other strategies accounting for flood risk, alignment with social goals, and costs. For example, Kool *et al*. (*14*) worked backward from an infrastructure threshold for SLR of 30 cm, at which point a gravity-based stormwater and wastewater system would need to be replaced by a pumped system. Before that point, the costs for a new system, its lifetime, and the opportunity costs to the community would need to be assessed against the costs and benefits of a retreat option that helps remove the ongoing impacts from SLR. Using pathways for adjacent locations, they identified opportunities for drainage system redesign to buy time for engagement with the community before eventual retreat. Such a strategy consisting of progressive steps can result in a beneficial transition that is supported by the community.

An increasing number of studies (*3*, *5*, *10*, *15*) provide lessons for developing robust pathways to coastal retreat: (i) engaging early with affected communities to build understanding of their risk tolerance, vulnerabilities, and values; (ii) enhancing the policy and public understanding of higher risk levels than in the past; (iii) early design of and contributions to design of funding mechanisms and regulations that can enable implementation of retreat; (iv) avoiding developments in places recognized as risky and where existing urbanization trends can be reversed through no-build zones and prohibited land uses; (v) considering locations for new developments or designing them to be movable; and (vi) considering whether buying time through temporary accommodation, protection, or nature-based measures will trigger greater risk exposure and therefore worsen the problem over time, or whether these approaches facilitate a transition to retreat.

NECESSARY ENABLERS

Inexorable SLR that will continue for centuries means that for many low-lying coastal areas worldwide, retreat is an inevitable adaptation action. If planned now and integrated with social, economic, and cultural goals, the anticipatory and dynamic pathways to retreat can be a positive approach to reduce coastal risks and minimize regret of investments and social inequities.

To allow retreat to be considered a serious option and implemented where appropriate, there are a number of necessary enablers that require further attention by the research and policy communities. These include: (i) improved understanding of how SLR is a changing risk over time that requires a shift from static to dynamic pathways decision-making and how this affects communities differently now than in the past; (ii) improved understanding of what managed retreat comprises and how it can be staged over time through monitoring and sharing experiences; (iii) development of policies and regulations that are grounded in anticipatory planning supported by sustainable funding arrangements; (iv) further development of analytical methods relevant to changing risk, such as for mapping the shrinking solution space and identifying if and when retreat will be needed; (v) further assessment of the effectiveness of the range of adaptation responses under alternative futures and how retreat can be integrated with wider societal goals; and (vi) enhancement of the role of political leadership in building community trust in preparation for managed retreat, and embedding commitment devices to maintain the long-term dynamic approaches for reducing SLR risks.

Notably, the development and the implementation of any retreat pathway fundamentally depends on the past trajectory of coastal risks; the present situation (governance, coastal strategy, observed impacts, individual and institutional values and attitudes toward climate-related risks); the envisioned future; and when and under what conditions adaptation opportunities and limits appear. Whatever the context considered, it is increasingly evident that the shrinking solution space for adaptation in low-lying coastal areas calls for long-term dynamic pathways planning now. ■

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POLICY FORUM

High-density population and displacement in Bangladesh

The strategy promotes "migrant friendly" towns and selective relocation abroad

By **Mizan R. Khan, Saleemul Huq, Adeeba N. Risha, Sarder S. Alam**

Among the many adverse impacts of climate change in the most vulnerable countries, climate change–induced displacement increasingly caused by extreme weather events is a serious concern, particularly in densely populated Asian countries. Reports by the Intergovernmental Panel on Climate Change (IPCC) project a grim picture for South Asia, the most populous region on Earth, home to about one-quarter of global population, with the highest poverty incidence. A combination of poor socioeconomic indicators and increased frequency and intensity of cyclones and floods renders the region extremely vulnerable. Meanwhile, slow-onset climate hazards, such as sea level rise, salinity intrusion, water stress, and crop failures gradually turn into larger disasters. Within South Asia, Bangladesh stands as the most vulnerable: 4.1 million people were displaced as a result of climate disasters in 2019 (2.5% of the population), 13.3 million people could be displaced by climate change by 2050, and 18% of its coastland will remain inundated by 2080 (*1*). We describe how, faced with such natural and human-made adversities, Bangladesh can stand as a model of disaster management, adaptation, and resilience.

The Paris Agreement goal of keeping the temperature rise at 1.5°C or well below 2°C compared to pre-industrial times may not be achieved, given the lack of ambitious mitigation. As a result, the number of people estimated to be displaced by slow-onset events will stand at ~22.5 million by 2030 and ~34.4 million by 2050 (*2*). A combi-

International Centre for Climate Change and Development (ICCCAD), Independent University, Dhaka, Bangladesh. Email: adeeba.nuraina@icccad.or

nation of sudden and slow-onset climate events, which affect all elements of the environment, becomes the main driver of environmental displacement.

Migration is an adaptation strategy. An estimated half a million people move to Dhaka, the capital city of Bangladesh, each year. Migration of this magnitude presents a challenge for Bangladesh given its small land area (147,570 km^2) and high population density (~1100/km^2). There is simply little space for retreat: Bangladesh's population is half that of the United States, living on ~1.5% of the land area of the United States.

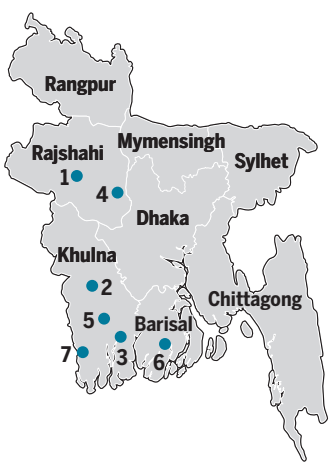
Usually, three pathways can be discerned with respect to how displaced people are settled: autonomous relocation by displaced individuals (without much government support), government-supported temporary settlement, and planned relocation. In Bangladesh, the first option overwhelms, followed by efforts for temporary settlement, until the government rehabilitates their former residences. Planned relocation or managed retreat in response to climate change (*3*) is not yet happening widely because of space and resource constraints.

Since the founding of Bangladesh in 1971, and even earlier in Pakistan, government-planned relocation of people displaced by riverbank erosion has fueled ethnic conflicts in the Chittagong Hill Tracts in the southeast part of the country, because the move was not backed by consultations with tribal communities. About 100,000 of more than a million Rohingya refugees in Bangladesh, fleeing persecution in Myanmar, are being relocated to Bhasan Char, an island in the Bay of Bengal. In land-hungry Bangladesh, most of the 30+ such Chars/mudflats in the bay are already inhabited at different degrees by people displaced by riverbank erosion and climate change.

Despite these odds, Bangladesh is a leader in economic growth among developing countries and in mainstreaming climate change into its development strategy. Partially in response to scientific findings, the National Strategy on the Management of Disaster and Climate Induced Internal Displacement (NSMDCIID) adopted in 2015 incorporated disaster risk reduction and rights-based approaches, so that vulnerable communities can enjoy their basic rights to livelihood, food, health, and housing. The Strategy is built on an integrated Displacement Management Framework, in line with the migration management cycle of the International Organization of Migration (IOM). This Framework elaborates responses during the three phases of mobility management: pre-displacement [disaster risk reduction (DRR)], displacement (emergency), a nd post-displacement (rehabilitation/relocation). Under the Strategy, the government has initiated support for livelihood opportunities, housing, and human development of displaced people in vulnerable hotspots. It is likely that the government-supported community mobilization and disaster management and DRR policies, both before and after adoption of this Strategy, were helpful in lessening the number of casualties from the supercyclone Amphan in May 2020.

Building migrant-friendly, climate-resilient cities in Bangladesh

The map shows some activities being undertaken to build migrant-friendly and climate-resilient cities in Bangladesh. Descriptions of activities are based on publicly available information about the programs, and on discussions with representatives of the NGO BRAC.



1 Rajshahi (city)
Provision for diversified livelihoods; training for skill development; access to health services and education.

2 Noapara
Investments in fish and shrimp export industries attract migrants; municipal authorities have improved water supply and drainage systems, reducing waterlogging and vulnerability.

3 Mongla
Investments in infrastructure projects attract migrants; government is building a vocational training institute; municipality and NGOs work to improve education and slum housing.

4 Sirajganj
Assessment of climate/disaster vulnerability; preparation and implementation of a risk reduction action plan at community and household levels.

5 Khulna (city)
Flood-resilient systems in slums; sanitation; training on climate-adaptable livelihood options; access to financial products in government-approved financial institutions and microcredits.

6 Barisal (city)
A baseline study is in preparation; a community-managed piped water supply network is arranged.

7 Satkhira
Community-led, low-cost, climate/disaster-resilient housing.

GRAPHIC: N. DESAI/*SCIENCE*

MIGRANT-FRIENDLY TOWNS

One way to address displacements under increasing urbanization across the world could be the establishment of peri-urban growth centers and transformation of cities and towns to be migrant-friendly. This option appears practicable for populous countries such as Bangladesh, having little space for retreat from vulnerable hotspots. To achieve this, institutional changes in a city need to be fostered by research, planning, design, and capacity building. Examples from cities such as Durban, Quito, Semarang, and Malé indicate that cities may need to develop general as well as sector-based strategies to manage effective climate change adaptation (*4*). This warrants the linking of adaptation planning and implementation to city priorities. Cities must have access to reliable information and opportunities to share experiences through local, regional, national, and international networks (*4*).

National and local governments should develop migrant-friendly plans along three lines: building of resilient hardware, such as low-cost housing, industries for employment generation, and other infrastructure; software, such as legal, policy, and institutional frameworks; and "heart-ware"—the promotion of awareness, reflecting values and ethics. The basic parameters for safe and orderly movement for migrants are to ensure employment, social protection, access to education, housing, health services, utilities, etc. Although government support is important, engagement of the private sector, nongovernmental organizations (NGOs), civil society, and university-led research can strengthen municipal adaptation efforts.

This is what the International Centre for Climate Change and Development (ICCCAD) in Bangladesh has been doing—to facilitate the transformation of smaller peripheral towns to be migrant-friendly as a climate adaptation strategy (see the figure). Our work has multiple purposes: to shift the tide of migration away from Dhaka and other large cities toward smaller towns, and to decentralize climate-resilient development and facilitate planning for basic services and amenities.

In Bangladesh, a majority of those displaced by climate change prefer non-migration from their ancestral roots (*5*) if they are provided support for improving their livelihood, housing, etc. Settlement of displaced people in a town nearer to their ancestral home allows them to maintain psychological kinship and cultural comforts. On the basis of such local context and needs, each migrant-friendly town needs its own development and adaptation plans to address climate risks and economic opportunities.

The NGO BRAC has initially identified about 20 towns and municipalities, considering their economic potential and climate stress, to determine whether they can absorb a sizeable number of displaced people. A number of satellite towns adjacent to economic hubs, such as relatively elevated sea and river ports and export processing zones (EPZs), can potentially employ millions of migrants. Investment in manufacturing and/or services is generating jobs through public, private, and community partnerships, such as private investments, government support, and microfinancing from BRAC and Grameen Bank. ICCCAD has formal agreements with many ministries and agencies including the Local Government Engineering Department (LGED), the agency for building and maintenance of rural infrastructure. ICCCAD has been working as an advisor and co-implementer of programs with all stakeholders, including mayors in two small towns in coastal Bangladesh, Mongla and Noapara (see the figure). It is helping town authorities in planning and implementing initiatives that are intended to be hospitable to incoming settlers, so that they can gradually be mainstreamed into citizenship (*6*). The process is based on a participatory, consultative process involving the municipal authorities, host community leaders, and settlers.

The Strategy (NSMDCIID) includes options such as supporting livelihood for new settlers and skill development, both in displacement hotspots and in new settlements. Although these towns do not yet have adaptation plans as such, the programs consider risk-informed and socially conducive adaptation measures. BRAC with its Climate Bridge Fund is also currently implementing different programs in five cities: Khulna, Rajshahi, Satkhira, Barisal, and Sirajgonj. For programs under implementation in these cities, the target groups are incoming migrants, who crowd the slums. The activities undertaken in these cities are similar, with some specific activities in each town (see the figure). Most of the new settlers have moved from rural areas rendered inhospitable as a consequence of slow and sudden-onset climate impacts. ICCCAD started facilitating this program 3 years ago with a strategy of learning by doing. Among the lessons learned: (i) Vibrant economic activities in these rapidly growing towns are absorbing increasing numbers of migrants from vulnerable hotspots, and (ii) migrants with energy and agency are engaging themselves in different small businesses, with government support and microcredits from Grameen Bank and BRAC.

The fact that an overwhelming share of those displaced by climate change around the world resettle internally indicates that adaptation in-country is the most viable option. The global community dealing with disaster displacement, including the United Nations Framework Convention on Climate Change (UNFCCC), primarily recommends this option. However, it requires adequate international support, which developed countries are obligated to deliver (with the language "shall provide") under the UNFCCC and the Paris Agreement. Unfortunately, adaptation finance continues to remain the "poor cousin" of mitigation, the ratio remaining 20:80 despite repeated pledges by developed countries and agencies. For domestic resource mobilization, some countries (for example, Fiji) have introduced an adaptation levy on all goods and services produced and consumed in the country.

SELECTIVE RELOCATION ABROAD

There are limits to relocation in-country; sudden and slow-onset events sometimes trigger cross-border movement of individuals seeking jobs and protection. The UN Commission on Human Rights argues for looking at such mobility from a human-rights perspective (i.e., the space for realizing the basic human rights of livelihood, health, housing, etc.). Currently, those displaced by climate change suffer an international protection deficit, not qualifying as "refugees" under the 1951 Geneva Convention. Consideration of those displaced by climate change began in 2008 under the UNFCCC, with research and advocacy. The Cancun Adaptation Framework (Decision 1./CP16, paragraph 14f) provides for different types of climate-induced human mobility (displacement, migration, and planned relocation), different scales of mobility (national, regional, and international), and different actions (research, cooperation, and coordination). This decision recognized migration as an adaptation strategy. The Nansen Initiative in 2011–2012 focused on promoting research and planned relocation. The Paris Agreement established a Task Force on Displacement under the Warsaw International Mechanism, with mandates to make recommendations for averting, minimizing, and addressing climate change–induced displacement. Finally, the Global Compact on Safe, Orderly, Regular and Responsive Migration was adopted in 2018 as the first multilateral framework to cooperate on migration, including in response to climate change.

Many major countries and think tanks started looking at climate displacement through a lens of national security, with its characterization as a "threat multiplier," and a number of nationally determined contributions under the Paris Agreement refer to those displaced by climate change as potentially fueling national and regional conflicts (*7*). However, climate security can be looked at either from a conflict perspective or from a lens of vulnerability-focused human and global security (*8*). The "conflict view" proponents call for closing the borders, but still the result of such a policy ends up being a humanitarian disaster, caused primarily by actions beyond the control of those being displaced or of their home countries. Should we see more of these displaced and disgruntled youth as victims in the hands of human traffickers? If not, we then argue—viewing this displacement in terms of vulnerability-focused human security—that planned relocation internationally can be an effective way forward under paragraph 14f of the Cancun agreement.

As multilateral processes are typically very cumbersome and painstakingly slow,

PHOTO: SUVRA KANTI DAS/ABACA/SIPA USA/AP IMAGES

Floods and erosion—such as along the Padma River in Louhajang, Munshiganj, on 23 July 2020—ravage communities, whose residents must retreat.

bilateral action can be more rapid and effective, and may then gradually feed into regional and global initiatives. For example, the Seasonal Migrant Worker Program in Australia and New Zealand, or New Zealand's Climate Visa Program (*9*), attract migrants from the Pacific Small Island States (although these initiatives are not solely meant for absorbing migrants displaced by climate change). Canada and the United States offered immigration opportunities to typhoon Haiyan victims, but these were based on kinship relations (*10*). Although the EU does not have a common policy, Finland and Sweden changed their earlier liberal policies on climate-induced displacement after the refugee influx from Syria (*11*). There are also provisions of circular migration, as between Spain and Colombia. The IOM continues recommending such migration between developed and developing countries as an adaptation response to climate-induced vulnerability. The Bangladesh Strategy recommends such options as well.

Many developed countries already suffer from demographic deficits, with negative growth, and increasingly aging cohorts. The rhetoric in many of these counties, which often is anti-immigrant, cannot change the reality that these countries will need more and more young and skilled labor. Using projected needs of specific skills, developed countries could thus enter into bilateral agreements with climate-vulnerable countries, where those displaced by climate change may be trained in jointly supported educational and training institutions, either for permanent or for circular migration. For example, under the "Triple Win" program, Germany recruits nurses from Serbia, Bosnia-Herzegovina, and the Philippines to meet their nursing shortage, while reducing unemployment and contributing to economic development in the countries of origin (*12*). It is only just and fair for developed-country emitters of greenhouse gases to take some responsibility under Article 3.1 of the UNFCCC for their disproportionate contributions to generating this increasing number of people displaced by climate change.

Lessons suggest that migration to rich countries can have strong positive impacts on labor market, GDP growth, and public revenue for host countries (*13*, *14*). Migration is also typically positive for countries of origin, through remittance, transfer of technology, skills, domestic consumption and GDP growth, housing, children's education, and more. In 2017, low- and middle-income countries received more than $466 billion in remittances, three times the amount of official aid (*15*). This presents an important indicator of the effects that bilateral agreements on migration of climate-displaced people may have on promoting many different Sustainable Development Goals. Such migration should be framed as a win-win option, not as climate humanitarianism (*10*).

The Bangladesh Strategy (NSMDCIID) argues for creating "opportunities for international labor migration by one or few members of families from the displacement hotspots" (p. 115). Older and underage family members and spouses can stay behind and rebuild their lives with remittance support. We believe this option of selective, not wholesale, relocation as a pragmatic policy can be scaled gradually, as warranted by projected demands of skills over time in developed countries. This relocation is based on bilateral planning and preparation, unlike the conventional, voluntary migration of skilled labor to industrial countries.

This option is challenging, though mutually rewarding. However, acceptance of this proposal by Western democracies depends on whether they are ready to embrace and enjoy more of "smart/pooled" sovereignty, with enlightened self-interests under climate-induced vulnerability interdependence, rather than holding on to a centuries-old "Westphalian" model of a zero-sum game in global cooperation. Many have argued that with the increasing number of global commons problems, we now live in a positive-sum world. But such a paradigm shift warrants a vigorous campaign to raise awareness among citizens in industrial countries about the "new normal" of increasing extreme and ever-growing slow-onset events. Those citizens and politicians must face the lead and obligatory responsibility their countries have assumed under the international climate regime to support adaptation in vulnerable countries. Such awareness must confront and overcome the xenophobia and anti-immigration sentiments that often surface in many countries, inhibiting the enjoyment of mutual dividends, which can contribute to real and sustainable global peace and security.

GERMINATE COORDINATION

Successful implementation of the two options raised above (migrant-friendly towns and bilateral agreements for international migration) could help to germinate coordinated implementation, as stipulated in the Cancun agreement, of global policy frameworks on climate change (UNFCCC), disaster risk reduction (Sendai Framework), and human migration (Global Compact for Migration). As many ideas and actions on planned internal or international relocation of climate change–induced displacement are relatively new in the national and global policy domains, continued research and science-policy interface are essential in order to determine the feasibility, efficacy, and scalability of these options. ■

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Mizan R. Khan, Saleemul Huq, Adeeba N. Risha and Sarder S. Alam

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