

Adaptation to Climate Change under Changing Urban Patterns: The Climatic Perspective of Migration

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Abstract

Climate change in human history is having the same effect as the opening of Pandora's box in Greek mythology. Although some still argue that the consequences of climate change might be trivial or harmless, the reality shows that at least some of these consequences are already severe and far-reaching. This is particularly true for climate-induced migration and urbanisation, a two-directional problem: urban areas are already accounting for 75% of global emissions, but the impacts of climate change are increasingly bringing people to urbanised areas, where they contribute to even greater emissions. In this article on climate-induced migration and urbanisation, we take a closer look at the city of Makassar in South Sulawesi, Indonesia. The city and its surroundings – including some 70 small coral islands in the Makassar Strait – are affected by impacts of climate change, especially water scarcity. Makassar's population is growing due to migration flows from nearby rural areas, and the city struggles to meet the needs of its inhabitants. Because political attention and adaptation planning is often focused on megacities, peripheral cities like Makassar as well as medium-sized and small towns might soon become hotspots of climate-change-related urbanisation.

A. Introduction

If one thinks of an environmental or climate migrant, the vision of a poor person in a dry landscape or in an endangered seascape might come to mind. Reality looks different. Environmentally or climate-induced migration is enlarging urban populations faster than is currently recognised. The global urban population already accounts for half of humanity. For the first time in

history, the world is facing a reverse situation: there are more people living in urban than in rural areas. In 2011, urban populations were already rising to 31% in Indian cities, for example. Projections for 2025 predict increases of up to 42.5%. The role that climate change is playing in this respect is currently hardly acknowledged in the political debate on urbanisation, yet it is a crucial role: climate-induced migration serves to enlarge human numbers in cities, and cities are the main contributors to carbon dioxide emissions. At present, cities account for 75% of global emissions. Furthermore, this is not the only challenge we face that is caused by expanding urban areas. Domestic material consumption, sanitation, infrastructure, and racial issues are among the others. All the challenges together will create severe problems for future urban sustainability, and will increase the potential for conflict.

Today, the main focus of attention regarding adaptation plans for countries affected by climate change is on rural development, food security and energy. What has been ignored, or at least is less frequently acknowledged, is that major adaptation measures will be needed in and around urban areas because they are the main destinations for climate and environmental migrants. The lack of adaptation research on the interface between climate change, urbanisation and migration is mainly the result of restrictions implied by disciplinary studies. In this chapter, we aim to combine three research fields – environmental history, natural resources management and migration studies – in an example of current urbanisation trends related to climate change perceptions and induced actions.

B. Opening Pandora's Box

In many parts of the world, climate change is supposed to be acting as the hand that has opened Pandora's box. The impacts expected from this release are only partly known, but they are already causing difficult situations in many regions. There are numerous reports on these impacts and their negative effects on human lives. Human migration is one of the impacts of climate change, yet neither the consequences nor the possible solutions to this challenge are part of the ongoing political discourse on climate change. Little policy attention has been focused on the complex and multidirectional relationships between climate change and migration.¹

1 Hugo (2008).

Environmental history provides us with many examples of human migration connected to climate change. Temporary or permanent migration has always been a way of adapting to changing climatic conditions. In many cases, it has been climate change that has driven the economic, social and environmental development of societies – and, therefore, their futures. The Viking colonisation of Greenland was only possible during a warm period, which enabled migration to formerly unsuitable areas. A couple of hundred years later, during a cold period which also caused the fall of the Yuan Dynasty in China, those Viking colonies were abandoned. Thus, as has been already stated, during its course, humanity has experienced many migration flows attached to climate change. But what we are currently experiencing is likely to be staggering, and will surpass any historical antecedent.² The main difference between historical events and the present is that, today, the highest percentages of migrants end up in cities or in urban peripheries. All trends in the developing world predict a further increase in urban populations. Statistics show that already around 50 million people have migrated to urban areas for climatic and/or environmental reasons.³ Rapid urban growth is critically surpassing the capacity of most cities to provide adequate services for their inhabitants.⁴ The face of the earth has changed, with around 3 billion people living in cities. Almost 400 cities already contain 1 million people or more. Most of these cities are in the developing world. The main concentrations of energy and domestic material consumption are also found in and around urban areas. This explains the high emission levels of cities, mentioned previously. But how do we understand climate-induced migration and link it to the effects on urbanisation and to adaptation needs? How do we make a clear distinction regarding reasons for migration, and link those reasons to climate change?

C. Climate-induced Migration and Urbanisation

In recent decades, natural disasters, extreme weather events and the loss of environmental services have contributed to increasing resource scarcity and led to environmental conflicts which have forced millions of people to migrate. Most migration routes end up in cities. Predictions for 2050 estimate

2 Warner et al. (2009).

3 Warner et al. (2010).

4 Cohen (2006).

some 200 million migrants ending up in and around urban areas. Additionally, climate change projections for the same time show that cities will be increasingly exposed to major impacts, such as temperature rise, heatwaves, sea-level rise, and an increase in storm severity. Cities and urban areas will not only face a tremendous increase of climate migrants, but will also have to deal with the effects of climate change that will reduce their resilience and ability to respond to these climatic events. An acknowledgement of climate migrants and the recognition of the rapid increase in their numbers, mostly in urban areas, will facilitate the preparation of adaptation policies to address this challenge.

If we are going to use the many research results and observations at our disposal to start adequate policy processes, we need to develop standards that allow for a uniform treatment of climate-related migration. This requires agreeing, firstly, on a proper definition of *climate-induced migration*. On the international level, *migration* is currently defined by the 1951 United Nations (UN) Convention Relating to the Status of Refugees⁵ as well as by the associated 1967 Protocol Relating to the Status of Refugees.⁶ Additionally, in 2002 recommendations were set by the UN Special Rapporteur on the Human Rights of Internally Displaced Persons to recognise migrants and their rights.⁷ However, these definitions are not legally binding at the national level. Also, they have considerable gaps, e.g. none of the documents mention climate- or environment-related migration, or provide advice on how countries can deal with this issue on a national level. The Inter-agency Standing Committee⁸ mentions four scenarios which may lead to environmental and climate migration:

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- 5 The 1951 Convention is the key legal document in defining who is a *refugee*, their rights and the legal obligations of states; see <http://www.unhcr.org/3b66c2aa10.html>, last accessed April 2013.
 - 6 The 1967 Protocol to the Convention of 1951 removed geographical and temporal restrictions on the definition of refugee; see <http://www.unhcr.org/3b66c2aa10.html>, last accessed April 2013.
 - 7 Report E/CN.4/2003/85 of the Special Rapporteur on Migrants; see <http://www.unhcr.org/refworld/topic,4565c22541,4565c25f509,45377ac50,0,UNCHR,,.html>, last accessed April 2013.
 - 8 The Inter-Agency Standing Committee (IASC) is a unique inter-agency forum for coordination, policy development and decision-making involving the key UN and non-UN humanitarian partners. The IASC was established in June 1992 in response to UN General Assembly Resolution 46/182 on the strengthening of humanitarian assistance.

- Hydro-meteorological catastrophes
- Environmental degradation and/or long-standing catastrophes
- Land loss caused by sea-level rise, and
- Conflicts caused by resource scarcity.

It was not until 2010 that countries agreed to sign the Cancún Agreement in which they recognised climate-induced migration as a fact that also has to be acknowledged in their national climate policies. As climate migration is often caused by poor adaptation strategies, the Cancún Agreement sets the political framework for addressing the causes of migration.

Since the beginning of the 1990s, researchers have provided serious attention to the study of connections between environmental change, security issues and migration.⁹ At the same time, a discussion has evolved about people who could be forced to leave their homes as a result of environmental destruction.¹⁰ Current research also focuses strongly on defining *environment- and climate-induced migration*,¹¹ based on what has already been identified as major issues with regard to migration and the governance of waves of climate-induced migration.¹² Surprisingly, there is hardly any research on the linkages between urbanisation and climate-induced migration.¹³ On a general level, the results of current scientific research are not percolating into proper adaptation policies that might be able to tackle the challenge of increasing migration associated with climate change and other environmental issues. The policy instruments available at present are not sufficient to support climate migrants and to respond to their needs. Such instruments also lack an adequate and useful definition of *climate-induced migration*. Bilsborrow and DeLargy are scholars working on a proper definition of this concept.¹⁴ They suggested as early as 1991 that a cluster of causes exacerbated by climate change induce people to migrate:¹⁵

9 Homer-Dixon (1991, 1994); Bächler et al. (1996); Bächler (1998); Percival & Homer-Dixon (1998). For a historical perspective, see McLeman (2011).

10 Richter (1998); Scheffran (1994); Wöhlcke (1994).

11 Fernando et al. (2009); Gemenne (2010, 2011); Grote & Warner (2010); Mánéz & Scheffran (2011); Renaud et al. (2007); Warner et al. (2009, 2010).

12 Mayer (2010, 2011).

13 DePaul (2012).

14 Bilsborrow & DeLargy (1991).

15 (ibid.).

- The reduction of income
- The increased risk of income reduction in the future, and
- The reduction of environmental health.

We might add to those causes the population trends in many areas of the world, the economic opportunities in cities, the diaspora networks, and the increasingly changing climatic patterns. The International Organisation for Migration assumes 192 million migrants globally. Several predictions show that this number will increase considerably. Direct causes will be environmental change and weather extremes such as droughts. Indirectly, economic problems and conflicts resulting from climate change impacts will also take their toll. Estimates of future numbers of climate migrants differ widely in the scientific literature. While Myers¹⁶ expects some 200 million climate migrants, the office of the UN General Secretary assumes between 50 and 350 million.¹⁷ The German Advisory Council on Global Change predicts that 10–25% of all future migrations will be caused by climate change and its impacts.¹⁸ However, Brown¹⁹ and Jakobeit and Methmann²⁰ criticise this prediction for being too high. Leaving numbers and projections on migrants aside, and irrespective of the uncertainties attached to those calculations, reality shows that the problems of climate- and environment-related migration have increasingly developed into one of the main political challenges of the 21st century.²¹ In 2008, approximately 208 million people worldwide were affected by different types of natural disasters. Around 36 million of them migrated, some 20 million because of climate-related incidents.²² It is already possible today to identify the specific areas in the world where climate-induced migration will be a major issue. Cities, mostly the small and medium-sized ones, will become the focal points for climate change impacts and growing urbanisation. This is expected to result in growing urban vulnerability to environmental and social change.²³

16 Myers (2002).

17 UN Report of the Secretary-General on Climate change and its Possible Security Implications, 11 September 2009, Document A/64/350.

18 WGBU (2007).

19 Brown (2011).

20 Jakobeit & Methmann (2007).

21 Morton et al. (2008).

22 OCHA et al. (2009).

23 DePaul (2012).

It is sometimes difficult to differentiate between climate-induced and other reasons for migration. Black et al. make such distinctions by introducing a framework of five drivers – environmental, economic, political, demographic and social – that contribute to migration, with climate change being an external factor affecting all five.²⁴

D. Climate Urbanisation Trends in Asia and the Pacific

Environment-induced migration within countries, especially from rural to urban areas, has become significant. In 2010, more than 30 million people in Asia and the Pacific were displaced by environmental disasters such as storms, floods or droughts. Many climate migrants returned home after the extreme events, but others found a new life in urban areas. This enlarged population numbers in cities in Asia, for example. Furthermore, not only big cities experienced such population growth: increasingly, small and medium-sized cities do so too. In China, for instance, it is expected that, by 2030, more than 1 billion people will live in cities, with 221 cities having more than 1 million inhabitants.²⁵

In the next few decades, climate change in Asia is expected to contribute to the increase in the frequency of extreme coastal weather events and to a significant sea-level rise. At the same time, the region's population – currently around 4 billion – will continue to increase. These developments will result in growing numbers of people on the move, for reasons that include environmental factors.²⁶ Countries and populations of Asia and the Pacific will be affected by climate change in different ways, leading to various migration scenarios. Cross-border migration is likely to increase. Already, the region is home to the most important source of international migrants worldwide.

An Example – Sulawesi, Indonesia

Environment-induced migration in Indonesia is not a recent phenomenon. The largest archipelagic country of the world is situated in a disaster-prone

24 Black et al. (2011).

25 Roberts (2008).

26 ADB (2012).

region: earthquakes, volcanic eruptions, floods and other extreme events have had a strong influence on the Indonesian people throughout time. For example, several million people were displaced as a result of the devastating tsunami in December 2004. For those who have lost their livelihoods, migration to urban areas has always been an option.

The city of Makassar is the capital of the province of South Sulawesi on the island of Sulawesi. This multi-ethnic city is settled by Makassar, Bugis, Mandar and Toraja, to name only the major ethnic groups. Due to its regional importance as having been the biggest city in the outer islands for centuries, Makassar has been characterised as a “peripheral metropolis”.²⁷ Makassar is the centre of migration on Sulawesi. Its population grew from 15,000 in the early 19th Century to 85,000 in 1930, mainly driven by in-migration from the rural areas of South Sulawesi. Over the last few decades, the population of Makassar has increased very rapidly: by 5.5% between 1971 and 1980, and by 2.92% between 1980 and 1990. In 2011, 1,352,136 people lived in Makassar, making it the fourth biggest city in Indonesia. Given that thousands of people live there without being registered, it is likely that this number is actually higher.²⁸

Following the 2005 Indonesia Intercensal Population Survey,²⁹ Makassar stood out in terms of in-migration as a major enclave in the eastern islands, with 331,000 long-term and 82,000 short-term migrants of rural origin. Historically, in-migration had largely resulted from political developments and/or economic considerations, but more careful scrutiny reveals that many of these migration flows were also driven by environmental change. Given that Indonesia is influenced by the monsoon, climate variations also play an important role in this respect. During the inter-monsoon months, approximately 10,000 peasants temporarily move to Makassar to work as rickshaw drivers.³⁰ In the other seasons, they return to their villages to work in the agricultural sector. These temporal migrants are adding to the steadily growing population of the city, and represent a further challenge as regards the city’s functioning and provision of services.

However, permanent in-migration to Makassar will also increase in future. Some of these migrants might come from the Spermonde Archipelago, some 70 very small coral atolls situated in the Makassar Strait just in front

27 Antweiler (2002:231).

28 (ibid.).

29 Survei Penduduk Antar Sensus (SUPAS).

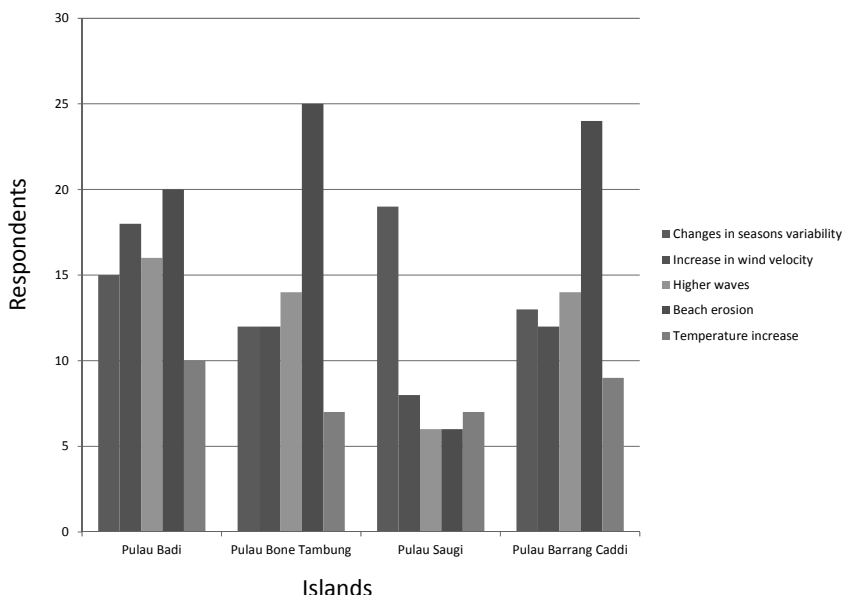
30 Antweiler (2002:231).

of the city. Spermonde's population is growing, and most of the tiny islands are already very densely settled. On the other hand, climate change is already having considerable impacts on the archipelago. Figure 1 reflects the perceptions of island inhabitants on climate change. Changes in season variability, increased wind velocity, higher waves, beach erosion, and temperature increases are increasingly putting people's lives under pressure and inducing them to migrate.³¹ Additionally, the scarcity of fresh water has increased significantly, with several islands now importing their supplies from Makassar.³² Makassar itself is struggling to meet the demand for a supply of clean water; and the problem is expected to increase over the next ten years. The majority of Spermonde's inhabitants are trying to stay where they are, but doing so is not a long-term solution. People who have lost their houses due to erosion are moving towards the centre of the island, or live with their relatives. Some people move between islands, but space is obviously limited. Only those with sufficient financial resources buy land and houses in Makassar, which will enable them to migrate there. However, over the next few decades, people from the Spermonde Archipelago will have to migrate to the mainland. Given their family ties and social connections, many of them might end up in Makassar.

31 Husain (2012).

32 Schwerdtner Mnez et al. (2012).

Figure 1: Responses with Regard to Perceived Climate Change



E. Conclusions and Policy Recommendations

Climate change will influence the capability of urban areas to adapt to expected and unexpected changes. Many growing cities are located in coastal areas and will be heavily impacted by storm surges, sea-level rise, heat-waves, and more intense floods and droughts. This situation will increase the need for cities to find new ways of adapting to gradually adverse effects within the environmental and social realms. One can also not forget the carbon dioxide budget of cities nowadays: if city sizes increase, one might expect a concomitant increase in carbon dioxide, which might have negative impacts in disaster-prone areas, as many cities are.

Climate-induced migration to urban areas is expected to become a major part of the broader global migration dynamics. In Asia, a region already subject to extensive migration, these dynamics will cause many urban areas, mainly medium-scale and small cities, to grow to previously unforeseen sizes. Climate-induced migration does not have to be seen as a threat; however, since urban areas are the migrant's principal destination, new ways of adaptation to this situation need to be found. When rural environmental or

climate migrants settle in urban areas, they mainly settle in slums around the cities. In the face of climate change, these areas – known as hotspots of migration – will be the most vulnerable due, among other things, to the high density of their inhabitants, poor sanitation, and limited water and power supplies. Furthermore, landslides are a problem in mountain regions associated with illegal or uncontrolled urban migration, and might be exacerbated in the near future. Therefore, governments need to look at increasing the capacity of their cities to manage larger populations and to serve these populations appropriately.³³ The planning associated with urban infrastructure and transportation to meet the needs of the increasing population is also vital. In many cases, the reality shows that poor planning has caused severe transportation problems, sewage problems when local flooding occurs, and problems of water supply, due to the increase in demand coupled with depleting aquifers. The city of Makassar is just one typical example of this.

However, like any type of migration, the climate-induced form is also an opportunity. People who migrate into urban areas may profit from more economic possibilities, better education and improved health services. Because many migrants support family members back home, their rural relatives become better off and increase their resilience to disaster and crisis. Migrants also bring to rural areas the new knowledge that they have acquired in the urban areas. Therefore, migration can provide benefits to those who migrate as well as to those who stay behind. Thus, rural–urban migration has been shown to be an effective solution for reducing rural poverty. For example, Indonesia has experienced rapid urbanisation with a concomitant rapid decline in rural poverty over the last few decades.

Climate change is already a challenge to many cities, especially in the developing world. Climate-induced migration might become one of the major issues that governments have to consider in their national adaptation policies. If planners and decision-makers do not react properly and timeously, many urban areas will become disaster hotspots. Actions are urgently needed in order to link urban planning with disaster management and dealing with increasing migrant populations. This is true not only for Asia, but also for other parts of the world, especially Africa, where urban areas are growing as fast as those in Asia. Governments will have to deal with the costs of disasters if they do not start taking into account the rapid development of urban areas due to increasing numbers of climate-associated migrants. In

33 ADB (2012).

their planning, governments should also include investments in sustainable infrastructure and basic services in migrant destination cities. One suggestion, as a first step, would be for governments to develop hotspot maps – maps showing vulnerable areas – so that projections of future development become visible and, on that basis, adaptive management plans can be developed.

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