1, 2 or 3	→	3 GHS
		Dice shows 4, 5 or 6	→	16 GHS
4	8 GHS			
5	First roll the dice!	Dice shows 1, 2 or 3	→	5 GHS
		Dice shows 4, 5 or 6	→	16 GHS
6	8 GHS			
7	First roll the dice!	Dice shows 1,2 or 3	→	7 GHS
		Dice shows 4,5 or 6	→	16 GHS
8	8 GHS			
9	8 GHS			

The respondent receives:

GHS

Please tell the respondent how much he will receive. ► Jump to G5

G3. Task 2 was selected. Please take a look which exit the respondent took and determine his payment.

Exit	Determination of payment
1	10 GHS in one week
2	8 GHS tomorrow
3	14 GHS in one week
4	8 GHS tomorrow
5	18 GHS in one week
6	8 GHS tomorrow

The respondent receives:

GHS

On: (Date)

Please tell the respondent how much he will receive. ► Jump to G5

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7	22 GHS in one week
8	8 GHS tomorrow
9	8 GHS in one week

G4. Task 3 was selected: We will now check how many fish the other members of your group took, calculate your earnings and notify you soon how much you have earned. ► *Jump to G5*

The number of fish the respondent took:	
The number of fish group member 1 took:	
The number of fish group member 2 took:	
The number of fish group member 3 took:	
Total number of fish taken by group	

Private earnings: (amount of fish taken by respondent * 0.5GHS)	
Group share: $(80 - \text{total number of fish taken by group}) * 1000\text{GHS}/4$	
Total earnings (add private earnings and group share)	

G5. Please let us now know to which number we should send your earned phone credits. As you know, the amount and date will depend on your previous decisions.

--

Thank you very much for your cooperation!

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Card A

Not at all optimistic				Very optimistic		
1	2	3	4	5	6	7

Card B

Not at all affected				Very much affected		
1	2	3	4	5	6	7

Card C

Not likely at all								Extremely likely	
1	2	3	4	5	6	7	8	9	10

Card D

Agree strongly	Agree	Neutral	Disagree	Disagree strongly
1	2	3	4	5

Card E

Complete distrust	Some distrust	Neither trust nor distrust	Some trust	Complete trust
1	2	3	4	5

V. REFERENCES

- Ackah, C. & Medvedev, D., 2012. Internal migration in Ghana: determinants and welfare impacts. *International Journal of Social Economics*, 39(10), pp.764–784.
- Adepoju, A., 2003. Creating a borderless West Africa: constraints and prospects for intra-regional migration. *Development*, 46(3), pp.37–41.
- Adger, W.N. et al., 2007. Assessment of adaptation practices, options, constraints and capacity. In M. Parry et al., eds. *Climate Change 2007: Working Group III: Mitigation of Climate Change*. Cambridge, UK: Cambridge University Press, pp. 717–744.
- Afifi, T., 2011. Economic or Environmental Migration? The Push Factors in Niger. *International Migration*, 49(1).
- Aheto, D.W. et al., 2012. Profitability of small-scale fisheries in Elmina, Ghana. *Sustainability*, 4(11), pp.2785–2794.
- Ajzen, I., 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), pp.179–211.
- Akgüç, M. et al., 2016. Risk attitudes and migration. *China Economic Review*, 37, pp.166–176.
- Akyeampong, E.K., 2001. *Between the Sea & the Lagoon - An Eco-social History of the Anlo of Southeastern Ghana c. 1850 to Recent Times*, Athens, Ohio, USA: Ohio University Press.
- Andersen, G.L. et al., 2014. Traditional nomadic tending of trees in the Red Sea Hills. *Journal of Arid Environments*, 106, pp.36–44.
- Andersen, S. et al., 2008. Lost in state space: are preferences stable? *International Economic Review*, 49(3), pp.1091–1112.
- Angnuureng, D.B., Appeaning Addo, K. & Wiafe, G., 2013. Impact of sea defense structures on downdrift coasts: The case of Keta in Ghana. *Academia Journal of Environmental Sciences*, 1(6), pp.104–121.
- Appeaning Addo, K., 2015. Assessment of the Volta Delta Shoreline Change. *Coastal Zone Management*, 18(3), p.408.
- Appeaning Addo, K., Jayson-Quashigah, P.N. & Kufogbe, K.S., 2012. Quantitative Analysis of Shoreline Change Using Medium Resolution Satellite Imagery in Keta, Ghana. *Marine Science*, 1(1), pp.1–9.
- Arcand, J. & Mbaye, L., 2013. Braving the waves: the role of time and risk preferences in illegal migration from Senegal. *CERDI working paper*, 7517.

REFERENCES

- Aswani, S., 2002. Assessing the effects of changing demographic and consumption patterns on sea tenure regimes in the Roviana Lagoon, Solomon Islands. *AMBIO: A Journal of the Human Environment*, 31(4), pp.272–284.
- Balk, D. et al., 2009. Mapping urban settlements and the risks of climate change in Africa, Asia and South America. In G. Martine et al., eds. *Population Dynamics and Climate Change*. New York, London: United Nations Population Fund (UNFPA), International Institute for Environment and Development (IIED), pp. 80–103.
- Bauernschuster, S. et al., 2014. Why are educated and risk-loving persons more mobile across regions? *Journal of Economic Behavior & Organization*, 98, pp.56–69.
- Becker, G., 1964. *Human capital : Theoretical and Empirical Analysis with Special Reference to Education* 1st ed., University of Chicago press.
- Berkes, F. et al., 2006. Globalization, Roving Bandits, and Marine Resources. *Science*, 311(5767), pp.1557–1558.
- Bernard, H.R., 2006. *Research methods in anthropology - Qualitative and quantitative approaches* Fourth Edi. H. R. Bernard, ed., Oxford, UK: AltaMira Press.
- Bilsborrow, R.E., 1992. *Rural poverty, migration, and environment in developing countries: Three case studies*, Washington, D.C.
- Bilsborrow, R.E. & Okoth-Ogendo, H.W.O., 1992. Population-Driven Changes in Land Use in Developing Countries. *AMBIO: A Journal of the Human Environment*, 21(1), pp.37–45.
- Binngießer, J. & Randler, C., 2015. Association of the environmental attitudes “Preservation” and “Utilization” with pro-animal attitudes. *International Journal of Environmental and Science Education*, 10(3), pp.477–492.
- Binswanger, H., 1980. Attitudes toward risk: Experimental measurement in rural India. *American Journal of Agricultural Economics*, 62(3), pp.638–670.
- Black, R., 2001. Environmental refugees: myth or reality? *Unhcr*, (34), pp.1–19.
- Black, R. et al., 2011. The effect of environmental change on human migration. *Global Environmental Change*, 21(SUPPL. 1), pp.S3–S11.
- Boateng, I., 2012. An assessment of the physical impacts of sea-level rise and coastal adaptation: A case study of the eastern coast of Ghana. *Climatic Change*, 114(2), pp.273–293.
- Boateng, I., 2009. Development of Integrated Shoreline Management Planning : A Case Study of Keta, Ghana. In *Federation of International surveyors Working Week 2009, Surveyors Key*

REFERENCES

- Role in Accelerated Development*. pp. 3–8.
- Bonin, H. et al., 2009. Native-Migrant Differences in Risk Attitudes. *Applied Economics Letters*, 16(15), pp.1581–1586.
- Borchers, C. et al., 2014. Environmental Education in Côte d'Ivoire/West Africa: Extra-Curricular Primary School Teaching Shows Positive Impact on Environmental Knowledge and Attitudes. *International Journal of Science Education*, 4(3), pp.240–259.
- Bremner, J. & Perez, J., 2002. A Case Study of Human Migration and the Sea Cucumber Crisis in the Galapagos Islands. *AMBIO: A Journal of the Human Environment*, 31(4), pp.306–310.
- Briggs, S.R. & Cheek, J.M., 1986. The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality*, 54(1), pp.106–148.
- Brown, O., 2008. The numbers game. *Forced Migration Review*, 31(31), pp.8–9.
- Camerer, C.F. & Hogarth, R.M., 1999. The effects of financial incentives in experiments: A review and capital labor production framework. *Journal of Risk and Uncertainty*, 19, pp.7–42.
- Carletto, C. & de Brauw, A., 2007. Measuring migration using household surveys. Available at: http://siteresources.worldbank.org/INTLSMS/Resources/3358986-1199367264546/MOVe_Note_02.pdf [Accessed January 15, 2015].
- Carr, D., 2009. Population and deforestation: why rural migration matters. *Progress in human geography*, 33(3), pp.355–378.
- Cassels, S., Curran, S.R. & Kramer, R., 2005. Do migrants degrade coastal environments? Migration, natural resource extraction and poverty in North Sulawesi, Indonesia. *Human Ecology*, 33(3), pp.329–363.
- Castles, S., 2002. Environmental change and forced migration: making sense of the debate. *United Nations High Commissioner for Refugees Working Paper*, No. 70, pp.1–14.
- Chabris, C., Laibson, D. & Schuldt, J., 2008. Intertemporal choice. In S. Durlauf & L. Blume, eds. *The New Palgrave Dictionary of Economics*. London.
- Chenoweth, J. & Feitelson, E., 2005. Neo-Malthusians and Cornucopians put to the test: and revisited. *Futures*, 37(1), pp.51–72.
- Christian Aid, 2007. Human tide: the real migration crisis. *Christian Aid report*, (May), p.52.
- Church, J. a. et al., 2013. Sea level change. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, pp.1137–1216.

REFERENCES

- Clark, L.A. & Watson, D., 1995. Constructing validity: Basic issues in objective scale development. *Psychological assessment*, 7(3), pp.309–319.
- Clarke, K.A., 2005. The Phantom Menace: Omitted Variable Bias in Econometric Research. *Conflict Management and Peace Science*, 22(4), pp.341–352.
- Codjoe, S.N.A., 2006. Migrant versus indigenous farmers . An analysis of factors affecting agricultural land use in the transi- tional agro-ecological zone of Ghana , 1984-2000. *Danish Journal of Geography*, 106(1), pp.103–113.
- Codjoe, S.N.A. & Bilsborrow, R.E., 2012. Are migrants exceptional resource degraders? A study of agricultural households in Ghana. *GeoJournal*, 77(5), pp.681–694.
- Conroy, H., 2009. Risk Aversion, Income Variability, and Migration in Rural Mexico. *California Center for Population Research, UCLA working paper*.
- Cookson, R., 2000. Framing effects in public goods experiments. *Experimental Economics*, 3(1), pp.55–79.
- Cripps, G. & Gardner, C.J., 2016. Human migration and marine protected areas: Insights from Vezo fishers in Madagascar. *Geoforum*, 74, pp.49–62.
- Curran, S. et al., 2002. Interactions between coastal and marine ecosystems and human population systems: perspectives on how consumption mediates this interaction. *AMBIO: A Journal of the Human Environment*, 31(4), pp.264–268.
- Curran, S., 2002. Migration, social capital, and the environment: Coastal ecosystems. *Population and Development Review*, 28, pp.1–31.
- Curran, S.R. & Agardy, T., 2002. Common Property Systems, Migration, and Coastal Ecosystems. *AMBIO: A Journal of the Human Environment*, 31(4), pp.303–305.
- Dabalen, A. et al., 2016. *Mobile Phone Panel Surveys in Developing Countries: a practical guide for microdata collection*, Washington, D.C.: World Bank.
- van Dalen, H.P. & Henkens, K., 2008. Emigration Intentions: Mere Words or True Plans? Explaining International Migration Intentions and Behavior. *SSRN Electronic Journal*, 2008, p.27.
- DaVanzo, J., 1981. Microeconomic Approaches to Studying Migration Decisions. In G. F. de Jong & R. W. Gardner, eds. *Migration Decision Making: Multidisciplinary Approaches to Microlevel Studies in Developed and Developing Countries*. Pergamon Press, pp. 90–130.
- Dietrich, F. & List, C., 2013. Where do preferences come from ? *International Journal of Game*

REFERENCES

- Theory*, 42(3), pp.613–637.
- Dohmen, T. et al., 2011. Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*, 9(3), pp.522–550.
- Duffy-Tumasch, A., 2012. Migrant fishers in West Africa: roving bandits? *African Geographical Review*, 31(1), pp.50–62.
- Dunlap, R.E. et al., 2000. Measuring Endorsement of the New Ecological Paradigm : A Revised NEP Scale. *Journal of Social Issues*, 56(3), pp.425–442.
- Dunlap, R.E. & Van Liere, K.D., 1978. New environmental paradigm - a proposed measuring instrument and preliminary results. *Journal of Environmental Education*, 9(4), pp.10–19.
- El-Hinnawi, E., 1985. *Environmental Refugees*, Nairobi, Kenya: United Nations Environmental Programme.
- Ezra, M. & Kiros, G.-E., 2001. Rural Out-migration in the Drought Prone Areas of Ethiopia: A Multilevel Analysis '. *International Migration Review*, 35(3), pp.749–771.
- Falk, A. et al., 2013. An experimentally validated preference survey module. *University of Bonn working paper*.
- Fearnside, P.M., 1997. Transmigration in Indonesia: Lessons from its environmental and social impacts. *Environmental Management*, 21(4), pp.553–570.
- Fehr, E. et al., 2003. A Nation-Wide Laboratory: Examining Trust and Trustworthiness by Integrating Behavioral Experiments into Representative Surveys. *IZA Discussion paper series*, No. 715.
- Fehr, E. & Leibbrandt, A., 2011. A field study on cooperativeness and impatience in the Tragedy of the Commons. *Journal of Public Economics*, 95(9–10), pp.1144–1155.
- Fishbein, M. & Ajzen, I., 1975. *Belief, attitude, attitude, intention and behavior: An introduction to theory and research*, Reading, MA: Addison-Wesley.
- Foresight, 2011. *Migration and Global Environmental Change*, London.
- Gammage, S., Benítez, M. & Machado, M., 2002. An entitlement approach to the challenges of mangrove management in El Salvador. *AMBIO: A Journal of the Human Environment*, 31(4), pp.285–94.
- Van der Geest, K., 2011. North-South Migration in Ghana: What Role for the Environment? *International Migration*, 49(1).

REFERENCES

- Gehrig, S. & Schlüter, A., 2016. Development and cultural evolution: Disentangling cooperative institutions and sustainability in a natural resource system in East Africa. *submitted for publication*.
- Ghana Statistical Service, 2014. *Population and Housing Census 2010 - Keta municipality*,
- Gibson, J. et al., 2016. The Long-Term Impact of International Migration on Economic Decision-Making: Evidence from a Migration Lottery and Lab-in-the-Field Experiments. *IZA Discussion Paper Series*, (10110).
- Gibson, J. & McKenzie, D., 2011. The microeconomic determinants of emigration and return migration of the best and brightest: Evidence from the Pacific. *Journal of Development Economics*, 95(1), pp.18–29.
- Gray, C.L., 2009. Environment, Land, and Rural Out-migration in the Southern Ecuadorian Andes. *World Development*, 37(2), pp.457–468.
- Gray, C.L., 2011. Soil quality and human migration in Kenya and Uganda. *Global Environmental Change*, 21(2), pp.421–430.
- Gray, C.L. & Bilson, R., 2014. Environmental Influences on Human Migration in Rural Ecuador. *Demography*, 50(4), pp.1217–1241.
- Gray, C.L. & Mueller, V., 2012. Drought and Population Mobility in Rural Ethiopia. *World Development*, 40(1), pp.134–145.
- Greenwood, M.J., 1997. Internal migration in developed countries. In M. Rosenzweig & O. Stark, eds. *Handbook of Population and Family Economics*. Elsevier.
- de Groot, C. et al., 2011. Life events and the gap between intention to move and actual mobility. *Environment and Planning A*, 43(1), pp.48–66.
- Guiso, L. & Paiella, M., 2004. *The Role of Risk Aversion in Predicting Individual Behaviour*,
- Halliday, T., 2006. Migration, Risk, and Liquidity Constraints in El Salvador. *Economic Development and Cultural Change*, 54(4), pp.893–925.
- Hamoudi, A., 2006. Risk preferences in households and families. *UCLA working paper*.
- Hao, L. et al., 2014. A Field Study of Chinese Migrant Workers' Attitudes toward Risks, Strategic Uncertainty, and Competitiveness. *IZA Discussion Paper*, 8227(8227).
- Hardin, G., 1968. The Tragedy of the Commons. *Science*, 162(June), pp.1243–1248.
- Harris, J. & Todaro, M., 1970. Migration, unemployment and development: a two-sector analysis.

REFERENCES

- The American economic review*, 60(1), pp.126–142.
- Harrison, G., Lau, M. & Williams, M., 2002. Estimating individual discount rates in Denmark: A field experiment. *The American Economic Review*, 92(5), pp.1606–1617.
- Harwitasari, D., 2009. *Adaptation responses to tidal flooding in Semarang, Indonesia*. Erasmus University Rotterdam.
- Harwitasari, D. & van Ast, J.A., 2011. Climate change adaptation in practice: People's responses to tidal flooding in Semarang, Indonesia. *Journal of Flood Risk Management*, 4(3), pp.216–233.
- Healy, P.J., Azrieli, Y. & Chambers, C.P., 2016. *Incentives in Experiments: A Theoretical Analysis*.
- Henry, S., 2006. Some questions on the migration-environment relationship. *Panel Contribution to the Population-Environment Research Network Cyberseminar on Rural Household Micro-Demographics, Livelihood and the Environment.*, p.3.
- Henry, S., Boyle, P. & Lambin, E.F., 2003. Modelling inter-provincial migration in Burkina Faso, West Africa: The role of socio-demographic and environmental factors. *Applied Geography*, 23(2–3), pp.115–136.
- Henry, S., Schoumaker, B. & Beauchemin, C., 2004. The Impact of Rainfall on the First Out-Migration: A Multi-level Event-History Analysis in Burkina Faso. *Population and Environment*, 25(5), pp.423–460.
- Hertwig, R. & Ortmann, A., 2001. Experimental practices in economics: A methodological challenge for psychologists? *Behavioral and Brain Sciences*, 24(3), pp.383–451.
- Hillmann, F. & Spaan, E., 2017. On the Regional Rootedness of Population Mobility and Environmental Change. *Comparative Population Studies*, 42, pp.25–54.
- Hillmann, F. & Ziegelmayer, U., 2016. Environmental change and migration in coastal regions: examples from Ghana and Indonesia. *Erde*, 147(2), pp.119–138.
- Hinrichsen, D., 1997. Coasts in Crisis. In *Living on the Edge: Managing Coasts in Crisis*. pp. 39–47.
- Hugo, G., 2011. Future demographic change and its interactions with migration and climate change. *Global Environmental Change*, 21(SUPPL. 1).
- Hugo, G., 2008. International Migration in Indonesia and its impacts on regional development. In T. Van Naersen, E. Spaan, & A. Zoomers, eds. *Global Migration and Development*. New York: Routledge, pp. 43–65.
- Hunter, L.M., 2005. Migration and environmental hazards. *Population and Environment*, 26(4),

REFERENCES

- pp.273–302.
- IOM, 2009. *Migration, Environment and Climate Change: Assessing the Evidence* F. Laczko & C. Aghazarm, eds., Geneva, Switzerland: International Organization for Migration.
- IOM, 2015. *World Migration Report: Migrants and Cities - New Partnerships to Manage Mobility*, Geneva.
- IPCC, 2007. *Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK* M. L. Parry et al., eds., Cambridge, UK: Cambridge University Press.
- Izazola, H., Martínez, C. & Marquette, C., 1998. Environmental perceptions, social class and demographic change in Mexico City: a comparative approach. *Environment and Urbanization*, 10(1), pp.107–118.
- Jaeger, D.A. et al., 2010. Direct Evidence on Risk Attitudes and Migration. *The Review of Economics and Statistics*, 92(3), pp.684–689.
- Javaid, A., 2016. *Temporal dilemma, time preferences and natural resource extraction*. Jacobs University, Bremen.
- de Jong, G.F., 2000. Expectations, Gender, and Norms in Migration Decision-Making. *Population Studies*, 54(3), pp.307–319.
- Jónsson, G., 2010. The environmental factor in migration dynamics – a review of African case studies. *International Migration Institute Working Papers*, pp.1–34.
- Jorion, P., 1988. Going Out or Staying Home: Migration Strategies among Xwla and Anlo-Ewe Fishermen. *Maritime Anthropological Studies*, 1(2), pp.129–155.
- Katz, E.G., 2000. Social Capital and Natural Capital: A Comparative Analysis of Land Tenure and Natural Resource Management in Guatemala. *Land Economics*, 76(1), pp.114–132.
- Keta District, 2001. *Keta District Annual Report*, Keta, Ghana.
- Knaap, G., 2015. Semarang, a Colonial Provincial Capital and Port City in Java, c. 1775. In *Commodities, Ports and Asian Maritime Trade Since 1750*. UK: Palgrave Macmillan, pp. 79–94.
- Kniveton, D., Smith, C. & Wood, S., 2011. Agent-based model simulations of future changes in migration flows for Burkina Faso. *Global Environmental Change*, 21(1).
- Koubi, V., Stoll, S. & Spilker, G., 2016. Perceptions of environmental change and migration decisions. *Climatic Change*, 138(3–4), pp.439–451.

REFERENCES

- Lawson, E.T., 2016. Re-thinking relationships between environmental attitudes and values for effective coastal natural resource management in Ghana. *Local Environment*, 21(7), pp.898–917.
- Leach, M. & Fairhead, J., 2000. Challenging Neo-Malthusian Deforestation Analyses in West Africa's Dynamic Forest Landscapes. *Population and Development Review*, 26(1), pp.17–43.
- Levin, I.P., Schneider, S. & Gaeth, G., 1998. All Frames Are Not Created Equal: A Typology and Critical Analysis of Framing Effects. *Organizational behavior and human decision processes*, 76(2), pp.149–188.
- Liberman, V., Samuels, S.M. & Ross, L., 2004. The Name of the Game: Predictive Power of Reputations Versus Situational Labels in Determining Prisoner's Dilemma Game Moves. *Personality and Social Psychology Bulletin*, 30(OCTOBER), p.2004.
- Lottum, J. Van & Marks, D., 2012. The determinants of internal migration in a developing country: quantitative evidence for Indonesia, 1930–2000. *Applied Economics*, 44(34), pp.4485–4494.
- Lucas, R.E., 1976. Econometric Policy Evaluations: A Critique. *Carnegie-Rochester Conference Series on Public Policy*, 1, pp.19–46.
- Malthus, T.R., 1798. An Essay on the Principle of Population.
- Marfai, M.A., 2011. The hazards of coastal erosion in Central Java, Indonesia: An overview. *Geografia*, 3(3), pp.1–9.
- Marfai, M.A. et al., 2008. The impact of tidal flooding on a coastal community in Semarang, Indonesia. *Environmentalist*, 28(3), pp.237–248.
- Marfai, M.A. & King, L., 2008. Tidal inundation mapping under enhanced land subsidence in Semarang, Central Java Indonesia. *Natural Hazards*, 44(1), pp.93–109.
- Marquette, C.M., 1997. Population and environment relationships in developing countries: a select review of approaches and methods. *Working Paper - Chr. Michelsen Institute*, WP15.
- Marquette, C.M. et al., 2002. Small-scale fisheries, population dynamics, and resource use in Africa: the case of Moree, Ghana. *AMBIO: A Journal of the Human Environment*, 31(4), pp.324–336.
- Martínez, M.L. et al., 2007. The coasts of our world: Ecological, economic and social importance. *Ecological Economics*, 63(2–3), pp.254–272.
- Massey, D.S. et al., 1993. Theories of International Migration: A Review and Appraisal. *Population and Development Review*, 19(3), pp.431–466.
- Massey, D.S., Axinn, W.G. & Ghimire, D.J., 2010. Environmental change and out-migration:

REFERENCES

- evidence from Nepal. *Population and Environment*, 32(2), pp.109–136.
- McGranahan, G., Balk, D. & Anderson, B., 2007. The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. *Environment and Urbanization*, 19(1), pp.17–37.
- McLeman, R., 2013. Developments in modelling of climate change-related migration. *Climatic Change*, 117(3), pp.599–611.
- McLeman, R., 2006. Migration Out of 1930s Rural Eastern Oklahoma: Insights for Climate Change Research. *Great Plains Quarterly*, 26(1), pp.27–40.
- McLeman, R.A. & Hunter, L.M., 2010. Migration in the context of vulnerability and adaptation to climate change: insights from analogues. *Wiley Interdisciplinary Reviews: Climate Change*, 1(3), pp.450–461.
- McLeman, R. & Smit, B., 2006. Migration as an adaptation to climate change. *Climatic Change*, 76(1–2), pp.31–53.
- Meier, S. & Sprenger, C., 2015. Temporal Stability of Time Preferences. *Review of Economics and Statistics*, 96(3), pp.402–417.
- Miladan, N., 2016. *Communities' Contributions to Urban Resilience Process: a Case Study of Semarang City (Indonesia) Toward Coastal Hydrological Risk*. Université Paris-Est.
- Milfont, T.L. & Duckitt, J., 2006. Preservation and utilization: Understanding the structure of environmental attitudes. *Medio Ambiente y Comportamiento Humano*, 7(1), pp.29–50.
- Milfont, T.L. & Duckitt, J., 2004. The structure of environmental attitudes: A first- and second-order confirmatory factor analysis. *Journal of Environmental Psychology*, 24(3), pp.289–303.
- Milfont, T.L. & Gouveia, V. V., 2006. Time perspective and values: An exploratory study of their relations to environmental attitudes. *Journal of Environmental Psychology*, 26(1), pp.72–82.
- Moriniere, L., 2009. Tracing the footprint of “environmental migrants” through 50 years of literature. In A. Oliver-Smith & X. Shen, eds. *Linking Environmental Change, Migration & Social Vulnerability*. United Nations University Institute for Environment and Human Security, pp. 22–29.
- Morrissey, J., 2009. Environmental Change and Forced Migration: A State of the Art Review. *Refugee Studies Centre*, (January), pp.1–49.
- Mortreux, C. & Barnett, J., 2009. Climate change, migration and adaptation in Funafuti, Tuvalu. *Global Environmental Change*, 19(1), pp.105–112.

REFERENCES

- Mulyana, W. et al., 2013. *Urbanisation, Demographics and Adaptation to Climate Change in Semarang, Indonesia*,
- Myers, N., 1997. Environmental Refugees. *Population & Environment*, 19(2), pp.167–182.
- Myers, N., 2002. Environmental refugees: a growing phenomenon of the 21st century. *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*, 357(1420), pp.609–13.
- Myers, N., 1993. Environmental refugees in a globally warmed world. *Bioscience*, 43(11), pp.752–761.
- Nairn, R.B. et al., 1998. Coastal Erosion at Keta Lagoon, Ghana - Large Scale Solution to a Large Scale Problem. *Coastal Engineering*, pp.3192–3205.
- National Development Planning Commission Ghana, 2010. *Medium-term national development policy framework: Ghana shared growth and development agenda (GSGDA), 2010-2013*, Accra.
- Nawrotzki, R.J., Hunter, L.M. & Dickinson, T.W., 2012. Natural resources and rural livelihoods: Differences between migrants and non-migrants in Madagascar. *Demographic research*, 26(5), pp.402–420.
- Neumann, B. et al., 2015. Future coastal population growth and exposure to sea-level rise and coastal flooding - A global assessment. *PLoS ONE*, 10(3).
- Ng, J., 2013. Elicited Risk and Time Preferences : The Role of Demographics, Cognition, and Interviewers. *University of Southern California Job Market Paper*.
- Nicholls, R. et al., 2007. Coastal Systems and Low-Lying Areas. In M. Parry et al., eds. *Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to the fourth assessment report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge University Press, pp. 315–356.
- Nicholls, R.J. & Hoozemans, F.M.J., 2005. Global Vulnerability Analysis. In M. L. Schwartz, ed. *Encyclopedia of Coastal Science*. Springer Netherlands, pp. 486–491.
- Noronha, L. et al., 2002. Goa: tourism, migrations, and ecosystem transformations. *AMBIO: A Journal of the Human Environment*, 31(4), pp.295–302.
- Nowotny, K., 2010. Risk Aversion, Time Preference and Cross-border commuting and Migration Intentions. *WIFO Working Paper*, No. 379.
- Nunnally, J.C., 1978. *Psychometric Theory*, New York: McGraw-Hill.

REFERENCES

- Obokata, R., Veronis, L. & McLeman, R., 2014. Empirical research on international environmental migration: A systematic review. *Population and Environment*, 36(1), pp.111–135.
- Ostrom, E. et al., 1999. Revisiting the commons: local lessons, global challenges. *Science*, 284(5412), pp.278–282.
- Ostrom, E., Gardner, R. & Walker, J., 1994. *Rules, Games, & Common-pool resources*, The University of Michigan Press.
- Overa, R., 2001. Institutions, mobility and resilience in the Fante migratory fisheries of West Africa. *Working Paper - Chr. Michelsen Institute*, (2), pp.1–38.
- Pichón, F.J., 1997. Settler households and land-use patterns in the Amazon frontier: Farm-level evidence from Ecuador. *World Development*, 25(1), pp.67–91.
- Piedmont, R.L., 2014. Inter-item Correlations. In A. C. Michalos, ed. *Encyclopedia of Quality of Life and Well-Being Research*. Dordrecht: Springer Netherlands, pp. 3303–3304.
- Piguet, E., 2013. From “Primitive Migration” to “Climate Refugees”: The Curious Fate of the Natural Environment in Migration Studies. *Annals of the Association of American Geographers*, 103(May 2015), pp.37–41.
- Piguet, E., 2010. Linking climate change, environmental degradation, and migration: A methodological overview. *Wiley Interdisciplinary Reviews: Climate Change*, 1(4), pp.517–524.
- Preacher, K.J. & Hayes, A.F., 2008. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), pp.879–891.
- Pretty, J. & Ward, H., 2001. Social capital and the environment. *World Development*, 29(2), pp.209–227.
- Randall, S., 2005. Review of Literature on Fishing Migrations in West Africa – from a Demographic Perspective. *FAO: Sustainable Fisheries Livelihoods Programme working paper*.
- Ravenstein, E., 1885. The laws of migration. *Journal of the Statistical Society of London*, 48(2), pp.167–235.
- Sahm, C.R., 2012. How Much Does Risk Tolerance Change? *Quarterly Journal of Finance*, 2(4).
- Schultz, P.W. et al., 2004. Implicit connections with nature. *Journal of Environmental Psychology*, 24(1), pp.31–42.
- Setiadi, R., Kunarso, K. & Yuniarti, R.K., 2012. An overview of future climate-forced migration in

REFERENCES

- indonesian urban coastal area (Case study: Semarang City). *Jurnal Kajian Pengembangan Perkotaan*, 5(1).
- Seto, K.C., 2011. Exploring the dynamics of migration to mega-delta cities in Asia and Africa: Contemporary drivers and future scenarios. *Global Environmental Change*, 21(SUPPL. 1).
- Shrestha, S.S. & Bhandari, P., 2007. Environmental security and labor migration in Nepal. *Population and Environment*, 29(1), pp.25–38.
- Sjaastad, L.A., 1962. The costs and returns of human migration. *The Journal of Political Economy*, 70(5), pp.80–93.
- Small, C. & Nicholls, R.J., 2003. A Global Analysis of Human Settlement in Coastal Zones. *Journal of Coastal Research*, 19(3), p.584 599.
- Spiliotopoulou, G., 2009. Reliability reconsidered: Cronbach's alpha and paediatric assessment in occupational therapy. *Australian Occupational Therapy Journal*, 56(3), pp.150–155.
- Stark, O., 1981. On the optimal choice of capital intensity in LDCs with migration. *Journal of Development Economics*, 9(1), pp.31–41.
- Stark, O., 1991. *The migration of labor*, Cambridge: Basil Blackwell.
- Stark, O. & Bloom, D., 1985. The New Economics of Labor Migration. *The American Economic Review*, 75(2), pp.173–178.
- Stark, O. & Levhari, D., 1982. On Migration and Risk in LDCs. *Economic Development and Cultural Change*, 31(1), pp.191–196.
- Stark, O. & Taylor, J.E., 1991. Migration Incentives, Migration Types: The Role of Relative Deprivation. *The Economic Journal*, 101(408), pp.1163–1178.
- Stern, N., 2007. The Economics of Climate Change. *Stern Review: the Economics of Climate Change*.
- Suhrke, A., 1994. Environmental degradation and population flows. *Journal of International Affairs*, 47(2), pp.473–496.
- Suhrke, A., 1993. Pressure points: Environmental Degradation, Migration and Conflict. *Peace and Conflict*, (June 1991), pp.1–43.
- Templeton, S.R. & Scherr, S.J., 1999. Effects of demographic and related microeconomic change on land quality in hills and mountains of developing countries. *World Development*, 27(6), pp.903–918.

REFERENCES

- The Economist, 2013. The other type of mobile money - Airtime is money. *The Economist*. Available at: <http://www.economist.com/news/finance-and-economics/21569744-use-pre-paid-mobile-phone-minutes-currency-airtime-money> [Accessed April 25, 2017].
- Todaro, M., 1969. A Model of Labor Migration and Urban Unemployment in Less Developed Countries. *The American Economic Review*, 59(1), pp.138–148.
- Torres-Guevara, L.E. & Schlüter, A., 2016. External validity of artefactual field experiments: A study on cooperation, impatience and sustainability in an artisanal fishery in Colombia. *Ecological Economics*, 128, pp.187–201.
- Toubia, O. et al., 2013. Dynamic Experiments for Estimating Preferences: An Adaptive Method of Eliciting Time and Risk Parameters. *Management Science*, 59(3), pp.613–640.
- Tsegai, D., 2005. *The Economics of Migration in the Volta Basin of Ghana: Household and District-level Analysis*, Göttingen: Cuvillier.
- Voss, K.E., Stem, D.E. & Fotopoulos, S., 2000. A comment on the relationship between coefficient alpha and scale characteristics. *Marketing Letters*, 11(2), pp.177–191.
- Werthmann, C., Weingart, A. & Kirk, M., 2010. *Common-Pool Resources- A Challenge for Local Governance: Experimental Research in Eight Villages in the Mekong Delta of Cambodia and Vietnam*,
- White, J., 2013. Logistic regression model effectiveness: Proportional chance criteria and proportional reduction in error. *Journal of Contemporary Research in Education*, 2(1), pp.4–10.
- Williams, A.M. & Baláž, V., 2014. Mobility, risk tolerance and competence to manage risks. *Journal of Risk Research*, 17(8), pp.1061–1088.
- Wiseman, M. & Bogner, F.X., 2003. A higher-order model of ecological values and its relationship to personality. *Personality and Individual Differences*, 34(5), pp.783–794.