CLIMATE CHANGE, COPING CAPACITY AND MIGRATION DYNAMICS IN THE NETHERLANDS AND BANGLADESH

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Abstract

Climate change is expected to have a significant role in weather patterns and consequential scarcities as well as in environmental degradation around the world.

The research presents two countries, the Netherlands and Bangladesh, facing similar climate and environmental changes in different forms mainly represented by extreme weather and by sea level rise. The difference between those countries lies within the coping capacity which determines how well are Netherlands and Bangladesh prepared for possible insurgencies. In the Netherlands, the cooperation of government, private companies and citizens created a stable base for dealing with climate change supported by a well-working mechanism where technical innovation meets economic advances and highly skilled professionals. The country is prepared for large-scale flooding and rising sea level as well as for consequential impacts such as salinization of the land or infrastructure challenges. Whereas in Bangladesh the government, highly corrupted and dysfunctional, has not been able to create such a complex system. Therefore, the coping capacity of Bangladesh is weak and insufficient.

Environmental change can work as a multiplier of economic, demographic, governmental and social factors and lead not only to environmental scarcities but also to a lack of social and economic ingenuity and conflict followed by migration.

Environmental migration might be considered as one of the coping strategies and will most likely intensify already existing migration flows in Bangladesh and the Netherlands. This fact is particularly important in case of Bangladeshi population which will be most likely internally displaced and eventually forced to leave the country without implementing the efficient coping strategy.

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Abbreviations

AL Awami League

BNP Bangladesh Nationalist Party

CO2 Carbon dioxide

COP Conference of the Parties

EU European Union

FAO Food and Agriculture Organization of the United Nations

IPCC Intergovernmental Panel for Climate Change

JI Jamaat-e-Islami

PVV Party for Freedom

UAE United Arab Emirates

UK United Kingdom

USA United States of America

UN United Nations

UNDP United Nations Development Programme

Introduction

In 2016 for the first time in the history, world leaders from representing 195 countries united and ratified Paris Agreement responding to the climate change threat with the intention to stop vast planetary changes. Despite the fact that there are global warming skeptics, significantly more scientists and world leaders agree on a new phase of the world, *The Anthropocene epoch*. The Anthropocene, popularized by a Dutch atmospheric chemist and Nobel laureate Paul J. Crutzen (2006), concludes that Earth's ecology and geology have been fundamentally changed by humans during the last decades (Carey, 2018). In spite of various disagreements over responsibility or causes of environmental changes, humanity is in a period of vast planetary environmental changes such as increase of carbon dioxide emissions (CO2), primarily caused by fossil fuels consumption, plastic pollution in the oceans, high extinction rates of animals, degraded soil, coastal erosions, desertification, deforestation, rising sea level, extreme weather conditions and more. Although developing countries are responsible only for 21 % of historical carbon emissions and global changes have had a massive impact on the populations around the globe, the most impoverished regions and global South are the most affected (CGD, 2015). The expected extreme environmental events such as sea level rise, drought, floods or storms do not only destroy houses, livelihoods, land, and infrastructure but can also lead to environmentally induced migration (El-Hinnawi, 1985). Current estimated and predicted numbers of people displaced by environmental changes might be highly instrumental with the purpose to draw attention in media or raise awareness about climate change. Furthermore, those studies often fail to incorporate undertaken coping and adaptation strategies and demographic development what may undermine the credibility of such research. Environmental change alone usually does not directly cause migration but rather the combination of environmental and non-environmental factors account for migration (Black, 2001, pp. 2-3). To study these interactions and consequential mobility dynamics, this research focuses on coping capacities of two countries and human mobility as well as on impacts on populations affected by the environmental change. The first country is located in southern Asia, Bangladesh and second in western Europe, the Netherlands.

Comparison of two differently developed nations, both expected to face a similar environmental issue – extreme weather conditions, will draw on resilience and ability to manage adverse conditions. Throughout studying coping capacity and determining contemporary drivers of migration, scenarios of migration dynamics affected by the environmental change will be developed.

The four primary goals of the study are as follows:

- First of all, the thesis will analyze the relationship between environmental change and its impacts on societies in chosen countries. The study is expected to emphasize the importance of studying environmental migration in a broader context and significance of not isolating separate factors from each other.
- Secondly, the research is aimed to study the coping capacity of Bangladesh and the Netherlands and therefore increase awareness of drawbacks.
- Thirdly, scenarios of consequential migration dynamics will be developed within the contextual background.
- Lastly, this research is conducted in order to draw attention to the topic of environmental change and consequential migration to encourage further research.

Research problem

Lonergan (1998, p. 5) claims that it is almost impossible accurately estimate how many environmental refugees already exist. Therefore it makes it even more unfeasible to predict accurate global or regional numbers. A better research strategy, proposed by Piguet (2010, p. 517) maps central regions in risks, so-called *"hotspots"* and consequently assesses triggers and resilience of the people affected. Such kind of strategy could provide insight into possible future migration dynamics. Thus, two countries for comparison were selected, each representing their respective hotspot – the Netherlands and Bangladesh. Instead of trying to estimate accurate numbers of environmental migrants, a relationship of impacts induced by climate change and its consequences will be scrutinized. Although these countries have both distinctive population size and area, they are facing the same environmental threats. The most severe risks are rising sea level as a vast amount of these countries' population lives in

elevations below sea level and extreme weather**.** The point of interest lies within the states' coping capabilities with environmental change and other factors which influence environmental migration and mobility dynamics.

In order to understand the environmental migration phenomenon and build appropriate responding mechanism, it is necessary to analyze the complexity of social, organizational and system reactions to the environmental degradation. Thus, this study is focused on answering these questions. *What are the most predominant environmental change impacts in Bangladesh and Netherlands and have the Netherlands coped with environmental change differently than Bangladesh? And what have been the consequences for migration dynamics?*

To answer those questions, throughout the research will be applied five drivers' framework which analyzes demographic trends, economic growth and social governance, all directly or indirectly related to the climate change (Black et al., 2011). This framework is going to be used to analyze and compare migration drivers and the interactions with environmental changes in Bangladesh and the Netherlands. In addition, a method of scenario development is going to be applied on both countries and will outline future migration dynamics considering the five drivers framework.

Data consideration

Main challenges during the research can turn out to be controversies over terminology and absence of a commonly agreed definition of environmental migration. The study will be based on the data from migration statistics, censuses, government departments, organizational reports and relevant literature. Also, lack and credibility of statistical data, particularly in the intra-national movement should be considered as a possible obstacle. Another concern is the credibility of presented reports by governments and organizations which may be influenced by political agenda. One of the essential reports used throughout the study is Intergovernmental Panel on Climate Change, The Fifth Assessment Report. The aim of the Intergovernmental Panel on Climate Change (IPCC) under the auspices of the United Nations, is to produce reports objectively assessing science on climate change and its impact. Despite the efforts for transparency, there is a chance that government representatives may influence these

reports. Notwithstanding, the scientists are expected to represent their point of view, they might be provided by financial support from governments (IPCC, 1998) which may corrupt their decision-making capabilities.

Theory and concept consideration

The purpose of this chapter is to introduce the concepts and relationship between migration and environmental change. This part also includes estimates of environmental migration and a brief introduction of scenario development.

Structural and behavioral drivers

According to Myers (1995, p.29), environmental factors do not generally operate in isolation from other factors such as economic, political and alike. Therefore the inter-sectoral linkages are crucial. To understand the role which environment plays as a driving factor in migration, it is necessary to study it through a structural political and cultural context (Lonergan, 1998, p.8.). In order to investigate the factors in full complexity while developing the future scenario, a framework by Black at al. (2011) will be applied considering structural and behavioral drivers of existing migration related to the environmental change. The framework provides a context for the development of scenarios of possible migration future. One of Black's suggestions is to use this framework to develop scenarios characterizing potential future migration flows and patterns for the evaluation of policy interventions. To understand individual's decisions, it is crucial to consider structural context. Based on the work of Black et al. (2011), five interconnected macro categories of migration drivers will be implemented: political factors, demographic factors, economic factors, social factors and environmental factors.

Firstly, economic drivers include an evolution of the world and domestic economy, job opportunities, income, trade and economic policies and technology development. Political drivers include governance types, the occurrence of persecution, security and policy reforms concerning development, migration, and environment. These drivers can be closely related and interconnected, for instance, the economic crisis can trigger political instability and consequently change the political system and migration. Demographic drivers include population growth and structure. They also include disease rates which can be dependent on the political and economic conditions. Environmental drivers apart from biophysical characteristics include rapid-onset

changes such as storms, hurricanes and slow-onset changes such as sea level rise, soil degradation or desertification.

Perception and evaluation of possible destination versus the place of the origin determine whether people decide to migrate or not concerning one or more of the drivers. These decisions are also influenced by social factors such as family, culture or access to networks where the individual choice can be influenced.

Neoclassical versus structural approach

To fully understand environmental migration, it is crucial to outline basics of migration theory and further develop this understanding. The origin of migration theory can be traced back to the 19th century by the work of Ravenstein (1885). In his article The Laws of Migration, he describes several rules and principles of migration. The principles include statements that the internal migration in the 19th century Britain was mainly short distance and that most migration occurred from the rural areas to cities. These principles also include the importance of “push” and “pull” factors and the economic factor is considered as the main cause for migration (ibid.). Since then, a variety of explanations has been proposed to describe and explain migration and its social, cultural, economic or political drivers. Steve Lonergan (1998, p.6) explains a few approaches to general migration which he divides into two following categories. The first approach comes from neoclassical economics equilibrium approach. In this approach, migration is caused by different economic and social situations in various regions. People voluntarily move from regions overloaded by humans, less labor and less capital to the regions which can offer better economic and social opportunities. Extensions to this theory explain migration as strongly influenced by “push” and “pull” factors, where push factors motivate individual to leave for the region for example due to lack of work, political instability or demographic conditions. Oppositely pull factors in the form of economic opportunities, security or environment can attract the migrants to the host destination. On the other hand, the second approach includes advocates for structural approach who criticize neoclassical approach, especially the belief of voluntary decision to leave and neglecting macrostructural forces. For the structuralists, migration is a reaction to the forces which structure unequal distribution of opportunities and to the

international division of power. In this case, migration is considered as a negative phenomenon which should be solved by eliminating these inequalities (ibid.). Structuralists believe in the importance of structural impact rather than individual decision. The same author claims that migration is caused by a combination of environmental, economic, social and political factors.

Estimates of environmental migration

As migration has been described as an extremely varied and complex phenomenon interacting with economic, social, cultural, demographic, and political processes at national and international levels (Lonergan, 1998), environmental migration is also incredibly complex, with multiple interacting driving forces and linkages across time and space. There are a few attempts of counting the actual number of people displaced by environmental change and of predicting future migration flows. One of the most known and among first is publication written by Egyptian scholar Hassam El-Hinnawi who has been credited for bringing the term environmental refugee to public debate. In the research, he concludes some 30 million displaced people due to environmental change (El-Hinnawi, 1985). El-Hinnawi (1985) as a pioneer, defines three groups of environmental refugees. In the first group are people displaced due to natural disasters, in the second group are people displaced due to permanent habitat changes, environmental processes and events and the last group include people displaced from areas that cannot support their basic needs and have a desire to improve quality of their life.

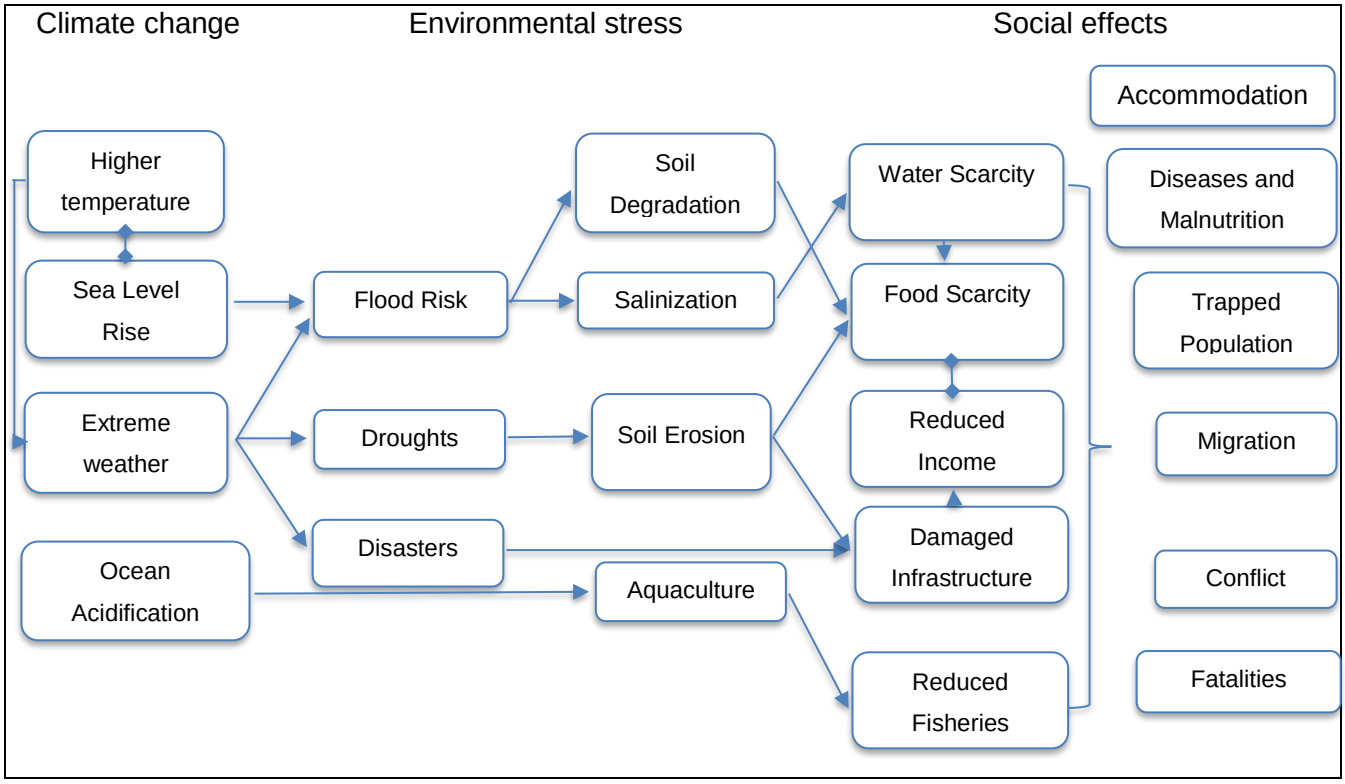
However, frequently cited author is environmental scientist Norman Myers, who wrote several papers with the intention to alert policy-makers and public sector about the growing phenomenon represented by 'environmental refugees' (Myers, 2002). Myers and Kent (1995, p. 18) defines 'environmental refugees' as people *"who can no longer gain a secure livelihood in their homelands because of drought, soil erosion, desertification, deforestation and other environmental problems, together with the associated problems of population pressures and profound poverty"* (Myers, 2002). In his paper, Myers (2002) forecasted 150 million displaced people caused by the environmental change by 2050 and warned that there could be as many as 200 million

people. He also assumes that all of the people living in the regions at risk will be forced to leave without any consideration of coping capacity by the year 2050. This figure has frequently been cited and used in media and reports despite the harsh critics of many scholars (Castles, 2002). Those studies considering environmental migration on a global level often attract media and the policy-making community attention. However, most of them are labeled as unserious and alarmist, because they often dismiss adaptation strategies or vulnerabilities and in fact, have only a little policy relevance. Gemenne (2011, p. 46) claims that these numbers can be easily influenced and manipulated in order to get the attention of a particular population at the expense of other societies in pressing need of protection.

A conceptual model of the casual path

Due to the difficulty of analyzing environmental migration, Perch-Nielsen et al. (2008, p. 376) suggest the creation of conceptual models which can offer an overall picture and are also able to capture a connection between climate change and migration. In Figure 2, a conceptual model of climate change casual path mechanism is presented. The model shows examples of the role of climate change and its possible paths. It includes direct and indirect effects through environmental stress on livelihoods. For example, a higher temperature which works as a multiplier intensifying weather may lead to inducing environmental stress such as flood risk, droughts, and disasters causing another environmental stress such as soil degradation or erosion. In the last phase, there are presented various impacts on humans and their social effects in the form of adaptation strategies such as migration, used as a logical coping strategy, or accommodation. For example, in case of an unfeasible means for migration to a more habitual area due to different reasons (border security, lack of funds, health), people may become a “trapped population” unable to move, stuck and exposed to dangerous living conditions causing casualties. These linkages are undoubtedly challenging to represent in the simple conceptual model with lacking information on the strength of the individual influences on society and interaction with the social and economic system.

Figure 1 Examples of causal paths



Scenario development

As conventional techniques, trend analysis and mathematical modeling become more and more inadequate due insufficient information, turbulent behavior or incalculable human decisions, scenarios offer an investigation of the various forces shaping our world (Raskin and Kemp-Benedict, 2002). Although it is possible to use a quantitative insight, scenarios are not primarily modeling exercise, and therefore they do not necessarily contain figures (ibid). The goal of the scenario is rather to estimate than predict the future and provide insights into the future possibilities. They can portray the role of human activities in shaping the future and clarifying possible future developments and their effects (EACH-FOR, 2007). James Mahoney (2010) argues that there are two sequences using path dependency in scenarios. One of them and more relevant for this work is a reactive sequence rather than persistence. In a reactive sequence, each event is a reaction to previous events and a cause of subsequent

events. Individual events influence cascades throughout the entire sequences. Since this research aims to develop the most feasible scenario of mobility dynamics caused by environmental change, it is necessary to use appropriate sequences or processes and consider migration as a variable. When events take place defines the continuation of the decision process. Conjunction is a crucial part of creating scenarios where external consequence can have an impact on the event, decision or another sequence (Minkinnen, 2015). Depending on which decision is taken by individual actors or which event occurs, different reactions are expected. This procedure needs interpretation in the form of a scenario where will be used narrative explanation to link the events together.

Climate change, environmental stress, and social impacts

This chapter is going to briefly discuss causes of climate change and its, mainly negative, consequences in the form of environmental change represented by environmental stress. Effects on livelihoods and societies will be presented in order to highlight the complexity of the interaction between environmental change and populations.

Environmental stress induced by climate change

Climate change is described as a significant change in the measures of a climate lasting for an extended period. Climate change as a negative phenomenon has become publicly discussed quite recently. The First World Climate Conference was held in Geneva in 1989 under World Meteorological Organization in order to predict and to prevent human-made changes in climate that may result in global warming from increasing greenhouse gases and changing solar radiation in the atmosphere. The greenhouse gases, mainly carbon dioxide, are consequences of diverse human activities as industrialization, transport and land-use practices (Kininmonth, 2014, p.1). More than ten years later after establishing Intergovernmental Panel on Climate Change (IPPC), the first report of IPCC confirmed the anthropogenic origin and highlighted that green gases will lead to the global warming (Kininmonth, 2014, p.3). During years of trying to agree on collective action against climate change (COP 1 - COP 23), many countries were not following the conventions due to immediate economic and social cost which would arise in case of transforming whole industries. Generally, developing countries want to reach the living standard of developed countries which went through industrialization and automatization dependent on energy production from fossil fuels. Only in the year 2016, 195 nations jointly ratified Paris Agreement, legally binding for every signatory country, and therefore agreed on a strategy and new goals which should prevent an increase in average temperature by 2 degrees of Celsius.

Despite the possible success of the collective action against climate change, the surface air temperature falls by only about 0.1 degrees of Celsius in all modeling cases in 2050 because the climate system takes many years to respond to emissions' reduction (Dwortzan, 2016). Thus, climate change will inevitably have a divergent

impact on regions and populations around the globe, through space and time, depending on many factors including non-climate stressors and the extent of mitigation and adaptation (IPCC, 2014). Environmental stress including non-climate stress is placing increasing pressure on many regions which can be severely affected by the intensive human activity. Lonergan (1993) divided environmental stresses affecting human displacement into five groups: natural disasters, cumulative or slow-onset changes, unexpected disruptions or industrial accidents, development projects and conflict and war. These stresses are divided in Figure 1 with the additional division of climate change induced stress and non-climate stress. Although natural disasters occur more often in developed countries, the number of deaths and economic losses are higher in developing countries due to higher exposure of assets. More than 95 % of deaths caused by natural disaster were in developing countries during years 1970 - 2008 (IPCC, 2014, p. 547). In this research, the categories of extreme weather are the most significant leading to intensification of floods, storms, hurricanes, sea level rise, land degradation and climate warming.

Figure 2 Environmental stress affecting human displacement

Climate change induced stress		Non-climate stress		
Natural disasters	**Cumulative (slow-onset) changes**	**Industrial accidents and disruptions**	**Development projects**	**Conflict and war**
Floods Sudden droughts Hurricanes Storms	Land degradation Deforestation Soil erosion Salinity Sea level rise Desertification Climate warming	Nuclear accidents Chemical accidents Transport accidents Air, water and land pollution	Dams Resource mining Infrastructure building Urbanization	Biological conflicts Conflict over resources

Coastal vulnerability to climate change

Climate change can affect coastal countries in many different ways. Some of the examples of coastal vulnerability to climate change are warmer temperatures, sea level rise, ocean acidification and changes in the frequency and intensity of extreme weather conditions.

Ongoing temperature increase is the most significant concern related to the climate change and is the main point of Paris Agreement. The mechanism of global warming depends on the balance between the amount of energy which the planet receives from the Sun (warming) and how much of energy it radiates back into space (cooling). Although this mechanism is necessary for life on Earth, the global temperature change in past in one to two degrees drop led to the Little Ice Age on Earth from the early 14th century through the mid-19th century. Excess in greenhouse concentration is currently affecting plants, animals, shrinking of glaciers, ice caps melting, changing in the thermal structure, decreasing water quality and more intense rains and drought in different regions (IPCC, 2014). A few examples are damaged crops due to droughts in African Sahel, loss of coastal wetlands and mangroves due to sea level rise or increasing coastal flooding. According to IPCC (2014, p. 189) by 2050 the global warming ranging from 1.5°C to 2.3°C above pre-industrial average temperature will influence more land areas than oceans' with the Arctic region warming the most. Thermal expansion of oceans with water from melted glaciers and ice sheets are the major factors that contribute to sea level rise on the global level. In the past, most glaciers were affected in the Canadian Arctic, Greenland, Southern Andes, Asian Mountains and Alaska. Even if the global warming slowed down, glaciers would continue to melt (IPCC, 2014, p. 190). As the world population density is almost three times higher along the coast than the average due to historically developed cities around ports which served as a primary form of transport, trade, job, and fishery, relatively new phenomenon of sea level rise become highly concerning. IPCC (2014, p. 191) researchers claim that near complete loss of Greenland Ice Sheet would mean average sea level rise about 7 meters over millennium and more. Nicholls et al. (2004) estimate that up to 187 million people could be displaced because of sea-level rise over the century in case of 4°C temperature increase. Due to sea level rise, the coasts will experience submersions, coastal

flooding, and erosion which will influence societies in coastal or low-lying areas. Additionally, ocean acidification will have ripple effects on all kinds of sea life and seafood together with the whole ecosystem will be negatively affected.

Precipitation events and society effects

Climate change will bring more frequent and extreme precipitation events to some coastal areas and a shift to more massive storms with negative after impact for societies (IPCC, 2014). For example, changes in temperature have already globally catalyzed a long-term increase in record-breaking rainfall events in the last decade which has impacted human societies and the environment, causing agricultural losses and flooding (Lehmann et al., 2015). Between years 1981 and 2010 Lehmann et al. (2015, p. 507) observed an increase in precipitation in Europe (31 %), North Asia (21 %) and the highest in Southeast Asia (56 %). In contrast, an area of the Mediterranean Sea or Northwest America undergoes a decrease in precipitation (20 %). It implies that roughly one in ten record-breaking events would not have occurred without climate change over 30 years long examined period.

Described environmental change has undoubtedly not only substantial negative but also positive effects on human population such as improving conditions in some countries for growing crops or increasing tourism due to the warmer weather. Environmental change works as a multiplier for events; for example, local flooding can be exacerbated by climate change and become more frequent and at the same time more intense.

Infrastructure

After the coastal system and areas with low altitudes are hit by sea level rise, extreme winds and waves will become dangerous for the population living in such areas. Due to the sea level rise accompanied by high tides and wind, coastal settlements may submerge due to erosion and flooding. The population will be more often dealing with destroyed settlements and housing (Hunt and Watkiss, 2011). Frequent flooding can damage sensitive infrastructure including transport (tunnels, railways, port, roads), water (dams) and power supply resulting in much larger system disruption, paralyzing whole industries and causing destruction in all kind of cities (for example a week-long

shutdown of the Port of New York caused by hurricane Sandy). Due to the extreme environmental hazard and coastal economic growth, some of the countries in southern, southeastern, and eastern Asia are especially vulnerable to the extreme sea level rise and flooding. Mainly caused by higher migration to these economically attractive coastal countries and by the fact that many of most densely populated areas are located in deltas (Nicholls and Cazenave, 2010, p. 1517). Simultaneously the economic growth and resulting income could help citizens and governments strengthen prevention and adaptation to the extreme events.

Food and water security

The environmental change also threatens food and water security, yet with more indirect variations of linkages. We can define food security as physical and economic access to sufficient, safe, and nutritious food for all people and at all times to live a healthy life (FAO, 1996). Particularly, aquaculture and fisheries are often extremely important for coastal communities as they provide them not only with necessary nutrition but also with income. Change in ocean acidity and temperature can lead to a redistribution of species and may disturb the whole ecosystem, especially in developing countries in tropical areas which are the most sensitive and where will be the environmental change the most intense. Also, the climate change without adaptation will negatively impact the production of major crops (wheat, rice, and maize) in tropical and temperate regions (IPCC, 2014, p. 488). The quality and production of crops depend on available water sources and water management. Water scarcity is divided into two subcategories, physical and economical water scarcity. Physical water scarcity is defined as a lack of available water to meet demands with a symptom of environmental degradation. Whereas economic water scarcity may occur in places with ample water resources, yet without sufficient investments to water management or human capacity (FAO, 2009). Physical water scarcity may occur when glaciers shrink and will cause floods during the rainy season while increasing water shortages during the dry season. Multiple water crisis are expected with decreases in annual rainfall or seasonal variations which may cause problems for groundwater supply with the enormous impact in the Asian region (Nkem et al., 2011). It was projected that each increase by one

degree of Celsius would reduce renewable water resources by at least 20 % (IPCC, 2014, p. 248). IPCC (2014, p. 512) shows that changes in temperature and precipitation will not only lead to scarcity of water but also to increase in food prices and worsen the situation of undernourished children with number peaking up to 25 million globally (with 22 % increase).

Diseases and malnutrition

Extreme weather can also mean both direct and indirect linkages to human health. Direct factors could be storms, floods and extreme temperatures causing higher injury risk and death, followed by indirect factors including diseases and salinization of coastal land, decreasing food production and clean water supply (IPCC, 2014). Especially living in coastal areas can lead to higher risk due to exposure and vulnerability of coastal populations to climate hazards and possible consequent diseases such as hypertension, malaria, cholera, salmonella and other. Although the mortality rate has generally fallen, in the countries with the weakest risk governance capacities, the mortality rate has been still rising (UNISDR, 2015). In the developed world, the population is aging due to a combination of declining fertility rate and increasing life expectancy. Therefore the population is gradually more sensitive to climate extremes as was proved by the European heat wave in 2003 with more than 30 000 reported casualties (UNISDR, 2003). A further concern is a human waste as most of the low-income cities do not operate with proper water services and with extreme flooding, this can aggravate already unhealthy conditions.

Urban and rural areas

More than half of the world's population was living in urban areas for the first time in human history in 2008, and the proportion continues to grow, particularly in megacities around deltas (UN DESA, 2012, World Bank, 2016a). Living in an urban area does not necessarily mean more considerable vulnerability to the climate change as it also depends on infrastructure, service provision and early warning systems. However, there is a distinction between classes. People with low income living in poor quality and insecure housing with lack of healthcare or emergency services are disproportionately

more vulnerable (IPCC 2014, pp. 543-544). Most deaths from disasters occur in low-income and middle-income countries, between years 1970 and 2008 it was 95 % (IPCC 2014, 547). However, many deaths are not recorded due to defined conditions which a disaster event must fulfill.

Urbanization is accompanied by a phenomenon in the form of "*heat islands*" (higher temperatures in the cities). Together with extreme local flooding, pollution, and high population growth rates, it can result in environmental stress in the form of heat-related health problems, infrastructure destruction, water scarcity and more. Coastal cities with extensive port facilities and large-scale industries are in the greatest risks together with fast-growing towns located in low-lying coastal areas (IPCC, 2014).

Urban and rural areas are tightly interconnected. For instance, if a drought causes a decrease in agriculture production, it may result in raising food prices due to its shortages and therefore lower rural funds and cause a reduction in demand for urban services. However, in the rural areas, the impacts of climate change are intensified through the water supply, food security, and agricultural incomes. Rural areas in developing countries, which count for 90 % of total rural areas, are characterized by a greater dependence on natural resources (fishery, forestry) and agriculture resulting in greater vulnerability to climate change (IPCC, 2014, p. 618). Moreover, the vulnerability can be exacerbated by poverty, lower level of education, neglected by policymakers and isolation of the rural areas. Extreme weather will also have a negative impact on rural infrastructure with large-scale consequences for agriculture which is crucial for urban livelihoods. Such environmental stress may lead to economic pressure due to lower income, employment reduction, gradual abandonment of rural settlements and migration to urban areas as an adaptive action (McLeman, 2011). By moving from affected areas, migrants may reduce exposures to disaster and climate extremes and thus use the migration as an adaptation strategy.

Climate change impacts in Bangladesh

The region of southern Asia is one of the most impacted areas by the climate change. Countries in this region are particularly affected by increasing frequency and intensity of droughts and floods, sea level rise including land erosion and by shrinking glaciers in the Himalayas resulting in large-scale flooding (IPCC, 2014). Due to Bangladesh's geophysical and hydrological characteristics, the country is often labeled as the most vulnerable to climate change within southern Asia (World Bank 2016b).

Moreover, Bangladesh is further disadvantaged by high population density, poverty, and dependency on agriculture. Bangladesh has an area of only 147,570 square kilometers with a population of about 163 million making it one of the most densely populated countries in the world with approximately 1 100 people per square kilometer (World Bank, 2016c). By 2050 the population is expected to rise from 150 million to more than 250 million and Dhaka, the capital city, will become a mega city with a population over 40 million (Streatfield and Karar, 2008).

Even though the poverty rate is decreasing in Bangladesh, 24.3 % of the population still live under poverty line while 12.9 % is affected by extreme poverty (World Bank, 2017). Due to the low income per capita, the economic vulnerability and the weak human assets index (nutrition, health, education), Bangladesh is termed as a least-developed country (World Bank, 2016d). In addition, Bangladeshi economy is mainly focused on agriculture with 63 % of labor force directly or indirectly dependent on the largest sector (Baas and Ramasamy, 2008, p.1).

Geographically, most of the territory is covered by the largest delta on Earth, Bengal delta, where the rivers Ganges, Brahmaputra, Meghna meet and drain into the Bay of Bengali. The territory is mostly flat, and two-thirds of the country is less than 5 meters above the sea level (World Bank, 2010) with 700 km of coastline. Socioeconomic context together with geophysical position makes Bangladesh extremely prone to natural disasters and flood hazards.

The UNDP (2004, p. 66) identified Bangladesh as a country most vulnerable to tropical cyclones, and the sixth most vulnerable country to floods. Climate change will intensify current problems and will simultaneously increase frequency and severity of tropical cyclones and rainfall which will together with the melting of the Himalayas glaciers

cause an increase in river flows (IPCC, 2014). Consequently, it will result in destroyed housing, infrastructure, and embankments. Settlements will be threatened by river bank erosion caused by strengthened river flows and by the sea level rise that will lead to submerging of low lying coastal areas and salinization of land and agriculture areas as the sea water gets more into the mainland (IPCC, 2014, MoEF, 2009).

Northern and western parts of the country are prone to drought, and due to lower regular rainfall, the frequency and intensity of droughts will increase (MoEF, 2009, p. 13). However, during the rainy season, the river flow increases, and significant part of the land is washed away. This phenomenon of alternating floods with droughts affects the sustainability of rice crops production, which is crucial for the country as the rice fields account for more than 80 % of the total cultivated land of the country (Baas and Ramasamy, 2008, p. 1). This will seriously affect agriculture and its production, and it is estimated that by 2050 the rice will decrease by 8 % and wheat by 32 % in the region (IPCC, 2014, p. 1344).

Although regular floods are seen as a blessing, Asian tropical monsoon climate attracts extreme flood to the country. The southern part of Bangladesh is the most affected by extensive floods caused by heavy rains and the sea level rise which gets worse during the storm season. Once every few years, approximately one-third of the country is severely affected by floods. During disaster years 1988, 1998, and 2004 more than 60 % of the country was flooded. For example, a flood from August 2017 negatively impacted nearly 7 million people and wholly or partly damaged 570 000 houses (NIRAPAD, 2017). After flooding, people often struggle with finding safe shelter, facilities for cooking and safe water. Without a shelter, unaccompanied woman and children are often exposed to abuse and violence (ibid.). Moreover, a flood may be unusually followed by a cyclone and again by another flood as it happened in 2007 when Bangladesh was hit by extremely severe storm Sidr that resulted in one of the worst natural disasters and was responsible for 3406 casualties and 55 282 injured people (Government of Bangladesh, 2008, p. 5).

Together with disasters and salinization of water comes scarcity of safe drinking water and spread of diseases such as cholera. Generally, post-flood diseases spread through the drinking of contaminated water. Although people are aware of the risk of consuming

contaminated water, it is not feasible to access clean water as everything, including water resources, is under water during a flood. The extreme poverty and landlessness pushed more than five million people to settle on emerging islands *"chars"* (moving islands) which are formed by the three major rivers. Inhabitants of these islands experience flood almost every year as monsoon rainfall generates excessive flows in the rivers and submerges the chars.

Population adaptation strategy

Due to monsoon seasons, the Bangladeshi population is accustomed to various environmental stress. However, flooding is accelerating, and the population is becoming more vulnerable. The term vulnerability generally refers to the exposure of communities and individuals to environmental or other stress due to environmental, economic or changes in structures where stress is disruption to livelihoods (Adger, 1999). Adaptation is therefore seen as a critical component of vulnerability (IPCC, 2014). Thus, it is possible to consider a coping capacity as an adaptation to the environmental stress (Brouwer et al., 2007). It is also necessary to consider complex economic and governance interactions as it requires specific circumstances to turn a flood into a flood disaster (Paul and Routray, 2010, p. 490). It is expected that the poorest people who lack means and who are the most vulnerable will be the most impacted by the environmental change (IPCC, 2014). Paul and Routray (2010) report that people living in low flooding areas and with better socioeconomic capacity are more likely to cope with those floods. Therefore, it depends on conditions such as level of income, education, network or occupation.

Indigenous strategies can help people affected by environmental change reduce their vulnerability in various ways. Such strategies include preventive action in the form of building barriers around houses from available materials, raising their platforms and avoiding construction materials sensitive to flooding. With the help of indigenous strategies, people try to protect crops and fisheries and adjust growing of diverse crops to different seasonal floods. As a flood approaches, the significant part of labor class loses their jobs for an extended period and is forced to take a loan with a high-interest

rate to sustain their livelihood and therefore becomes again more vulnerable. Loans do not help populations come out of the poverty trap; it just helps them survive.

Unequal income distribution contributes to the socioeconomic vulnerability and the relative cost for poorer households is significantly higher (Brouwer et al., 2007). Thus, people with the lowest income are the most vulnerable to extreme weather conditions.

People in Bangladesh adopt different preventive measurements during the centuries, and one of them as a last resort might be migration, mainly internal. However, some may also decide to not take any prevention due to the belief that flooding is a natural process which is unable to prevent. Haque and Zaman (1993) claim that the flood issue in Bangladesh is also linked to problems of demography, ecology, education, society, settlement patterns, socioeconomic status and even culture and politics.

Government and politics

Since the constitutional amendment in 1991 referendum, Bangladesh has been a parliamentary democracy with the dysfunctional two-party system. In that system, power is held between ruling Awami League party (AL) with prime minister Sheikh Hasin Wadej as a leader and Bangladesh Nationalist Party (BNP) led by Khaleda Zia. None of these parties is internally democratic as both are led by family members of political dynasties since independence in 1971. In 2014 election the AL won the majority of seats in the parliament which was the result of boycott undergone by the most opposition parties including anti-Indian and pro-Islamic BNP. Since the constitution bans political parties which are based on religious believes, the Jamaat-e-Islami (JI) party, fundamentalist party favoring the creation of Islamic state, was prohibited from 2014 elections. Later in 2016, a party leader was executed for crimes related to the 1971 war and for collaborating with Pakistan perpetuating genocide during the war. According to the Freedom House study (2018), many party members of BNP and JI party has been harassed by AL and regularly arrested. Meanwhile, AL party sets policies with a minimum control in its decision making and continue to implement court verdicts against JI, the largest coalition partner of BNP. Since the beginning of 2018 when BNP party leader was controversially arrested for corruption, it is has become difficult for the government led by AL party to reject turning into an authoritarian regime. Political

disputes may trigger large-scale violence as in 2014 since the next election is due by December 2018.

Government adaptation strategy

A single-minded preference for mitigating floods was implemented by the government which started to build dams, dikes, and embankments under the Bangladesh Coastal Embankment Rehabilitation Project in the year 1995 (World Bank, 1995). However, these have proved inadequate in the face of abnormal and regular cyclonic storms and floods, and there is no constitutional framework for monitoring and evaluation of the projects dealing with climate change issues (Islam, 2001). Bangladesh uses structural (embankment, dikes) and non-structural (awareness raising, flood warning) measures for flood prevention and risk management. However, it has become evident that structural methods require extensive financial investment and are not environmentally sustainable (Paul and Routray, 2010, p. 490). The more critical socio-cultural, economic, demographic and ecological considerations were left out. Moreover, the country's top-down approaches to planning have repeatedly failed to deliver timely and effective flood mitigation (ibid). The government is not implementing any emergency resettlement plan. Instead, it has destroyed a lot of slums marking them as illegal, which resulted in people moving from one slum to another. As it is mentioned in a work of Poncelet (2009), there is also a credibility consideration of reported numbers of people being affected by environmental disasters. Poncelet (2009) claims that official figures published by the government do not correspond with the reality observed.

Despite the fact that Bangladesh has even a Disaster Management and Relief Ministry dealing with the management of natural disasters and highlight climate change as a priority for the country, the state lacks involvement of local government institutions, communities, and coordinating mechanism on the national level.

Migration patterns

Historically, migration patterns between regions in southern Asia are believed to happen for centuries. However, international migration adheres to the colonial history.

The first migrants who found a job in the British merchant navy carrying goods from Kolkata port during the 18th century are considered as pioneers to the West as they ended up in various countries including UK and USA (Siddiqui, 2003, p. 2). What led to the strengthening of the connection between Bangladesh and UK were labor shortages in the UK after The Second World War continuing in chain migration of workers and family members to the UK. Currently, the Bangladeshi diaspora with nearly half million persons is one of the largest diaspora communities in the UK (UK Census, 2011).

After gaining independence and after oil boom in the 1970s, the Middle East has become a lucrative country for labor migration from Bangladesh, and currently, it is the most attractive region for Bangladeshi workers (Siddiqui, 2005). This popularity led to labor restrictions introduced by UAE in 2012, the male labor migration from Bangladesh has therefore decreased while the number of female migrants increased.

Due to economic, cultural and historical ties, India hosts the largest Bangladeshi diaspora in the world. In two states of East India, West Bengali and Tripura, the dominant ethnic group is Bengali. India experienced the main influx of Bangladeshi Hindu, particularly during the independence war and perpetuated genocide when the majority decided to not return to Bangladesh for unsecular government and safety reasons (Totten and Parsons, 2013, p. 262). Migration has been natural for many centuries, and even after building fences between the countries in over three-quarters of the borders (total length is more than 4 thousand km), irregular migration continues.

According to United Nations (2017), Bangladesh has currently the fifth largest diaspora in the world with 7,5 million international migrants. The main host countries of Bangladeshi diaspora are India with more than 3 million international migrants, followed by Saudi Arabia (1,2 million), UAE (1 million), Kuwait (380 000), Malaysia (370 000), Oman (280 000), UK (230 000) and USA (220 000) (Pew Research Centre, 2018).

Diaspora has a vital role in the Bangladeshi economy what can be seen through remittances which made up to 6.2 % of the country's' GDP in 2016 (World Bank 2016). Sending remittances and maintenance of international social network may also

contribute to increasing the knowledge network, institution-building, and support from the Bangladeshi diaspora organizations or businesses abroad.

Since August 2017, Bangladesh has been facing the fastest growing refugee crisis in the world. An ethnic minority from Rakhine state in Myanmar is escaping harassment and violence to neighboring Bangladesh which has opened the borders. Currently, the camps in Bangladeshi Cox's Bazaar (mainly Kutupalong) host more than 900 000 Rohingya refugees (ISCG, 2018), who are also extremely vulnerable to upcoming monsoon and cyclone season particularly due to weak shelters and density in the camps.

Environmental migration patterns

Migration within the southern Asian region is historically common in search of a job or education and often pursued due to fast-growing population and consequent shrinkage of available land. However, environmental change has been increasing migration and forcing people to search for safer environments and household security as well (Black et al. 2008). Prediction of future environmental patterns over the next 50 years caused by environmental change is believed to depend on current trends. For example, Joarder and Miller (2013) suggested counting with the strengthening of existing migration channels because these will shape the future pattern of environmental migration flows.

Generally, it is assumed that all the affected people will migrate and that they will migrate permanently. However, this theory does not take into account a few factors such as household or individual decision to react differently to the same event and different adaptation strategies (Black et al. 2008). Migration in response to extreme events is likely to be local and regional and not international due to capital and social constraints and may also work as the last survivor strategy (Kartiki, 2011, p. 28). However, migration might also be used as an adaptation strategy applied to slow onset changes. Haque and Zaman (1989) investigated displacement induced by riverbank erosion in sub-districts of Bangladesh and found that 60 % of the respondents had been displaced at least once in their lifetime.

Due to environmental events such as drought, flood, and riverbank erosion, access to the common resources (fisheries, forests) on which poor rural people depend is likely to

decline. They may become unemployed which acts as a driving force for the outmigration that is likely to be on a permanent basis (Joarder and Miller, 2013). Impulses which may affect the decision to migrate are unemployment, inadequate income, unavailability of croplands, poor livelihood and living conditions (Poncelet, 2009). These reasons have gradually contributed to the poverty of the people and may consequently lead to the decision to migrate.

Consequent economic challenges resulting from environmental change are the key to understanding the extent to which environmental change will lead to movements of people, and whether these movements will be temporary or permanent (Black et al., 2011). In environmental stress, people try to find better economic opportunities, often in the form of moving from rural to urban areas as they perceive cities as a land of opportunity even if the city is located in the environmental risk-prone area. The migration may begin for example, when extreme floods destroy crops and the price of food may become increasingly higher with the highest adverse effect for already impoverished people. At the same time, the income from agriculture may become too low to maintain households and consequently push people to migration. In addition, Bangladeshi men are often pushed to migration and usually leave women and children in place of origin what can lead to a weak economic situation and may result in trafficking in a promise of decent work (Poncelat, 2009). Humanitarian organizations have a role in shaping migration as well. Those that received some humanitarian relief but find it insufficient to address their long-term concerns over employment and stability may also migrate.

Oppositely to migration, environmental pressures may limit population mobility, due to reduced demand for casual labor and reduced income, people can be unable to cover the cost of migration and therefore become stuck and labeled as “trapped population” (Kartiki, 2011, p. 31). As a result, those who are the most vulnerable are often the least provided to migrate, and the immobility may add to their vulnerability.

Summary

Migration in Bangladesh appears to be one of the most important strategies for diversification of income and essential part of Bangladeshi's life. With the above mentioned consideration of introduced migration patterns, climate change is not yet the main trigger for emigration, at least not for the international. However, climate change has been already directly or indirectly contributing to migration's decision. Therefore, migration patterns might be impacted mainly internally and eventually internationally. Nevertheless, not everyone has the means or network to be able to migrate and may easily become trapped, unable to migrate. In contrast, increasing internal migration may enhance population resilience and add to adaptation strategies as the government did not take any significant action to plan future resettlement or support people who will be forced to migrate in future by any program or by international cooperation with possible host countries.

Climate Change impacts in the Netherlands

Together with six overseas countries and territories in the Carribean, the Netherlands form constitutional monarchy with a head of government, the prime minister and head of the state, the monarch.

The Netherlands has an area of 41,5 square kilometers with a current population of little over 17 million in western Europe (CBS, 2018a). Although, the population growth is expected to be steady as the fertility rate is currently just 1,7 births per woman with only 0.5 % population grow (World Bank, 2016e), the Netherlands is overall highly populated with 505 people per square kilometer and ranks as the second most densely populated country in Europe (ibid). In order to plan the land usage strictly due to the demographic conditions, the Ministry of Housing, Spatial Planning and the Environment has been coordinating the land usage since 1946. Furthermore, in order to build polders in low lying areas enclosed by dikes, the Netherlands has been reclaiming land, and due to these implemented policies, the country has been able to combine a high level of agriculture production with high population density.

According to the World Bank (2016e), the Netherlands is an 18th largest economy in the world with GNI per capita above 46 000$, and due to high income, human assets index and the economy it is termed as a developed country.

Despite the fact that the rural population is rapidly decreasing, agriculture land still represents the primary usage of the total land (54 %), and the Dutch agricultural export is gradually growing, accounting for 22 % total export value (MEACP, 2017, p. 6). The agriculture is highly mechanized and uses smart and innovative farming technologies such as cultivation techniques applicable to salty soils. Therefore the Netherlands ranks first in the EU and second worldwide in total value of agricultural exports being €91.7 billion, with only the United States ahead (Government of the Netherlands, 2018).

Geographically, the Netherlands is situated very low in the delta of the rivers Rhine, Meuse, and Scheldt. The lowest point is seven meters below the sea level and the highest 321 meters above the sea level where more than 50 % of the population live in areas with the elevation less than 5 meters (CIESIN, 2013). The delta is greatly urbanized and densely populated with the largest port in Europe, Rotterdam.

With variations across Europe, IPCC (2014, pp. 1275-1276) estimates a significant increase in extremely high temperatures, droughts, and heavy precipitation all around Europe. The extent of those changes depends on a region, but there is high confidence in the estimation of increased heavy precipitation in Northern Europe where since 1950, annual precipitation has increased by up to +70 mm per decade (IPCC, 2014, p. 1276). Weather with warm and wet conditions may lead to spread of diseases by mosquitoes and heat waves.

Together with the climate change, the risk of extreme sea level rise increases, and thus coastal flood risk will remain a key challenge for several European cities, port facilities, and other infrastructure. This will increase the likelihood of system failures caused by extreme climate events. For low lying countries located in a river delta such as the Netherlands, the major concern induced by climate change is the impact of sea level rise (Katsman et al., 2011, p. 618). Not only that but also changes in storm surges and increased river discharge are possible threats for the Netherlands. The urban area in the flood-prone part of the delta has increased six times during the 20th century (from 20 000 ha to 120 000 ha) and may further double over the course of the 21st century (Moel et al., 2011, p. 624). Combination of changes in extreme precipitation, storm surge, sea level rise and increased river discharge becomes a complex flood risk for the indicated area with a need for protection strategy.

The positive impacts of climate change in the Netherlands

Climate change for the Netherland may also positively influence the wellbeing. The rise in temperatures and increase in greenhouse gas will have a positive impact on the production levels of most agricultural crops grown in the Netherlands (IPCC, 2014, p. 1284). This effect may result in competitive advantage as other regions will be hit harder by climate change. With warming, the Netherlands may become more attractive for tourist and suitable for recreation what will also have a positive effect on the Dutch economy.

Government adaptation strategy

The Netherlands has experienced massive flooding for centuries, and the protection measures are dated back into 12th century. The most recent significant flood occurred when the North Sea hit the south-west Netherlands in 1953 which had caused a collapse of several dikes and drownings of more than 1 800 people. After the disaster, the Dutch government instituted the *"Delta Works"* in order to protect the country against future flooding. Delta Works was a project consisting of civil works through the coast and took over more than 30 years (d'Angremont, 2003).

Nowadays, the protected area covers more than 55 % of the total land surface and secures places with high economic activity such as Rotterdam or the Amsterdam airport. The areas are divided into dike rings, which are geographical units bound by a flood protection system (dikes, dunes, natural high ground). For example, Rotterdam is protected by a storm surge barrier, which will close automatically in case that the local water level reaches a specific point (nearly 3 m above normal conditions).

As one of the first countries, the Netherlands developed a National Adaptation Strategy in 2007 (MEACP, 2017, p. 139). It includes the national Delta Programme which addresses issues such as flooding protection, fresh water supply, and heat stress. It also deals with adaptation to sea level rise, more intensive rainfall, increased peak discharges of rivers, droughts, and heat. The national Delta Programme has adopted a risk-based approach including dealing with consequences of flooding, such as fatalities, damage, and disruption. In addition, a higher protection level may be applied for areas in which flooding could lead to large groups of casualties or significant losses. Other projects such as *"The Coast is Growing"* (MEACP, 2017, p. 142) has a similarly innovative approach where the government indicated as a key coastal solution the concept of sand replenishment which enables growing of the coastal zone with the sea level rise. The coast is then structurally enhanced by the distribution of sand which is spread by wind, waves, and currents. Therefore, the coast grows naturally, making it safer while creating new natural areas. Another significant project is *"Flood Protection Programme"* (ibid.) and other 30 programmes for river widening which were completed along the major rivers. Since 2015, the river Rhine is able to handle a peak discharge level of 16,000 m^3/s and the Meuse a discharge level of 3,800 m^3/s (MEACP, 2017, p.

142). All of these projects undergo testing every few years and are continuously improved.

With the growth of the urban area in the flood-prone zone of the Netherlands, the socio-economic change has led to an exponential increase in potential flood damage (Moel et al., 2011). However, the government authorities are working alongside private sector companies and publicly implement measures such as green roofs, water squares, ditches, canals, and ponds. The guidelines for infrastructure were also updated in order to adapt to the changing weather patterns (MEACP, 2017).

How has the Netherlands been preparing for dealing with the risk of flooding and sea level rise is addressed in the Delta Programme. Furthermore, there is already a monitoring system for possible infectious diseases. Therefore, considering already implemented projects, the biggest challenge for the Netherlands currently lies in the power supply and IT services where the failure of the grids could have a tremendous socio-economic impact.

It is crucial to consider that even if the adaptation strategies and flood prevention strategies are going to be successful and reduce expected loss, the extreme events will remain unchanged. In the Bouwer et al. (2010) study scenarios, in the case of the low economic growth and low climate change, the prevention measures are likely to offset almost all of the consequences of flood risk due to the socioeconomic change. Whereas under the high economic growth and high climate change scenario, risks increase due to the higher exposure and assets at risk. Also, the potential losses from the most extreme events are not mitigated by flood prevention measures (ibid). However, also the capacity to cope with the extreme flood damages has increased due to the socio-economic changes. It was observed that in a case of adjusting potential flood damages to a constant welfare level (using GDP), the capacity to deal with catastrophic flood losses has actually increased over the 20th century (almost doubled in 2000 with respect to 1900) as collective resources increased more than potential flood damage (Moel et al., 2011). In addition, the Netherlands has been implementing simulations where the system analyses emergency and possible evacuation response to a worst-case flooding scenario.

Migration patterns

The Netherlands has a long history of emigration to various countries. Most emigrants left during a few waves where the first began in the 17th century when the Netherlands established The Dutch empire. The Netherlands controlled multiple territories until the 20th century. These territories included for example parts of Indonesia, Sri Lanka, Taiwan, Iran, Australia, Suriname, Brazil and more (Wesseling, 1997). The Netherlands has become a country of immigration only in the second half of 20th century since many Dutch citizens resettled to Canada, US or Australia during the Second World War. Only when so-called guest workers for unskilled jobs from former colonies and Mediterranean countries, later from Morocco and Turkey, started arriving in the 1960s, the Netherlands had slightly begun becoming an immigration country. Labor workers were expected to stay only temporarily, but after the oil crisis in 1973, many of them remained despite the official closure of recruitment. Therefore Turkey, Suriname, and Morocco represent the largest part of the foreign-born Dutch population (Eurostat, 2017). Those two flows were then followed by immigrants with the intention to pursue reunification with their family or migrants from overseas territories and Suriname, a Dutch colony in South America which has gained independence in 1975 (Meeteren, 2013, p. 116). The fourth wave accounts for the sharp increase in asylum seekers arrivals in the 1990s predominantly due to the war in former Yugoslavia. After joining European Union, an influx of migration from other Western European countries had increased, especially when Poland, Romania, and Bulgaria joined in years 2004 and 2007 (Meeteren, 2013, p. 117). The flows show how diverse the immigration has been in the last hundred years. At the same time, these flows have led to a related change in the geography of migration with an increase in long-distance immigration to the country.

Despite the fact that the Dutch government has encouraged emigration to fight with overpopulation, more people have migrated to the Netherlands that have left the country in recent years. Nowadays, due to the combination of decreasing fertility rate, the natural population growth is low whereas overall growth relatively substantial. Last year the growth was fueled mainly by foreign migration which counts for more than 233 thousand immigrants compared to 169 thousand births (CBS 2018b). The increase in

population, calculated on the base of net migration together with births minus deaths, was more than 100 thousand people (ibid.).

The structure of migration flows in 2017 has also changed compared to the previous years. Fewer asylum migrants and more migrants coming for work or studies settled in the Netherlands. The number of asylum seekers from Syria, Iraq, and Afghanistan has declined whereas immigration from European countries, Brazil and India have risen with a leading country Poland. Currently, approximately 11 % of the Dutch population are children of at least one immigrant parent (CBS, 2018c).

Historically the Dutch government has always been tolerant towards foreign migrants with attempts to preserve ethnic identity. Since 1990s immigration has more attention in the Dutch politics and some of the parties have replaced their multiculturalist attitudes with a monoculturalism and several immigration laws have been introduced to tighten up the immigration policy. One highly controversial example is the law on integration which requires immigrants after a period of three and half years or five passing an exam that evaluates Dutch language skills and includes a test of knowledge of Dutch society. Furthermore, the civic integration exam for newcomers has to be taken already abroad before the migrant outside of Europe arrives. Passing of the Civic Integration exam is compulsory for receiving a permanent residence permit.

Summary

The Netherlands started a fight against climate change decades ago, and people have been used to living alongside water. Combination of presented strategies and other factors such as leading economic position and wealth, democracy and government transparency and inclusion produce a stable base for coping with environmental change. The Netherlands is safeguarded by a strong research institutions, highly educated human resources and by complex mechanism prepared to deal with environmental change. However, worsening of the climate change will have a massive impact on the country and will require constant improving adaptation strategies.

Migration dynamics in the Netherlands and Bangladesh

As previous sections showed, it is inevitable that climate change and following events will have a significant impact on human livelihoods in both countries. Estimating to what extent it will influence human mobility is almost impossible. However, depending on the nature of the change, population tends to leave often suddenly and temporarily in case of extreme events such as cyclones, whereas due to slow onset changes population will likely leave gradually and permanently due to gradual character of changes in the form of drought, erosion and more (Bohra-Mishra, Oppenheimer, Hsiang, 2014).

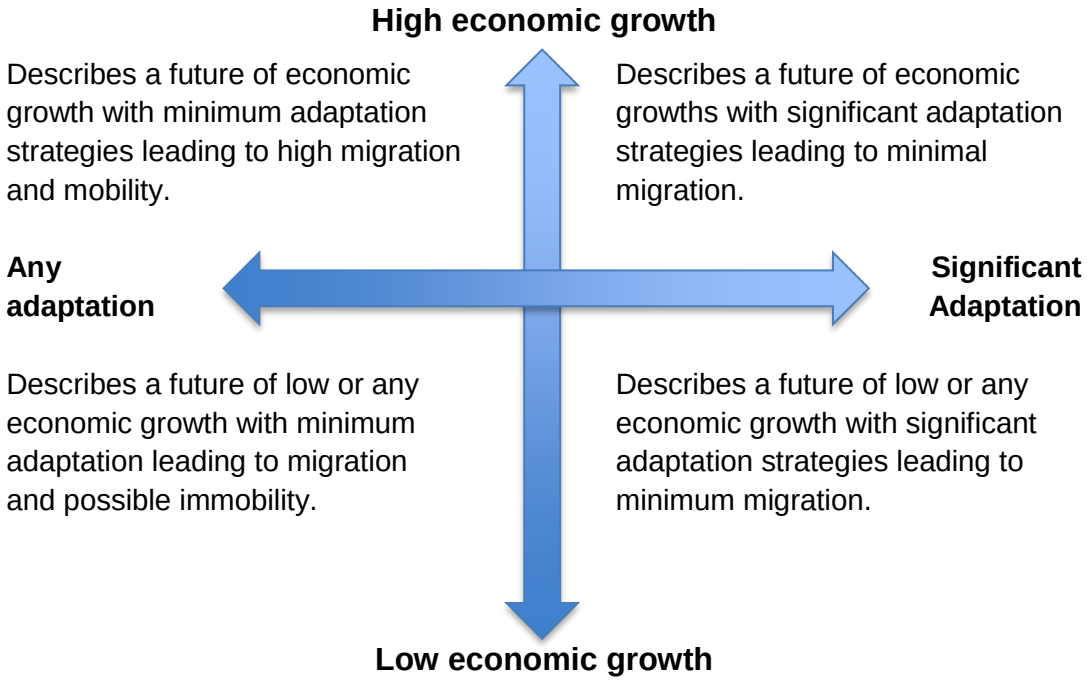
As was previously mentioned, scenarios are not meant to be predictions of future; they should rather encourage discussion and consideration of broad future possibilities. It should point out which capacities should be strengthened or changed. After identifying trends and impacts in the previous sections, it is crucial to determine relative uncertainties in the future, especially those which have the highest potential to impact future migration. The relative uncertainties are factors which may shape outcomes in the future and are uncertain either due to lack of data or complexity. A few important uncertainties influencing environmental migration are summed in Figure 3. The table of uncertainties influencing migration in the Netherlands and Bangladesh include political, economic, social, demographic, environmental and technological factors which play a significant role in future development of intensity and direction of migration dynamics.

In the next part, some of the uncertainties will be considered with trends for a better understanding of how they can develop, interact and eventually influence migration.

Figure 3 Uncertainties influencing migration in the Netherlands and Bangladesh

	Political	Economic	Social
Bangladesh	**International** - Deepen cooperation with India - Regional cooperation **National** - Emigration policies - Democratic versus dictatorial government - Two party system - Corruption - Human rights violation	**International** - Closer economic relationship with India - Economic corridors with other South Asian countries - Supply of skilled labor - Foreign investments **National** - Increasing foreign aid dependency - Relative economy growth - Remittances - Labor wage - Industrialization	**Education** - Improving access to education - Increasing literacy - Professional skill level **Health** - Access to health care - Infections induced by climate change **Culture** - Persisting of Bangladesh norms and religion - Persisting importance of kindship - Social inequality
The Netherlands	**International** - European integration or fragmentation **National** - Immigration policies - Anti-immigration parties	**International** - Economic relations among EU members - Demand for skilled labor - Foreign investments **National** - Economic growth - Welfare state	**Health** - Mortality rate -Infections induced by climate change **Culture** - Factionalism of culture - Social inequality **Migration** - Attitudes towards migration
	Demographic	Environmental	Technological
Bangladesh	**Population** - Population growth - Urbanization managements - Migration - Growing Bengali diaspora	- Rising sea level effects - Extreme weather events - The intensity of monsoons and cyclones - Droughts - Effectivity of adaptation - Freshwater scarcity - Food scarcity - Energy scarcity - Soil and water salination	- Electricity usage - Usage of ICT - Agriculture development
The Netherlands	**Population** - Declining fertility - Urbanization managements - Migration	- Rising sea level effects - Droughts - Effectivity of adaptation - Extreme weather events - Water scarcity - Food scarcity - Energy scarcity - Soil and water salination	- Technological innovation and implementation - Technical development

Figure 4 Possible scenarios development with economic growth and adaptation



Possible scenarios development

Development of migration flows and its dynamics in areas affected by climate change is influenced, as was presented earlier in the study, by various complex factors. One of the most significant drivers is economic growth and level of adaptation. Figure 4 includes four simplified possible scenarios influenced by the level of economy and adaptation to an environmental change. In the first case, if the country economically grows and simultaneously implements various adaptation strategies and interdisciplinary approach, this may lead to a minimal change in migration dynamics characterized by high skilled labor migration and even immigration from surrounding countries. In the case that the country still grows in economic terms yet may implement only minimal or no adaptation strategies to climate-induced impacts, it will most likely lead to high migration rate with the wealthiest first leaving and to general mobility increase within the country. The reason behind that is an increase in income making easier to finance the migration despite reducing income gap in a state of origin (Collier,

2013, p. 159). This may lead to intensifying migration flows internally but also internationally. In the third case, low economic prosperity with sufficient adaptation strategies may lead to minimum migration as only some have the means to migrate and most importantly in case of the successful adaptation, the migration will not be desired, and the migration flows will remain consistent. The last scenario with low economic growth and nearly no implemented adaptation strategies may lead to high rate of migration within the state and casualties due to adaptation failures. Also, it may lead to immobility of the most vulnerable population with no means in the form of funds or network for migration. The following discussion is focused on the uncertainty of possible future without any significant environmental adaptation in Bangladesh versus significant environmental adaptation in the Netherlands with continuing economic growth in both countries.

Economic factors

Migration is a complex phenomenon as both voluntary and forced migration are shaped by a range of political, economic, social, technological and environmental factors. Considering the economic growth in these countries, both states will be significantly affected by climate change, particularly by extreme precipitation what may result in high financial loss caused by higher assets exposure. These conditions may lead to different types of mobility, and economic factors alone are not sufficient to understand the complexity of these relations. However, they are essential in social transformation and individual's decision to migrate.

In the near future, the Netherlands will likely remain among the top of the world nations like it is in 2018 and will stay among leading economies in the European Union due to higher integration and stronger intra-trade relations among former and new members of EU unless fragmentation occurs. As European population is generally aging including the Netherlands and a part of the Dutch population which is supported by the state is increasing (Statistics Netherlands, 2016, p. 23), immigration population might partly replace demographic gap and requirements for new industries. In Bangladesh, if the economic trend continues, the country may confirm its position as emerging market and the economy will continue growing in fast pace after recovering from being one of the

poorest regions of Pakistan. Due to created economic corridors with other Asian countries together with strengthened trade relations with India and China, technological development, the agriculture sector together with information technology may become dominant puller of the economy in future (Abdin, 2016). At the same time, there is an ominous risk of high industrialization and consequent resource and environment exploitation resulting in resource degradation and in widening inequality gap due to unequal economy growth distribution. The inequality gap could function as a push factor, particularly for internal migration as well as further environmental degradation which may force communities to move too.

While both countries are currently growing in economic terms, the Dutch economy may come to stagnation or decline due to the aging population and the rapid economic growth in Bangladesh may be compromised by the high level of corruption, increased inequality and cronyism as well as by spreading of religious fundamentalism as Bangladesh has been increasing emphasis on its Islamic identity (Hussain, 2007, p. 215). Labor migration may therefore become crucial for the Dutch economic growth and welfare system, whereas inequality and further pursuing of Islamic identity may lead to pushing people, mainly Hindu, to leave Bangladesh.

As countries develop economically, urbanization is both a cause and consequence of the growth. The urban area grows together with economic importance and soon becomes attractive for the population for different reasons such as unskilled and skilled job opportunities or the possibility of acquiring new skills (Lukas, 2004). The pull factor of the city area may intensify if environmental change and its consequences negatively influence the rural population. Simultaneously, the change in the form of droughts, flooding, and extreme events turn into push factors of migration and lead to internal displacement. In the Netherlands, economic activity is surrounding Amsterdam, Utrecht or Rotterdam and in Bangladesh Dhaka, Chittagong or South-West Khulna. Such city areas often uncontrollably grow and can reach exceeding area size as it is in the case of fast-growing urban slums in Bangladesh (Ahmed, 2016, p. 2013).

Having lost the opportunity to use the agricultural skills, new arrivals into cities often fill factories and tanneries, where work conditions can be deadly. Not only have rural households been migrating to cities as a part of their livelihood strategy, but urban

migration is significantly contributing to diversifying rural incomes and livelihoods, and migrants tend to pursue permanent or long-term migration in such case. Furthermore, people who decide to undertake the route to a city, or the wealthier individuals who will cross the borders, may be able to send supporting transfers or remittances to the family or community which they left behind. The household may use the new income source for food, education or even for house repairs and become self-sustainable.

Despite the fact that migration can help reduce risk to lives, livelihoods, and ecosystems, diversified income and enhance households and communities in order to cope with the degradation, there are a few arising challenges.

Lack of ingenuity and conflict

According to Homer-Dixon (1994, pp. 16-17), strategies for adaptation fall into two categories depending on social and technical ingenuity where social ingenuity is necessary for the stable system and technical ingenuity for technology development. The need for a combination of those two will increase with worsening climate change, and at the same time, they may become insufficient. The Netherlands is an excellent example of using its ingenuity in using resources sensibly and in having a stable system of markets, legal regimes, educational institutions leading to the high probability of being able to adapt. Whereas in Bangladesh, before the country supports these institutions and encourage social transformation able to supplement social and technical ingenuity, it may reach a time where capable people migrate since those with available funds and education are first to leave leading to inability to recover (Collier, 2016, pp. 124 - 126). With sufficient funds, the ingenuine migrants may even leave to the Netherlands with already existing Bangladeshi diaspora, yet they more likely will choose Great Britain or Belgium as a destination in Europe due to a higher possibility of setting up a new business and easier procedure for reunification with their family or other countries with already existing large diaspora such as India, Saudi Arabia or Malaysia (Meeteren, 2013, p. 131). According to Collier (2016, p. 105) diasporas reduce migration barriers such as lack of initial finances and restrictive legal policies, therefore the migration flows to the countries with existing diasporas tend to increase. For example, in Bangladesh, it

would mean strengthening migration flows to India, UAE or Saudi Arabia and in case of Dutch, to the USA, New Zealand or Canada.

Chronic loss of educated elites would mean social and technical solutions scarcity and thus lead to an inability to cope with climate change and environmental degradation. In addition, the ability of the state to create necessary systems may be further undermined by environmental degradation combined with lack of skilled people. Reasons such as lack of technical capacity, innovation, national coordinating mechanism, human resources, state accountability and low transparency may explain why there have not been put in a lot of effort into climate change prevention in Bangladesh.

Apart from worsening population pressures and environmental change pushing people to migrate both to the cities and abroad, there is recognition of migrating populations having an adverse effect on host areas and countries. This assumption rather applies to large numbers of migration flows caused by major disasters than a smaller steady stream of migrants leaving because of slow onset changes. Such a migration influx after an extreme event may result in economic disputes, the burden on society and eventually raise an ethnic conflict (Homer-Dixon 1994, p. 22). Particularly in India's regions West Bengali, Assam, and Tripura, in case of Bangladesh, the border clashes regularly happen with one of the reasons being irregular migration, yet there is no reliable evidence as both countries deny irregular migration. Migration from Bangladesh to India has already resulted in intergroup conflicts. For example, in 1983 Lalung tribe in Assam, accused Bengali Muslims of stealing the most prosperous land and after those immigrants were allowed to vote in India, the so-called Neilla massacre took place in Assam, during a six hours period, more than 2 000 people were killed (Kimura, 2013). In case of Dutch citizens, there is a low chance of emigration from the country caused by lack of ingenuity, but if it occurs, it will not probably result in conflict due to a smaller number of Dutch citizens and cumulative wealth. The Dutch would begin to emigrate and move to bordering countries or countries with diaspora and most likely with the help of emergency resettling plan for EU member countries.

In both cases, the most vulnerable and prone to the conflict are people left behind, those without sufficient funds and government support unable to pursue immigration.

Combination of poverty, resource scarcity and economic marginalizing may also fuel internal violence and eventually lead to civil strife.

Government fragility

While the level of governance influences migration, environmental change and migration may contra-wise affect the governance. Environmental degradation may increase political and economic pressures towards state and lead to its weakening. With rising scarcities, the government will be forced to invest in sustainable development and to the renewal of the resources. If the state is not able to meet growing demand for resources, the country will likely be weakened (Homer-Dixon, 1994, p. 25). The government might also be threatened by economic decline resulting from lack of resources and consequent drop in government's revenue.

Especially states which are already debilitated by corruption undermining government revenue and by inter conflicts among elites are prone to disenabling state capacity to cope with scarcities and lower fragility (Chayes, 2016, p.). In Bangladesh, political corruption takes place since the independence in 1971 with indirect or direct involvement in large-scale corruption of every leader. During the Ziaur Rahman's rule of the country, 40 % of resources intended to development were misused as a result of political corruption (Khan 1999, p. 8). In the study of Mahmud and Prowse (2012), it was reported that 99 % of households experienced losses from corrupt practices during interventions before and after Cyclone Aila in 2009. Despite having a robust legal framework (including United Nations Convention against Corruption and state reforms), corruption in Bangladesh is an extensive problem on all levels of society. In the Corruption Perception Index (Transparency International, 2017), Bangladesh has ranked 143rd out of 180 countries due to weak implementing of the framework. For comparison, the Netherlands ranks 8th in the same index. Due to a low risk of corruption and high transparency in the public administration, corruption does not represent significant constraints for the Netherland and the greater transparency reduces the concerns about state fragility too (Duta and Roy, 2016).

Persisting scarcities and the dysfunctional government may lead to continuous increase in demand, civilian unrest and migration. To avoid state fragmentation as a

consequence of civilian strife, the state may become more authoritarian and militarized. With the upcoming elections in Bangladesh with the possible change from two-party system to one leading party and with accumulative tensions among party leaders and civilians, this scenario can become vivid even before the environmental change intensifies. The authoritarian regime may then work as a push factor and lead to out-migration due to the political and civil rights violation. The Fragile States Index (2018) which uses indicating trends such as security, human rights, state legitimacy or public service, ranks Bangladesh 32nd from 178 countries whereas the Netherlands ranks among the least fragile countries 165th in the index.

In the Netherlands, the 2017 parliamentary elections led to a fragmented parliament as none of the mainstream parties wants to cooperate with the second winning party, right-wing populist Party for Freedom (PVV) (Dutch News, 2018). The unwillingness to cooperate shows that there is a strong opposition against anti-EU and anti-immigrant movements which PVV pursues and the Netherlands will most likely stay in the EU and moreover strengthen the integration as the country is the highly open economy. The lack of corruption together with welfare and transparency will less likely lead to a state fragmentation or change the regime which has the most proportional electoral system in the world (Mudde, 2017). Arising from the above comparisons, one of the strategies positively affecting society, is to shift the political power from elites to more inclusive government empowering the population. According to Acemoglu and Robinson (2001), this is the key institutional change necessary for transferring societies and therefore avoid extensive emigration.

Summary

The logic of scenario development has been applied throughout the study, but this chapter showed a few possible scenarios focused mainly on economic, social and governmental drivers. Although it is nearly impossible to capture every factor influencing migration dynamics, all of them has a significant impact on people's decision to migrate or to stay. As was previously mentioned, the relations between the environmental driver and other drivers are often too complex and therefore harder to analyze. The chapter showed us what the possible ways of the future evolvement of these relations could be and highlighted a few risks in the form of ingenuity gap, government fragmentation and possible changes in migration dynamics.

Conclusion

The impacts of climate change are expected to have a significant role in weather patterns and consequential scarcities as well as in environmental degradation around the world. These impacts will be more intensified in the future influencing more or less negatively every single country. Although the exact consequences are impossible to predict, they are inevitable, and it is necessary to strengthen available adaptation strategies and coping capacity.

The research presented two countries, the Netherlands and Bangladesh, facing similar climate and environmental change in the form of extreme weather precipitation, rising sea level, land degradation, salinization and many more. Both countries are prone to environmental stress, and both are high densely populated. The difference is in the coping capacity of the countries, how well are they prepared for possible insurgencies. In the Netherlands, the cooperation of government, private companies and citizens created a stable base for dealing with climate change and its impact on livelihood. The country is prepared for large-scale flooding and rising sea level as well as for consequential impacts such as salinization of the land or infrastructure challenges. Indeed, it is a result of a complex combination of the government creating well-working mechanisms in which technical innovation meets economic advances and highly skilled professionals. Whereas in Bangladesh environmental disasters has had a long history and the government, highly corrupted and dysfunctional, has not been able to create such a system. Despite a few aspirations on fighting climate change and poverty, the coping capacity of Bangladesh is weak and insufficient. The country is agitated not only by hybrid government but also by extreme density, inequality and high rate of poverty.

The lack of coping capacity and insufficient adaptation strategies can result in many different scenarios. Environmental change can work as a multiplier of economic, demographic, governmental and social factors and lead not only to environmental scarcities but also to a lack social and economic ingenuity and conflict followed by migration.

The migration is often presented as a linear process. However, it is crucial to study environmental migration within development context as the other factors might often be multiplied by environmental change. Furthermore, it is essential not to deny people’s

capacity to cope with environmental stress and to adapt to environmental changes and other structural transformations.

As was mentioned in the study, environmental migration might be considered as one of the coping strategies and will intensify already existing migration flows. This fact is particularly important in case of Bangladeshi population which will be most likely internally displaced and eventually forced to leave the country to neighboring India or other countries with diasporas unless efficient establishment of coping mechanism takes place. While in the Netherlands in case of adaptation strategies failure, Dutch population would most likely migrate to countries of EU or other countries with the Dutch diaspora. However, it is impossible to directly predict the scale of migration induced by climate change due to the complexity, lack of data, terminology and environmentally induced impacts.

While there is great uncertainty regarding accurate estimates of future migration patterns induced by climate change, it has been expected to, directly or indirectly, trigger population movement, therefore it is crucial to increase human ability to cope with environmental risks in coming years.

Appendix 1: List of Terms

Climate Change	Statistical distribution of weather patterns lasting for an extended period of time.
Coping Capacity	The ability of people, organizations, and systems, using available skills and resources, to manage adverse conditions, risk or disasters.
Cyclone	A storm rotating about a center of low atmospheric pressure advancing at a speed of 30 to 50 kilometers an hour.
Disaster	A disruption of the functioning of society at due to hazardous events interacting with conditions of exposure, vulnerability, and capacity.
Drought	A drought is a period of below-average precipitation in a given region, resulting in prolonged shortages in the water supply, whether atmospheric, surface water or groundwater.
Environmental Change	Alterations in that which comprises an environment. Disturbance of any of all surroundings living organism, natural forces, and other living things.
Environmental Risk	Actual or potential threat of adverse effects on living organisms and the environment.
Extreme Precipitation	Unusual, unpredictable severe or unseasonal weather different from the average or usual weather pattern.
Flood	A temporary overflow of a usually dry area due to the overflow of a body of water, runoff of surface waters, or abnormal erosion or undermining of shoreline. Floods can also be an overflow of mudflow caused by a buildup of water underground.
Global Warming	Rise in the average temperature of the Earth's climate system due to greenhouse gases.
Hurricane	A tropical cyclone with winds of 74 miles (119 kilometers) per hour or higher that is usually accompanied by rain, thunder, and lightning.

Monsoon	Seasonal changes in atmospheric circulation and precipitation associated with the asymmetric heating of land and sea. The rainy phase of a seasonally changing pattern.
Salinization	Process by which water salts accumulate in the soil. It can be caused by the use of salt-rich irrigation water or due to other inappropriate irrigation practices.
Sea Level Rise	Increase in global mean sea level as a result of an increase in the volume of water in the world's oceans. The two major causes of global sea level rise are thermal expansion caused by warming of the ocean and increased melting of glaciers and ice sheets.
Soil Degradation	The decline in the soil quality resulting in a diminished capacity of the ecosystem to provide goods and services for its beneficiaries.
Soil Erosion	The displacement of the upper layer of soil which is the most fertile. This process is caused for example by water, ice (glaciers), snow, air (wind), plants, animals, and humans.
Storm	Disturbed state in atmosphere affecting normal conditions with a strong wind, thunder and lightning, heavy precipitation and more.

Appendix 2: List of Figures

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