

## Rohingya Refugees and Their Impact on the Environment and Climate Change in Bangladesh

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**[Abstract:** Bangladesh, besieged by the Rohingya crisis, mostly since 2017, is hosting over one million Rohingya people who fled Myanmar to escape one of the most atrocities against humanity in the contemporary world. To shelter this large-scale Rohingya influx, immediately, the forestland has been cut, and the hills were levelled to build the makeshift camps, mostly in Ukhiya and Teknaf *upazilas* (sub-districts) of the coastal district, Cox's Bazar, of Bangladesh. Moreover, it is reported that the Rohingyas illegally collect huge volumes of forest resources, for example, firewood, timber, roots, and bamboo for cooking, making shelter, or other uses. Such anthropogenic activities destroyed the forests and vegetation cover of this area, affecting the wildlife habitats, biodiversity, and the total ecosystem with adverse effects on the region's environment and climate system as a whole. In this backdrop, the article uses content analysis method to explain how and what changes have occurred due to human-induced activities endangering the environment and climate related issues in the areas under study. This paper also addresses the impact of environmental degradation and climate change effects, and a few policy recommendations to mitigate the problem in this area.]

**Keywords:** Rohingya, refugee, environment, climate change, forest, Bangladesh.

### 1. Introduction

Refugee research is one of the emerging issues as the world is facing serious strain from its consequences, especially regarding the environment and climate change for the host country. In the host country, refugees are often sheltered in the surrounding critical areas, such as national parks, reserve forests, wildlife sanctuaries, and even agricultural land of the host country. Particularly, refugees create adverse impacts when they stay for prolonged periods of time in environmentally vulnerable countries like Bangladesh. Because of violence in the Rakhine state of Myanmar, a mass exodus of Rohingya people took (or is taking) temporary shelter in the neighbouring country, Bangladesh. Bangladesh accepted these Rohingya people, primarily on humanitarian grounds, which drew the attention of the international community. Following the August 2017 violent conflict in Myanmar's Rakhine state, over 750,000 Rohingyas fled to Bangladesh (United Nations High Commissioner for Refugees [UNHCR], n.d.). These shelter seekers joined with previous influxes of Rohingya refugees in the 1970s and 1990s; now, more than one million Rohingyas are living in Bangladesh (UNHCR, n.d.). The majority of the

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Rohingyas are settled in the Ukhia and Teknaf *upazilas* of the Cox's Bazar district (the south-eastern ecologically critical areas) of Bangladesh, a district near the border with Myanmar identified as the main entry point, mostly crossing the Naf River of Teknaf. The Rohingya population is now outnumbering the local people of Ukhia and Teknaf. According to the Population and Housing Census 2022, the populations of Ukhia and Teknaf are 263143 and 333840, respectively (Bangladesh Bureau of Statistics, 2023, p. 397). The summation of the local people of Ukhia and Teknaf is less than the total number of Rohingya people sheltered in this area.

To shelter this mass influx of Rohingya people, forestland is destroyed to build makeshift camps, resulting in enormous environmental damage, including other immense effects on vegetation cover change, wildlife habitats, biodiversity, and ecological change in this area. According to the United Nations Development Programme (UNDP) report, because of this urgent and vast expansion of refugee camps in the Cox's Bazar district (particularly in Ukhia and Teknaf *upazilas*), Bangladesh faces environmental loss, which is the worst effect of this Rohingya influx (UNDP, 2018, p. 25). For example, according to the Cox's Bazar Forest Department, Rohingyas, sheltered throughout the district, have already razed about 4818 acres of forest reserves worth US\$55 million (UNDP, 2018, p. 87). This serious environmental degradation, mostly caused by the recent Rohingya influx of 2017, also affects Bangladesh's vulnerable climate change.

## 2. Objective of the study

The objective of this study is to find out the impact of the environment and climate change, mostly caused by the Rohingya people sheltered in Bangladesh. To address this objective, some supplementary questions are needed to be answered. For example, what major changes relating to the environment and climate were caused by the Rohingya settlement in Bangladesh? What are the impacts derived from these changes? What are the consequences of environmental degradation and climate change? However, this article's originality lies in addressing two crucial issues—environment and climate change—in the same study with substantial data.

## 3. Methodology and the Structure of the Paper

The methodology of this article is both qualitative and quantitative in nature, which primarily relies on the content analysis method. For analysing various factors of the degradation of the environment and climate change, adequate quantitative data are incorporated to substantiate the qualitative discussion. Thus, this study mainly relied on secondary sources, for example, books, research articles, remote sensing analysis from a few earlier studies, newspapers, magazines, research reports, and web-based documents. To answer the research question as noted in the introduction section and the sources of data, this paper is primarily based on secondary sources. In the following, how and in what ways section-wise discussion is incorporated is noted in detail.

The corpus of the article is divided into seven distinct sections arranged in a coherent and logical sequence. The division is not a watertight one, as ideas and thoughts as narrated in the sections are interconnected as well as interceding. Following the introduction in the first section, objective of the study in the second section, this third section is a discussion related to methodology and the structure of the paper, where the nature of the paper, the technique of collecting data, and the way of analysis are incorporated. Section four, entitled 'Forest Land and Vegetation Cover Change', depicts the scenario of deforestation and vegetation cover changes after the unprecedented speed

and large-scale influx of the Rohingyas from Myanmar to Bangladesh. This section analyses how the forestland has been depleted and how the environment has fallen prey to threats with quantitative evidence. This section is the pivot of the study as it sets the background of environmental degradation and the issue of climate change in the refugee-sheltered areas. The section five fleshes out the environmental and climate change factors that led to widespread loss of wildlife habitat and biodiversity, degradation of the ecosystem, soil erosion, landslides, ecological risk of surrounding critical biodiversity areas, cyclones, flash floods, air and water pollution, carbon dioxide emissions, and the like. Needless to mention, these are some of the worst immediate effects caused by quick and hasty Rohingya settlements in makeshift camps in the Cox's Bazar area of Bangladesh. This not only affected the environment and climate change of Bangladesh but also of some bordering regions of Myanmar connected with India and Thailand. Next, section six incorporates some policy recommendations for a probable way out of these environmental and climate change related problematic issues. Finally, the paper ends with section seven titled 'Conclusion'. The narrative in the conclusion section deals with an analysis of the summarisation of the earlier discussion.

#### 4. Forest Land and Vegetation Cover Change

Because of the mass Rohingya influx in the Cox's Bazar district, they are primarily sheltered in Bangladesh government-owned land for humanitarian reason. These Rohingya people are first sheltered in makeshift camps on 6000 acres of governmental land, which are mostly characterised by forests and hills (UNDP, 2018, p. 87). The immediate effect is that, for making their temporary houses, forests needed to be cut down, and hills were levelled. Moreover, it is accused that the Rohingyas are illegally collecting and using fuelwood, timber, roots, and bamboo for cooking and building their temporary shelters. Ultimately, forest land has been razed, and its impact on the environment and climate is more visible. The collection of forest resources by the Rohingya refugees has had an adverse impact on natural and social forests. According to the UNDP (2018) report, the destroyed forest area contains 58.5 per cent natural forest and 41.5 per cent artificial forest among the total damaged forest land (p. 87). Besides the refugees sheltered in Ukhia and Teknaf *upazilas* of Cox's Bazar, some of the Rohingyas stayed for a shorter time in Naikhongchhari *upazilas* of the Bandarban district, severely damaged the private forests owned by the local people (UNDP, 2018, p. 87). And, within the social forest, more than 1500 local participants have lost their shared trees because of cutting of trees from social forestry plantations (Rahman, 2019, p. 13).

According to Saleemul Huq, one of the environmental experts in Bangladesh, this area is seriously affected by environmental degradation because of the overconsumption of fuelwood by the Rohingya people for cooking, which is causing loss not only to the forest but also to the biodiversity in this region (Huq, 2018). After the immediate influx, it was reported by the aid agencies that the increased demand for fuelwood for the Rohingyas could not be met by the local market. According to Needs and Population Monitoring (NPM) Round 7, about 65 per cent of refugee households collected fuelwood from nearby forests (UNDP, 2018, p. 88). And the surrounding critical biodiversity areas, for example, the Teknaf Wildlife Sanctuary, Himchari National Park, and Inani National Park, were also severely affected and fell into danger due to these Rohingya people. Table 1 below presents the estimated biomass and fuelwood demand in the three

protected forest areas possibly impacted by the Rohingya refugees for collecting fuelwood.

**Table 1** Available biomass and fuelwood demand in the area of interest of the Rohingya refugee camps

| Name of protected area    | Baseline area (ha) | Projected 5 km (ha) | % to baseline area | Projected 10 km (ha) | % to baseline area |
|---------------------------|--------------------|---------------------|--------------------|----------------------|--------------------|
| Teknaf Wildlife Sanctuary | 11615              | 6375                | 55                 | 11615                | 100                |
| Inani National Park       | 7770               | 1862                | 24                 | 7264                 | 93                 |
| Himchari National Park    | 1729               | 0                   | 0                  | 0                    | 0                  |

*Source* UNDP Bangladesh and UN WOMEN Bangladesh, 2018, p. 54.

One of the recent informative research papers, the Policy Research Working Paper (latter, referred to as paper), published in 2022, observed that the range of forest area has been decreasing since 2010 in Cox's Bazar, but its loss has been faster since 2017 compared to the early years (Dampha, Salemi and Polasky, 2022, p. 21). Table 2 below also illustrates this declining trend of forest cover loss. The paper (2022) also revealed that almost 20 per cent of the forest area has decreased between 2017 (pre-arrival of the Rohingyas) and 2020 (post-arrival of the Rohingyas) throughout the district, with an equivalent annual loss of 6.7 per cent (Dampha, Salemi and Polasky, 2022, p. 21). On the one hand, the settlement areas of Rohingya refugees were increased across the Cox's Bazar district; on the other hand, the forest area was decreasing. The paper (2022) also exposed that settlement areas enlarged by 21 per cent in 2020 compared to the 2017 estimation (pre-arrival of the Rohingyas) period (Dampha, Salemi and Polasky, 2022, p. 21). Moreover, the paper (2022) found a solid indication that, in the current areas of the Rohingya refugee camps, "land-use / land cover (LULC)" changed from forests to settlements. The paper (2022) also exposed that the official refugee camps gripped a total area of 2545 ha (Dampha, Salemi and Polasky, 2022, p. 21). While 54 per cent of the existing campsites were forested during the pre-arrival of the Rohingyas in February 2017, only 2 per cent were counted in the post-arrival of the Rohingya refugees; this change is equivalent to 1337 ha of forest cover loss (Dampha, Salemi and Polasky, 2022, p. 21).

**Table 2** Description of land cover changes all over the Cox's Bazar district from 2010 to 2020

|                        | 2020                              | 2020–2017                  | 2017–2014                  | 2014–2010                  |
|------------------------|-----------------------------------|----------------------------|----------------------------|----------------------------|
| Class name             | Share of total land area (ha) (%) | Net change (ha) (% Change) | Net change (ha) (% Change) | Net change (ha) (% Change) |
| Forests/ Grassland     | 52629 (25%)                       | 12807.99 (-19.57)          | -135.99 (-0.21)            | -3663.99 (-5.59)           |
| Water/ Fish-ponds      | 39875 (19%)                       | -2272.50 (-5.39)           | 1367.46 (3.35)             | 3249.99 (8.66)             |
| Developed/ Settlements | 82631 (39%)                       | 14511.42 (21.30)           | 4028.76 (6.29)             | -192.06 (-0.30)            |
| Barren/ Bare grounds   | 12202 (6%)                        | 1757.07 (16.82)            | -980.01 (-8.58)            | 3447.81 (30.18)            |
| Planted / Cultivated   | 26302 (12%)                       | -1201.50 (-4.37)           | -4280.22 (-13.47)          | -2841.75 (-8.94)           |

**Note:** The 2020 column shows the share of total land area in ha. The brackets are percentage areas for each class. The rest of the columns show the net change between the two periods in hectares and percentage changes in the bracket.

*Source* Dampha, Salemi and Polasky, 2022, p. 21.

The report also relied on the NDVI<sup>1</sup> visualisation technique to study the vegetation cover change in Cox's Bazar district over the past three decades, which found that most of the vegetation cover began to decrease following the influx of Rohingyas during and after 2017. For example, within the camp areas, the mean NDVI declined by 98 per cent during the post-arrival period of February 2020, compared to the pre-arrival period of February 2017 of the Rohingyas (Dampha, Salemi and Polasky, 2022, p. 22). In Cox's Bazar district, the Teknaf peninsula, including its protected Teknaf Wildlife Sanctuary (one of the oldest reserve forests of Bangladesh), is adversely affected by the recent Rohingya crisis, making it a more ecologically critical area. The vegetation of the southern coast of Bangladesh plays an important role in the climate change adaptation and resilience process in this area and in Bangladesh as a whole. In a study with remote-sensed images, it has been revealed that the vegetation cover decreased severely as a result of the recent settlement of the Rohingyas in camps and their practice of cutting trees to use fuelwood for cooking. According to this study, the characteristics of vegetation cover change in Teknaf *upazila* and the Teknaf Wildlife Sanctuary are shown in Table 3 and Table 4. In these tables, the change in vegetation cover is exposed in the rightmost column. The analysis based on the timeline shows a rapid change in the decreasing rate of land area in hectares of vegetation cover in both Teknaf *upazila* and Teknaf Wildlife Sanctuary, immediately after the Rohingya influx in 2017. According to the study, as shown in Table 3 and Table 4, total vegetation cover declined by 1284.48 ha and 102.87 ha in Teknaf *upazila* and Teknaf Wildlife Sanctuary, respectively (Imtiaz, 2018, p. 17). These negative changes have an immense impact on the environment and climate adaptation, as the assessment was conducted through satellite images after about 3.5 months of the Rohingya influx in Bangladesh, which started on 25 August 2017. The frequent influx of these Rohingyas to Bangladesh, though fewer than before, formed a severely adverse effect on forest and vegetation cover change and finally threatened the environment and climate.

**Table 3** Total vegetation cover change in Teknaf *upazila*

| Year | Number of pixels | Area in ha | Area changes in ha |
|------|------------------|------------|--------------------|
| 2014 | 290056           | 26105.04   | -                  |
| 2015 | 288712           | 25984.08   | -120.96            |
| 2016 | 292206           | 26298.54   | -314.46            |
| 2017 | 277934           | 25014.06   | -1284.48           |

*Source:* Imtiaz, 2018, p. 17.

**Table 4** Total vegetation cover change in Teknaf Wildlife Sanctuary

| Year | Number of pixels | Area in ha | Area changes in ha |
|------|------------------|------------|--------------------|
| 2014 | 127200           | 11448.00   | -                  |
| 2015 | 127684           | 11491.56   | 43.56              |
| 2016 | 127417           | 11467.53   | -24.03             |
| 2017 | 126274           | 11364.66   | -102.87            |

*Source:* Imtiaz, 2018, p. 17.

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1. "... Normalized Difference Vegetation Index (NDVI), a spectral enhancement technique, to transform and manipulate data structure to maximize data display for vegetation cover detection" (Tammy, McGee, and Campbell, 2019, as cited in Dampha, Salemi and Polasky, 2022, pp. 12–13).

Another estimation counted that, every day, nearly 750000 kg of timber, vegetation, and roots are collected as fuelwood from the reserve forest (UNDP, 2018, p. 88). Table 5 below shows a few statistics of loss in Ukhiya and Teknaf *upazilas*, where around 5125 acres of land were acquired for the Rohingyas, and their daily fuelwood demand was at a total of 700 tons, leading to adverse effects on the environment, climate, and the economy as a whole.

**Table 5** Impact of loss on forestry in Ukhiya and Teknaf *upazilas*

| Upazila | Land acquired | Lost forest assets | Created forest assets lost | Daily fuelwood needs (in camps) |
|---------|---------------|--------------------|----------------------------|---------------------------------|
| Ukhiya  | 5000 acres    | Tk. 500 crore      | Tk. 235 crore              | 650 tons                        |
|         |               | US\$60.2 million   | US\$28.3 million           |                                 |
| Teknaf  | 125 acres     | Tk. 50 crore       | Tk. 3 crore                | 50 tons                         |
|         |               | US\$6.0 million    | US\$0.36 million           |                                 |

**Source:** Forest Department, Cox's Bazar Sadar, as cited in UNDP, 2018, p. 88.

However, though some steps were taken to reduce pressure on firewood for cooking by supplementing with alternative fuel, deforestation is still ongoing to a lesser extent. For example, some non-governmental organisations (NGOs) initiated a programme named the “Clean Cooking Programme” and supplied fuel-efficient stoves and charcoal only to 100000 Rohingya families sheltered in Bangladesh (Rahman, 2019, p. 18). The NGOs also provided biogas and liquefied petroleum gas (LPG) to other Rohingya families in this programme (Rahman, 2019, p. 18). It was projected that this programme would save over 1200 ha of forest land per year and reduce CO<sub>2</sub> emissions by more than 500000 tons in a year (Rahman, 2019, p. 18). The pilot programme of August 2018, initiated by the United Nations High Commissioner for Refugees (UNHCR) and partners, distributed LPG cylinders to only some Rohingya households. When the programme scaled up in 2019, nearly 1719101 LPG cylinders (1st time + refill) were supplied to Rohingya households as of 2020; moreover, 96487 LPG cylinders were supplied to host communities' households in the Cox's Bazar district (United Nations High Commissioner for Refugees, 2021). With reference to the International Union for Conservation of Nature and Natural Resources (IUCN) Survey of 2019, an assessment report revealed that 97% of Rohingya households were using LPG for cooking, and about 56% still use firewood occasionally when gas runs out before the due date for refill (Haque et al., 2019, p. 21). Again, referring to the IUCN Survey, the report also noted that 22% of the Rohingya LPG users still collected fuelwood from forests, and another 54% collected it from nearby areas, for example, social forests, homestead forests, etc. (Haque et al., 2019, p. 21). This study showed the hindrance to saving the forest and vegetation cover change. It may be noted that the host communities, living near the Rohingya camps, were receiving free LPG cylinders initially; however, this was discontinued after six months.

Though the usage of LPG cylinders has reduced Rohingyas' dependency on fuelwood collection from forests, the demand for bamboo (another forest product) collection is continuing for the construction of shelter, cooking, and other uses. A study on a recent shelter assessment survey exposed that 38 per cent of the assessed shelters were in “bad condition”, 59 per cent were in “moderate condition”, and only 3 were in “good condition” (Dampha, Salemi and Polasky, 2022, p. 32). As bamboo is regarded as a primary source for constructing shelters, about 99 per cent of all refugee shelters now require “muli” and “borak” types of bamboo for the construction of new makeshift camps or improvement of existing shelters (UNHCR, 2020a, as cited in Dampha, Salemi and

Polasky, 2022, p. 32). A report also noted that, for the construction of the refugee camps, each of the Rohingya families used  $63.54 \pm 11.99$  culms of bamboo with a fresh weight of  $358.93 \pm 85.52$  kg/family (UNDP Bangladesh and UN WOMEN Bangladesh, 2018, p. 51). To meet this huge demand, once the bamboos were mostly collected from the nearby forest of the Rohingya camps, but now it is also supplied from outside of the Cox's Bazar district of Bangladesh. Thus, the increasing demand for bamboo collection is regarded as one of the reasons for deforestation and continuing pressure on the extraction of natural resources from nearby forests or vegetation cover.

### 5. Environment and Climate Change Factors

The unprecedented speed of Rohingya influx and the associated makeshift camp expansion in the Cox's Bazar area include the degradation of the ecosystem, loss of wildlife habitat and biodiversity, human-wildlife conflict (e.g. human-elephant conflict), soil erosion, hill cutting, landslides, water cycle disruption, air and water pollution, cyclones, flash flood, carbon dioxide emission and as such. These have severely affected the environment and the biodiversity of the country, mostly derived from the deforestation. Three coastal areas—Teknaf peninsula, Saint Martin island and Sonadi island—including surrounding critical biodiversity areas, such as Teknaf Wildlife Sanctuary, Inani National Park, and Himchari National Park, are facing ecological risks because of the Rohingya influx and their settlement in Bangladesh. These areas are also home to thousands of plant and animal species, for example, deer, elephants, birds, wild boar, monkeys, squirrels, different types of snakes, bats, and red jungle fowl. Because of the Rohingyas' settlements, the wildlife's traditional way of life was seriously affected by the shortage of food, reduced habitats, disruption of breeding grounds, and limited wandering fields. Besides, according to some experts, this region is part of the flying zone of migratory birds between Middle and East Asia to Australia, and the birds may change their route if the condition of their resting place is hampered (Moral and Islam, 2017). According to the data collected from the interview, Sarker (2023) noted that the Rohingyas were secretly involved in the poaching of animals (p. 51).

Among the wildlife, the wild Asian elephant, which previously played a supportive role in the forestation of the region, is now regarded as a threatened and critically endangered species. The whole ecosystem of this region will be threatened if this kind of forest resource collection is continued and the human-elephant conflict remains sustained for the long term. The diverse food habit enables the elephants to act as a seed dispersal agent in the forest ecosystem, allowing a large variety of plant species at a specific site, eventually shaping the structure, composition and function of the forest ecosystem of the given area (Campos-Arceiz and Blake 2011, as cited in Rahman, 2019, p. 17). Moreover, the huge amount of dung passed by the elephants helped a lot in the nutrient cycle of the forest ecosystem as well as the dispersal of seeds (Sukumar, 2006, p. 4). Thus, it is understandable that if the number of elephants decreases because of human-elephant conflict, this adversely affects the plant species of the forest and finally the ecosystem of this area. By cleaning the forests, camps were built for the Rohingyas' settlement; these forests are regarded as one of the vital natural habitats and corridors of globally endangered wild Asian elephants (*Elephas maximus*) as well as other wildlife in Bangladesh. The Rohingya refugees widely collected (or were collecting) timber, bamboo, or firewood from nearby forests for constructing their shelters or cooking food; this destroyed about 2000 hectares of forest land (Rahman, 2019, p. 10). Blocking of well-known natural pathways and scarcity of food, elephants frequently entered into the camp areas and ruined the settlements, which increased human-elephant conflict and

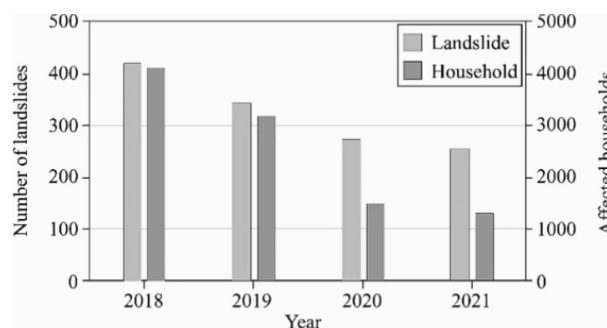
resulted in 13 Rohingya people being killed and about 50 people being injured (Rahman, 2019, p. 10). Table 6 below shows the casualties of the Rohingya people sheltered in the Cox's Bazar area. Also, Rahman (2019) noted that, according to studies, 48 wild Asian elephants are roaming around the Rohingya camps (p. 10).

**Table 6** A summary of casualties of Rohingya people by wild elephants

| Date<br>(2017–2018) | Number of refugees killed |                |        |               | Number of injured<br>refugees |
|---------------------|---------------------------|----------------|--------|---------------|-------------------------------|
|                     | Time                      | Male           | Female | Child         |                               |
| September 18        | 5 am                      | 1 (55)         | -      | 1 (2)         | -                             |
| October 14          | 1 am                      | -              | 1 (30) | 3 (0.6, 6, 9) | 6                             |
| January 9           | 3 am                      | 1 (45)         | -      | -             | -                             |
| January 19          | 4 am                      | 1 (45)         | -      | -             | 5                             |
| January 21          | -                         | -              | -      | 1 (10)        | 2                             |
| February 22         | 5–6 am                    | 1 [2] (28, 30) | -      | 1 (0.7)       | 30                            |
| May 9               | -                         | -              | -      | 1 (12)        | 1                             |
| Total               |                           | 5              | 1      | 7             | 44                            |

*Source* Rahman, 2019, p. 16.

Most of the hilly land of Cox's Bazar is composed of 67% mud and sand, which creates the risk of landslides in this region (Rahman, 2018). The majority of Rohingya refugees were settled in hilly areas and cut hills to make makeshift camps, destroying the natural settings of the surrounding land, and most of the vegetation cover of the terrain has already been removed because of deforestation. Besides, weak soil structure is one of the causes of erosion, and other loose soil or topsoil is seriously vulnerable to being blown away in the rainy monsoon season. Thus, erosion of soil/ground may be the basis of landslides in this season, which caused property loss, blocked the passage, and caused deaths in this area. Also, deforestation raises the threat of flash flooding and creates the risk of cyclones because of extreme precipitation events during the cool, rainy monsoon season. For example, Figure 1 demonstrates the yearly number of landslides that occurred in the Kutupalong Rohingya camps and the affected households for the period of 2018–2021. From this figure, it has been revealed that the occurrence of landslides was more in 2018 (immediately after the huge Rohingya influx in August 2017) than in the data presented in 2021. However, in recent years, the occurrence of landslides has been reduced because of slope stabilisation and afforestation initiatives adopted by non-governmental organisations (NGOs) and the local authorities (Kamal et al., 2022, p. 3).



**Fig. 1** Yearly number of landslides and affected households in the Kutupalong Rohingya camp (*Source* The International Organization for Migration (IOM), 2021, as cited in Kamal et al., 2022, p. 3)



Soil erosion, landslides, and flash flooding frequently occur in this area, which also affects groundwater, water resources, cultivation, and agricultural production, both for the host and Rohingya people. Dwindling of the groundwater is one of the crucial problems for this area, followed by the Rohingya influx. Mohiuddin and Molderez (2023) noted that the water level went down and many tube wells are dysfunctional, as many hosts and Rohingya people mentioned (p. 9). As groundwater levels are exhausted and contaminated in this area, there is the possibility of a risk of transmission of infectious diseases from waterborne pathogens. Another concern is the purity of the drinking water; in the camp water resources, the level of “Dissolved Oxygen” is around 0 or almost near 0 in accordance with the environment department officer (Sarker, 2023, p. 51). Sarker (2023) also noted from the interview with the officer of the environment department that, if the “Dissolved Oxygen” level is less than 4.5 mg/l in any water, then no aquatic elements can live there according to Environmental Conservation Rules 1997 (p. 51). However, another mentionable event is that sewer sludge management is in a critical condition in this area. Thus, the local biodiversity, including the vegetation, wildlife-acoustic environment, air quality, and marine and freshwater ecosystems, is adversely affected at an unprecedented rate. Finally, this degradation of ecological and environmental damage fosters climate change.

Moreover, there are many issues relating to climate change, as the surrounding nature has lost its balance due to deforestation, environmental degradation, various pollution, overcrowding, and so on. As it is noted, most of the Rohingyas are encamped in the Ukhiya and Teknaf *upazilas* of the Cox’s Bazar district; the temperature has increased in this area compared to other areas. The Rohingyas and the host people suffer from incredible heat and climate change around the camp area (Rahaman, 2018, as cited in Mohiuddin and Molderez, 2023, p. 8). During the windy and summer season, dust covers the entire region; as a consequence, various respiratory diseases are breaking out among the host and Rohingya people. Climate as a whole in this region is badly affected as a consequence of the change in the ecosystem, loss of biodiversity, forestland, wildlife habitats, etc., because of the unprecedented scale of the Rohingya influx, especially in the south-eastern ecologically critical area of Bangladesh. Besides the environmental degradation, man-made pollution derived from waste materials and sewer sludge management, for example, the usage of polythene, food packaging trash, kitchen garbage, plastic bottles, and unclean use of latrines, adversely affected the climate. Even with a lack of fuelwood, many families use plastic for cooking as an alternative to firewood (Mohiuddin and Molderez, 2023, p. 9). Also, Mohiuddin and Molderez (2023) narrated that plastic bottles were collected by a Rohingya man for cooking (p. 9). Thus, human-induced climate change accelerates the risk of landslides, flash floods, unbearable heat, damage to makeshift camps’ structure, loss of life, and so on, which finally affects the nature and people of the region. UNHCR, one of the fund-providing UN agencies, is assisting displaced people driven by conflict and climate change displacement, but underfunding reduces the facility from meeting the urgent needs of these refugees or displaced people (UNHCR, 2022).

## 6. Policy Recommendations

From the earlier studies of various scholars and the fieldwork done by the author on different issues of the Rohingyas, it is evident that repatriation is one of the best solutions for the Rohingya refugee crisis to reduce the untoward environmental and climate change issues. From a field study in the Rohingya camps, it has been observed that the Rohingyas are willing to go back to their home country—Myanmar—with citizenship

and other civic rights. However, the process of repatriation through the diplomatic channel appears to remain, at present, mired in a number of complexities and political qualms. As a result, any early repatriation of the Rohingyas to Myanmar is still a far cry. Hence, immediate actions should be taken from the policy level of Bangladesh, including the aid agencies, representatives from the host and Rohingya people, local and international NGOs, and so on. It is quite difficult to stop these climate change and environmental degradation issues overnight; rather, some attempts should be taken to reduce the adverse effects to a minimal level. For example, immediate action can be adopted for the restoration approach of forests, the landscape, and the ecosystem of this area. In this regard, encouraging fast-growing tree plantations to reduce the pressure on the firewood collection of the Rohingyas and the host communities, and seedlings of native species to plant trees are a few immediate solutions to restore the biodiversity of this area. Alternative cooking technologies such as LPG cylinders, improved cookstoves, and biogas should be distributed among the Rohingya refugees to reduce pressure on fuelwood. As discussed in sections three and four respectively, some development agencies, NGOs, and local authorities have taken a few initiatives for reforestation and alternative cooking technologies. Such initiatives should be more elaborate, effective and sustainable. If stakeholders agree, Rohingya refugees could be relocated from protected forest areas to other safe zones. Finally, a complete policy framework, derived from research-based work, should be crafted for the restoration of natural resource management in order to address environmental and climate change issues.

## 7. Conclusion

With the analysis of data from various sources, it is revealed from the foregoing discussion that the environment and climate have been adversely affected by the Rohingya influx in Bangladesh. Firstly, to shelter the mass of Rohingyas, forests were cut and hills were levelled, mostly in the south-eastern ecologically critical areas of the Cox's Bazar district of Bangladesh. It has also been examined how the surrounding critical biodiversity areas (i.e. Teknaf Wildlife Sanctuary, Inani National Park, and Himchari National Park) are severely affected by this Rohingya influx in Bangladesh. Due to the Rohingya settlement, forestland has been razed to an extreme level, with an immense negative impact on the depletion of vegetation cover, wildlife habitats, ecosystem loss, and finally, the environment and climate change of the region as a whole. Secondly, it was noted from various sources that the Rohingyas illegally collected and used forest resources (firewood, timber, roots, bamboo, etc.) for cooking, making and repairing their makeshift camps or for other usages. This has adversely affected the vegetation cover and the climate in this area. As a result of the serious effects of a huge collection of daily firewood for cooking, some aid agencies are currently providing supplemental alternative fuel, for example, LPG cylinders or fuel-efficient stoves. Nonetheless, the collection of firewood is still an ongoing issue in the area. Another forest resource, for example, the bamboo collection, is continuing to make new makeshift camps, repair existing camps, and cook or use for other purposes. Alongside, the Bengali host communities' feeling of deprivation is increasing as they are not getting this kind of support now. Finally, the deforestation process is continuing with the existing Rohingyas or the newcomers, though to a smaller scale, which ultimately degrades the environment and climate of Bangladesh, including the regions mentioned earlier.

The depletion of forest land and vegetation cover change, caused by the Rohingya habitation, has set the background for some of the recent wildlife habitat loss, human-wildlife conflict, soil erosion and landslide, water and air pollution, cyclones,

flash floods, carbon dioxide emission, and so on in this area. It was also noted in the earlier section that there are thousands of plant and animal species (including critically endangered species of wild Asian elephants) in this area; their traditional way of life is seriously affected by the scarcity of food, habitats, breeding grounds, wandering fields, and the like. The weak soil structure of this area is further exacerbated by deforestation, cutting of trees and hills – activities undertaken to make makeshift camps for habitation. This has eventually increased the risk of soil erosion, landslides, pollution, a decrease in water level, disruption of cultivated land, flash flooding, cyclones, other natural disasters, and finally, negative changes in the climate. The disruption of the ecosystem in three coastal areas (i.e. Teknaf peninsula, Saint Martin island, and Sonadi island), as analysed in section four, is clearly indicative of eventual perturbation caused to the environment and climate change in the areas that hosted the in-migration refugees from Myanmar. These human-induced climate changes reduced the opportunity for the resilience process and climate change adaptation of Bangladesh. However, the host people also faced difficulties in socio-economic perspectives that may be addressed in a future study.

## References

- Bangladesh Bureau of Statistics. (2023). *Population and housing census 2022, national report (volume-1)*. Ministry of Planning, Government of the People's Republic of Bangladesh.
- Dampha, N. K., Salemi, C., & Polasky, S. (2022). Rohingya refugee camps and forest loss in Cox's Bazar, Bangladesh: An inquiry using remote sensing and econometric approaches. *Policy Research Working Paper*, (9948). Environment, Natural Resources & the Blue Economy Global Practice, World Bank Group.
- Haque, A. K. E., Bari, E., Khan, M. Z. H., & Mian, A. U. (2019). *Assessment report: impact of LPG distribution among the Rohingya and host communities of Cox's Bazar south forest division on forest resources*. International Union for Conservation of Nature and Natural Resources, Bangladesh Country Office.
- Huq, S. (2018, July 25). A note on the environmental aspects of Rohingya camps. *The Daily Star*. <https://www.thedailystar.net/opinion/politics-climate-change/note-the-environmental-aspects-rohingya-camps-1610368>. Accessed 1 August 2024.
- Imtiaz, S. (2018). Ecological impact of Rohingya refugees on forest resources: Remote sensing analysis of vegetation cover change in Teknaf peninsula in Bangladesh. *Ecocycles*, 4(1), 16–19.
- Kamal, A. S. M. M., Hossain, F., Ahmed, B., & Sammonds, P. (2022). Analyzing the 27 July 2021 rainfall-induced catastrophic landslide event in the Kutupalong Rohingya camp in Cox's Bazar, Bangladesh. *Geoenvironmental Disasters*. 9 (17). DOI: <https://doi.org/10.1186/s40677-022-00219-0>
- Mohiuddin, M. & Molderez, I. (2023). Rohingya influx and host community: A reflection on culture for leading socioeconomic and environmental changes in Bangladesh. *European Journal of Cultural Management and Policy*. Polic. 13:11559. DOI: 10.3389/ejcmp.2023.11559
- Moral, S. & Islam, R. (2017, December 26). *Jibboichitro marattok humkite* [Biodiversity under serious threat]. *Prothom Alo*, p. 4.
- Rahman, M. (2018, March 17). *Bhumidhoser jhukite Rohingyara* [Rohingyas at risk of landslides]. *Prothom Alo*, p. 5.

- Rahman, M. H. (2019). Rohingya refugee crisis and human vs. elephant (*Elephas maximus*) conflicts in Cox's Bazar district of Bangladesh. *Journal of Wildlife and Biodiversity*, 3(3), 10–21.
- Sarker, T. (2023). The Rohingya and the host community in Bangladesh: A future threat of environmental conflict. *Journal of International Affairs*, 25(1), 33–70.
- Sukumar, R. (2006). A brief review of the status, distribution and biology of wild Asian elephants. *International Zoo Yearbook*. 40(1), 1–8.
- UNDP Bangladesh and UN WOMEN Bangladesh. (2018). *Report on environmental impact of Rohingya influx*. Dhaka, Bangladesh.
- United Nations Development Programme. (2018). *Impacts of the Rohingya refugee influx on host communities*. Dhaka, Bangladesh.
- United Nations High Commissioner for Refugees. (2021). *Rohingya refugee response –Bangladesh LPG distribution tracking dashboard 2020*.
- United Nations High Commissioner for Refugees. (2022). *Top climate emergencies impacting refugees in 2022*. <https://www.unrefugees.org/news/top-climate-emergencies-impacting-refugees-in-2022/>. Accessed 31 October 2024.
- United Nations High Commissioner for Refugees. (n.d.). *Rohingya emergency*. <https://www.unhcr.org/emergencies/rohingya-emergency>. Accessed 2 July 2025.

[সার-সংক্ষেপ : বাংলাদেশে রোহিঙ্গা সমস্যার প্রভাব ২০১৭ সাল থেকে প্রবল আকার ধারণ করেছে, বর্তমানে দশ লাখেরও বেশি রোহিঙ্গা মিয়ানমার কর্তৃক অভ্যচারিত ও বিতাড়িত হয়ে বাংলাদেশে আশ্রয় নিয়েছে। এই বিশাল সংখ্যক রোহিঙ্গাদের আশ্রয়ের লক্ষ্যে তাৎক্ষণিকভাবে বাংলাদেশের উপকূলীয় জেলা কক্সবাজারের উখিয়া এবং টেকনাফ উপজেলার বনভূমি কেটে এবং পাহাড় সমান করে অস্থায়ী ক্যাম্প নির্মাণ করা হয়েছে। তাছাড়া, অভিযোগ আছে যে রোহিঙ্গারা অবৈধভাবে বিপুল পরিমাণ বনজ সম্পদ সংগ্রহ করছে, যেমন জ্বালানি ও আসবাবপত্রের কাঠ, শিকড়, বাঁশ যা তারা রান্না, আশ্রয় নির্মাণ এবং অন্যান্য কাজে ব্যবহার করছে। এই ধরনের মানবসৃষ্ট কার্যকলাপ এ অঞ্চলের বন এবং গাছপালা ধ্বংস করেছে যার ফলে বন্যপ্রাণীর আবাসস্থল, জীববৈচিত্র্য এবং সমগ্র বাস্তুতন্ত্র ক্ষতিগ্রস্ত হচ্ছে; এতে করে সমগ্র অঞ্চলের পরিবেশ ও জলবায়ুর উপর বিরূপ প্রভাব পড়ছে। এই প্রেক্ষাপটে বিষয়বস্তু বিশ্লেষণ পদ্ধতির মাধ্যমে প্রবন্ধটি ব্যাখ্যা করে যে, মানবসৃষ্ট কার্যকলাপের কারণে এই গবেষণাধীন এলাকাগুলোর পরিবেশ এবং জলবায়ুর কী কী পরিবর্তন ঘটেছে এবং পরিবেশকে কিভাবে বিপন্ন করে তুলেছে। এই প্রবন্ধে পরিবেশগত অবক্ষয় ও জলবায়ু পরিবর্তনের প্রভাব এবং এই সমস্যাসমূহ নিরসনের লক্ষ্যে কিছু নীতিগত সুপারিশও তুলে ধরা হয়েছে।]