

# Who takes responsibility for the climate refugees?

Responsibility  
for the climate  
refugees

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Received 4 October 2016  
Revised 17 November 2016  
Accepted 10 January 2017

## Abstract

**Purpose** – “No climate change, no climate refugees”. On the basis of this theme, this paper aims to propose a method for undertaking the responsibility for climate refugees literally uprooted by liable climate polluting countries. It also considers the historical past, culture, geopolitics, imposed wars, economic oppression and fragile governance to understand the holistic scenario of vulnerability to climate change.

**Design/methodology/approach** – This paper is organized around three distinct aspects of dealing with extreme climatic events – vulnerability as part of making the preparedness and response process fragile (past), climate change as a hazard driver (present) and rehabilitating the climate refugees (future). Bangladesh is used as an example that represents a top victim country to climatic extreme events from many countries with similar baseline characteristics. The top 20 countries accounting for approximately 82 per cent of the total global carbon dioxide (CO<sub>2</sub>) emissions are considered for model development by analysing the parameters – per capita CO<sub>2</sub> emissions, ecological footprint, gross national income and human development index.

**Findings** – Results suggest that under present circumstances, Australia and the USA each should take responsibility of 10 per cent each of the overall global share of climate refugees, followed by Canada and Saudi Arabia (9 per cent each), South Korea (7 per cent) and Russia, Germany and Japan (6 per cent each). As there is no international convention for protecting climate refugees yet, the victims either end up in detention camps or are refused shelter in safer places or countries. There is a dire need to address the climate refugee crisis as these people face greater political risks.

**Originality/value** – This paper provides a critical overview of accommodating the climate refugees (those who have no means for bouncing back) by the liable countries. It proposes an innovative method by considering the status of climate pollution, resource consumption, economy and human development rankings to address the problem by bringing humanitarian justice to the ultimate climate refugees.

**Keywords** Displacement, Climate change, Migration, CO<sub>2</sub>, Climate justice, Climate refugee

**Paper type** Conceptual paper



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Bayes Ahmed is a Commonwealth Scholar funded by the UK Government. The author thanks Gillian Dacey for proofreading this manuscript, and specially thanks the two anonymous reviewers and the editors for their constructive comments.

International Journal of Climate  
Change Strategies and  
Management  
Vol. 10 No. 1, 2018  
pp. 5-26  
Emerald Publishing Limited  
1756-8692  
DOI 10.1108/IJCCSM-10-2016-0149

## 1. Introduction

The International Federation of the Red Cross estimates that there are more environmental refugees than political refugees trying to avoid wars and conflicts (IFRC, 2009). The United Nations High Commissioner for Refugees (UNHCR) confirmed that around 36 million people were displaced by natural hazard related disasters in 2009, and the number will increase to at least 50 million by 2050 (UNHCR, 2016). The [Sendai Framework for Disaster Risk Reduction \(2015-2030\)](#) (2015) stated that more than 1.5 billion people were affected by disasters worldwide from 2005 to 2015. In addition, around 144 million people were displaced by disasters in between 2008 and 2014, and many of them were exacerbated by climate change with increasing frequency and intensity. Climate change and associated incremental level of extreme climatic disasters are now being widely accepted as a threat for mankind (Hulme, 2016; IPCC, 2014). It is also acknowledged that communities in vulnerable regions are already facing limits in their capacity to adapt with those incremental climatic disasters (Dow *et al.*, 2013). The Intergovernmental Panel on Climate Change (IPCC) has identified the emissions of carbon dioxide (CO<sub>2</sub>) as one of the most dominant factors for global warming and consequently causing climate change (IPCC, 2014). In particular, CO<sub>2</sub> emissions from cities are considered the single largest human contribution to climate change (Duren and Miller, 2012). On an interesting note, as per the World Bank database 2014, only 10 countries emit 69 per cent of the world's total of CO<sub>2</sub>, whereas 20 countries are responsible for producing 82 per cent of world's total CO<sub>2</sub> emissions (Table I).

Country	Total carbon dioxide (CO <sub>2</sub> ) emissions in 1,000 metric tons		
	2011	Country	1990
China	9,019,518	USA	4,823,557
USA	5,305,570	China	2,460,744
India	2,074,345	Russian Federation	2,081,840
Russian Federation	1,808,073	Japan	1,094,288
Japan	1,187,657	Germany	929,973
Germany	729,458	India	690,577
Korea, Rep	589,426	Ukraine	641,681
Iran, Islamic Rep	586,599	United Kingdom	555,903
Indonesia	563,985	Canada	435,181
Saudi Arabia	520,278	Italy	417,550
<i>Top 10 Country Total</i>	<i>22,384,909</i>	<i>Top 10 Country Total</i>	<i>14,131,294</i>
<i>World Total</i>	<i>32,407,893</i>	<i>World Total</i>	<i>20,649,856</i>
<i>Top 10 Contribution</i>	<i>69%</i>	<i>Top 10 Contribution</i>	<i>68%</i>
Canada	485,463	France	375,633
South Africa	477,242	Poland	368,398
Mexico	466,549	South Africa	319,795
United Kingdom	448,236	Mexico	314,291
Brazil	439,413	Australia	263,848
Italy	397,994	Kazakhstan	261,307
Australia	369,040	Korea, Rep	246,943
France	338,805	Spain	218,597
Turkey	320,840	Saudi Arabia	217,948
Poland	317,287	Iran, Islamic Rep	211,135
<i>Top 20 Country Total</i>	<i>26,445,778</i>	<i>Top 20 Country Total</i>	<i>16,929,189</i>
<i>World Total</i>	<i>32,407,893</i>	<i>World Total</i>	<i>20,649,856</i>
<i>Top 20 Contribution</i>	<i>82%</i>	<i>Top 20 Contribution</i>	<i>82%</i>

**Table I.**  
List of countries  
producing most CO<sub>2</sub>

Source: The World Bank (2014)

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On the contrary, Bangladesh is one of the greatest victims of climate change and is repeatedly being struck by disasters associated with climatic events. For instance, about half of the population in Bangladesh lives less than 5 meters above the mean sea level. It is predicted that Bangladesh will lose 17 per cent of its land by 2050 due to flooding caused by climate change, and this will trigger around 20 million climate refugees (Mallick and Vogt, 2012; National Geographic Society, 2016). Considering that 161 million people live within areas with a population density of 1,240 people per sq. km. of land area and the risk factors, Bangladesh is ranked as the world's sixth most disaster prone country (UNU-EHS, 2015). Most notably, the 1970 great Cyclone Bhola caused 300,000 casualties; Cyclone Sidr in 2007 caused 3,406 fatalities with 2.3 million households damaged; Cyclone Aila in 2009 caused 234 deaths; and the 1998 flood submerged about two-thirds of Bangladesh (Huq, 2016; Ahmed *et al.*, 2016; Mallick, 2014). Although Bangladesh is ranked as 162 out of 199 countries listed by The World Bank (2014) in terms of producing CO<sub>2</sub>, the impacts of climate change are catastrophic in Bangladesh. Some major climatic facts about Bangladesh are as follows:

- Bangladesh will be among the most affected countries in South Asia by an expected 2°C rise in the world's average temperatures in the next decades, with rising sea levels and more extreme heat and more intense cyclones threatening food production, livelihoods and infrastructure as well as slowing the reduction on poverty (The World Bank Group, 2013).
- Around 34 million people will be affected and 22,000 sq. km. land area will be inundated by 150 cm of sea level rise that will occur in about 150 years or even earlier (UNEP, 2014).
- The extreme climatic events are responsible for migration and conflict in Bangladesh. This migration would be enough to cause conflict in today's tumultuous environment in South Asia, add a few hundred million people to the mix, and it will be a ticking time bomb (Litchfield, 2010).

In this article, Bangladesh is used as a case study. Bangladesh has been severely affected by climate change in recent decades, and it represents centuries of deprivation as a result of colonization, imposed war, economic repression and fragile governance that are considered as the root causes of vulnerability (Wisner *et al.*, 2004; Lewis, 1999). The National Aeronautics and Space Administration (NASA) confirmed that the global level of CO<sub>2</sub> has passed 400 parts per million (PPM) for the first time (that is the point of no return) because of industrialization and fossil fuel burning, whereas the safe level of CO<sub>2</sub> in the atmosphere is 350 PPM (NASA, 2013). This will worsen the impacts of climate change in present world and generations to come; and ultimately will trigger climate refugees. Therefore, it is high time to address these issues and develop a framework for taking the responsibilities by the liable countries in a common global platform.

Climate change alters habitats and disrupts ecosystems. Displacement due to climate change is also common in other species including mammals, birds and amphibians. It was found that about 3,000 species were forced to move for survival in response to climate change (Lawler *et al.*, 2013). Similarly, humans are also subject to migration following the impacts of climate change that have impacted on their livelihoods, homestead or family members. Interestingly, uprooted mammals, birds, fish and amphibians due to climate change are free to relocate or move anywhere, however humans are not. Biermann and Boas (2010) suggested five principles to address the climate refugee problems:

- (1) planned relocation and resettlement;
- (2) resettlement instead of temporary asylum;
- (3) collective rights for local populations;
- (4) international assistance for domestic measures; and
- (5) international burden sharing.

There is also an urge to recognize climate refugees in international law and develop a convention for them. In reality, the liable countries are mistreating climate refugees in the absence of a formal recognition system (UNHCR, 2016).

In contrast, the aim of this concept paper is to develop a method for taking responsibility of climate refugees by the top climate polluting countries. In this article, climate refugees are defined as “people who must leave their homes and communities because of the effects of climate change and global warming” (National Geographic Society, 2016). This paper also takes into account the history of oppression that made Bangladesh socio-economically vulnerable to tackle upcoming disasters by hindering the preparation of emergency management plans and disaster risk reduction (DRR) strategies. For example, Hurricane Matthew, which struck Haiti in October 2016, killed at least 1,000 people, displaced 175,000 people, affected 894,057 children, placed 80,600 people at the extreme level of food insecurity, resulted in 5,840 suspected cholera cases (until 5 November 2016) and affected approximately 2.1 million people. The same intensity hurricane caused much less damage in the USA (OCHA, 2016), a country that has much better emergency management, warning and evacuation plans as compared to Haiti. Hence, the question – “Why is Haiti lacking DRR plans?” It is obviously related to past oppressions by various colonisations and wars that made Haiti a vulnerable country to address the disasters. It proves that the historical past, geopolitics, uninvited wars, economic repression, governance, external forces and cultural aspects are vital in analysing vulnerability and its relation to disasters (Wisner *et al.*, 2004; Alexander, 2000; Hewitt, 1983; Lewis, 1999; O’Keefe *et al.*, 1976; Kru $\ddot{u}$ ger *et al.*, 2015).

## 2. Theoretical framework

### 2.1 *Who consumes the planet’s resources?*

With increasing human activities, the consumption of resources and production of wastes are increasing simultaneously. The ecological footprint helps to calculate human pressure on the planet. The consumption pattern of the earth’s resources on a world map reveals that the citizens from the most industrialized countries are consuming more, and the least developed countries have less impact on the planet. The bio-capacity per person on earth is currently 1.7 global hectares, which should be equal to the world’s ecological footprint. Bangladeshi citizens use almost 50 per cent less resources than the planet’s average. On the contrary, a total of approximately 5.5 planets would be required to fulfil the Australian citizens’ resource needs (Global Footprint Network, 2016). In other words, if everyone lived the lifestyle of an average UK standard, then three additional planets would be needed. Hence, it has to be asked – “How is it possible that the citizens of industrialized countries are surviving? Where are they getting the additional resources from? Are they doing any harm to planet earth? Who is going to suffer ultimately?”

### 2.2 *Who causes climate change?*

Over the past century, a sharp increase has been observed for the global average of combined land and ocean surface temperature, greenhouse gas (GHG) concentrations (including CO<sub>2</sub>, methane and nitrous oxide) and for global anthropogenic CO<sub>2</sub> emissions

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mostly from the burning of fossil fuels, cement and flaring. Some key points from the Fifth Assessment Report of the IPCC are as follows (IPCC, 2014):

- Human influence on the climate system is clear, and recent anthropogenic emissions of GHGs are the highest in history (2000-2010) (p. 2).
- An increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events are evident in a number of regions (e.g. all these events are already distinct in Bangladesh) (p. 7).
- Continued emissions of GHGs will cause further warming and it would cause increasing likelihood of severe and irreversible impacts on people and ecosystems (p. 8). Climate change will amplify existing risks and create new risks (p. 13).
- The global mean surface temperature change for the end of the twenty-first century (2081-2100) is projected to likely exceed 1.5°C to 2°C, extreme precipitation events over the wet tropical regions will very likely become more intense and more frequent, the global ocean will continue to warm and the sea level will continue to rise at the rate of 8-16 mm/year (pp. 60-62).
- About 70 per cent of the coastlines worldwide are projected to experience significant increase in sea level rise (p. 62), and this applies to the coastlines of Bangladesh.

Despite a number of mitigation policies undertaken, it is clear that the negative impacts of climate change are mounting alarmingly (Kelman, 2010). It is mentioned “climate change can make some hazards worse, for example, tropical cyclones seem to be decreasing in frequency but increasing in intensity due to climate change” (Kelman, 2016). This kind of less frequent cyclone with higher intensity has the greatest potential to initiate catastrophic disasters. It is also obvious that:

[. . .] coastal Bangladesh will be seriously affected by climate change over the next decades, with elevated air and sea temperatures, sea-level rise and more intense cyclones all threatening livelihoods and lives (Ahmed *et al.*, 2016; Brammer, 2014).

To tackle the negative impacts of climate change on local communities and vulnerable groups (including the coastal communities, small island states, women, youth, indigenous people, poor people, disabled and the elderly), the “Climate Justice” initiative brought some hope. The climate justice concept with a formal framework first came into light at the United Nations World Summit on Sustainable Development in Bali in June 2002. The 27 principles of climate justice were developed by a coalition at the summit (CorpWatch, 2002). It added:

[. . .] the biggest injustice of climate change is that the hardest hit are the least responsible for contributing to the problem, and climate change is being caused primarily by the industrialized and transnational corporations (CorpWatch, 2002; Before the flood, 2016).

The principles highlighted on getting rid of climate change impacts, reducing the GHGs, influence of the transitional corporations on decision-making, lack of liability of the fossil fuel and extractive industries and arranging compensation for the climate victims. It also calls for a ban on new fossil fuel, nuclear power and large hydro schemes exploitation. Instead, generating sustainable energy resources, increasing the need for women’s rights, promoting relevant education, consuming resources sensibly and creating a healthy planet for the future generations are required (CorpWatch, 2002). Principles 7, 8 and 9 of the document call for the recognition of an ecological debt that the industrialized governments and transitional corporations owe the rest of the world, identifies them liable for all past and current life-cycle impacts and affirms the rights of the climate change victims and

associated injustices to receive full compensation, restoration and reparation of loss of land, livelihood and other damages (CorpWatch, 2002; Goodman, 2009). This conveys the idea of bringing justice to the ultimate climate victims – the climate refugees. One central theme of climate justice is taking responsibility of the climate refugees by the polluting countries, and rehabilitating them properly (Okereke, 2010). This is the core concept of this paper, based on the principles of climate justice.

### *2.3 Impacts of climate change in Bangladesh*

Bangladesh is one of the countries in the world worst hit by climate change. Due to the changes in rainfall and temperature pattern, hydro-meteorological disasters are becoming more frequent in Bangladesh, e.g. cyclones, tidal surges, flooding, sea level rise, coastal and riverbank erosion, ground and surface water scarcity, salinity intrusion, drought, heat stress and rainfall induced landslides and flash flooding. The climate induced extreme weather events and associated disasters are causing problems such as land soil degradation, loss of crops and agricultural productivity, food insecurity, water borne diseases, threatening livelihoods, gender inequality, stress on human health, human displacement and migration, social instability, unemployment, poverty and ultimately triggering conflicts (Ahmed *et al.*, 2016; McPherson, 2015; Shamsudduha, 2013; Watts *et al.*, 2015).

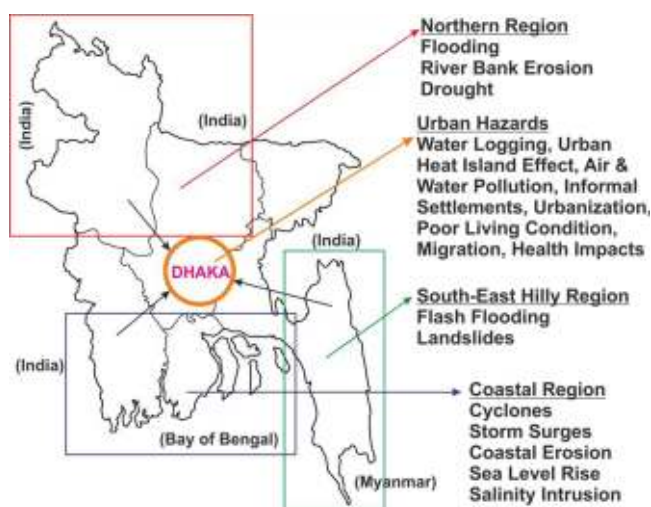
For example, hundreds of villages and several districts were severely affected by flooding in Bangladesh in July 2016. The disastrous situation lasted for few months, and approximately 4 million people were stranded by floodwater, losing their houses and crops. As a result, they were forced to leave their homesteads and take temporary shelter in nearby highlands (in highways), where they live under appalling conditions, with serious threats from road traffic accidents and other health hazards. They have lost their livelihoods, schools are closed, their houses are destroyed and many are without hope. It will likely take these refugees some months to recover even partially from these shocks; and by the time they are settled-down, it appears that another similar intense-disaster is knocking at the door. On the other hand, the tropical cyclones and associated tidal surges are usual in the coastal region (with approximately 580 km of coastline) of Bangladesh that has nearly 28 million people with an average density of 853 people per sq. km. The magnitudes of increasing global warming are causing serious problems to the coastal communities (Ahmed *et al.*, 2016; Mallick *et al.*, 2017) by triggering frequent tropical cyclones and coastal area inundation. Almost every year, the coastal communities or the coastal rural villages are washed out by cyclones. Most recently, monsoon rains have triggered flooding across 19 districts (out of 64) in north-eastern Bangladesh and killed at least 120 people as of 21 August 2017. Hundreds of villages are now under water and at least 50 million people are seriously affected. Again, deadly landslides triggered by torrential monsoon rains in south-eastern Bangladesh are estimated to have claimed at least 160 lives in June 2017. This landslide disaster occurred just two weeks after the Cyclone Mora killed 9 people and caused significant damages in the coastal belt of Bangladesh (ReliefWeb, 2017). Thus, river flooding, flash flooding, landslides, storm surges and cyclones devastate at least one-third of Bangladesh each year. Climate change impacts have the potential to exacerbate this catastrophic hydro-meteorological disaster scenario in Bangladesh.

It is estimated that around 6 million people were either seriously affected or displaced by the climate-induced disasters in Bangladesh in recent years (UNU-EHS, 2015). The displaced population from the disaster hit areas or the climate refugees were forced to leave their homes, migrate to urban areas and end up living in slums that are highly exposed to other hazards like flooding and water pollution (Martin *et al.*, 2012). The major cities in Bangladesh are getting bigger due to this excessive in-migration and population pressure,

and are expanding rapidly. This is causing unplanned urbanization, degrading the natural vegetation and water bodies. The largest cities are now highly vulnerable to urban life problems like waterlogging, flash flooding, encroachment of floodplain areas, development of informal settlements, urban heat islands, urban landslides, traffic jams, air and water pollution and scarcity of drinking water, even as the city dwellers lack other city life facilities (Ahmed and Dewan, 2017; Alam and Mullick, 2014; Ahmed, 2015; Ahmed *et al.*, 2013). All these problems are evident in Dhaka city, the capital of Bangladesh. As a result, Dhaka was ranked as one of the worst liveable cities in the world in previous consecutive years (Ahmed and Ahmed, 2012; McPherson, 2015). Hence, extreme climate disasters in the rural parts of the country are indirectly making the major urban agglomerations highly vulnerable to urban disasters (Figure 1).

#### 2.4 The forgotten past

Today, Bangladesh is listed as one of the least developed countries in the world. The Gross National Income (GNI) per capita of Bangladesh is only US\$1,190, as compared to US\$60,100 for Australia in 2015 (World Bank, 2016). No country becomes poor and vulnerable in a day; and in the case of Bangladesh, it was a result of centuries-long history of invasion, colonization, unwanted and imposed wars and systematic oppression, thus forcing the people to become socio-economically vulnerable. Historical states/dynasties (currently part of modern countries) that invaded Bengal between 600 AD and 1800 AD can be listed as follows: 610-625 Kannauj (India), 740 Kannauj (India), 741-750 Kashmir (India/Pakistan/China), 780-790 Tibet (China/India/Bhutan), 840-850 Gurjar Dynasty (India), 891-915 Gurjar Dynasty (India), 1020-1081 Chola Dynasty (India), 1203-1338 Delhi Sultanate (India), 1212-1264 Kalinga (India), 1353-1355 Delhi Sultanate (India), 1358-1359 Delhi Sultanate (India), 1528-1666 Portuguese Empire, 1539-1555 Shuri Dynasty (India), 1576-1711 Mughal Dynasty (India), 1610 Dutch Empire, 1690 British Empire, 1692 French Empire, 1757 British Empire, 1763 Dutch Empire and so on (Stewart, 1813; Majumdar and Sarkar, 1943; Majumdar, 1977).



Source: Bayes Ahmed, February 2017

Figure 1.  
The frequently hit  
major climate  
induced disaster  
prone areas of  
Bangladesh

Most notably, Bangladesh as part of the Indian subcontinent, suffered approximately 200 years of British subjugation (including 100 years of East Indian Company's military dominance) from 1757 to 1947. Out of thousands of problems triggered by the British Empire, the most significant one was the Great Bengal Famine (1769-1773) that caused at least 10 million deaths and the population of Bengal was declined by a third. As mentioned by Sir William Wilson Hunter in his book, *The Annals of Rural Bengal* in 1897, "In the cold weather of the 1769, Bengal was visited by a famine whose ravages two generation failed to repair" (Hunter, 1897, p. 19). During the British colonization era, most of the disasters were man-made. For example, back in the 1770s, the indigo planting (also known as capitalist plantations) became commercially profitable because of its demand for blue-dye in Europe. Hence, Bengal peasants were forced to cultivate indigo by the British indigo planters, instead of food crops. It caused the peasants to become landless, and subsequently severe food crises emerged as the lands became arid and the profits all went to England. Following the Indigo Revolt of Bengal, the Indigo Commission was formed in 1860 to inquire into the grievances. The commission chairman described it as - "a system of bloodshed", and confessed "not a chest of indigo reached England without being stained with human blood" (Bhattacharya, 1977). Disputes like these were followed by the great famines of 1866 (claimed 135,000 lives), 1876-1878 (5.5 million people died), the Indian famine of 1896-1902 (19 million) and other famines (Currey, 1979). Lastly, the Bengal Famine of 1943 caused at least 1-3 million deaths, which was mentioned as "possibly the biggest famine in the last hundred years" (Sen, 1977). Interestingly, the then British Prime Minister Sir Winston Churchill said, "Britain could not spare the ships to transport emergency supplies" and he is still blamed for allowing more than a million deaths due to starvation. Today, it is well accepted that "the British Empire was based on the exploitation, murder and devastation of people across the globe" (Andrews, 2016).

India's (Bangladesh was a part of it) global share of economy dropped to 4 from 23 per cent during the British Colonization (Tharoor, 2016). After the partition in 1947, Bangladesh faced 24 years of economic oppression by West Pakistan that ended after nine months of a bloody liberation war with 3 million deaths in 1971 (Liberation War Museum, 2016). Just before the liberation, on 12 November 1970, the coastal area of Bangladesh was struck by a devastating cyclone killing at least 300,000 people (Huq, 2016). The freshly liberated country was then war-torn and suffering from an acute economic crisis with no preparations to tackle the disasters. Later, the country faced another famine in 1974 that caused the loss of 27,000 lives (Currey, 1979). Floods and droughts along with the long-lasting unwilling wars, geopolitical unrest and questionable governance were the root causes of these famines, cyclones and flooding disasters in Bangladesh. At present, there is no war in Bangladesh, and the country is addressing similar disasters seamlessly, but the impacts of climate change are striking the country's territory in a much more brutal way, putting the local communities in a miserable situation with reduced adaptation capability. Though Bangladesh has now managed to get rid of the foreign invasions, the extreme climatic events and associated incremental disasters due to external forces like climate change are now compared to modern day colonization as it is damaging the national economy and livelihoods.

### *2.5 Rising from the ashes*

The combination of 315 years of British enslavement and Pakistani Army Dictatorship left the Bangladeshi people with nothing to fight the imposed poverty (Tharoor, 2016). In the last few decades, Bangladesh has moved forward quite progressively. The country's life expectancy at birth has increased to 72 years in 2014 (82 years for Australia in 2014) from



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only 46 years, back in 1960. In Bangladesh, the gross enrolment at primary school, for both sexes, was only 55 per cent in 1970, but that has increased to 112 per cent in 2011 (The World Bank, 2016), surpassing most of the developed countries (in Australia 106 per cent, and in the USA 100 per cent).

Over the past few decades, Bangladesh has also achieved remarkable progress in public health and the empowerment of women. According to Amartya Sen:

[...] it is important to understand how a country that was extremely poor a few decades ago, and is still very poor, can make such remarkable accomplishments particularly in the field of health, but also in social transformation in general (Sen, 2013).

Numerous government programmes, the poverty alleviation initiatives undertaken by the world's largest non-governmental organization (NGO) originated in Bangladesh – BRAC – and the micro-credit revolution by the Grameen Bank (bank for the poor) made it possible to achieve these goals in a relatively short time. As the founder of Grameen Bank, Professor Muhammad Yunus first introduced lending micro-credits to rural women without any financial security to fight poverty. It helped them get access to credit, ushered women empowerment and reduced poverty – for which Muhammad Yunus was awarded the Noble Peace Prize in 2006, the first Bangladeshi to achieve this prestigious award. His pioneer initiative, the “Social Business” concept, is also helping in eradicating unemployment from Bangladesh (Yunus, 2003).

In recent times, Bangladesh has also managed to reduce the drought-related food crisis as farmers are growing four varieties of crops in a year. This magical “four crop rotation” has partially solved the famine problems in the high areas of the country's north. Hence, Bangladesh has progressed with ensuring food security more than ever before (Seraj, 2016). Bangladesh has also progressed substantially in addressing disaster risk reduction in the coastal region. For example, most recently during Cyclone Roanu, which hit the coast of Bangladesh on 22 May 2016, around 26 people died. In 1970 and 1991, cyclones of similar strengths killed around 300,000 and 100,000 people respectively. This reduction in deaths has been possible because of the initiatives undertaken by the government, such as constructing embankments and cyclone shelters in the coastal areas, developing reliable early warning systems, training the local communities to tackle the disasters and creating alternative livelihood options (Ahmed *et al.*, 2016). Despite bitter experiences in the past, Bangladesh is progressing well, with a vision to eradicate poverty by 2021. But the unexpected and enforced global-warming-related extreme climatic events are hindering the country's sustainable development progress. At present, the increasing number of climate-change-related disasters is causing more problems than ever (Afsar, 2003; Dasgupta *et al.*, 2009, 2016). This issue needs to be addressed seriously to ensure the pace of improvement works accomplished by Bangladesh in recent decades is maintained, and for ensuring a sustainable development.

### 2.6 Combating climate change

The 21st session of the Conference of the Parties (COP21) was held in Paris, France from 30 November to 12 December 2015. At COP21, parties to the United Nations Framework Convention on Climate Change (UNFCCC) reached a historic agreement to address the climate change issues. The agreement highlights in keeping the rise in global temperature below 2° C (even though this rise in temperature could potentially inundate the coastal region of Bangladesh), taking action plans to reduce GHGs, raising US\$100bn (in loans and donations) each year from 2020 to finance projects that enable vulnerable countries to adapt with the impacts of climate change (such as a rise in sea level or droughts), establishing an

obligation for the industrialized countries to fund through the climate finance for the victim countries and finally this agreement will enter into force once it is ratified by the 55 countries, representing at least 55 per cent of emissions (UNFCCC, 2016). Most importantly, on 3 September 2016, the USA and China, together responsible for 40 per cent of the world's carbon emissions, both formally joined the agreement. The Paris Agreement came into force on 4 November 2016, and as of 21 August 2017 160 parties out of 197 have ratified the convention. Unfortunately, on June 1, 2017 the USA announced that it would cease all participation in the 2015 Paris Agreement. It proves the progress towards a global consensus to combat climate change is under serious threats. The future is lying ultimately on how the parties will deal with the issues like international political strategies, carbon emissions cut, climate finance, addressing the climate refugees and helping the affected countries (UNFCCC, 2016). For instance, on 18 January 2016, Oxfam Great Britain published a briefing paper titled – “An Economy for the 1 per cent” that calculated (Hardoon *et al.*, 2016, p. 2):

- Just 62 individuals (down from 388 individuals in 2010) had the same wealth as the bottom half of humanity.
- Since 2010, the wealth of the richest 62 people has increased by 45 per cent; and the wealth of the bottom half dropped by 38 per cent.

This squeezing trend of global economy is horrifying, and it indicates that the rich are getting richer and poor are becoming poorer; and the world's net wealth is being concentrated. Professor Muhammad Yunus had pointed out this problem and asked for a review of the world's current economic system. This is an example of how the current global economic system can make other countries economically vulnerable. In addition to this, over exploitation of resources and, thus, emissions of CO<sub>2</sub> by the industrialized countries trigger climate change. The IPCC as part of its future pathways for adaptation, mitigation and sustainable development has clearly signposted that, “adaptation can reduce the risks of climate change impacts, but there are limits to its effectiveness, especially with greater magnitudes and rates of climate change” (IPCC, 2014, p. 79). This scenario applies to Bangladesh, and the country is now seeing an overwhelming increase in the number of climate refugees than previously recorded. It is becoming impossible for the climate victims to return to their normal livelihoods in the disaster affected areas (Siddiqui *et al.*, 2014). The biggest challenges in the upcoming years to combat climate change and implement effective initiatives like the COP21 agreement include the global monopoly of the economic system, and the negligence by a major portion of politicians and corporations (Johnston, 2016). Figure 2 depicts how Bangladesh (a victim country for an example) became socio-economically vulnerable after centuries of inflicted wars and tyranny by the developed world, and how Bangladesh is now facing discriminating problems because of the climate-change-induced extreme events that are externally being triggered by the same developed world. This vicious cycle of oppression, disaster and poverty is hindering the overall sustainable development and DRR progress in Bangladesh.

### *2.7 Addressing climate refugees and climate migration*

It is projected that over the next 40 years (from 2011 to 2050), around 16 to 26 million people are likely to migrate long-term from areas affected by inland flooding, storm surges and riverbank erosion in Bangladesh. Among them, a significant portion would migrate solely due to climate change, and the remaining, due to the current context of climatic disasters, economic needs and population growth. These figures are expected to be even larger considering the shorter term and circular migration (Siddiqui *et al.*, 2013). It proves



Source: Bayes Ahmed, March 2017

**Figure 2.**  
The pathways to  
achieve sustainable  
development goals by  
addressing the  
climate change  
impacts in  
Bangladesh

population movement or migration due to extreme climatic events in Bangladesh is becoming evident. Every year millions of Bangladeshi migrate both internally and internationally for various reasons. Many of those climate extreme displaced people later convert as labour migrants and move internationally. The labour migrants contribute significantly to the national economy by sending remittances that are higher than direct foreign investment (Siddiqui 2010). Traditionally, migration is treated with fear, but the Refugee and Migratory Movements Research Unit (RMMRU) at University of Dhaka has suggested that migration should be considered one of the climate change adaptation techniques (Siddiqui, 2010). RMMRU found that a major section of people move from rural to urban areas due to environmental or climatic stresses. Such migration should not be treated as a failure to adapt locally; rather, it should be well accepted as a survival strategy (Siddiqui *et al.*, 2014).

Recent estimates suggest that by 2050, one in every 45 people in the world (Brown, 2008) and one in every 7 people in Bangladesh will be displaced by climate change (CDMP II, 2014). In the context of Bangladesh, climate refugees are those who have lost their homestead, arable land or livelihoods in the rural settings after extreme climatic disasters. In most cases, climate refugees internally migrate to urban areas in search of livelihoods and living. In the long run, they convert to economic migrants, and many of them travel to foreign countries as labour migrants. As climate-induced displacement is evident at the national and international levels, climate migration should be treated with respect under the present global warming and climate change context. Climate refugees should also be entitled to democratic accountability, ecological sustainability and social justice (CorpWatch, 2002). In 2015, the Government of Bangladesh developed a “National Strategy on the Management of Disaster and Climate-Induced Internal Displacement (NSMDCIID)” to address the multiple human rights challenges faced by the migrating people in the aftermath of climatic disasters (NSMDCIID, 2015). This is a great achievement in terms of recognizing the climate refugees and climate migration in Bangladesh, although it only concentrates on internally

displaced or migrated population caused by climatic hazards. This should be considered the first milestone, but there is still a need to develop such formal strategies through international consensus to share the burden and responsibilities of climate refugees by the top climate polluting countries (Table I).

**3. Methodology**

The primary aim of this paper is to propose a model for resettling climate refugees in the liable countries that are producing most CO<sub>2</sub> and thus polluting the climate. There is an international convention (i.e. 1951 Refugee Convention) for a refugee who has been forced to flee her or his country because of armed conflict or prosecution (UNHCR, 2016). Yet, there is no international convention for the climate and associated economic refugees (Biermann and Boas, 2010). Hence, climate refugees face greater political risks than refugees who flee their homes due to conflict or political oppression (National Geographic Society, 2016). Climate refugees have no place to go and ultimately end-up in refugee detention camps (Warner, 2010). The 44th US President Barack Obama was highly concerned about the increase of extreme climatic events due to climate change, and the consequent influx of the huge number of climate refugees is being considered as a serious threat to US national security (Before the Flood, 2016).

In a world of “polluters pay”, it is the liable countries that need to take responsibility for climate refugees. It is also well accepted that achieving resilience is the possible solution to address these problems, but resilience is a multi-scale agenda (Ahmed et al., 2016). Resilience varies from global to individual level. For example, since the great Bhola cyclone in 1970, vulnerable communities in Bangladesh have learned how to cope with the changing climate and frequent natural hazards like flooding, cyclones and drought. To tackle the catastrophic problems numerous international and national organizations are also working at local level (Table II). Now the country has emergency management and contingency plans at community level, many of the community people are trained and they have alternative

Resilience Level	Parameters of judgement	Progress
Global	Reducing global warming, addressing climate change impacts, climate refugee settlement, carbon tax, climate justice, and climate finance etc	✗
Regional		
Organizations	IPCC, UNFCC, UN, UNEP, UNISDR, OEDC, ILO, Internal Displacement Monitoring Centre (IDMC), WMO, IFRC, COP21, etc	✓
National Government	Ministry of Disaster Management and Relief, Bangladesh climate change resilience fund, Department of Disaster Management, Refugee and Migratory Movements Research Unit, NSMDCIID, Bangladesh Climate Change Strategy and Action Plan, National Task Force on Displacement and relevant DRR projects	✓
Local Government	NGOs, emergency plans, effective early warning and response system, local volunteers	✓
Community	Resilience characteristics: connectivity, cohesion, infrastructure, opportunities, managing natural assets, available services and healthy	✓
Household	Destroyed houses, lost livelihoods, long term recovery plans	✗
Individual	Unemployed, displaced, short term recovery and migration plans	✗

**Table II.**  
Progress of achieving resilience at various levels to address climate change

Source: Modified from Ahmed et al. (2016)

livelihood options (Ahmed *et al.*, 2016). In contrast, there remains no international recognition for climate refugees and climate financing. Consequently, due to the mismanagement at global and regional stages, the overall resilience process is being hampered at household to individual level in Bangladesh (Table II).

On the basis of the above discussions, a total mismanagement is apparent in achieving global level resilience, which results in the need for the development of an action plan for addressing problems associated with climate refugees (Platje and Kampen, 2016). Amnesty International estimates that climatic extreme events will increase the number of people on the move across borders. They will meet the legal definition of refugees, and the most responsible countries for climate change should support them (Carvalho, 2015). A climate refugee settlement action plan should be added as part of future climate action initiatives similar to the carbon tax and climate finance (Before the Flood, 2016). On human rights grounds, there is a need for resettling climate refugees in the liable countries. That results in the question – “Who will take what proportion of the climate refugees?” The proposed method considers the top climate polluting countries (Table I). For the purpose of model development, the affected countries are all termed as “VICTIM” (the parameter values were chosen for Bangladesh as a case study). On the basis of the data availability, the model can incorporate all other victim or affected countries.

Four parameters were identified as relevant for constructing the climate refugee settlement model: per capita CO<sub>2</sub> emissions (2011), per capita GNI (2015), human development index (HDI) 2014 and per capita planet’s resource consumption. It has already been discussed that the countries responsible for climate change are producing more CO<sub>2</sub>, are consuming more resources (Pearson’s  $r = 0.85$ ) and are better off in terms of economic conditions ( $r = 0.63$ ) and living standards ( $r = 0.67$ ). The values for each parameter of the countries included were collected from the most reliable sources (The World Bank, 2016; UNDP, 2015). The parameters relating to CO<sub>2</sub> emissions and ecological footprints were used for identifying the countries polluting the climate (thus generating climate refugees), and GNI and HDI were used for measuring the refugee intake strength of the liable countries. Both of these categories were combined with adjusted weights to calculate the total climate refugee responsibility by each liable country. It is also assumed that a particular country that is polluting the climate excessively (by emitting CO<sub>2</sub> and with higher ecological footprints) may not be socio-economically capable to take in a proportion of the refugees. This proposed model neutralizes this uncertainty by adding both the economic (GNI) and social development strata (HDI) in distributing the climate refugees.

The parameter values were in different units. Hence, the original values are normalized using a scale (i.e. 0 to 1). The scale is applied for better understanding and for comparing the parameters with each other. The normalized value of  $e_i$  for the parameter  $P$  in the  $i^{th}$  row is calculated by applying Equation (1):

$$Normalized (e_i) = \frac{e_i - P_{min}}{P_{max} - P_{min}} \quad (1)$$

where,  $P_{min}$  = the minimum value for parameter  $P$  and  $P_{max}$  = the maximum value for parameter  $P$ .

In the next step, the selected parameters and indicators were assigned weights to reflect the degree of influence. As this calculation is related to climate justice, the indicator – per capita CO<sub>2</sub> production – is given 60 per cent weight, followed by 20 per cent weight for the ecological footprint and 10 per cent weight for the remaining two parameters each (a total of 100 per cent). Assuming that a total of 50,000 people were severely affected, displaced and

lost their livelihoods because of climatic extreme disasters in the “VICTIM” category in a certain year with no options for them to bounce back, Table III represents the polluters’ statistics for the same year. The next question to ask is – “Which liable countries will take what proportion of the 50,000 climate refugees?” The calculation for the climate refugee distribution for each parameter is calculated by applying Equation (2):

$$\text{Climate Refugee Proportion} = \frac{\left[ \frac{\text{Total Refugee} \times \text{Parameter Weight}}{100} \right] \times \text{Parameter Scale Value}}{\text{Total Scale Value for the Parameter}} \quad (2)$$

#### 4. Results and discussions

After applying Equation (1) to all the parameters, the values are now comparable (Table III). In case of GNI per capita, it is clear that Australia is the most economically developed (with a normalized scale value of 1) and the “VICTIM” (with a normalized scale value of 0) is the least economically developed country (Table III).

After applying Equation (2) to Table III with a pre-defined weight for each of the parameters, the distribution of the victim countries among the responsible or top climate polluting countries is estimated. It is calculated that under current circumstances, Australia is responsible for taking in the greatest number of climate refugees (i.e. 4,994) followed by

Top climate polluting countries	Per capita CO <sub>2</sub> emissions		Ecological footprint Per capita		GNI per capita (Atlas Method)		HDI	
	(Metric Tons)	Scale (0-1)	(Global Hectares)	Scale (0-1)	(Current US\$)	Scale (0-1)	Index value	Scale (0-1)
China	6.71	0.358	3.4	0.314	7820	0.113	0.728	0.433
USA	17.02	0.941	8.2	0.872	54960	0.913	0.915	0.945
India	1.663	0.073	1.2	0.058	1590	0.007	0.609	0.107
Russian Federation	12.647	0.694	5.7	0.581	11400	0.173	0.798	0.625
Japan	9.292	0.504	5	0.500	36680	0.603	0.891	0.879
Germany	8.918	0.483	5.3	0.535	45790	0.757	0.916	0.948
Korea, Rep	11.841	0.648	5.7	0.581	27440	0.446	0.898	0.899
Iran, Islamic Rep	7.802	0.420	2.8	0.244	6550	0.091	0.766	0.537
Indonesia	2.304	0.109	1.6	0.105	3440	0.038	0.684	0.312
Saudi Arabia	18.072	1.000	5.13	0.515	23550	0.380	0.837	0.732
Canada	14.136	0.778	8.2	0.872	47500	0.787	0.913	0.940
South Africa	9.258	0.502	3.3	0.302	6050	0.083	0.666	0.263
Mexico	3.876	0.198	2.9	0.256	9710	0.145	0.756	0.510
United Kingdom	7.086	0.379	4.9	0.488	43340	0.716	0.907	0.923
Brazil	2.191	0.103	3.1	0.279	9850	0.147	0.755	0.507
Italy	6.703	0.358	4.6	0.453	32790	0.537	0.873	0.830
Australia	16.519	0.912	9.3	1.000	60070	1.000	0.935	1.000
France	5.185	0.272	5.1	0.512	40580	0.669	0.888	0.871
Turkey	4.364	0.226	3.3	0.302	9950	0.149	0.761	0.523
Poland	8.336	0.450	4.4	0.430	13690	0.212	0.843	0.748
VICTIM	0.372	0.000	0.7	0.000	1190	0.000	0.57	0.000

**Table III.** Scaling the parameters for climate refugee distribution

Source: The World Bank (2016); UNDP (2015); Global Footprint Network (2016)

the USA (4,870), Canada (4,269), Saudi Arabia (4,258) and so on, as shown in Table IV. In other words, Australia and the USA each should take sole responsibility for 10 out of every 100 climate refugees a year, followed by Canada and Saudi Arabia 9, South Korea 7; Russia, Germany and Japan 6; and so on, as shown in Table IV.

The United Nations (UN) predicts that up to 250 million people might be displaced by climate change by the year 2050. The report also highlights that climate change is impacting the entire planet, raising the risk of hunger and conflict (UN, 2014). In May 2016, five islands were lost due to sea level rise in the Solomon Islands. Kiribati purchased 20 sq. km of land in Fiji in 2014, and the Maldives are also planning to purchase land in another country (Caramel, 2014). These are some of the examples on how some nations are responding to climate change impacts. A Kiribati national lost his asylum appeal in May 2014 in a New Zealand Court, which could have made him the world’s first-ever “climate change refugee”. The rejection was possible due to the absence of climate induced refugee issues in the 1951 Refugee Convention (UN, 2014). Hence, the UNHCR has shown serious concern on accommodating climate refugees in safer places or countries and recognizing them as refugees. The model of undertaking responsibility for climate refugees by the liable countries as proposed in this article could be the first step towards the start of negotiations at various UN, international and national platforms.

### 5. Conclusions

When only 62 billionaires have more combined wealth than the bottom half of the world population, only 10 countries are producing 69 per cent of the world’s total of carbon dioxide, and these countries are consuming most of the world’s resources and consequently

Climate polluting country list	CO <sub>2</sub> (60% Weight)	Responsibility for the 50,000 climate refugees in a year				Final allocation	Total allocation (%)
		Ecological Footprint (20% Weight)	GNI (10% Weight)	HDI (10% Weight)			
Australia	2,910	1087	628	369	4,994	10	
USA	3,000	948	573	349	4,870	10	
Canada	2,480	948	494	347	4,269	9	
Saudi Arabia	3,189	560	238	270	4,258	9	
Korea, Rep	2,067	632	280	332	3,310	7	
Russian Federation	2,212	632	109	231	3,183	6	
Germany	1,540	581	476	350	2,947	6	
Japan	1,607	543	378	325	2,854	6	
United Kingdom	1,211	531	449	341	2,532	5	
Poland	1,435	468	133	276	2,312	5	
Italy	1,141	493	337	307	2,277	5	
France	867	556	420	322	2,165	4	
South Africa	1,601	329	52	97	2,079	4	
Iran, Islamic Rep	1,339	265	57	198	1,860	4	
China	1,142	341	71	160	1,713	3	
Turkey	719	329	93	193	1,335	3	
Mexico	631	278	91	188	1,189	2	
Brazil	328	303	92	187	911	2	
Indonesia	348	114	24	115	601	1	
India	233	63	4	39	340	1	
VICTIM	0	0	0	0	0	0	
Total	30,000	10,000	5,000	5,000	50,000	100	

**Table IV.**  
Calculations showing  
the tentative  
distribution of the  
climate refugees

generating more wastes, then the least developed and world's poorest countries carry the burden of the polluters in the form of climate-change impacts. These cause serious damage to the national economies of victim countries. On 14 November 2016, the World Meteorological Organization (WMO) announced that 2016 will be hottest year on record, breaking temperatures in 2015 (WMO, 2016). The NASA scientists projected this trend earlier in 2016 (Lynch, 2016). In a recently published article, scientists mentioned that it could be "game over" for planet earth if humans continue to ignore climate change because temperatures could rise by between 4.78°C to 7.36°C by 2100 (Friedrich *et al.*, 2016). Recently, the renowned American philosopher Noam Chomsky has warned that the US Republican party is now "the most dangerous organisation in world history" because of their denial of climate change (Johnston, 2016). Unfortunately, there are still some scientists and academics that believe in climate change, but they purposively deny of the existence of climate refugees.

"If climate change is real, then climate refugees are real". Based on this statement, this concept paper has undertaken a holistic approach in identifying the root causes of a victim country (for example, Bangladesh) being vulnerable to global climate changes and the parallel consequences. Today, Bangladesh is labelled as one of the least developed countries, but most researchers skip the issues on how the country was socio-economically oppressed by external forces for centuries. This study takes into account how the historical past and foisted wars made a country's economy fragile to tackle the upcoming disasters. This paper identifies how, at present, the economically developed countries are exploiting most of the planet's resources, producing most GHGs including CO<sub>2</sub> and how their most liveable lifestyle is indirectly causing catastrophic disasters in victim countries like Bangladesh (Before the Flood, 2016). Those developed countries are ultimately placing victims in the vicious cycle of invasion, oppression, disasters and poverty (Kartiki, 2011; Mallick & Etzold, 2015). As a consequence, it is deemed that the liable or climate polluting countries should pay for the victim country's recovery to bring climate justice. Here, recovery means by supporting social, ecological, cultural, economic and infrastructure sectors, and, most importantly, by taking responsibility, if needed, for the permanently displaced population – the climate refugees. Some recommendations are made that should be incorporated in the COP23 or other UN (UNHCR) platform agendas. There should be:

- A method for considering the relevant parameters and assigning weights to the indicators to calculate the climate refugee distribution.
- An internationally recognized legal convention for climate refugees to resettle them in responsible countries considering relevant social, cultural and ecological aspects.
- An immediate short-term shelter plan in neighbouring countries in case of urgency, and a long-term resettlement plan in the liable countries, as needed.
- A monitoring system for identifying disasters solely triggered by climate change, and calculating the number of displaced people without sustainable livelihood and adaptation options to survive in affected areas or in the country of origin.
- A cumulative monitoring system for measuring those countries consuming more resources and producing more CO<sub>2</sub> within a given timeframe.
- A system for penalizing the responsible countries immediately to provide humanitarian assistance in the victim countries.
- A system to compensate the victim countries for the loss and damages occurred due to disasters induced by climate change, and finally to undertake plans to resettle them and so forth.



This research is motivated to identify the countries that are responsible to resettle climate change induced refugees, and this is the central argument. There is no such indication to claim that the developed countries should solely bear the consequences of climate refugees; rather, neutral opinion is depicted based on evidence, published literature and fieldwork experiences. It is also admitted that there would be extreme weather events in Bangladesh even if the climate had not changed. This is true; however, this article assumes that the intensity and frequency of climate extreme disasters have increased in Bangladesh and consequently in other victim countries due to climate change (IPCC, 2014; Kelman, 2010). Those victim countries are responsible for the additional and unwanted disasters created by climate change (Siddiqui, 2010), and the liable countries should pay for polluting the climate and share the burden proportionally. Some would argue that the effects are all forecasted for the future. This is not true; climate change is real and happening right now (Gillett *et al.*, 2003; Duren and Miller, 2012), and the affected communities have already exceeded their limits of adaptation with the changing climate (Hulme, 2016; Dow *et al.*, 2013). Some would also argue that climate- and weather-related adversities usually cause migration only within a country, and often just temporarily. This statement is also not true; there is ample evidence that climatic-disaster-affected populations migrate both internally (Afsar, 2003; Siddiqui, 2010; BBS, 2015) and internationally (Siddiqui *et al.*, 2014; Warner, 2010; Litchfield, 2010; Mallick & Etzold, 2015).

This paper also highlights events that Bangladesh has been subjected to by other countries over the centuries. It covers a range of topics for which Bangladesh is owed reparations. Question may arise how any of these topics relate to climate change or migration. This is a major issue known as the “Root Causes of Vulnerability” that needs to be understood properly (Wisner *et al.*, 2004; O’Keefe *et al.*, 1976; Kru~~u~~ger *et al.*, 2015; Rahman and Kausel, 2013). Countries with stronger economic and social capital are more likely to tackle the impacts of climate-change-induced disasters than the countries that are economically fragile. In many cases, socio-economic fragility was originally generated because of historical past and oppression. This statement is true in the case of Bangladesh. For example, due to unwanted colonization, imposed wars and centuries of socio-economic injustice Bangladesh failed to undertake disaster mitigation measures like constructing cyclone shelters in coastal regions, training people how to evacuate safely before a cyclone strikes, creating alternative livelihood options after the cyclone and failed in preparing emergency plans at various local and national levels. For instance, a cyclone with similar intensity and geographic location caused at least 300,000 deaths in Bhola Island in 1970, though only 26 deaths was reported after the Cyclone Roanu in 2016 (Ahmed *et al.*, 2016; Huq, 2016). There are many such examples all over the world, including Haiti. Hence, it is important to admit the root causes of vulnerability and analyse how it relates to achieving resilience (short-term) and adaptation strategies (long-term) from community to local levels. Finally, it is important to identify which groups of people are affected by climate change events, and which groups are parts of the baseline. This can form the basis for future and continued research into who should take responsibility for climate refugees.

## References

- Afsar, R. (2003), “Internal migration and the development nexus: the case of Bangladesh”, paper presented at the Regional Conference on Migration, Development and Pro-Poor Policy Choices in Asia. The Refugee and Migratory Movements Research Unit, Bangladesh, and the Department for International Development, UK, 22–24 June 2003, Dhaka.

- Ahmed, B. (2015), "Landslide susceptibility modelling applying user-defined weighting and data-driven statistical techniques in Cox's Bazar Municipality, Bangladesh", *Natural Hazards*, Vol. 79 No. 3, pp. 1707-1737.
- Ahmed, B. and Ahmed, R. (2012), "Modeling urban land cover growth dynamics using multi-temporal satellite images: a case study of Dhaka, Bangladesh", *ISPRS International Journal of Geo-Information*, Vol. 1 No. 3, pp. 3-31.
- Ahmed, B. and Dewan, A. (2017), "Application of bivariate and multivariate statistical techniques in landslide susceptibility modeling in Chittagong city corporation, Bangladesh", *Remote Sens*, Vol. 9 No. 4, p. 304.
- Ahmed, B., Kelman, I., Fehr, H.K. and Saha, M. (2016), "Community resilience to cyclone disasters in coastal Bangladesh", *Sustainability*, Vol. 8 No. 8, p. 805.
- Ahmed, B., Kamruzzaman, M., Zhu, X., Rahman, M.S. and Choi, K. (2013), "Simulating land cover changes and their impacts on land surface temperature in Dhaka, Bangladesh", *Remote Sens*, Vol. 5, pp. 5969-5998.
- Alam, M.J. and Mullick, R.A. (2014), "Climate change effects upon massive land and housing development: case of Dhaka, Bangladesh", *International Journal of Climate Strategies and Management*, Vol. 6 No. 3, pp. 315-331.
- Alexander, D. (2000), *Confronting Catastrophe: New Perspectives on Natural Disasters*, 1st ed., Terra Publishing, Hertfordshire.
- Andrews, K. (2016), *Colonial Nostalgia is Back in Fashion, Blinding us to the Horrors of Empire*, Guardian News and Media Limited, London.
- BBS (2015), "Population distribution and internal migration in Bangladesh", *Statistics and Informatics Division (SID), Ministry of Planning, Bangladesh Bureau of Statistics (BBS)*, Government of the People's Republic of Bangladesh, Dhaka.
- Before the Flood (2016), *National Geographic*, available at: [www.beforetheflood.com/](http://www.beforetheflood.com/) (accessed 12 November 2016).
- Bhattacharya, S. (1977), "The indigo revolt of Bengal", *Social Scientist*, Vol. 5 No. 12, pp. 13-23.
- Biermann, F. and Boas, I. (2010), "Preparing for a warmer world: towards a global governance system to protect climate refugees", *Global Environmental Politics*, Vol. 10 No. 1, pp. 60-88.
- Brammer, H. (2014), "Bangladesh's dynamic coastal regions and sea-level rise", *Climate Risk Management*, Vol. 1, pp. 51-62.
- Brown, O. (2008), *Migration and Climate Change, IOM Migration Research Series. No. 31*, IOM, Geneva.
- Caramel, L. (2014), "Besieged by the rising tides of climate change, Kiribati buys land in Fiji", *The Guardian*, available at: [www.theguardian.com/environment/2014/jul/01/kiribati-climate-change-fiji-vanua-levu](http://www.theguardian.com/environment/2014/jul/01/kiribati-climate-change-fiji-vanua-levu) (accessed 16 November 2016).
- Carvalho, S. (2015), "What has climate change got to do with human rights?", *Amnesty International*, available at: [www.amnesty.org/en/latest/campaigns/2015/12/climate-change-human-rights/](http://www.amnesty.org/en/latest/campaigns/2015/12/climate-change-human-rights/)
- CDMP II (2014), *Trends and Impact Analysis of Internal Displacement due to the Impacts of Disasters and Climate Change. Comprehensive Disaster Management Programme (CDMP II)*, Ministry of Disaster Management and Relief, Dhaka.
- CorpWatch (2002), "Bali principles of climate justice", *International Climate Justice Network*, available at: [www.corpwatch.org/article.php?id=3748&printsafe=1](http://www.corpwatch.org/article.php?id=3748&printsafe=1) (accessed 15 November 2016).
- Currey, B. (1979), "Mapping areas liable to famine in Bangladesh", PhD thesis, University of Hawaii.
- Dasgupta, S., Sobhan, I. and Wheeler, D. (2016), "Impact of climate change and aquatic salinization on mangrove species and poor communities in the Bangladesh Sundarbans", Policy Research working paper; no. WPS 7736, World Bank Group, Washington, DC, available at: <http://documents.worldbank.org/curated/en/452761467210045879/Impact-of-climate-change-and-aquatic-salinization-on->

- [mangrove-species-and-poor-communities-in-the-Bangladesh-Sundarbans](#) (accessed 10 November 2016).
- Dasgupta, S., Benoit, L., Craig, M., David, W. and Jianping, Y. (2009), "The impact of sea level rise on developing countries: a comparative analysis", *Climatic Change*, Vol. 93 Nos 3/4, pp. 379-388.
- Dow, K., Berkhout, F., Preston, B.L., Klein, R.J.T., Midgley, G. and Shaw, M.R. (2013), "Limits to adaptation", *Nature Climate Change*, Vol. 3 No. 4, pp. 305-307.
- Duren, R.M. and Miller, C.E. (2012), "Measuring the carbon emissions of megacities", *Nature Climate Change*, Vol. 2 No. 8, pp. 560-562.
- Friedrich, T., Timmermann, A., Tigchelaar, M., Timm, O.E. and Ganopolski, A. (2016), "Nonlinear climate sensitivity and its implications for future greenhouse warming", *Science Advances*, Vol. 2 No. 11, pp. e1501923, doi: [10.1126/sciadv.1501923](https://doi.org/10.1126/sciadv.1501923).
- Gillett, N.P., Zwiers, F.W., Weaver, A.J. and Stott, P.A. (2003), "Detection of human influence on sea-level pressure", *Nature*, Vol. 422 No. 6929, pp. 292-294.
- Global Footprint Network (2016), "Ecological wealth of nations", available at: [www.footprintnetwork.org/ecological\\_footprint\\_nations/ecological\\_per\\_capita.html](http://www.footprintnetwork.org/ecological_footprint_nations/ecological_per_capita.html) (accessed 20 August 2016).
- Goodman, J. (2009), "From global justice to climate justice? Justice Ecologism in an Era of Global Warming", *New Political Science*, Vol. 31 No. 4, pp. 499-514.
- GRID-Arendal- a centre collaborating with the United Nations Environment Programme (UNEP) (2014), *Potential Impact of Sea-Level Rise on Bangladesh*, UNEP, Arendal.
- Hardoon, D., Ayele, S. and Fuentes-Nieva, R. (2016), *An Economy for the 1%. 210 Oxfam Briefing Paper*, Oxfam GB, Oxford, available at: [www.oxfam.org/en/research/economy-1](http://www.oxfam.org/en/research/economy-1) (accessed 30 August 2016).
- Hewitt, K. (Ed.) (1983), *Interpretations of Calamity from the Viewpoint of Human Ecology*, 1st ed., Allen & Unwin, London.
- Hulme, M. (2016), "1.5°C and climate research after the Paris agreement", *Nature Climate Change*, Vol. 6 No. 3, pp. 222-224.
- Hunter, S.W.W. (1897), *Annals of Rural Bengal*, Smith, Elder, and Co, London.
- Huq, S. (2016), *Cyclone Roanu Hits Bangladesh: A Story of Loss and Damage Avoided*, The International Institute for Environment and Development (IIED), London, available at: [www.iied.org/cyclone-roanu-hits-bangladesh-story-loss-damage-avoided](http://www.iied.org/cyclone-roanu-hits-bangladesh-story-loss-damage-avoided) (accessed 29 August 2016).
- IFRC (2009), *Climate Change and Human Mobility: A Humanitarian Point of View*, International Federation of Red Cross and Red Crescent Societies (IFRC), Geneva.
- IPCC (2014), "Climate change 2014: synthesis report", *Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*, Geneva.
- Johnston, I. (2016), *Noam Chomsky: Donald Trump's Election will Accelerate Global Warming and Humanity's 'Race to Disaster'*, The Independent, available at: [www.independent.co.uk/environment/noam-chomsky-donald-trump-climate-change-denier-global-warming-race-to-disaster-republicans-most-a7418296.html](http://www.independent.co.uk/environment/noam-chomsky-donald-trump-climate-change-denier-global-warming-race-to-disaster-republicans-most-a7418296.html) (accessed 16 November 2016).
- Kartiki, K. (2011), "Climate change and migration: a case study from rural Bangladesh", *Gender and Development*, Vol. 19 No. 1, pp. 23-38.
- Kelman, I. (2010), "Hearing local voices from small island developing states for climate change", *Local Environment*, Vol. 15 No. 1, pp. 605-619.
- Kelman, I. (2016), "Climate change and vulnerability", available at: [www.21stcentury.co.uk/science/climate-change-vulnerability/](http://www.21stcentury.co.uk/science/climate-change-vulnerability/) (accessed 24 August 2016).
- Krüger, F., Bankoff, G., Cannon, T. and Schipper, L. (2015), *Cultures and Disasters: Understanding Cultural Framings in Disaster Risk Reduction*, Routledge, Abingdon.
- Lawler, J.J., Ruesch, A.S., Olden, J.D. and McRae, B.H. (2013), "Projected climate-driven faunal movement routes", *Ecology Letters*, Vol. 16 No. 8, pp. 1014-1022.

- Lewis, J. (1999), *Development in Disaster-Prone Places: Studies of Vulnerability*, Intermediate Technology, London.
- Liberation War Museum (2016), *Bangladesh: History*, Liberation War Museum, Dhaka, available at: [www.liberationwarmuseumbd.org/history/](http://www.liberationwarmuseumbd.org/history/) (accessed 2 September 2016).
- Litchfield, W.A. (2010), *Climate Change Induced Extreme Weather Events & Sea Level Rise in Bangladesh leading to Migration and Conflict*, available at: [www1.american.edu/ted/ice/Bangladesh.html](http://www1.american.edu/ted/ice/Bangladesh.html) (accessed 27 August 2016).
- Lynch, P. (2016), *2016 Climate Trends Continue to Break Records*, NASA's Goddard Space Flight Center, the National Aeronautics and Space Administration (NASA), available at: [www.nasa.gov/feature/goddard/2016/climate-trends-continue-to-break-records](http://www.nasa.gov/feature/goddard/2016/climate-trends-continue-to-break-records) (accessed 15 November 2016).
- McPherson, P. (2015), "Dhaka: the city where climate refugees are already a reality", *The Guardian*, London United Kingdom, available at: [www.theguardian.com/cities/2015/dec/01/dhaka-city-climate-refugees-reality](http://www.theguardian.com/cities/2015/dec/01/dhaka-city-climate-refugees-reality)
- Majumdar, R.C. and Sarkar, J. (Eds) (1943), *The History of Bengal*, University of Dacca, Vol. 2.
- Majumdar, R.C. (1977), *Ancient India*, Motilal Banarsidass Publication.
- Mallick & Etzold (2015), *Environment, Migration and Adaptation in Bangladesh: Evidence of Politics and Climate Change in Bangladesh*, AHDPH Publication, Dhaka.
- Mallick, B. (2014), "Cyclone shelters and their locational suitability: an empirical analysis from coastal Bangladesh", *Disasters*, Vol. 38 No. 3, pp. 654-671.
- Mallick, B. and Vogt, J. (2012), "Cyclone, coastal society and migration: empirical evidence from Bangladesh", *International Development Planning Review*, Vol. 34 No. 3, pp. 217-240.
- Mallick, B., Ahmed, B. and Vogt, J. (2017), "Living with the risks of cyclone disasters in the South-Western Coastal Region of Bangladesh", *Environments*, Vol. 4 No. 1, p. 13.
- Martin, M., Kniveton, D. and Siddiqui, T. (2012), *Making Migration Decisions amid Climate Change*, Climate change-related migration in Bangladesh, briefing paper no. 1, the Sussex Centre for Migration Research, University of Sussex, UK and Refugee and Migratory Movements Research Unit, University of Dhaka.
- NASA (2013), "NASA scientists react to 400 ppm carbon milestone", Earth Science Communications Team, NASA's Jet Propulsion Laboratory, California Institute of Technology, National Aeronautics and Space Administration (NASA).
- National Geographic Society (2016), *Climate Refugee*, available at: <http://nationalgeographic.org/encyclopedia/climate-refugee/> (accessed 25 September 2016).
- NSMDCIID (2015), *National Strategy on the Management of Disaster and Climate Induced Internal Displacement (NSMDCIID). Comprehensive Disaster Management Programme (CDMP II)*, Ministry of Disaster Management and Relief, Dhaka.
- O'Keefe, P., Westgate, K. and Wisner, B. (1976), "Taking naturalness out of natural disasters", *Nature*, Vol. 260, pp. 566-567.
- OCHA (2016), *HAITI: Hurricane Matthew, Situation Report No. 21. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA)*, available at: [www.unocha.org/hurricane-matthew](http://www.unocha.org/hurricane-matthew) (accessed 16 November 2016).
- Okereke, C. (2010), "Climate justice and the international regime", *Wiley Interdisciplinary Reviews: Climate Change*, Vol. 1 No. 3, pp. 462-474.
- Platje, J.(Joost). and Kampen, R. (2016), "Climate justice from a club good perspective", *International Journal of Climate Change Strategies and Management*, Vol. 8 No. 4, pp. 520-538.
- Rahman, S. and Kausel, T. (2013), "Coastal community resilience to tsunami: a study on planning capacity and social capacity, Dichato, Chile", *IOSR Journal of Humanities and Social Science*, Vol. 12 No. 6, pp. 55-63.

- ReliefWeb (2017), *Bangladesh: Floods and Landslides - June 2017*, available at: <http://reliefweb.int/disaster/ls-2017-000068-bgd>
- Sen, A. (1977), "Starvation and exchange entitlements: a general approach and its application to the Great Bengal Famine", *Cambridge Journal of Economics*, Vol. 1 No. 1, pp. 33-59.
- Sen, A. (2013), "What's happening in Bangladesh?", *Lancet*, Vol. 382 No. 9909, pp. 1966-1968.
- Sendai Framework for Disaster Risk Reduction 2015-2030 (2015), *United Nations Office for Disaster Risk Reduction (UNISDR)*, United Nations - Headquarters (UN), Geneva.
- Seraj, S. (2016), "Four crops a year, boon for farmers", available at: <https://shykhseraj.wordpress.com/2016/08/25/four-crops-a-year-boon-for-farmers/> (accessed 30 August 2016).
- Shamsudduha, M. (2013), "Groundwater-fed irrigation and drinking water supply in Bangladesh: challenges and opportunities", in Zahid, A., Hassan, M.Q., Islam, R. and Samad, Q.A. (Eds), *Adaptation to the Impact of Climate Change on Socio-economic Conditions of Bangladesh*, Alumni Association of German Universities in Bangladesh, German Academic Exchange Service (DAAD), Dhaka, pp. 150-169.
- Siddiqui, T. (2010), "Impact of climate change: migration as one of the adaptation strategies", Working paper series no. 18, Refugee and Migratory Movements Research Unit (RMMRU), Dhaka.
- Siddiqui, T., Bhuiyan, M., Sikder, M. and Islam, M. (2014), "Adaptation strategies of poor urban migrants in the context of climate change: a case study of informal settlements in Natore, Sirjaganj and Rajshahi", Working Paper Series no. 46, Refugee and Migratory Movements Research Unit (RMMRU), Dhaka.
- Siddiqui, T., Islam, M.T., Kniveton, D., Black, R. and Martin, M. 2013, "The staggering scale of climate-related migration and the need for pro-poor policies". *Climate change-related migration in Bangladesh, briefing paper no. 5, the Sussex Centre for Migration Research, University of Sussex, UK and Refugee and Migratory Movements Research Unit*, University of Dhaka.
- Stewart, C. (1813), *The History of Bengal*, Black, Parry, and Co., London.
- Tharoor, S. (2016), *Britain Does Owe Reparations*, Oxford Union Society, Oxford, available at: [www.youtube.com/watch?v=f7CW7S0zxv4](http://www.youtube.com/watch?v=f7CW7S0zxv4) (accessed 22 August 2016).
- The United Nations Framework Convention on Climate Change (UNFCCC) (2016), *Paris Agreement – Status of Ratification*, UNFCCC, Bonn, available at: <http://unfccc.int/2860.php> (accessed 30 August 2016).
- The World Bank Group (2013), *Warming Climate to Hit Bangladesh Hard with Sea Level Rise*, More Floods and Cyclones, Washington, DC.
- The World Bank (2014), *World Development Indicators: Energy Dependency, Efficiency and Carbon Dioxide Emissions*, The World Bank, Washington, DC, available at: <http://wdi.worldbank.org/table/3.8#> (accessed 1 September 2016).
- The World Bank Group (2016), "World Bank open data", available at: <https://data.worldbank.org/> (accessed 14 September 2016).
- UN (2014), *Should International Refugee Law Accommodate Climate Change?*, UN News Centre, available at: [www.un.org/apps/news/story.asp?NewsID=48201#.WCx1plv4P3X](http://www.un.org/apps/news/story.asp?NewsID=48201#.WCx1plv4P3X) (accessed 16 November 2016).
- United Nations Development Programme (UNDP) (2015), *Human Development Report 2015*, UNDP New York, NY.
- United Nations High Commissioner for Refugees (UNHCR) (2016), available at: [www.unhcr.org/en-us/](http://www.unhcr.org/en-us/) (accessed 26 September 2016).
- United Nations University - Institute for Environment and Human Security (UNU-EHS) (2015), *World Risk Report 2015*, available at: [www.worldriskreport.org/](http://www.worldriskreport.org/) (accessed 11 November 2016).
- Warner, K. (2010), "Global environmental change and migration: governance challenges", *Global Environmental Change*, Vol. 20 No. 3, pp. 402-413.

Watts, N., Adger, W.N., Agnolucci, P., Blackstock, J., Byass, P., Cai, W., Chaytor, S., Colbourn, T., Collins, M., Cooper, A., Cox, P.M., Depledge, J., Drummond, P., Ekins, P., Galaz, V., Grace, D., Graham, H., Grubb, M., Haines, A., Hamilton, I., Hunter, A., Jiang, X., Li, M., Kelman, I., Liang, L., Lott, M., Lowe, R., Luo, Y., Mace, G., Maslin, M., Nilsson, M., Oreszczyn, T., Pye, S., Quinn, T., Svendsdotter, M., Venevsky, S., Warner, K., Xu, B., Yang, J., Yin, Y., Yu, C., Zhang, Q., Gong, P., Montgomery, H. and Costello, A. (2015), "Health and climate change: policy responses to protect public health", *The Lancet*, Vol. 386 No. 10006, pp. 1861-1914., doi: [http://dx.doi.org/10.1016/S0140-6736\(15\)60854-6](http://dx.doi.org/10.1016/S0140-6736(15)60854-6).

Wisner, B., Blaikie, P., Cannon, T. and Davis, I. (2004), *At Risk: Natural Hazards, People's Vulnerability and Disasters*, Routledge, London.

WMO (2016), *Provisional WMO Statement on the Status of the Global Climate in 2016*, available at: <http://public.wmo.int/en/media/press-release/provisional-wmo-statement-status-of-global-climate-2016> (accessed 16 November 2016).

Yunus, M. (2003), *Banker to the Poor: Micro-Lending and the Battle against World Poverty*, Public Affairs, New York, NY.

### Further reading

Marshall, P. (2011), *The British Presence in India in the 18th Century*, The British Broadcasting Corporation (BBC), London.

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