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Governance Approaches to Mitigation of and Adaptation to Climate Change in Asia

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The Interplay between Climate Change, Economy and Displacement: Experience from Asia

A.K.M. Ahsan Ullah

1. Introduction

Only after the devastating tsunami of 2004 shook the policy-makers, scientists and academics has climate change (CC) emerged as one of the strongest forces that can cause economic loss and massive human displacement. CC could now be linked to a number of contemporary dimensions, such as securitisation, poverty, migration and refuge. However, climate security or environmental security poses a few questions. Whose security, what do we mean by security and what are those elements that pose threats? Have we ever thought that climate and climatic disruption may pose threats to human kind that seriously? The attendant consequences of climatic disorder, such as crop failure and infrastructural breakdown, may lead to severe poverty conditions which may tend to social unrest (Garnaut, 2008). Both poverty and unrest can create sufficient conditions to induce population displacement. Until recently, migration and refugee scholars might have somehow missed seeing the link between CC and displacement. The Indian Ocean disaster in 2004, the Fukushima catastrophe in 2011 and some other environmental tragedies beyond Asia, such as Haiti and Chile, suggest that there is a direct link between CC with human displacement. The classical migration theorists tended to generalise myriad factors of displacement using a push–pull approach.

The devastating climate consequences that have taken place in the last two decades and the possible threat of the disappearance of most of the small island developing nations, such as Kiribati, Vanuatu, Tuvalu and Samoa, in the coming four to five decades have shaken the conscience of world leaders. Kiribati will disappear in 50 years, and Tuvalu is negotiating the purchase of land for its citizens from Australia and Fiji. The Maldives is already lying below sea level. A cabinet meeting of Mohamed Nasheed's government was held under water in order to attract the attention of the

world to the imminent danger that the country is expected to encounter. The relevant question to ask here is what the economic value of a nation state is. CC has been a significant agenda at the global level for a long time; however, the issue was rarely viewed from an academic angle (Daron, Johnson and Robinson, 2001; Reuveny, 2007; Tol, 2009). Moreover, CC and its attendant consequences, and the interplay between human displacement and economy, have come into this domain as a policy matter recently. However, serious attention has not been paid to such emerging issues by global policy-makers, academics, think tanks or civil society organisations.

Is CC a natural response, an anthropogenic one or both? Scientists have presented overwhelming evidence that CC, in a negative way, has been contributed by human activities (Holzmann and Jorgensen, 2000; Intergovernmental Panel on Climate Change (IPCC), 2007a; Ullah, 2012a, 2012b). The facts about emissions of greenhouse gas (GHG) are important in this discourse. This is, however, a more technical, political and scientific discourse than a social science one (Crompton, Pielke and McAneney, 2011). Since the onset of the discourse about CC and migration, there have been attempts at both global and regional levels to manage CC and its resultant effects. This chapter aims to analyse how effective those attempts are. Enforcement of these attempts depends largely on the goodwill, commitment and sincerity of the respective governments. This chapter goes on to argue that the direct association between CC, economy and displacement has come to the fore in the global development agenda in general and in Asia in particular.

2. Literature review

CC is a global concern, so measures should be adopted globally and regional and domestic actions should be complementary. Which countries, regions and continents are vulnerable to CC? The answer is the 'entire world'. However, regionally or continentally, the severity and forms of CC vary. For example, the African continent is more vulnerable to drought than floods while the Asian continent is the opposite (Heltberg, 2007; Heltberg, Siegel and Jorgensen, 2009). The implications of CC encompass the social, political and economic landscapes both regionally and internationally.

Today, global CC is one of the most dangerous challenges that the international community faces. Since CC is likely to have profound effects on agriculture, settlement patterns, natural disasters, disease and economic activity, future scenarios and potential human impacts can easily be imagined. There is no doubt that CC would exacerbate resource scarcity, which would lead to social unrest and conflict, and these, in turn, would create human dislocations (Cullen and Sarah, 2007; Idean, 2008), and these always come with huge economic losses.

CC may have both positive and negative impacts depending on the geographical location involved. For example, in countries with extreme (low) temperatures, such as Canada, Russia and some parts of Europe, an increase in temperature by 2 °C or 3 °C would be a benefit as a result of higher agricultural yields, lower winter morbidity and lower heating costs (Driessen and Glasbergen, 2002). Obviously, extreme cold weather is not favourable for tourism, so this change would help the countries to boost tourism. Developed countries in lower latitudes are not spared either by the fact that water availability and crop yields (e.g. in Southern Europe) are expected to decline by 20 per cent with a 2 °C increase in global temperature (Baer and Athanasiou, 2007; Asian Development Bank (ADB), 2009a, 2009b; Fung, Lopez and New, 2011).

Nonetheless, all of the countries that are vulnerable to these negative consequences are in developing regions. Africa and Asia, especially Sub-Saharan Africa and South Asia, are at the biggest risk from CC (Heltberg, Siegel and Jorgensen, 2010). Meanwhile, rich nations, as mentioned above, will not be spared either. For example, a 1 m rise in sea level may affect 13 million people in five European countries and destroy property worth $600 billion (Adger, 2006; IPCC, 2007c; Ananthaswamy, 2009). The top 10 countries at risk from the impact of CC, in order of their CC Vulnerability Index (CCVI), are Haiti, Bangladesh, Zimbabwe, Sierra Leone, Madagascar, Cambodia, Mozambique, the Democratic Republic of the Congo, Malawi and the Philippines (IPCC, 2007a; Anthoff, Hepburn and Tol, 2009). One-third of them are from Asia. The CCVI singled out six cities in the world that are at extreme risk from CC impacts. They are perceived as the fastest-growing cities in the world, such as Calcutta in India, Manila in the Philippines, Jakarta in Indonesia, Dhaka and Chittagong in Bangladesh, and Addis Ababa in Ethiopia (United Nations (UN), 2012).

CC is directly affecting biodiversity, ecosystems and resource bases, and both directly and indirectly affecting humans. Drought, cyclones, wildfire and storm surges are the greatest risks posed by CC (see Figure 3.1). Droughts and wildfire in Australia, Russia, the United States and Africa, and floods in Bangladesh, Pakistan, Sri Lanka and Central America, are obvious consequences of CC (IPCC, 2012). Various studies assume that 1–3 billion people will experience water scarcity in the coming seven decades and 200–600 million will suffer hunger. Also, 2–7 million will experience coastal flooding every year (Christian Aid, 2007). The Christian Aid agency further predicts that in the coming four decades about 1 billion people will be displaced from their habitat by global warming. The repeated accentuation exerted by Myers (2002, 2005) on the estimated 50 million people who had migrated by 2010 and the number of people displaced by CC in China was 30 million (Myers, 2002, 2005).

The world will witness three times as much drought by 2070 and seven times as many floods and cyclones by 2070. In fact, it is striking to see

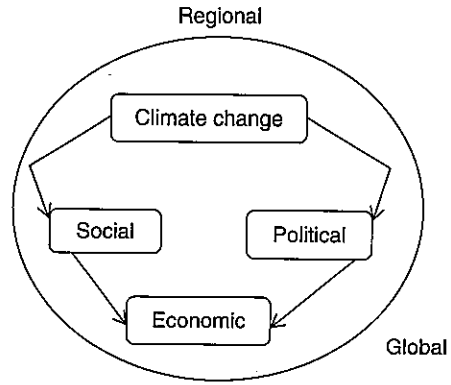

Figure 3.1 Impact of climate change at regional and global levels
Source: By the author (2012).

that the changes in GHG in the last 100 years have been tremendous. For example, CO_2 (carbon dioxide) increased by 34 per cent, CH_4 (methane) by 152 per cent, N_2O (nitrous oxide) by 18 per cent and chlorofluorocarbons by 0–880 parts per trillion (US Department of Transportation, 2010). Worldwide, 'desertification is making approximately 12 million hectares of land useless for cultivation every year'; about 29 per cent of the globe's surface is land (Food and Agriculture Organisation of the UN (FAO), 2009, p. 2). Out of this, the FAO (2009) estimated that 39 million km^2 (26 per cent) were 'forested land' in 2000. Also, 15 million hectares of forest are lost every year (FAO, 2009).

Changes in the polar ice sheets could raise sea levels by 1 m or more by 2100 (Poore, Williams and Christopher, 2000) and the implications could be severe. The more ice and glaciers melt, the higher the rise in sea level. The implication is that about 10 per cent of the world's population lives in vulnerable coastal areas, and 75 per cent of vulnerable people are in Asia. More striking is that, globally, 1.2 billion people (23 per cent of the world's population) already live within 100 km of the coast and in the coming two decades this number is expected to increase to 50 per cent (UN Educational, Scientific and Cultural Organisation (UNESCO), 2009).

Not only are Asian countries at the risk of sea level rises but many European countries are at the same level as the sea, and the Netherlands is already below sea level. If global average warming exceeded 1.9 °C for long enough, the Greenland ice sheet would melt, resulting in a sea-level rise of about 7 m. This is a scary warning because a 1 m rise in sea level means that 60 million people would be living within 1 m of the mean sea level. It is expected that this number will rise to 130 million by 2100 (IPCC, 2007b; Nicholls *et al.*, 2007).

The primary concern about CC and migration is that the latter continues to result from complex combinations of the classical push-and-pull model, underlying causal dynamics and triggering events. CC drives along other factors rather than fundamentally shifting existing contexts and characteristics of migration (Ewing, 2012). There has always been a sweeping tendency to associate migration instantly with economic factors which has overshadowed many other underlying factors. For instance, intraregional migration within any region could not be explained by economic models alone. What are the reasons for Sudanese people to move to Eritrea or for Eritreans to move to Burkina Faso and so on? In Asia, apparently, intracountry mobility takes place due to climatic reasons, generally from coastal areas inland. However, exceptions are not rare indigenous population and Afar population in Ethiopia are perfect examples.

Most variables behind catastrophic consequences, such as, drought, desertification, sea-level rise, deforestations and so on, began to surface long ago. All of these consequences are reminiscent of the predictions that scientists made earlier. More alarming is that during the coming half-century, drought-affected areas will continue to expand. In Asia, China appeared as a significant country in the debate about CC because it did not sign the Kyoto Protocol and it emits arguably the largest amount of GHG, putting a huge population in a highly vulnerable position.

Southeast Asia is often perceived in the climate literature as a hotspot of CC-induced migration, in part because it is already 'migration active', with increasing internal mobility and cross-border migration (Ducanes and Abella, 2009; Ullah and Hossain, 2011). One-third of the Southeast Asian population is subject to CC-induced risk, and these are located in low-lying coastal areas of Indonesia, Myanmar, the Philippines, Thailand and Vietnam. This fact is important and needs to be further analysed in order to compare the situation with South Asia. The latter suffers a high level of poverty and poor governance (Duit, 2008), which has a major impact on its adaptation strategies for CC. This implies that CC and poverty combined induce migration from South Asia (Ullah, 2010). CC compounds the existing poverty in Asia. Their dependence on natural resources and their limited capacity to adapt to a changing climate put Asians into vulnerability to poverty. Those who have the fewest resources and the least capacity to adapt to CC are the most vulnerable. Severe events in CC threaten livelihoods hugely. Although agriculture contributes about 2.5 per cent of global gross domestic product (GDP), its share is much larger in Asian countries (Hertel, Burke and Lobell, 2010). The farm sector in the broader economic performance of poor countries in Asia is significant, therefore the potential macro- and microeconomic effects of CC on agricultural production has crucial implications. Studies confirm that low agricultural productivity in countries of Asia and Africa is the direct contribution of CC (Hertel *et al.*, 2010).

3. Conceptual framework

It is now an established fact that climatic disorder is linked directly to population migration. The phenomenon has freshly occupied space in the discourse of how to manage climatic disorder to mitigate human suffering. It was recently acknowledged that CC contributes to the displacement of habitation and economic loss. It is predicted that more than 200 million people will be displaced by the effects of CC over the next four decades (Hugo, 2008; IPCC), 2012; Ullah, 2012b).

This chapter, however, takes the straightforward position that CC has an impact on human displacement and this displacement does not come without economic loss. Economic loss may cause and be caused by displacement. Obviously, it is not an easy task to measure this loss in economic terms nor is there any method currently available to do so. We may find anecdotal estimates of human loss but no such assessment was made of the economic loss incurred from the Tsunami disaster, the Fukushima catastrophe or the Haiti tragedy. However, at this level it is possible to explore the direct and indirect link between CC, economic loss and human displacement.

In fact, there are so many gaps in our knowledge of CC, migration and the relationship between them in Asia and the Pacific that it would be irresponsible to precisely offer an estimate of the number of people likely to migrate in the future. This study does not intend to repeat the work by the IPCC and others. Rather, this chapter draws upon the key issues relating to the impacts of CC. These could be viewed from three levels – namely, (i) the primary level, which results directly from changes to climatic patterns, (ii) the secondary level, which refers to changes to environmental systems resulting from primary impacts and (iii) the tertiary level, which refers to the broader impacts on societal systems, including implications for migration patterns, and implications of potential policy responses by governments. There are a number of ways in which CC may affect countries, such as exposure, impact sensitivity, adaptive potential and capacity. Conceptually, exposure refers to the likelihood of vulnerability to CC effects, based on current metrics. Impact sensitivity demonstrates the magnitude of disruption resulting from these impacts. Adaptive potential refers to the economic resources available to a country to manage its vulnerability. These key factors determine which country is at most risk and its ability to cope with the climatic disorder (Alberini, Chiabai and Muehlenbachs, 2006) (see Table 3.1).

The relationship between CC and population migration is a widely recognised reality, though relatively little empirical research has been done so far to delve further into the details of specific regions. Speculation suggests that it remains one of the hardest tasks to determine the likely origins or destinations and the likely number of people who may be motivated to move due to CC.

Table 3.1 Vulnerability indicators

Indicators	Summary rationale
Exposure	
Average temperature	A higher starting average temperature indicates greater vulnerability
Temperature changes	A higher rate of increase in average temperature suggests greater vulnerability to changing weather factors
Water availability	A lower water availability per capita value indicates greater vulnerability to CC factors
Water availability	A higher negative percentage change of renewable water per capita indicates greater vulnerability
Extreme events	A higher level of extreme events indicates greater exposure
Change in extreme events	A higher rate of events indicates an increasing magnitude of climate risk
Impact sensitivity	
People affected	More people affected reflects greater vulnerability
Deaths	More people affected reflects greater vulnerability
Damage costs	Higher damage costs as a proportion of the economy reflects greater vulnerability to CC-driven weather events
Adaptive potential	
Wealth	A lower GDP per capita indicates greater vulnerability because of the lower ability to invest to adapt
Budget	Higher debt indicates a lower capacity to pay for infrastructure build
Adaptive capacity	
Rule of law	Higher rule of law indicates better governance which demonstrates an ability to implement change
Corruption	Better control of corruption indicates a greater likelihood of proper allocation of funds for adaptation
Education	Higher education indicates a higher skills base to change

Sources: Compiled from Knight (2011), Alberini *et al.* (2006) and Ullah (2005).

Maplecroft (2011) ranked 'the top 10 countries at 'extreme risk' from the impact of CC by using the CCVI in 2011 (pp. 2–3). The analysis measures vulnerability to CC by country on a relative basis. This provides insights into long-term strategic decision-making for corporates and policy-makers in the context of potential CC risk (Huddleston, 2010; Knight, 2011).

Today it is important to ask who emits more and suffers less. The level of discrepancies prevailing in the world system in GHG production by country as well as globally is shocking. The Western world – frontline campaigners for a green world – emits the most GHGs. However, China and India also emit alarmingly large amounts. As discussed above, CC is closely linked to energy production and consumption since fossil-fuel usage is the single biggest contributor to GHG emissions (Eckerberg and Forsberg, 1998; Birol, 2011). I often argue that a visible reluctance to protect the world could be explained by the Western-centric ideology that contends that there should be no concern about emitting GHGs because technology is there to protect us from environmental damage. Effective action against CC would reduce industrial productivity, which would in turn lead to job cuts. Therefore technology can face or control the damage that CC may cause (Anderson and Liefferink, 1997). Some critics and analysts (such as Dimitrov, 2010) also say that the failed Copenhagen summit 2009 was the corollary of such an approach.

4. Findings on climate change and economic effect correlates

GHGs are fundamentals to the world's energy system, which implies that they are somewhat benign (Doern and Gattinger, 2004). The production of CO_2 is intrinsic to fossil-fuel combustion. Specifically, thermal energy is generated by breaking the chemical bonds in the carbohydrates contained in oil, coal and natural gas, and oxidising the components to form CO_2 and H_2O. Cheap energy cannot be produced without CO_2 emissions. Similarly, methane (CH_4) emissions are necessary to prevent the build-up of hydrogen in anaerobic digestion and decomposition. Practically, this means beef, mutton, dairy and rice cannot be produced without methane emissions (Tol, 2009). One may ask why we can't stop emitting GHGs. This could put us into a dilemma between stopping GHG production and food production. The fact is that the emission of GHGs is essential for human survival, while being damaging at the same time. In most cases, GHGs come from energy use, which, in turn, is driven largely by economic growth. Therefore the minimisation of GHG emission is the best option.

The above paragraph tends to sum up the fact that, irrespective of the size, all manufacturing companies, farms and households have to emit some GHGs. This is because of the complex interdependences of the natural system, such as weather affecting agriculture, energy use, health and many other aspects of nature, which, in turn, affect everything that is part of

nature. Hence the causes and consequences of CC are very diverse, and those in low-income countries, who contribute least to CC, as mention earlier, are most vulnerable to its effects. CC has appeared as the primary source of all externalities – larger, more complex and less certain than any other environmental problems. The sources of GHG emissions are more diffuse than any other environmental problem.

Why are GHGs so devastating to the world? The reasons are obvious and many. First, GHGs stay in the atmosphere for tens of thousands of years. Second, the quantities being emitted are enormous – for instance, in 2000, CO_2 emissions alone (and excluding land-use change) were 24 billion metric tons (Tol, 2009). More interesting and astonishing is that if all emissions were priced at the January 2009 value of €15/tCO_2 as applied in the Emissions Trading System of the European Union, CO_2 would be worth 1.5 per cent of world income (Tol, 2009; UN, 2012).

As considered earlier, is it, in fact, possible to measure the economic damage that CC can cause? The answer would obviously be no. However, the link between CC and the economic damage could be clarified. The increased costs of damage from storms, hurricanes, typhoons, floods, droughts, and heat waves counteract some early benefits of CC, and the cost could reach 0.5 to 1 per cent of world GDP per annum by the middle of the century. Some examples may dispel Eurocentric ideas that damage caused by climatological whims could be overhauled by the Western countries because they have the necessary resources. Flooding in the United Kingdom may cause losses worth 0.1–0.4 per cent of GDP once the increase in global average temperatures reaches 3 °C or 4 °C (Stern, 2007). The heat wave experienced in 2003 in Europe resulted in 35,000 deaths (although Larsen (2006) claimed the number was 52,000). Agricultural losses reaching $15 billion are directly linked to CC (Römisch, 2009).

'Climate change in India could cause a decline of around 20 million metric tons (25%) in rice production and over 30 million metric tons in wheat (30%) over 2000–2050' (Gerald *et al.*, 2010, p. 41). Clearly, this could create significant population pressure, causing domestic and international migration. For instance, millions of Indians live in areas that are vulnerable to flooding and water stress and, in particular, at least 12 million people in Mumbai alone are subject to flooding (IPCC, 2001).

There is no doubt that there will be an enormous impact of CC on the global economy (Daron, Johnson and Robinson, 2002). The tsunami of 2004, the most tragic and disastrous climatic catastrophe in recent history, has warned as well reminded us about possible losses that may reach an irreparable scale. According to the Asian Disaster Preparedness Centre (ADPC), the economic loss from the 2004 Indian Ocean earthquake and tsunami disaster was around US$10 billion. Three-quarters of the losses were incurred in four countries – namely, Indonesia, Thailand, Sri Lanka and India. Indonesia was the hardest hit in terms of human and physical damage

(ADPC, 2006). These losses were not only about lives but also about the destruction to residential and commercial buildings and infrastructure, and other healthcare facilities.

In those four countries, 'by 2100, the mean cost could reach 2.2 per cent of GDP each year if one considers market impact only, 5.7 per cent of GDP if non-market impacts related to health and ecosystems are included, and 6.7 per cent of GDP if catastrophic risks are also taken into account' (Brömmelhörster, 2009, p. 9).

Not only the loss of human life, homelessness and displacement of populations but also the macroeconomic impact of the disaster has been remarkable. The economic impact has become obvious and also that the poor would become poorer (Ullah, 2012a, 2012b). The large majority of the damage was along the west coast of Sumatra, Indonesia, and the loss was equivalent to approximately US$4.5 billion; and to a lesser extent the countries of India and Sri Lanka were affected (Table 3.2). The economy of the Maldives was severely hit and the loss there amounted to 45 per cent of GDP (Risk Management Solution (RMS), 2006).

4.1 The impact on population displacement

The discourse on whether CC is natural or anthropogenic lies in the following statement made by Zoe Knight (2011):

> Even without climate change, soaring demand for natural resources on the back of demographic growth, economic expansion and the shift in the economic axis towards the emerging world is driving up commodity prices and intensifying resource risks, particularly at the intersection of energy, food and water. (p. 5)

A widespread misconception is that environmental change leads directly to migration. However, that is not the case all of the time. Rather, CC interacts with a range of economic, social and demographic factors (O'Connel, 2003).

Table 3.2 Economic loss caused by climate change

Country	Economic losses ($ million)	Insured losses ($ million)
Indonesia	4,500	500
Thailand	1,000	500
Sri Lanka	1,000	100
India	1,000	100
Maldives	500	50
Other	2,000	50
Total	10,000	1,300

Source: Canada Geological Survey (2006) and Ullah (2012a, 2012b).

This is especially the case when projecting the impact of CC. Population mobility is either a direct or an indirect response to environmental change and it can take many forms. Climate migration, then, may be viewed as a wide array of mobility types and not just displacement. It is seen as only one of the responses among many potential adaptation strategies that populations undertake. Urbanisation in Asia occupies an important space in the debate about CC since the urban population is growing dramatically with a strong coastal concentration. From about 24 per cent of the total in 1970 to 42 per cent in 2007, the population is likely to reach 50 per cent in the next decade (UN, 2012).

5. Discussions

It is relevant to bring minimalist and maximalist thoughts into the discussion in order to see how differently they view CC as a cause for the displacement decision. The migration-environment research literature tends to fall into two extreme categories – namely, (i) 'minimalists', who suggest that the environment is only a contextual factor in migration decisions, and (ii) 'maximalists or naturalists', who claim that the environment causes people to be forced to leave their homes. The maximalists and minimalists have missed out the economic factors. Irrespective of economic and habitat loss, everyone is either directly or indirectly affected. Thus Western centrism is getting weaker, though different states differ among themselves in managing the problem. Ultimately, CC governance and the problems of governance have become prominent in the global governance agenda. As mentioned earlier, minimisation of the impact of CC could be the best option in the present situation. Hence, climate governance merits space in the current discussion.

Climate governance represents significant challenges globally in terms of administrative and political systems of states through which they address this issue. Since the problem of CC is a global one, the UN system should have an active and significant role in addressing this problem. Multilateral environmental agreements (MEAs) are one way to address CC. One example of these is the UN Framework Convention on Climate Change (UNFCCC), 2007). This is a specific convention for dealing with the CC problem that was adopted at the Rio Earth Summit in 1992. Through this convention a legal structure has been formulated to deal with the matter in any future agreement. Also, it has determined the goals that need to be achieved in climate policy (Bernauer and Böhmelt, 2012).

In particular the UNFCCC is responsible for protection and ensuring that anthropogenic interference does not play a damaging role in the global environment. Most important is monitoring the effectiveness of regional and bilateral efforts that were supposed to reduce the volume of GHG emissions (Drexhage and International Institute for Sustainable Development, 2008; Crompton *et al.*, 2011). The UN Watercourses Convention has been

drafted but has not yet entered into force regardless of the critical situation of water on the international political agenda. This is reminiscent of the slow response to attendant problems arising from CC (Gibson *et al.*, 2005). CC governance requires strategic capacity, which can be addressed through leadership, knowledge and provision of expert advice, 'defining the national interest and elaborating a strategic policy framework, and building organisations focused on a low carbon emission economy' (Meadowcroft, 2009, p.12). A need for an external entity that has an 'independent oversight body would oversee a range of national and private registries' (Drexhage and International Institute for Sustainable Development, 2008, p. 4). Far-reaching environmental, social and economic consequences, leading to political instability, increased income disparity, and the loss of biodiversity and habitats occurred, which negatively impacted the whole matter (ITTO-International Tropical Timber Organisation and FAO, 2009). Here is the need for a reform to the policies and legal frameworks (ITTO and FAO, 2009).

There is no denying that a global trend of migration is obviously triggered by CC. On one side there are people who move voluntarily in anticipation of environmental change. On the other side there are people who are forced to flee their homes as a result of environmental disasters (ADB, 2009a, 2009b). Thus this type of migration seems to directly result from CC and takes two major forms, which are 'migration associated with real or perceived direct environmental hazards, and migration associated with real or perceived reduced access and effective use of natural resources, including land, water, soil or biological resources' (ADB, 2009a, p. 9).

It is worth mentioning that CC policies can achieve their goals by being integrated into the development discourse or socioeconomic sectors, such as energy, transportation and industry. Integration implies an attempt to find synergies among different types of goal (Meadowcroft, 2009, p. 17). The mitigation of climate impact is a complex job and it has become more so due to the fact that it is a global feature and that the climate regime lacks centralised enforcement mechanisms (Geels, 2005; Bernauer and Böhmelt, 2012).

A few examples are worth mentioning. On a national level, joint commitments among local governments have emerged. The Nottingham Declaration, which was signed by 200 local authorities in the United Kingdom, is such an example, aiming at meeting specific climatic, culture and economic conditions (Morlot *et al.*, 2009). In order to tackle CC, the president provided a strategic direction for CC governance in the Philippines. He is responsible for directing and guiding all governmental agencies in order to work on their local development plans. Furthermore, these plans will be integrated into a regional form to provide regional development plans. This will require the regional offices of national governments, civil society organisations and provincial executives to be engaged.

The financial and investment elements are significant questions in the domain of CC governance. International efforts are not represented in the

area of investment. These efforts are not institutionalised in order to 'foster the critically needed flows of clean energy investment in developing countries and for helping to ensure that they foster development' (Drexhage and International Institute for Sustainable Development, 2008, p. 4). The reason behind this is that the investment system is not unified but is scattered among many bilateral investment treaties. Essentially, the institutionalisation of CC within the domestic system of governmental organisations would 'effectively create 'champions' for mitigation and adaptation within governments of developing countries' (Drexhage and International Institute for Sustainable Development, 2008, p. 5).

Efforts of CC mitigation can be summarised into two major categories: economic and political factors. For the economic factors, economic growth has complicated effects on pollution. Yet, there is an argument for the benefit of this complex which is that bad environmental conditions usually lead to a better and clean environment. For example, economic growth is associated with updated technologies which are supposed to be environmentally cleaner according to the demand of the public for the sake of the environment (Bernauer and Böhmelt, 2012). In terms of the political system and how it can help in CC mitigation, political systems do have implications in this domain. For instance, democratic systems are excellent providers of good-quality environment-related products.

In an explanation of the measures that can be taken with regard to CC mitigation, these measures can include a requirement to incorporate CC impacts into national and regional planning processes, such as land-use and transport planning. Also, there is a need for periodic reports that highlight adaptation and anticipated long-range adaptation cost on the national and regional levels. In addition, these measures can embrace the establishment of regional and sector-based adaptation forums with key stakeholders to explore impacts; collaboration with the insurance industry to identify vulnerabilities and take remedial action; the integration of climate adaptation into agriculture and natural resource management plans; and the incorporation of adaptation issues into research-funding councils (Meadowcroft, 2009, p. 8). In addition to adaptation, governance of mitigation has specific requirements which are an understanding of the emissions source, cost-effective abatement potentials and policy approaches (Meadowcroft, 2009).

6. Conclusion

To sum up, because of the transnational nature of CC problems, a multi-level approach is needed. This should include states and international actors through the UN system, civil society, the private sector and stakeholders in order to represent economic, political and legal interests and benefits. Several megacities in South Asia, including Dhaka, Kolkata, Mumbai, Chennai and Karachi, are also at high risk of sea-level rise, more frequent

cyclonic activity and greater saltwater intrusion. In Central Asia, widespread salinisation, inefficient water-management practices, land degradation, heat stress, desertification and increasing aridity are crucial issues that impede the social, cultural and economic well-being of local populations, exacerbating vulnerability to CC-induced effects in the local and regional environment.

This chapter concludes by posing some vital questions that merit answers because they have got a lot to do with the heart of the argument addressed here. This indicates that further in-depth research is necessary to ascertain the scale of potential damage which CC may cause to human life and livelihoods, and in human displacement. What particular environmental force has the potential to cause the most severe human displacement? Have researchers and policy-makers reached a consensus about the conceptualisation of the relationship between migration and the environment? What tools are available to measure the scale of migration caused by CC? How many more people are likely to migrate in the future? Since this chapter grasps the climatic and displacement issues in Asia, it would be an oversight if two giant economies of the region were not touched upon. China and India are among the largest GHG producers in the world. However, in the matter of compliance, China has recently declared its plan to reduce its GHG emissions while maintaining growth at the same pace as before. This means that it is aiming for energy-efficient production and introducing new technology into the production sector. Meanwhile, India has no such plans so far but the government has to comply with major accords and has agreed to reduce the emissions.

Abbreviations

ADPC	Asian Disaster Preparedness Centre
CC	climate change
CCVI	Climate Change Vulnerability Index
FAO	Food and Agriculture Organisation of the UN
GDP	gross domestic product
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
ITTO	International Tropical Timber Organisation
MEA	multilateral environmental agreements
UNESCO	UN Educational, Scientific and Cultural Organisation
UNFCCC	UN Framework Convention on Climate Change

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