

# Complex Mechanisms in Climate Refugee Management: A Case Study from Bangladesh

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**Abstract:** Global climate change has intensified extreme weather and resource shortages, making climate refugees a growing concern, particularly in Bangladesh's Khulna region. This study uses mechanism complex theory and case analysis to explore how Bangladesh addresses climate refugee challenges through international, human rights, and environmental laws. Khulna faces issues like resettlement difficulties, food insecurity, education and healthcare shortages, unclear legal status, and limited interstate cooperation. While efforts exist, problems like poor resource allocation and implementation persist. The study highlights the need for better interdepartmental coordination, international cooperation, local capacity building, and increased global support to manage climate refugees effectively.

## 1 INTRODUCTION

The growing global climate crisis, characterized by extreme weather phenomena and resource shortages, is increasingly forcing large populations to lose their homes to environmental changes, leading to the emergence of climate refugees. The traditional definition of refugees and its position in international law as represented by the 1951 Refugee Convention do not mention the phenomenon of climate refugees, which calls for increased focus on such a phenomenon from the international community. Climate refugees manifest differently across the world, as, for example, populations in certain countries migrate from drought-affected areas to better water availability areas. Or as in the case of Bangladesh, rising sea levels and floods make the coastal populations migrate inland. Bangladesh, being a low-lying and densely populated country, is highly susceptible, with the Khulna region being an illustrative example of rising sea levels, floods, and soil salinity. These tensions generated by climate change force residents to change their livelihoods and migrate east. In turn, population migration puts pressure not only on the social composition of the area of origin but provides an ongoing burden on the resources, infrastructure, and public belongings of areas of destination. For those who remain, living conditions deteriorate, along with exposure to poverty

and vulnerability. Consequently, the climate refugee issue in Bangladesh represents not only an environmental challenge but also a complex socio-economic problem, urgently requiring concerted efforts both domestically and internationally.

At the level of international relations, Bangladesh's challenge in coping with climate refugees is not only related to its domestic policy but also its position in the world political economy. As a developing country, Bangladesh finds it hard to gain support from the international community. However, by participating in international climate change dialogue and negotiation, Bangladesh can strengthen its voice in global climate governance and urge the international community to pay more attention to the climate refugee issue while getting technical, financial, and knowledge-based support. Therefore, Bangladesh's synchronization between domestic policy and international cooperation, as well as effective mechanism integration and conflict resolution in managing climate refugees, will be a case for global climate governance.

This study aims to present the theory of mechanism complexity. A case study will be conducted to illustrate how Bangladesh deals with coordinating multiple mechanisms such as international law, human rights law and environmental law to establish a sound climate refugee management system. The theory is mechanism complexity, which allows for the

integration of multiple mechanisms as it focuses on the coordination and cooperation among multiple mechanisms, meaning that multiple fields can be integrated. This research not only focuses on how Bangladesh can leverage international cooperation, non-governmental organizations, and other forces to enhance the international protection and management of climate refugees, but also examines how to strike a balance between domestic policies and international mechanisms, offering practical improvement proposals. The aim is to provide new insights and references for climate refugee management.

## **2 THE KHULNA ISSUE**

### **2.1 Introduction**

Khulna is an important city located in the southwestern part of Bangladesh, at the confluence of the Padma River (lower section of the Ganges) and the Rupsha River, near the Indian border. As the capital of the Khulna Division, the city serves not only as the administrative center of the region but also plays a significant role in industry and commerce, particularly in sectors such as paper production, wood processing, and sugar manufacturing. Additionally, Khulna is one of the main gateways to the Sundarbans National Park. The Sundarbans is renowned for its vast mangrove forests and rich biodiversity, and it is one of the largest mangrove ecosystems in the world.

### **2.2 The Problem of Climate Refugee**

#### **2.2.1 Climate Refugee Resettlement**

Natural disasters have led to large numbers of people being forced to move to the Khulna region. For example, in early 2011, approximately 60,000 people were displaced in remote areas of southwestern Khulna District due to permanent coastal flooding caused by rising sea levels (Displacement Solutions, 2012). This is an organization where many residents are forced to live on embankments, surrounded by uncontrolled waters or large areas of abandoned land. It is worth noting that 90% of the displaced people have no fixed source of livelihood and can only rely on humanitarian assistance to survive.

Migration has fundamentally changed because two countries, Bangladesh and India are affected by climate change. There is a lot of migration in Khulna due to rising sea levels and increased flooding (Adger et al., 2018). Many residents in the low-lying areas have been affected by climate change. All of these

migrants fleeing will create pressure on the receiving side. The impact on the areas where migrants are fleeing will not only be physical but also affect the structure of the human economy and society.

#### **2.2.2 Food Security**

Since the relocation of displaced persons to temporary settlements by the government and humanitarian agencies alleviated the issue of displacement, food security proved to be the most pressing challenge for the Khulna region. Salinization and floods have destroyed a large amount of agricultural land, directly impacting local crop production. Underpinning the Khulna region economy, agriculture has plummeted dramatically, which resulted in crop shortages and loss of income. Other than being deprived of the traditional agricultural source of income, the majority of the households cannot make a living without food self-sufficiency, adding to the overall level of poverty. Moreover, the overall situation has worsened due to climate change-caused unstable climate conditions and the frequency of extreme climate incidents. Agricultural production and food security have been subjected to an increased level of uncertainty (Chowdhury and Hasan, 2022). In this context, food security in the Khulna region is not only affected by natural environmental factors, but also by changes in socio-economic structures. Long-term solutions are urgently needed to address this problem.

#### **2.2.3 The Shortage of Education and Healthcare Resources**

With the influx of climate refugees, the host communities in the Khulna region are facing tremendous pressure in terms of education and health services. Due to the population surge, the resources of schools and hospitals are insufficient to effectively cope with the sudden increase in demand, resulting in a significant decline in the quality of education and health services. In terms of education, the capacity of schools has quickly reached its limit, the number of students has increased significantly, classrooms are crowded, and teacher resources are tight, which has affected the quality of teaching, especially for children from poor families, and the dropout rate has increased, further exacerbating social inequality (McAdam and Saul, 2010). In the medical field, hospitals and health service systems are also unable to meet the sharply increasing demand. With the increase in health problems among vulnerable groups such as pregnant women and the elderly, the allocation of medical resources has become more

difficult, and the timeliness and quality of treatment services have been threatened. The migration of refugees in Bangladesh has been a huge strain on its public service system, and also brought new challenges to the host communities in the process of social inclusion. In Khulna, due to refugee migration, schools and hospitals are especially under stress and effective ways to resolve this increasingly serious situation are urgently needed (Ahmed and Ahmad, 2013).

#### **2.2.4 Legal Status and Social Integration**

Many climate refugees may be faced with an uncertain legal identity after immigrants settle in the receiving areas, such as Khulna (Dewan, 2023). The immigrants can neither fully enjoy the social rights of the place they come from nor adapt themselves to the social system of the place they immigrate to. The ambiguity of their identity leads to their unfavorable situation of employment, education, and medical treatment and, in any case, they cannot get equal resources and opportunities as local residents. Furthermore, cultural differences and social exclusion also worsen their marginalization and become an obstacle to their social integration. Under the situation of lack of legal protection and social support, climate refugees face greater survival challenges and psychological pressure. The problem of identity and rights of climate refugees in the Khulna area still lacks effective solutions. It is urgent for the government and all sectors of society to take measures to protect this vulnerable group's interest (Kraemer, 2017).

There's still no legally binding agreement on climate change migrants, and current international law doesn't provide sufficient rights for climate refugees (McAdam, 2012). It shows again, that there is a need to enhance international cooperation and construct a better legal infrastructure. Moreover, climate change not only threatens human security, but it can also cause or aggravate violent conflicts, which creates future hardships on climate refugees' social integration (Barnett and Adger, 2007).

### **3 SOLUTIONS**

#### **3.1 Refugee Settlements**

These assistances also provided loans and technical assistance in the development and implementation of the National Adaptation Programme of Action (NAPA) of Bangladesh while also investing in basing

infrastructures like flood embankments and improving drainage systems of the Khulna region. The World Bank and other existing partners of this organization did not just provide finances but also offered their technical assistance to assist the country in dealing with the challenges associated with climate change. It was through such projects that these infrastructures within the Khulna region were improved and consequently, the capacity for floods and management of water resources in this region were improved and therefore the resilience and adaption of communities were improved (Ahmed and Ahmad, 2013).

#### **3.2 Food security**

The Food and Agriculture Organization (FAO) developed salt-tolerant varieties of agricultural crops and agricultural technologies to enable farmers to continue to run farming operations in areas of severe salinity and increase food production. Thus, in Khulna, salt-tolerant rice varieties have been promoted locally by Faon (Ahmed and Ahmad, 2013). At the same time, the Fund for Agricultural Development (IFAD) Micro-Credit Project provides assistance to affected families to obtain funds for buying seeds, fertilizers, and other materials to restore agricultural productivity (Chowdhury and Hasan, 2022).

Thus, farmers of Khulna district were provided with much-needed support with funds through this project.

#### **3.3 Insufficient Education and Medical Resources**

Pantries need to be improved Schooling needs to be improved Mobile classrooms and distance education programs made by United Nation's Fund for Children (UNICEF) have been employed to carry on the educating of climate refugee children. Training and support of teachers have been also provided for coping with learning market niches. The schools of Khulna improvements have been made by the mentioned initiatives and projects. Pantries need the following: emergency medicine Affected sanitation needs to be improved Pantries have emergency medicine delivered by the World Health Organization (WHO). Medical stations and emergency clinics have been established by the affected place for emergency immigration services to climate refugees. Pantries have medical stores for Khulna upgrades (Ahmed and Ahmad, 2013).

### 3.4 Legal Status and Social Integration

International organizations and non-governmental organizations (NGOs) have introduced multiple social integration projects to promote harmonious coexistence between climate refugees and host communities. Organizations such as the Red Cross and Save the Children provide vocational training and mental health intervention to assist climate refugees from the Khulna region in smoothly progressing to the local human community (Ahmed and Ahmad, 2013).

Changes in refugee labels are new challenges to the identification of refugees under globalization (Zetter, 2007). To protect the rights of climate refugees, refugee definitions and policies should be reviewed and revised.

### 3.5 Cross-Border Cooperation and Information Sharing

Countries, governments and international organizations should work together to establish a transnational cooperation mechanism to share information and exchange experiences on climate refugee. So we can predict and control the trend of climate refugee flows, and we can implement measures in advance to avoid emergencies. For example, the G20 group can be the focus of global governance and can promote the establishment of an effective climate refugee protection mechanism (Kraemer, 2017). The case of the Khulna region has also been included in this international discussion.

## 4 EVALUATING INTERNATIONAL MECHANISMS

### 4.1 Interaction Among Multilateral Mechanisms

#### 4.1.1 Resource Allocation and Coordination

The World Bank and other multilateral development banks are providing loans and technical assistance, but in some cases, this is not very effective. For instance, while building flood control dams and improving the drainage in Khulna, resources are wasted due to overlapping implementation and unreasonable project planning.

Limited cooperation across various international organizations, particularly within a region such as Khulna, creates uneven distribution. For example, the

lack of an effective connection between FAO projects to promote salt-tolerant rice varieties and the financial support of microcredit projects has prevented some farmers from making full use of these resources.

#### 4.1.2 Policy Implementation and Local Adaptation

Although many policy frameworks have been developed by institutions such as the actions Human Rights Council (UNHRC), and the International Organization for Migration (IOM), there are gaps in their actual implementation in the Khulna region. For example, the human rights protection policies advocated by the UNHRC may not be fully implemented at the local level, resulting in the legal rights and interests of climate refugees not being effectively protected.

Many aid projects tend to focus on short-term results and ignore long-term sustainable development. For example, although FAO's technical support has increased food production in the short term, the lack of attention to long-term soil health and water resource management may lead to new environmental problems in the future.

### 4.2 Bilateral and Regional Cooperation

#### 4.2.1 Bangladesh-India Cooperation

The two countries have strengthened cooperation in border management, but in the Khulna region, due to its special geographical location, there is still a problem of illegal immigration (Ahmed and Ahmad, 2013). This not only increases the difficulty of management, but also brings security risks to local communities.

Although Bangladesh and India jointly manage cross-border rivers, in the Khulna region, water resource allocation in downstream areas still faces challenges due to the impact of upstream water conservancy facilities (Chowdhury and Hasan, 2022). This unbalanced water resource allocation exacerbates local drought and flood risks.

#### 4.2.2 Regional Cooperation and SAARC

The South Asian Association for Regional Cooperation (SAARC) promotes cooperation among member countries, but in the Khulna region, resource allocation remains uneven. For example, some infrastructure projects may be concentrated in more developed regions, while remote areas such as Khulna receive relatively less support (Ahmed and Ahmad, 2013). Despite the promise of technical



assistance, the actual effect of technology transfer in the Khulna region is limited.

### **4.3 The Role of non-Governmental Organizations**

#### **4.3.1 Coordination and Supplementation of Official Mechanisms**

While Greenpeace has promoted global climate action through advocacy and lobbying, its impact in Khulna is limited. Local environmental awareness and policy promotion require more localized work.

The Rural Labour Market Monitoring and Research Center (RMMLRUR) works for research and policy recommendations. However, the coverage of the vocational training centers needs to be improved in Khulna. Still, many climate refugees do not have skills and employment (Ahmed and Ahmad, 2013).

#### **4.3.2 Community Support and Service Provision**

Though non-government organizations provide direct aid like food, medicine, and education, coverage and continuity of their aid are lacking within the Khulna region.

Efforts to raise public awareness of climate refugee issues and mobilize social participation are not deep enough in the Khulna region. Social opposition and exclusion still exist, affecting the social integration of climate refugees (Ahmed and Ahmad, 2013).

## **5 SUGGESTION**

### **5.1 Establishing a Cross-Departmental Coordination Mechanism**

The Bangladeshi government should set up an interdepartmental committee to clarify the division of responsibilities of various departments in climate refugee management and strengthen the connection with international mechanisms. The mechanism complex theory emphasizes that coordination between various departments within the country and external international mechanisms is crucial. The government can establish a unified policy framework through an interdepartmental committee to coordinate cooperation between departments such as diplomacy, interior affairs and social welfare and international organizations such as the UNFCCC and

the International Organization for Migration (IOM). For example, the diplomatic department maintains communication with international organizations to strive for climate change funds; the social welfare department is responsible for coordinating the actual implementation of local refugee resettlement.

At the same time, the mechanism complex theory also proposes that the flow of information between different mechanisms is the key to achieving efficient cooperation. It is recommended that the government establish an information-sharing platform to update and share information such as resources, funds, and technology of various departments and relevant international organizations in real time, thereby reducing information islands and avoiding duplicate investment and waste of resources. This can promote effective coordination between the Bangladeshi government and multilateral mechanisms and non-governmental organizations (NGOs).

### **5.2 Strengthening Capacity Building**

According to the mechanism complex theory, the interaction and coordination of multiple international mechanisms in dealing with climate refugees requires local governments and communities to have sufficient response capabilities. Therefore, it is recommended to provide professional training on climate change, disaster management, refugee resettlement, etc. for local governments and community organizations. These trainings can be conducted through UN agencies or international NGOs to enhance the understanding of local governments and communities on the requirements of international mechanisms and enhance their initiative and response capabilities in climate refugee management.

It is recommended to set up a special fund to support local governments and community organizations in improving their capabilities in facility construction, vocational training, etc. in the process of climate refugee resettlement. The mechanism complex theory emphasizes that the distribution of resources is often unbalanced on a global scale. By establishing a special fund, the funding gap at the multilateral mechanism or national level can be made up, ensuring that vulnerable areas such as Khulna can receive sufficient support and reducing the uneven distribution of resources.

### **5.3 Promoting Multi-Party Cooperation**

The mechanism complex theory emphasizes that Bangladesh should mobilize more international

resources and technical support through bilateral and multilateral cooperation mechanisms. For example, Bangladesh can sign a cooperation agreement on climate refugee management with developed countries to ensure that these countries' commitments in funds, technology and materials can be implemented promptly. At the same time, it can strive for more climate financing support through international platforms such as the UNFCCC to enhance the overall disaster resilience of climate refugee resettlement.

The mechanism complex theory also emphasizes the role of regional mechanisms. Under the framework of the South Asian Association for Regional Cooperation (SAARC), Bangladesh can promote regional countries to strengthen cooperation in climate refugee management, especially in cross-border resource management and disaster response, and coordinate the allocation and sharing of resources. Bangladesh can work with neighboring countries such as India and Myanmar to study climate refugee management models to ensure that resource sharing in the region is not restricted by national borders and reduce conflicts and unfair resource allocation.

#### **5.4 Leverage the Power of non-Governmental Organizations**

The mechanism complex theory emphasizes that the role of NGOs in climate refugee management cannot be ignored, especially in grassroots services and social mobilization. The government should establish a cooperation framework with NGOs, and use the flexibility and rapid response capabilities of NGOs in climate refugee management to make up for the shortcomings of government mechanisms. For example, Greenpeace can promote local society's awareness of climate change and increase public attention to climate refugee issues; while RMMRU can help provide specific vocational training, employment support, etc. to reduce the social exclusion of climate refugees.

In order to ensure that the projects in which NGOs participate can meet the climate refugee management needs of Bangladesh, the government needs to establish a more stringent supervision mechanism and conduct regular project evaluations. The mechanism complex theory emphasizes that reasonable supervision and coordination can reduce friction and conflict between different mechanisms, ensure the effective use of resources, and avoid duplication of investment or ineffective intervention.

#### **5.5 Promoting Social Integration and Psychological Support**

The mechanism complex theory states that the long-term resettlement of climate refugees relies heavily on social and cultural integration. It is suggested that the government should work with international institutions and NGOs to carry out cultural exchanges in the refugee resettlement area so that refugees can understand local culture, and local residents can also recognize and accept the cultural background of refugees. Forms such as community activities and cultural festivals can reduce social conflicts caused by cultural differences and promote social integration between the two sides.

The psychological issues of climate refugee should be taken seriously. It is suggested that the government and NGOs work together to establish a psychological counseling service system to provide psychological support for climate refugees to recover from post-disaster post-traumatic stress disorder and the stress of adapting to new life. According to the mechanism complex theory, mental health support can not only alleviate social conflicts, but also enhance refugees' self-development ability and help them to better integrate into the community.

#### **5.6 Education and Skills Training**

According to the mechanism complex theory, education and skills training are important means to enhance the self-adaptation ability of climate refugees. It is recommended to set up vocational training centers in refugee settlements to provide skills training courses suitable for the local market, such as agricultural technology and handicraft production. Through cooperation with international educational institutions and enterprises, educational resources and employment opportunities can be provided to refugees to achieve a virtuous cycle of education, skills training and employment.

From the perspective of the mechanism complex theory, Bangladesh can unite international organizations, NGOs and private enterprises, integrate global resources, provide support including teaching materials, teacher training, internship opportunities, etc., and improve the quality and coverage of education and skills training. Through such transnational cooperation, Bangladesh can more effectively solve the employment problems of climate refugees and promote their social integration.

## 5.7 Sustainable Development Planning

From the mechanism complex theory, the construction of climate refugee settlement areas requires. The sustainable development of the resettlement area should pay attention to environmental protection and rational use of resources, try to use environmental-friendly materials and energy-saving technology, such as solar energy, rainwater recycling, etc. At the same time, it is also necessary to develop green agricultural projects, so that refugees can have self-supporting production and living resources, which can not only alleviate environmental pressure, but also create long-term jobs for climate refugees.

In order to reduce the reliance of refugees on foreign resources and help them become more self-reliant, it is necessary to develop ecological agricultural projects using the mechanism complex theory to solve the problem, so as to provide refugees with job opportunities and at the same time, improve refugees' self-sufficiency in food and the sustainable development capacity of the settlement sites.

## 6 CONCLUSION

As a kind of environmental refugee, the climate refugee problem in Bangladesh is a multi-level and multi-dimensional problem not only caused by environmental problems such as climate change, but also by the superposition and interaction of many economies, law, culture, politics, and other aspects. And through the mechanism complex theory, this paper analyzes not only how Bangladesh coordinates international mechanisms with domestic policies and observations to facilitate the settlement and migration of climate refugees, and so on: the case of Khulna shows the influence of climate change on the livelihoods, food security, social infrastructure, and the public services to local people, so it is necessary to enhance the transnational space and international organizations to enhance the cooperation, and realize the joint solution.

However, the latter is still facing issues, such as resource allocation, policy implementation, and social integration, despite efforts from both international and local communities. Bangladesh should strengthen cross-sectoral synergy in climate refugee management, promote interaction and cooperation among different international mechanisms, and enhance the response capability of local governments and communities. The international community, especially developed

countries and multilateral agencies, should further strengthen their support for climate refugees, especially in funding, technology, and knowledge transfer. Through cooperation and coordination, not only can Bangladesh cope with the current challenges, but also provide valuable experience and solutions for the global management of climate refugees.

## AUTHORS CONTRIBUTION

All the authors contributed equally and their names were listed in alphabetical order.

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