

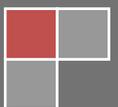
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# Assessing the Impact of Climate Change and its Potential Societal and Political Implications for Bangladesh, India and Myanmar

T Nang Seng Pan

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## Author Profile

T Nang Seng Pan is a researcher at Myanmar ISIS. She holds a BA in International Studies (May 2015) from Juniata College in Pennsylvania, USA. She has worked on research papers on topics such as public health, identity, development and climate change. She is also a Project Officer at Innovations for Poverty (IPA), Myanmar.

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## Executive Summary

Climate change is predicted to bring adverse societal consequences, including food and water security problems and possible eco-migration, which could influence politics within and among countries. The frequencies of natural disasters like floods, tropical storms, and droughts as well as sea-level rise are alarming warnings that the impacts of climate change cannot be ignored. Changes in weather patterns and hydrological systems affect freshwater resources and agricultural production, threatening food and water security in many countries. This paper examines the cases of Bangladesh, India, and Myanmar to assess the social and political consequences of climate change, taking into consideration land and water resources and each country's vulnerability to climate change. India and Bangladesh are amongst the world's most populous nations, whereas neighboring Myanmar could be facing considerable eco-immigration. Additionally, these three countries are located in a region highly vulnerable to climate change—especially Bangladesh, in a low-lying and cyclone-prone area.

This paper discusses how water and food insecurity could lead to displacement of the population in Bangladesh, with eco-migration to India or to Myanmar. Population size is lower, and resources like land and freshwater are more abundant, in Myanmar than in Bangladesh or India. Drawing on the experiences of past and recent migration conflicts in the region, this paper also looks into the political consequences of possible conflicts between the eco-migrant population and the receiving population if resources become scarce. This inquiry leads to discussion of the implications for regional cooperation as well as specific policy recommendations for Myanmar to prepare for the future.

## Introduction

According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2014), global temperature has increased by 0.85°C: from 0.65° to 1.06°C between 1880 and 2012 (p.2). Furthermore, global temperature is “more likely than not to exceed 4°C above pre-industrial levels by 2100.” (p.19) (IPCC, 2014). Global increases in temperature are already causing changes in climate patterns, with adverse effects in many regions. Higher temperatures entail rises in sea level and the disappearance of low-lying regions, as well as resource scarcity that could eventually lead to population displacement (ibid.). The consequences of climate change are predicted to hit countries in the South and Southeast Asia region the hardest, given their low-lying coastal areas and vulnerability to tropical storms (Bhattacharyya & Werz, 2012). These states are already facing, and will continue to face, the societal consequences of climate change such as resource scarcity, and political impacts due to eco-migration.

## Food Security

One potential consequence of climate change is the threat to food security. The Food and Agricultural Organization of the United Nations (FAO) recognizes climate change as a “hunger-risk multiplier” (FAO, 2015). The 1996 World Food Summit defined food security as:

...the state in which people at all times have physical, social and economic access to sufficient and nutritious food that meets their dietary needs for a healthy and active life (p.3.) (cited in FAO, 2008).

With the increase in global temperature, droughts, rainfalls, floods, and land degradation, which in turn affect crop production and availability, become common occurrences (IPCC, 2014). Changes in weather patterns causing soil degradation, with loss of land, then impact food production and security (Anik, Kabir, & Ray, 2012). For Bangladesh, India, and Myanmar, which are already facing food insecurity, climate change could exacerbate these problems, in turn causing food shortages. According to the Economist Intelligence Unit food security index, undernourishment stands at 16.4% in Bangladesh, 15.2% in India, and 14.2% in Myanmar (Global Food Security Index, 2016). Climate change is also predicted to affect the production of staple crops like maize and rice, as well as impacting on food accessibility, usage, and price stability (IPCC, 2014). Climate change is predicted to cause at least half a million deaths in 2050 due to food shortages that lead to disease vulnerability (Woodward & Porter,

2016). The likely impacts of climate change on food security in Myanmar, India, and Bangladesh are assessed below.

## **Bangladesh: Climate Change and Food Security**

Located in a low-lying coastal area, Bangladesh is vulnerable to flooding and tropical cyclones, as well as land degradation (Bhattacharyya & Werz, 2012). Agricultural productivity is high: agriculture stands for 20% of Bangladesh's GDP and employs 65% of the labor force (Bhatia, 2011). However, because of the effects of climate change on its arable land areas and crop production, GDP could decrease by 3.1% each year, which could amount to a loss of US\$ 26 billion of GDP between 2000 and 205 (Farming First, 2010). Currently, about a quarter of Bangladesh's 160,995,442 million population (World Bank, 2015) suffer from food insecurity (World Food Programme (WFP), 2016). This figure is bound to increase due to the impacts of climate change, leading to food shortages. A temperature increase of 4°C would lead to a reduction in rice and wheat production by 28% and 68%, respectively (Akanda, 2010). Further, it is predicted that a 0.5 meter rise in sea-level could submerge 11% of Bangladesh's total landmass, leading to loss of agricultural land (ibid.). Such loss of land could severely impact the livelihoods and food security of those living in the coastal regions (Haweya, 2016). Flooding of the three main regional rivers—the Ganges, the Brahmaputra, and the Meghna—due to heavy rainfall from climate change would also lead to food shortage (Pender, 2008). In the 1998 floods, for example, some 3.5 metric tons of crops were lost (Ahsan, 2006). As of 2013, available arable land per person in Bangladesh was calculated to 0.05 hectare per person—lower than comparable figures for Myanmar (0.20 hectares per person) and for India (0.12 hectares per person) (all figures from World Bank 2013 reports). This shows that Bangladesh is more likely to face food insecurity due to climate change.

## **India: Climate Change and Food Security**

India is home to one-quarter of the world's undernourished people (WFP, 2016). It is the second most populous nation, with a population of 1.311 billion (World Bank, 2015). With climate change, the melting of Himalayan glaciers is predicted to bring about more frequent and severe flooding, leading to landslides and erosion (World Bank, 2013). Moreover, the droughts of 1987 and 2002/ 2003 severely reduced crop production (ibid.). Food security has been affected by lower rainfall brought about by climate change—India would have produced more than 6% of its current crop yield if it were not for climate change (ibid.). Over 65% of the population relies on the agricultural sector for livelihood; and

production of India's main staples—rice, wheat, and maize—is sensitive to climate change (Vaibhave, 2015). According to the Council of Energy, Environment and Water (CEEW) of India, for each 1°C rise in temperature, rice production decreases by between 4% and 20%, maize production by between 32% and 50%, and wheat production by between 5% to 20% (Vaibhave, 2015). It is predicted that an increase of 2°C in global temperature could mean that India would face food insecurity, having to import twice the amount of the food that it otherwise would be able to produce sufficiently (World Bank, 2013). Additionally, climate change is predicted to add pressure to the country's existing urban food insecurity, as flooding and landslides will affect settlements in peri-urban areas of riverside cities like Mumbai and Chennai (Chakrabarty, 2016).

## **Myanmar: Climate Change and Food Security**

Myanmar has a population of 53.9 million as of 2015 (World Bank, 2015). Twenty-six percent of the population live below the poverty line, and close to three million people are considered food-poor (WFP, 2016). Although Myanmar is considered self-sufficient in terms of food production at the national level, food and nutrition insecurity still exist at the household level (WFP, 2016). The agricultural sector is essential to achieving national food security. However, over the past decade, agriculture has experienced adverse climate-change affects such as floods, tropical cyclones, and droughts, especially in the Ayeyarwaddy Delta, and the Coastal and Central Dry Zones (Ministry of Agriculture and Irrigation, Myanmar, 2015). The Ayeyarwaddy Delta, the rice bowl of the country, is subject to tropical cyclones, which impedes achieving food security in the region (ibid.). In 2015, flooding inundated 1.29 million acres of farmland and damaged 687,200 acres of farmland, according to the Ministry of Agriculture (Floodlist, 2015).

By 2050, average temperature across Myanmar is expected to rise between 0.8° to 1.4°C (Ministry of Environmental Conservation and Forestry, 2012). This temperature increase could extend the growing season for some crops, but could also impact seasonal rainfall and water availability (Verbruggen, 2016). In the 2016 monsoon season, the Ayeyarwaddy Delta experienced floods that negatively impacted the livelihoods of the local people. During the 2008 Cyclone Nargis, the Ayeyarwaddy Delta lost approximately 4 million hectares of rice-growing area, affecting more than half of total rice production in Myanmar that year (Ministry of Agriculture and Irrigation, Myanmar, 2015). Prolonged dry spells contribute to food shortage in the Dry Zone, the most food-insecure region in the country. In other words, more frequent tropical storms as well as droughts brought about by climate change could

threaten national food security as well as farming livelihoods. Moreover, according to *The Lancet*, death tolls in Myanmar due to climate change could reach 4450 by the year 2050 (Woodward & Porter, 2016).

Thus we see that all three—Bangladesh, India, and Myanmar—are already affected by food insecurities, and climate change could aggravate the situation. Especially in Bangladesh and India, food insecurity could induce people to migrate to nearby areas where more resources are available. Myanmar, with a lower population density and higher land availability per capita, could become the next destination for eco-migration in the region. However, with each country's food security already at stake, it would be challenging for Myanmar to bear the burden of climate-induced eco-migration.

## Consequences of Climate Change on Water Security

United Nations Water (UN Water) (2013) defines water security as:

..the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability.

Only about 1% of the world's total freshwater supply is available for consumption and usage (Smith, 1999). As a result, 36 countries are water-stressed (Reigh, Maddocks & Gassert, 2013). *Water stress* is defined as a condition in which the annual water supply drops below 1700 cubic meters per person; if the water supply per capita reaches below 1000 cubic meters per person, there is *water scarcity* (UN Water, 2012).

Climate change is a threat to achieving water security because temperature rises cause changes in hydrological systems, due to the melting of glaciers and increase in water levels: both the quality and availability of water are affected (p.51) (IPCC, 2014). The increase in temperature contributing to heat waves and droughts especially in the subtropical region could result in water shortages in the countries of that region as well (p.69) (ibid.). Further, global areas characterized as “very dry” have doubled since the 1970s (Kainth, 2011). Additionally, Asia has faced more frequent droughts as well as greater flooding and El Nino events, affecting the availability of water(ibid.).With water shortages, bodies of water which span transnational borders could also be affected, causing people to migrate towards regions with more resources available (Oppenheimer et al., 2014).

## **Bangladesh: Climate Change and Water Security**

According to the World Bank (2014), the total renewable internal freshwater resources per capita in Bangladesh are 660m<sup>3</sup> as of 2014. Thus, according to the UN definition, Bangladesh is water-scarce. Bangladesh is located in the floodplains of the world's second-largest river basin, the Ganges-Brahmaputra-Meghna, but enjoys only 7% of its total watershed (Kolås et al., 2013). These great rivers originate in other countries, so the water resources that eventually reach Bangladesh are dependent on the water usage of the upper-riparian states: some 92.5% of its water resources come from outside the country (ibid.). In addition, Bangladesh faces water stress due to its vulnerability to floods, storms, and sea-level rises which increase water salinity (Anik, Kabir & Ray, 2012). Water storage and flow are affected by melting from Himalayan glaciers: peak discharge of rivers will occur during the rainy season, with low flows during the dry season (Pender, 2008). Bangladesh's population (161 million as of 2015), is projected to increase to 214 million by 2050, in turn requiring more freshwater resources (Haweya, 2016). For all these reasons, climate change causes strains on freshwater availability in Bangladesh.

## **India: Climate Change and Water Security**

According to the World Bank, India is already facing water insecurity even without climate change, due to the demands of its increasing population (World Bank, 2013). In fact, 54% of India faces high to extremely high water stress, according to the World Resources Institute (Tien et al., 2015). As of 2014, India's total renewable internal freshwater resources per capita were 1116m<sup>3</sup> (World Bank, 2015). According to the Indian Space Research Organization (ISRO), 75% of the Himalayan glaciers have been retreating during the past 15 years (Misra, 2014). Glacial melt could lead to heavy flooding in the monsoon season and drought during the dry seasons, exacerbating the problems of achieving water security in India (World Bank, 2013). About 15% of India's groundwater resources have been exploited and 60% of the country's agriculture is dependent on groundwater resources: water scarcity could lead to food shortages as well (ibid.). India's population is projected to reach 1.4 billion by the year 2050, making it even more difficult to achieve water security (Kainth, 2011). Thus, climate change adds pressure to the existing water insecurity in India.

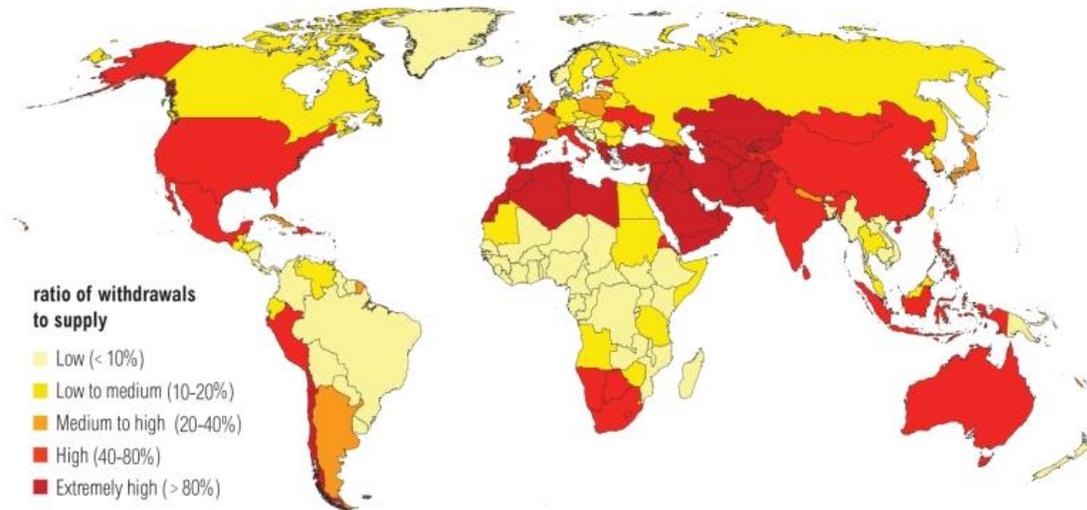
## **Myanmar: Climate Change and Water Security**

Myanmar is amongst the ten countries with the most abundant available freshwater resources (Maps of World, 2013). According to the World Bank (2015), total renewable internal freshwater resources per

capita in Myanmar are 18770m<sup>3</sup>, higher than India or Bangladesh. However, the Dry Zone in central Myanmar is feeling the effects of climate change, with water shortage in recent decades (World Food Programme, 2011). This Dry Zone includes the southern part of Sagaing Division, western and middle parts of Mandalay Division, and most parts of Magway Division. It is vulnerable to increasing droughts and dry spells caused by climate change, and has experienced prolonged droughts and water scarcity due to El Nino events (Adaptation Fund, 2015). This is the third mostly densely populated region of Myanmar and comprises about 10% of its total land area (ibid.). The scarcity of water resources and vegetation makes crop production difficult. Subsistence farming of sesame, groundnuts, and paddy (rice) predominates, but production is hindered due to water shortages during the prolonged summer dry-spells (ibid.). Hence, livelihoods and food security in the region are affected due to climate change.

Myanmar faces water stress in certain regions, especially during the dry season. All the same, with Myanmar's more abundant freshwater resources, compared to India and Bangladesh, and its location next to these densely populated nations, these neighboring countries could become reliant on Myanmar for freshwater resources in times of scarcity. Bangladesh has about three times the population of Myanmar, whereas its land area is 130,170 km<sup>2</sup>, approximately five times less than that of Myanmar (653,080 km<sup>2</sup>) (World Bank, 2013). Even without climate change, natural spillover effects could occur; climate change could serve as an additional pressure triggering eco-migration towards Myanmar. Figure 1 shows worldwide water-stress levels predicted by 2040, according to the World Resources Institute (Maddocks, Young & Reig, 2015).

## Water Stress by Country: 2040



**NOTE:** Projections are based on a business-as-usual scenario using SSP2 and RCP8.5.

For more: [ow.ly/RiWop](http://ow.ly/RiWop)

 WORLD RESOURCES INSTITUTE

Figure1. Water Stress by Country in 2040, from The World's Most Water-Stressed Countries in 2040. Retrieved September 9, 2016, <http://www.wri.org/blog/2015/08/ranking-world%E2%80%99s-most-water-stressed-countries-2040> (Maddocks, Young, & Reig, 2015).

## Political Impacts of Climate Change

According to the IPCC Fifth Assessment Report, when populations seek to counter the effects of climate change, like food shortages and water stress, displacement or migration may occur towards areas where the impacts are less severe (Oppenheimer et al., 2014). This could apply to Bangladesh, India, and Myanmar, due to the effects of climate change noted above. Such eco-migration may lead to conflicts, especially if vital resources like food and water are less readily available because of climate change. As stated by the President of the UN Security Council: “the Security Council expresses concern that climate change may aggravate certain existing threats to international peace and security”(United Nations Security Council, 2011). A major societal consequence of climate change is its *political impact*.

India has a population of 1.311 billion; Bangladesh, 161.0 million; and Myanmar, 53.90 million (World Bank figures, 2015). India and Bangladesh are amongst the most populous nations in the world. When water and food resources become scarce, Myanmar will still enjoy greater resource availability compared to Bangladesh and India. Moreover, Myanmar has more available renewable freshwater resources and greater land availability per capita. Scarcity caused by climate change could put pressure on the populations of affected areas—especially in Bangladesh, with its high vulnerability to climate change—to eco-migrate towards India, and eventually, to Myanmar.

Eco-migration could lead to conflicts and influence regional politics among these three countries. Each country faces stresses on its own food and water securities, and lacks the capacity to absorb eco-migrants coming into its territories. Conflicts over resources are not unthinkable between the receiving country’s population and the incoming eco-migrant population.

Here we should recall the past history of conflicts between the Bangladesh migrant population in the Indian state of Assam and the Bengali migrant population in Rakhine state of Myanmar. As noted, Bangladesh is exceptionally vulnerable to climate change, and severe consequences are predicted. The Bangladesh government estimates sea-level rises as follows: increase by 5.5 inches by the year 2030, 12.6 inches by 2050, and 34.7 inches by 2100—this could lead to the displacement of between 13 million to 40 million people (Bhattacharyya & Werz, 2012). There has been gradual internal migration within the country as well as external migration to neighboring India in past years. Since the 1950s an estimated 12 to 17 million migrants from Bangladesh have arrived in the Indian states of West Bengal, Assam, and Tripura, driven by economic as well as environmental stresses. However, the displaced

people from Bangladesh, especially Muslim Bangladeshis, have not been welcome in Assam state. In 1979, the All Assam Students Union demanded deportation of unauthorized Muslim Bangladeshi immigrants when the Indian government exploited these immigrants to get electoral votes (ibid.). Such conflicts and tensions over Muslim immigrants from Bangladesh continued into 2003, and escalated in 2012. Continuing eco-migration from Bangladesh and India could create strains on existing border conflicts and tensions between the two countries. Additionally, India, with its high population and limited resources, will have difficulty accommodating immigrants from Bangladesh. If India is unwelcoming towards eco-migrants from Bangladesh, they are likely move onto other countries.

Myanmar, with more resources available in terms of food and water per capita, as well as bordering on the state of Assam, could become the next destination for eco-migrants from Bangladesh. Myanmar had migration from the Bengal territory of India into Rakhine (then Arakan) state in the 19th and early 20th centuries, when both regions were under British colonial rule (Albert, 2016). Recently, political and religious tensions have erupted between the Muslim Rohingya migrants (estimated to number some 1 million) who descended from Bengali migrants, and the Buddhist majority in Rakhine state (ibid.). The Rohingya migrants are not recognized as a legal ethnic group and have not been granted Myanmar citizenship. The fact that Rakhine is the least developed state in Myanmar could also be a factor behind the political and religious tensions. Further tensions could arise with eco-migration to Rakhine. Myanmar has already experienced food and water stresses brought about by climate change, and an influx of new migrants could create further burdens on its resources.

## **Policy Recommendations**

### **Regional Plan**

As climate change brings adverse social and political consequences that transcend national boundaries, it is essential for the governments of Bangladesh, India, and Myanmar to cooperate and prepare. Each country must focus on finding the means to achieve sustainable food and water security within its territory, bearing in mind that bodies of water span transnational boundaries. The 1996 Ganges Water Treaty between India and Bangladesh stands as an example of transnational cooperation on sharing water resources (Hanasz, 2014). However, the treaty has some shortcomings: it tends to benefit India, as Bangladesh has been not receiving the amount of water agreed (Hanasz, 2014). It is important that such conditions be implemented and followed, to mitigate water stress due to climate change.

Dialogue on dealing with potential eco-migration within the three countries is needed in order to prevent conflicts caused by eco-migration and lack of resources. One possible coping solution would be for Myanmar to seek help from wealthier nations and international donors, in terms of economic assistance to enable Myanmar to provide for eco-migrants from neighboring countries. That could relieve the economic strains of sharing of resources between the existing in-country population and the newcomers, and could in resettling the eco-migrants (See Figure 2.)



Figure2. Map of India, Bangladesh, and Myanmar, including Assam state in India, and Rakhine state in Myanmar, the latter indicated by the state capital Sittwe.Reprinted from *Words from Solitude*. Retrieved 16 October, 2016, from <http://wordsfromsolitude.blogspot.com/2008/11/tragedy-called-assam.html?m=0> from a blogpost by shubho, 2008.

## National Plan

In addition to cooperating regionally, Myanmar will need to implement internal climate-change mitigation policies. It signed the United Nations Framework Convention on Climate Change (UNFCCC) on June 11, 1992, and ratified it on November 25, 1994 (Ministry of Environmental Conservation and Forestry, 2012). Currently, Myanmar does not have a National Climate Change Strategy in place but is in the process of adopting one (McKinley et al., 2015). The previous government had issued a National Adaptation Programme of Action (NAPA) to climate change in 2012 (ibid.). This plan outlined thirty-two national adaptation projects with focus on three priorities: Agriculture, Early Warning Systems, and Forest (McKinley et al., 2015). It emphasized making communities resilient to climate change by focusing on climate-resilient agriculture, and on reforestation. The plan also proposed implementing early warning systems for informing the population of imminent disasters. In other words, the previous government's plan focused more on disaster-risk management and building resilience.

It is now essential for the current government to give priority to preventative measures to natural disasters, rather than responding only when the emergency strikes. Additionally, a nationwide umbrella study, assessing each state/region's vulnerability and risks to climate-change impacts, would offer a deeper understanding of the types of natural disasters frequent in specific regions and states, as well as what should be done to prevent them and mitigate their consequences. Myanmar has five geographic regions: Hilly, Delta, Dry Zone, Coastal, and Plains. Regional assessments should be carried out for each of these, as the impacts of climate change may vary from one region to another. A vulnerability study, with a customized emergency response plan, should be conducted for each geographic region, prior to developing preventative measures. Periodical scenario-based exercises should be conducted, to ensure that plans are appropriate for the threats posed by climate change in each geographic region. Importantly, the government must ensure that policies are implemented at each level, so as to prepare for the risks to food and water security as well as dealing with the consequences of eco-migration.

## Conclusions

The potential societal and political consequences of climate change in Bangladesh, India, and Myanmar have important implications for regional cooperation, as the spillover effects of climate change do not respect national boundaries. The governments of these countries will need to strengthen dialogues on coping with the consequences of climate change while also preparing for the potential societal consequences of risks to water and food security, as well as the political consequences of eco-migration.

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