

SUSTAINABLE DEVELOPMENT AFFECTING BY THE CLIMATE CHANGE: A SECONDARY STUDY OF CYCLONES (NATURAL DISASTERS: SIDR, AILA AND ROANU IN BANGLADESH

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*Corresponding Author, Received: April 12. 2020, Revised: May 15. 2020, Accepted: May 17. 2020

ABSTRACT: Climate change makes the world thoughtful to take care of nature to keep safe the earth. Bangladesh is one of the most popular countries that experienced many natural disasters almost every year. The aim of this research to make a measure of the factors that affected sustainable development in the country. By natural disasters cyclones such as Sidr 2007, Aila 2009, and Roanu 2016, which will help the responsible division of the natural disaster and sustainable development sectors to figure out the knowledge about natural disasters that effecting the SDG in the country. The research shows the result that cyclone (Sidr 2007, Aila 2009, and Roanu 2016), flood, earthquake, and land-sliders are the most dangerous and frequent natural disasters that were affecting sustainable development. By the damages of the info structure in the country such as roads, houses, bridges, agriculture, cyclone centers, and social economy. Those problems can solve with the advancement of education plus providing the physical resources in advance to face the incident. Furthermore, natural disaster management works together with the United Nations Development Programs by implicating the Climate Change Assessment Projects in Bangladesh.

Keywords: *Cyclone, Climate Change, Effects, Sustainable-Development, Bangladesh*

1. INTRODUCTION

Human activities with nature cause climate change [2] [4] [5] [6] [8]. Natural disasters can come to any part of the world at any time because it happens naturally. That is the reason why it can be a huge factor in the country's sustainable development goals [13]. There are some studies about the natural disasters in Bangladesh; however, those studies have not included specific factors of natural disasters in the sustainable development of the country. This study aims to find out and fulfill the study gap in natural disasters affecting sustainable development. The results of the study will help the future researcher or government of Bangladesh to solve the existing problems. Bangladesh is the top fifteen climate-risk hotspots in the globe [10] [11] [12] [23].

There is a study that said that Bangladesh is a prosperous country in taking immediate action on the affected areas after natural disasters [15] [16] [25]. That is why the researchers want to make a further study on how Bangladesh overcomes natural disasters. This paper will concentrate on the factors created by the Cyclones to sustainable development goals in Bangladesh, such as Sidr in 2007, Aila in 2009, and Roanu in 2016 [19] [20] [21] [22]. How natural disaster affects sustainable development in Bangladesh? In which sectors need reconstruction

and how Bangladesh can solve the problems created by the natural disaster?

Proactive climate change measures are crucial for every generation of this globe to stay safe [17] [24]. That is why Climate Action is under one of the United Nation's goals among the 17 SD goals. Supporting vulnerable areas will contribute directly to the target 13 SDG, and it will automatically help the other SDGs. These steps must go together with disaster risk management [16] [26] [27], sustainable natural resource management, and efforts to integrate national security strategies into human development. It is still possible to use strong political will. To investment growth, and existing technology, aiming to limit the global average temperature rise to two degrees Celsius above the pre-industrial level is 1.5 degrees Celsius, but this requires urgent and ambitious concerted climate action [28] [29] [30].

Bangladesh is one of the successful survivors of the natural disaster from 1980 to now [31]. The country over-come from the disaster very fast by the self-help and international organizations was there to help Bangladesh government such as UNDP supported Bangladesh in addressing the risk of natural disaster for a long time. For more than 24 years, UNDP helped transform Bangladesh from reactive relief to active risk reduction. The result is evident in the small quantity of lives and livelihoods destroyed by disasters [9]. Currently, Bangladesh is

the world leader of natural disaster management and risk reduction [33].

2. METHOD

This paper is qualitative, and the method of document analysis has used as a research method. Data have collected from secondary sources such as official documents, research reports as well as journals, and newspaper articles for the analysis of the research subject. Relevant information and data related to various government sources collected to support the study such as project documents, annual reports, official statistics, official regulation documents, gray literature, and journal articles [15].

To find solutions to research on natural disasters that effecting sustainable development in Bangladesh by Cyclones. This study approach had chosen for qualitative secondary data study because of the reliability of trusted information published in trusted journals and websites with academic standards. All journals have taken from Google scholars, the report taken from the United Nations Development Programs website, and some Newspapers websites. Moreover, the author cited the references in this research paper via implicating the application called Mendeley, which is a professional citation system followed in the research paper. It can help readers to get the proofs of the references quickly from the list to the link as its systems queuing the lists of references accordingly in the bibliography.

The author's focus on this research is to study the effects created by the Cyclones in Bangladesh, and it causes problems for sustainable development projects or plans in the country.

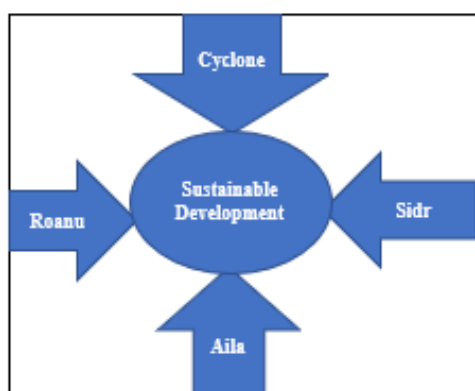


Fig 1. Natural Disasters Affecting Sustainable Development

The framework shows that the author chose the Cyclone (natural disasters) as a study focus to examine the effects that to the sustainable development of the country. In Bangladesh, almost every natural disaster incident happened, such as

heavy rainfalls, floods, land sledding, and Cyclone. Furthermore, it kills lives, and it damages infrastructure, houses, roads, and cyclone center [14]. In 2007 Sidr, 2009 Aila and Roanu in 2016 hits most of the parts in Bangladesh. Thus, the researcher wants to explore the data of those cyclones had damaged the sustainable development in the country [18].

3. RESULTS AND DISCUSSION

Data of Natural Disaster in Bangladesh

The National Report on Sustainable Development states that Bangladesh is rich in unique natural resources. About 30% of the country has about 300 rivers over the river network, including floodplains and wetlands, which maintain rare wildlife, flora, and fauna throughout the country and provide unique yet diverse ecosystems. These systems range from the unique mangrove forests of the southwest to the mangrove forests of the Sundarbans (the world heritage insects). To the coastal and marine ecology in the deep south; In the northeast, there are deep 'HAOR' and natural water basins called 'BAORS.' That has been submerged for half a year and has a unique but changing ecology, dry zones in the upper central part of the southeastern highlands and the plain sand or wetlands in the south to the delta.

Moreover, A catastrophic cyclone in 1991 encouraged additional activity. With the help of UNDP, the government has established a disaster management bureau. With the responsibility of reducing the humanitarian, economic, and environmental costs of disasters, and strengthening national capacity and inter-departmental partnerships, the new bureau has become the institutional basis for an integrated approach to disaster risk reduction, response, and recovery. Between 1994 and 2002, the UNDP supported the development of policies that empowered disaster management committees at all levels of government to reduce risk and plan and coordinate emergency response. This approach integrated into the early 2000s. The government established the National Disaster Management Council with a coordinating framework that embraced civil society organizations and local government authorities. UNDP has supported this integration through a multi-donor comprehensive disaster management program. The program led to revised policies, strategies, and processes that began screening development programs through a 'risk-lens'.

Furthermore, in 2007 Sidr, Aila 2009, and Roanu in 2016 hit the country very deeply. During the Sidr, About 31% of the cropland flooded by the storm, and all the vegetation, habitat, and infrastructure of the area were wholly or partially damaged by Sidr 2007 around the area named

Sarankhola Upazila (151.24 km²) by tropical Cyclone in Bangladesh satellite from moderate spatial resolution. The general situation of livelihoods, crops, animals, fisheries, lack of drinking water, disease transmission, infectious food shortages, lack of food, houses have observed during the cyclone. Aila was heated and flooded with saltwater in southwestern Bangladesh. As a result, it caused much residential damage and destroyed vast properties in Satkhira, Khulna, Bagerhat, and other coastal districts. Furthermore, Cyclone Roanu 2016 hit the east coast of Bangladesh at 1000 UTC on 21 May 2016 at a speed of 110 km / h. to assess the immediate impact of the cyclone on protective infrastructure and local livelihood; a field visit made at Banskhali Upazila of Chittagong district on the coast of Bangladesh.

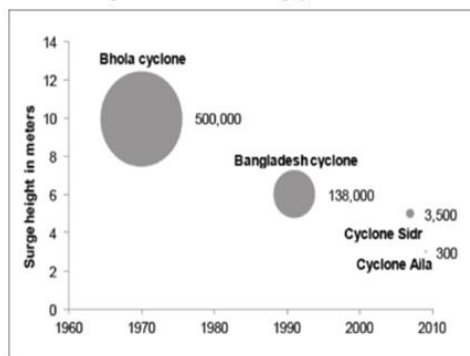


Fig 2. Death tools during the Cyclone Sidr and Aila [1]

Figure 2 shows the distribution of disaster-affected households by the disaster department. Floods and cyclones affect 24.44% of the most common disasters and 15.10% of disaster-affected households, respectively. Over the years, the country has invested heavily in disaster management infrastructure such as flood dams, flood shelters, cyclone shelters, extra, which has resulted in a significant reduction in mortality in recent times. However, many of these social structures suffer from a lack of proper management and maintenance [1]. As a result, structures fail to provide adequate protection during disasters. Rehabilitation of this structure after the disaster is becoming a big problem due to the need for massive funds. For example, after Cyclone Sidr in 2007 and Aila in 2009, sufficient time is needed to rehabilitate coastal rocks [3].

Moreover, Bangladesh faces various challenges in achieving sustainable development. These further complicated by the effects of emerging climate change and disaster risk. It estimated that there were 93 disasters between 1991 and 2000, killing 200,000 people and causing 5.9 billion in damage. According to an official report, abnormal monsoon floods cost 1.1 billion in 2007

and 1.7 billion as a direct cause of cyclone Sidr. These figures further disrupted when considering the distributional impact. Weak areas and marginalized populations, especially women and girls, are unusually vulnerable due to their greater vulnerability and limited resilience. Agriculture employs more than half of the workforce, and about 70 percent of the population lives in rural areas. These communities remain powerless, yet access to new energy sources is central to improving living standards. Similarly, degradation and pollution of natural ecosystems are affecting not only the environment but also livelihoods and health conditions [32].

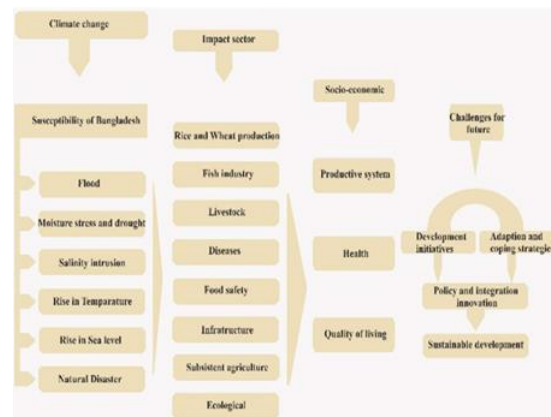


Fig 3. Climate Changes Effects the Sustainable Development [7]

This study is focusing on the area of factors created by natural disasters in the country. The author finds this above figure number 1 is very much related to this research model. [7] Relations of the climate changes with sustainable development, this migration puts an unbearable strain on urban utilities such as water and sanitation services. Climate change believed to adversely affect Bangladesh's river system as melting Himalayan glaciers will lead to higher river flows, resulting in floods and waterlogging in large urban areas. Water The water supply of the city will face a major crisis as its water source will not be sustainable, and people will not be able to get adequate safe drinking water. Crop farming and livestock farming and aquatic construction of residential buildings that eventually lead to the migration of people and animals to urban areas. The migration will put more pressure on our densely populated country (increasingly populated slums) and accelerate urbanization, resulting in social. There will be fierce competition among urban people for access to economic opportunities, and so on, the increase will lead to social unrest. The overall linkup between sustainable development and climate change shown in Figure 3.

In the national revenue plan, Bangladesh became the leader among the least developed countries in giving priority to disaster risk reduction. With the help of the Disaster Management Program, Bangladesh adopted a simple risk reduction model that encouraged national partners to consider climate change risk in addition to existing disaster risk, as well as increase resilience to the national and the population. UNDP supports the development of early warning systems and the introduction of innovative technologies, including the construction of 15,000 disaster-resilient homes and the development of drought and saline-resistant crops. Due to environmental and climatic factors - inadequate energy infrastructure, poor sanitation, pollution, and a large part of the pressure on social services, the pressures associated with rapid urbanization are intensifying in urban centers. Again, this burden falls on the poor. The country has made progress in reducing the death toll from natural disasters. The rest of the challenge is to ensure that people do not face poverty due to natural disasters and not forced to migrate to urban slums. Climate change is exacerbating these problems. Attempts to accurately measure the cost of the effects of climate change remain unfinished and incomplete.

However, the UN system has actively addressed the integration of climate change and disaster risk reduction agendas. Through research and dissemination efforts, rigorous science of climate change has been translated into stable, community-level actions to support adaptation to the way poor people live and work in hydro-climatic hazards.

Cyclones Effecting the Sustainable Development Goals

Conditions of vulnerability are, therefore, dependent on the spatially varying natural environment and social factors. Accordingly, large-scale separation has the effect of locally differentiating and effective in counteracting the catastrophic effects of cyclones and floods, and investment in optimal targets must be optimized. The most effective measure for analyzing the results of a research project is to demonstrate a separate individual analysis and planning requirement, including a vulnerability atlas in the sense of a comprehensive database and development of plans and measures. In 2007 Sidr Cyclone make the record that 3,363 people were dying, and 55,282 were injured. Approximately 563,877 houses were damaged, and 9,55,065 houses partially destroyed. It reported that Sidr affected 186,883 hectares of crop areas were totally damaged, and 498,645-hectare areas were partially damaged.

For the vulnerability atlas, which will be the basis for the planning and implementation of preventive measures, the vulnerability needs to determine the effects of more variables and maybe socially and professionally different. The list of variables will expand beyond what currently investigated, and for example, treatment variables will include and thought to quantify the impact of social power relations. It will also be a tool that shows temporary monitoring of disasters and relief effects and can, therefore, also be used to evaluate policies for external intervention. What has happened during the Cyclone Aila 2009, These cyclones have endangered the lives and livelihoods of the coastal community. Since Hurricane Aila, more than 20,000 families have displaced from Koira and Dokop to embankments and other areas near roads and communal centers.

Furthermore, it caused much residential damage and destroyed vast properties in Satkhira, Khulna, Bagerhat, and other coastal districts. In 2016, at a speed of 110 km / h. to assess the immediate impact of the cyclone Roanu on protective infrastructure and local livelihood, a field visit made at Banshkhali Upazila of Chittagong district on the coast area in Bangladesh.

Therefore, the pre-event situation highlights that disadvantaged communities are the last shelters who are entitled to final social status and were physically vulnerable due to the strategic location of their home locations in relatively low-lying areas. The victims were also financially vulnerable, considering the high rate of illiteracy, large family size, lack of land ownership, and extreme poverty. They were laborers, farmers, and his Sherman on most days. The aftermath of the incident revealed that the victims' homes and livelihoods were severely damaged or destroyed.

Disaster management and risk reduction focus have a wide range of potential hazards, including the impact of climate change. The most significant measure of Bangladesh's success is the dramatic reduction in natural disasters. Historically, deaths in a single event reached millions. However, except for two unusual cyclones in the year 1995, the recent trend is steadily going down. Of course, the challenge remains. Ensuring the same level of affordability across the country and maintaining a 'normal' timeframe between disasters remains a problem. Disaster considerations are a continuous process in Bangladesh, as in other countries, integrating mainstream flows and their development plans.

Climate change is a serious threat to development everywhere. Indeed, the adverse effects of climate change could undo much of the investment made to achieve the Millennium Development Goals. Nevertheless, this is not a zero-sum game. By being creative, we can reduce

emissions while promoting economic development. Economic Development is our opportunity to advance sustainable development, promote new types of cleaner technologies, industries, and jobs, and integrate climate change risk into national policies and practices [32].

The causes of climate change, population patterns, and the impact of economic globalization are increasing risk exposure in almost all regions of the world. The coastal region of Bangladesh is one of the hot spots of the world's cyclone risk.

However, perceptions and management practices of cyclone events vary locally, so that broader arrangements are socially acceptable or economically viable. The complexity of any catastrophic situation is inevitable and unavoidable; Thus, learning to reduce adverse effects is essential for Bangladesh natural disaster management [4].

It is, therefore, necessary to consider the real validity of the causes of social vulnerability, so that they are collected and support a cohesive algorithm. In most cases, it is necessary to encompass the existing interactions between all the factors that lead to significant amplification of social vulnerability and thereby create a socially destructive effect of natural disasters. It is the basis of building plans and measures for a sustainable way of reducing disaster risk. The social acceptance of all relevant measures, including restrictions on use at the local level, can only be increased because the production of these restrictions is transparent [7].

Accordingly, the effects of climate change affect both different economic sectors as well as individual entities. Each event has a different effect on the regional system by natural, economic, and social conditions [22]. Compared to the technical and social standards of higher industrialized countries, the developing countries of the South lack knowledge, awareness, and relevant government responsibilities as well as some physical resources such as social conditions.

4. CONCLUSIONS

Bangladesh's government agencies, non-governmental organizations (NGOs), and local communities have taken various steps to mitigate the effects of natural disasters, including floods and cyclones, on the people, economy, and society. The idea behind the development of national preparedness for accidental response to disasters such as floods and cyclones after the catastrophic floods of 1988 and 1991 was that the main reason behind this change was that if people well prepared for frequent disasters, they would reduce their effects will decrease. Government agencies strongly felt that if disaster preparedness at the family, community, regional and national levels

could have integrated into the socio-economic development process, it would build the long-term capacity of the community to mitigate risks and vulnerabilities.

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