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India, Climate Change and Security in South Asia

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South Asia faces a wide array of social, political, and economic issues that already threaten security in the region[i]. The region has a history of border disputes, sectarian violence, and government corruption. In addition, population increases continue to stress the growing problems associated with urbanization, such as poor sanitation, the spread of disease, resource allocation, and meeting energy demands.. The region is also particularly vulnerable to the effects of climate change[ii]. In this context, climate change could exacerbate existing insecurities in South Asia, and potentially heighten the likelihood of instability.

In the coming years, rising temperatures will likely lead to more frequent extreme weather events, such as flash floods, droughts and cyclones[iii]. According to a 2016 World Meteorological Organization report, uncharacteristic heat waves are already affecting many countries in South Asia [iv]. For example, Ahmedabad, India faced a crippling heatwave with temperatures reaching 46.8 degrees Celsius [~116 degrees Fahrenheit] in 2010[v]. Following the high death toll that year, researchers from the Indian Institute of Public Health and Ahmedabad HeatClimate Study Group concluded there was a statistically significant correlation between the May 2010 heat wave and mortality rates, stating " [the 2010 heat wave] had a substantial effect on all-cause excess mortality…"[vi]

Though uncertainties remain with respect to precisely where and how climate change will affect certain areas, there is enough certainty[vii] on the severity of risks for governments to devote more attention to preventive measures.[viii] The region is already experiencing resource disputes over water and land. For example, disputes and conflict over allocation of the Indus River have plagued the history between India and Pakistan[ix]. Furthermore, migration pressures, some of which may already be driven by climate-related phenomenon, have displaced millions of native Bangladeshis, and threaten to displace millions more[x]. Bangladesh is a geographically low country prone to climate change and sea level rise (SLR). In fact, the IPCC projections predict that a 1-meter SLR will affect 15 million Bangladeshi people in coastal areas, submerging 17,000km^2 of land along the coast[xi]. Some of the resource allocation agreements and migration

policies in India, and other parts of South Asia, are not comprehensive enough to deal with the added impacts of climate change. With these points of tension already threatening the region, the added stressors of climate change could result in several intrastate and interstate security risks.

India's climate and security challenge

India faces a unique set of challenges, both internally and externally. India has a complex history of sectarian conflict resulting from a wide variety of sources, including class pressure, religion, and migratory flows[xii]. For example, the Hindu-Assam region in northeast India, which has clashed with Bangladeshi Muslim immigrants, is an ongoing case of migratory religious conflict. Additionally, the conflict between the Tamil Nadu and Karnataka states over water allocation of the Cauvery River is an enduring problem[xiii]. Water policy has failed to ensure sustainable distribution of the River as withdrawals continue to exceed the amount of water that is naturally replenished[xiv]As a result, conflicts continue to take place, and periodically break out in violence[xv]. For example, following a Supreme Court ruling in 1991 that demanded Karnataka release an additional 205 TMCft of water to Tamil Nadu, violence erupted in Karnataka killing 23 people[xvi]. Again in 2002, the Supreme Court directed Karnataka to release 0.8 TMCft each day in September and October, since the region was experiencing a drought[xvii]. This also led to violent protests. Protests also occurred following a 2007 allocation ruling, but no deaths were reported.

Climate-related risks already threaten lives, food security, and health across many parts of South Asia[xviii]. As rising temperatures, rising seas, melting Himalayan glaciers, and more extreme weather patterns-including rainfall variability-continue to put strains on food, water, and human security in the region, the potential for the exacerbation of conflict between already resource-stressed parties is a risk to India's security, especially if these issues are not addressed and adequately and equitably. Controversial water allocation agreements, especially during times of drought, are a problem for certain parts of India, like the Cauvery-fed region. Additionally, India's per capita land availability is ~0.25 ha per person, which is well below the global average of ~2.3 ha per person[xix]. Similarly, cattle density per km in India is almost six-times that of the global average. This has put tremendous stress on land resources, resulting in extensive environmental degradation of arable land[xx]. In other words, there are several pieces crucial to India's security that are already being tested.

Although climate change does not directly cause the problems that grip India today, its repercussions may exacerbate ongoing disputes, and potentially create new ones, which could further intensify an already fragile system. The Asia region experienced the most weather and climate-related disasters in the world between 2000 and 2008, and suffered a proportional total economic loss of almost 30%[xxi]. Future climate change projections indicate further warming, an increase in monsoon precipitation extremes, and sea level rise[xxii]. These climatic impacts are projected to increase the risk of crop failure and lower crop production, exacerbate water shortages, and increase flood-related coastal damage as well as infrastructure damage[xxiii]. Therefore, with several of these key aspects, such as food production and water availability, already under stress, the added potential impacts from climate change, could severely jeopardize the security of South Asia, specifically India.

Domestic risks

Internally, India faces several challenges with respect to climate impacts, specifically related to conflict over resources such as water,

land and food. As India's population continues to grow, the demand for water and food continues to increase, outstripping the available resources[xxiv]. According to the State of Food and Agriculture in 2014, demand for food is growing, while land and water resources are becoming more scarce and degraded[xxv]. In particular, the water sector faces multiple challenges from population increase, urbanization, shifting agriculture and livelihoods, privatization of water rights, over-extraction, and resource degradation[xxvi]. Water withdrawals are expected to reach 1,195 billion m^3 by 2030, which is a 50 percent increase from 2012 withdrawals[xxvii]. Part of India, specifically the east and west coasts, are expected to fall under "high water stress" in the near future as a result of current withdrawals and availability, coupled with future climate impacts[xxviii].

The Cauvery River is one river system in India that exemplifies the potential for added internal conflict over water sharing agreements that may be inadequate under climate change conditions. The Cauvery River is primarily a monsoon-fed system vital to farming in the Tamil Nadu and Karnataka states[xxix]. Agreements over withdrawals date back over 100 years, but disagreements have plagued the two states. In the 1970's, 1994-5, and 2002 disagreements and conflict erupted over proper allocation from the river. Not surprisingly, this conflict broke out during period's monsoon rainfall totals were below average. In 2007, Karnataka agreed to release 192 thousand-million cubic feet of water to Tamil Nadu during a normal monsoon year. However, no plan was established for weak monsoon years. Again in July 2014, public protests broke out from both sides in Tamil Nadu and Karnataka over allocation totals resulting from a weak start to the monsoon season. As the season strengthened, tensions settled.

This highlights a fundamental problem for the Cauvery-fed region. The IPCC linked rising global temperatures, distribution to rainfall patterns and increased likelihood of drought to climate change[xxx]. If global temperatures rise by two-degree Celsius, India's monsoon season would be deemed "highly unpredictable"[xxxi]. As mentioned above, inconsistencies in the Indian monsoon season have already shown to add internal pressures on the state. With the threat of an even more erratic monsoon season on the horizon for India, it is imperative that India's withdrawal agreements properly account for weak monsoon years and periods of drought.

Interstate risks

The Ganges-Jamuna-Meghna Delta is at the center of the climate and security nexus between India and Bangladesh. Both rely on the Delta, and climate impacts could add volatility to the two nations. It is one of the largest and most fertile deltas in the world[xxxii], and one of the main sources of livelihood for the people of Bangladesh and an important source for India[xxxiii]. The soil surrounding the Delta is extremely fertile, which allows for favorable conditions for agriculture and food production. The Delta is home to several intertidal and estuarine areas, which serve as nurseries for many fish species and invertebrates, making it a critical fishing resources[xxxiv]. Floods are common in the delta and depend on monsoon location, duration, and intensity. Almost 80 percent of the total area of Bangladesh is already prone to flooding[xxxv]. In 2009 and 2010 alone, unprecedented floods caused the largest population displacement ever recorded in Bangladesh; an estimated one million people[xxxvi].

The IPCC has made several assertions about the correlation between sea level rise (SLR) and more frequent coastal flooding, and storm surge[1]. About 35 million people live in coastal areas of Bangladesh, and half of them

[1] Church, John et al. Unnikrishnan, Alakkat. "Climate Change 2013: The Physical Science Basis, Chapter 13: Sea Level Rise" *Intergovernmental Panel on Climate Change* (2013)

live in low-lying areas, which are prone to these climatic events. Some estimates of forced displacement resulting from climate change, predict roughly 5 million people will be displaced by 2050-2075, and this number is expected to double to 10 million by the end of the century[xxxvii].

Furthermore, monsoon paths and intensities are easily influenced by slight rises in sea-surface temperature changes[xxxviii]. Therefore, as global temperatures continue to rise, more intense, sporadic monsoons could be on the horizon for this region.[xxxix] This could have several negative repercussions, resulting in damage to crop yields and displacement for local populations. According to *Schewe and Levermann,* increasing temperatures in the late 21st century and early 22nd century will cause frequent changes in monsoon precipitation, such as delays in the onset of the summer monsoon season, season. This would cause many problems for the India since 75% of their total annual rainfall comes from the summer monsoon season[xl]. Other studies indicate the agriculture could be significantly impacted sooner than the latter part of the 21st century. One study suggest that rice production could drop by 8%, and wheat production by 32%, by 2050[xli]. India ranks number one among countries that rely on rainfed agriculture, in both size (86 million hectares) and value of production to the country[xlii].Rainfed agriculture alone accounts for roughly 44% of total food grain production in India[xliii]. Therefore, a more volatile monsoon season, could be damaging to a significant piece of India's agriculture and food supply.

However, delays in the onset of monsoon seasons are not the only consequences of climate change. Warmer oceans will also allow these monsoons to carry more moisture, increasing precipitation roughly 5-10%[xliv].. A stronger, and more sporadic, monsoon season could be crippling one-two punch. The delayed start would increase drought conditions, yet the more intense monsoons that follow would increase regional flooding, pushing the landscape to both extremes. This problem is not a new phenomenon. Dom Scalpelli, the World Food Programme Country Director, reflected on the effects of the 2015 summer season, which caused severe flooding throughout the region, by stating "food security will be seriously affected…people have lost homes, livelihoods, crops and existing food and seed stocks."[xlv] Therefore, if the current summer monsoon season already threatens local food stability, a shorter, more intense, season would likely increase the pressures South Asia already faces.

The implications of large-scale population migration is another humanitarian and security issue that could be exacerbated by climate stressors. Bangladesh, for example, is a country that is already experiencing the effects of climate change – especially rising sea levels. The IPCC has voiced its concerns over Bangladesh, stating with "very high confidence" that climate change will produce further socioeconomic impacts in the region[xlvi]. As many as 27 million Bangladeshi citizens could be at risk of sea-level rise by 2050. In the absence of significant adaptation support, these rising seas, and socioeconomic impacts will likely force millions of Bangladeshi citizens to move away from the low-lying coastal areas, forcing some migrants into parts of India.

Assam, located in northeast India, is already a popular migratory area for displaced Bangladeshi people[xlvii]. The native Indians of Assam are primarily Hindu, whereas the Bangladeshi are primarily Muslim. Ethnic conflict has historically been a problem. In 19793, the All Assam Student's Union started a six-year movement demanding the deportation of Bangladeshi immigrants. The Student's Union believed that Bangladeshi immigrants were changing their state's demographics, which threatened the Assam way of life. One of their principal grievances was the presence of Bangladeshi immigrants on electoral rolls, and the Student's

Union demanded they be removed. When the central government refused, fights broke out in the Nellie district between two large groups of Assam villagers and Bangladeshi immigrants. In this conflict alone it was estimated over 2,000 people died. Similar conflicts continued through 1985, adding to an estimated total death toll of roughly 7,000[xlviii].

In July 2012, the Bodo tribe, a native Hindu aboriginal group also located in Assam, clashed with the Bangladeshi-Muslim community over construction of a mosque[xlix]. This clash also turned violent, resulting in hundreds of injuries and 55 deaths. The Bodo blamed the conflict on the influx of Bangladeshi Muslim immigrants. As Bangladesh is further pressured by more extreme weather and rising waters, it is likely that this violence could escalate in the absence of robust conflict prevention measures that take climate and resource dynamics into account. This could further threaten the security and well-being of Bangladeshi peoples seeking refuge in India, as well as political and economic stability in India.

South Asia in today's and tomorrow's climate

South Asia today faces a variety of social, political and economic issues that already threaten the stability of the region, including India. These problems alone are already several points of tension, and the addition of climate stressors will truly test the resilience of the Indian government, and other states and populations in South Asia. Although climate change does not directly cause most of the problems facing the region, it can certainly create conditions that make instability and conflict over resources and land more probable. However, an increase in the likelihood of conflict is not a foregone conclusion. Historical examples have demonstrated that water stress can often drive conflicting parties to cooperate, if the necessary leadership is there to drive it.

However, several water sharing agreements exist between South Asian countries that historically lack strong intergovernmental cooperation and are prone to conflict. . For example, the Joint Rivers Commission between India and Bangladesh, as well as the Indus Water Treaty, between India and Pakistan. These agreements were created out of necessity to help maximize and protect the benefits from the common river system[l]. The Joint Rivers Commission, was put in place in 1972 to not only help with water sharing management, but also transmission of flood data, mitigate floods and flood damage, and discuss the impacts of potential dam projects on the region[li]. Furthermore, the Indus Water Treaty, an agreement between India and Pakistan, was put in place in the late 1950's for a similar purpose. The IWT serves as the primary negotiation and equitable allocation medium for the two nations with respect to the Indus River[lii].

Yet, despite the fundamental groundwork for regional water-sharing, many issues still remain. Both agreements have suffered from unequal distribution problems, specifically for meeting irrigation needs, and unfair power sharing arrangements[liii]. Furthermore, a lack of transparency has led to a lack of political trust, which has only heightened tensions between the nations[liv].

Regional agreements such as these are crucial to maintaining peaceful relations in South Asia. The region already experiences several stress factors that have led to conflict, and could potentially flare up once again. Many of them are the result of resource disputes, specifically river and other water disputes. Although there are several water-sharing agreements between these nations, their strength and longevity remain uncertain. With climate change comes only further water uncertainties, and without stronger regional agreements, South Asia could suffer even greater security risks than are already present in the region.

South Asia already faces a wide variety of social, political and economic issues that threaten its security and stability. Unfortunately, it is also an area that is geographically vulnerable to the effects of climate change, such as rising sea levels, widespread flooding, and droughts. Although climate change does not cause many of the problems that grip South Asia, such as resource disputes or challenges around population and migration, it will certainly add unwanted stress to an already struggling region. Some unknowns remain with respect to scope and scale of how South Asia will be affected, but enough scientific certainty exists to spur government change and preparation. In times of resource scarcity, or extreme weather, history has shown that violent conflict is a serious risk. Population migration between India and Bangladesh has periodically broken out into violence without the added stresses of climate change. Furthermore, India has faced internal problems in times of drought with its Cauvery River system, as well as interstate problems with the Joint Rivers Commission and Indus Water Treaty. In order to prevent a severe breakdown of internal and interstate relation, India as well as neighboring nations, must strengthen both their domestic and regional agreements. Without a stronger attention to the impacts climate change will have on the livelihoods of South Asia, the potential for security breakdowns could be disastrous.

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