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MYTH AND REALITY OF VULNERABILITY TO DISASTER: PRESSURE AND RELEASE MODEL FOR HAZARDS IN BANGLADESH

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A B S T R A C T

Climate change effects like flood, tropical cyclone with storm surge, salinity, drought, water logging etc. that affect Bangladesh agriculture and coastal area and organizations as well as socio-economy of the country, however There is no researchers and scientist didn't establish any particular standard hazard model yet to examine, estimate and analyze the people's vulnerabilities to disaster due to adverse events. There is a complexity yet between the ecological and social system of our country. The people of Bangladesh don't know yet how vulnerabilities with root causes, dynamic pressures and unsafe conditions contribute to form a hazard or disaster due to climate change. Therefore, the aim of this study is to adapt to the climate change shocks and stress in use of a well-established conceptual frameworks such as Pressure and Release model (PAR). There are many significant major factors such as decision-making power, political power, resources, environmental degradation insecure livelihood and inadequate measure of state to reduce the disaster risks. The mechanisms were adopted with a PAR model. Large-scale disaster to life and livelihood of the people caused for both slow onset changes in climate and unpredictable weather shocks. Despite Social safety net services (SSNS) may help to relief some pressures due to climate change by coordinating disaster risk management (DRM) and climate change adaptation (CCA), it is not enough yet.

Keywords: Climate change adaption (CCA), Disaster risk reduction (DRR), Dynamic pressure, Pressure and release model (PAR), Progression of vulnerability, Root cause, Unsafe condition.

INTRODUCTION

Bangladesh is one of the most vulnerable countries because of climate change with fewer resources to overcome the climate change. Every year low-lying areas of this country are affected by the flood. In the north-west side of Bangladesh, the drought is going acuter. Entire southern parts of Bangladesh now are facing multi-hazard because of the striking of a tropical cyclone with storm surge and salinity intrusion. Nevertheless, sea level rising is gradually appearing as a slow onset disaster as it creates some other perils like a flood, water logging, salinity intrusion etc. (Awal, 2013). Bangladesh is a "beach country" so it is also vulnerable to oceanic tsunami (DDM, 2015) as other countries like Thailand, Indonesia, Japan etc. The whole country along with the adjacent Bay of Bangle will face more than one climate change related peril/hazard/problems. The events arise because of climate change seriously affect agricultural production and livelihood as well as the socioeconomic system. Unfortunately, there are no predictably of those shocks is also acts as a hazard as most rural households especially agriculture deepeners and coastal belt communities are not so prepared because of limited access to political power, resources, market facilities, and so on. Bangladesh government utilizes various types of social safety net services (Morshed, 2009; BDS, 2006)) to tackle the emergencies although these are not enough measure for releasing the pressure appropriately. Generally, climatic disaster can be explained with some conceptual frameworks like Pressure and Release (PAR) model (Wisner, 2003; Wisner, Cannon, Davis, & Blaikie, 1994; Santha & Sreedharan, 2010)). However, in spite of Bangladesh is facing multi-hazards and vulnerabilities there is no such model applied yet for this country. Therefore, the aim of this study is to explain the Pressure and Release (PAR) model in Bangladesh for vulnerabilities due to various type of climatic hazards.

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METHODOLOGY AND STUDY AREA PROFILE

Secondary data have been used in this study. Information on climate change and climate scenarios, and social safety net services of Bangladesh have been collected from scientific articles, published and unpublished reports, online archives etc.

A conceptual framework like Pressure and Release (PAR) model has been used to link up the climate vulnerability, disaster or hazards, social safety net services, and other related information of Bangladesh. Integration of social safety net (SSN), disaster risk management (DRM) and climate change adaptation (CCA) was analyzed for achieving adaptive social protection (ASP) of rural poor.

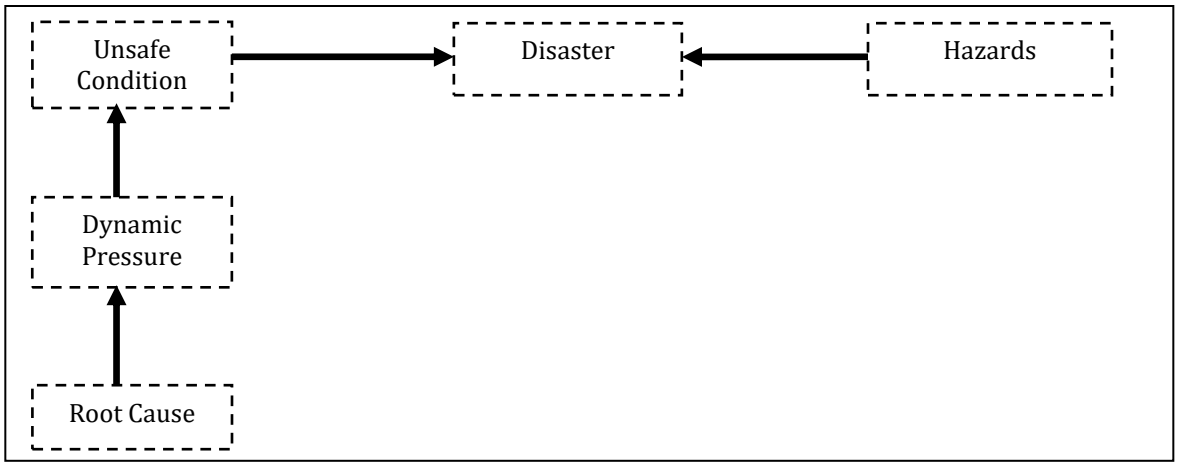

Figure 1. Disaster crunch model. Source: (Ben Wisner, 2003, p. 47).

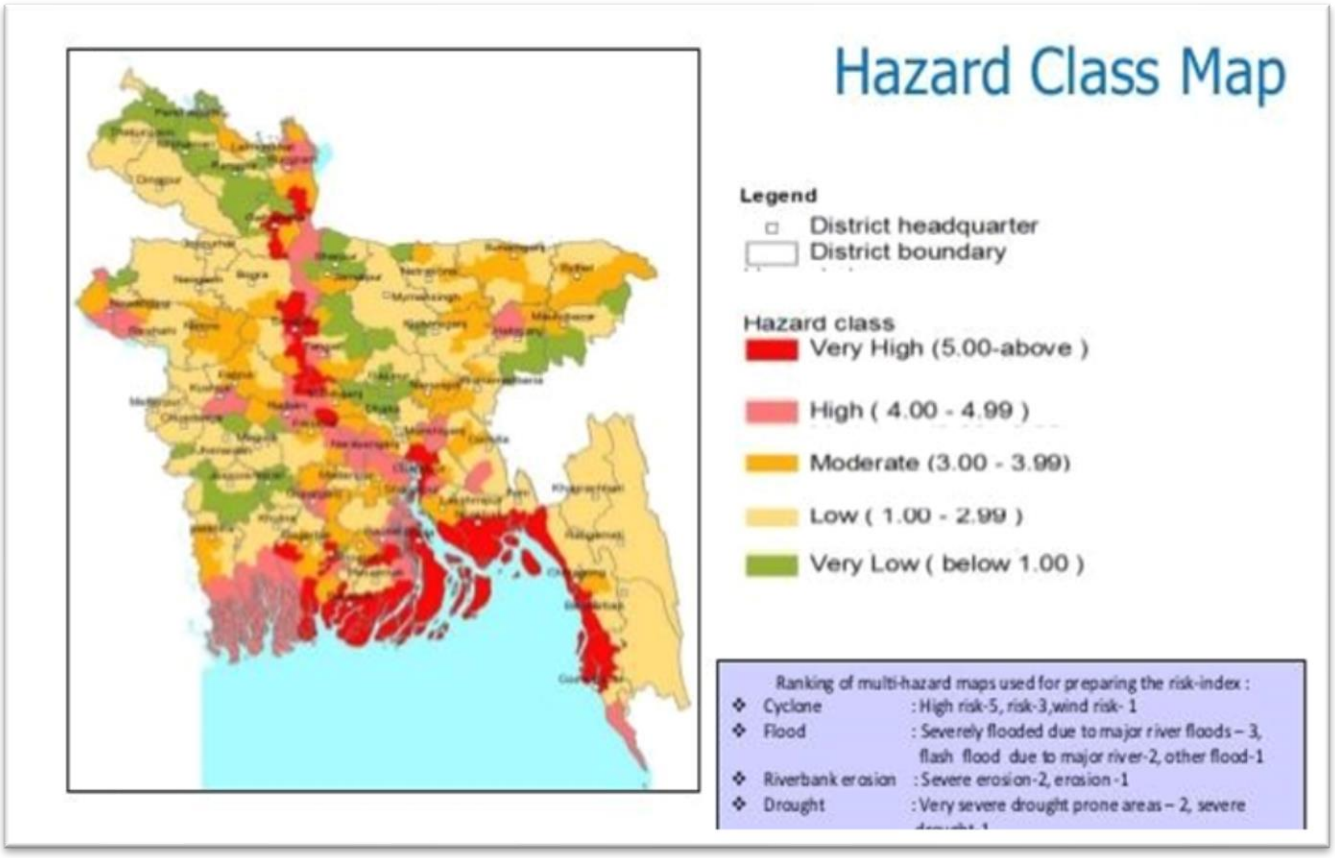

Figure 2. Hazard map Bangladesh. The study area comprised in whole Bangladesh. Source: (Rahman, 2014, May 15).

RESULT AND DISCUSSION

For understanding vulnerability to disaster and to reduce it disaster managers use pressure and release (PAR) model (Wisner, 2003) as a conceptual framework. The PAR model argues that disaster occurs at the tangent between two counter forces, those of natural hazards and the processes that generate vulnerability. It is when these two forces coincide that a disaster happens.

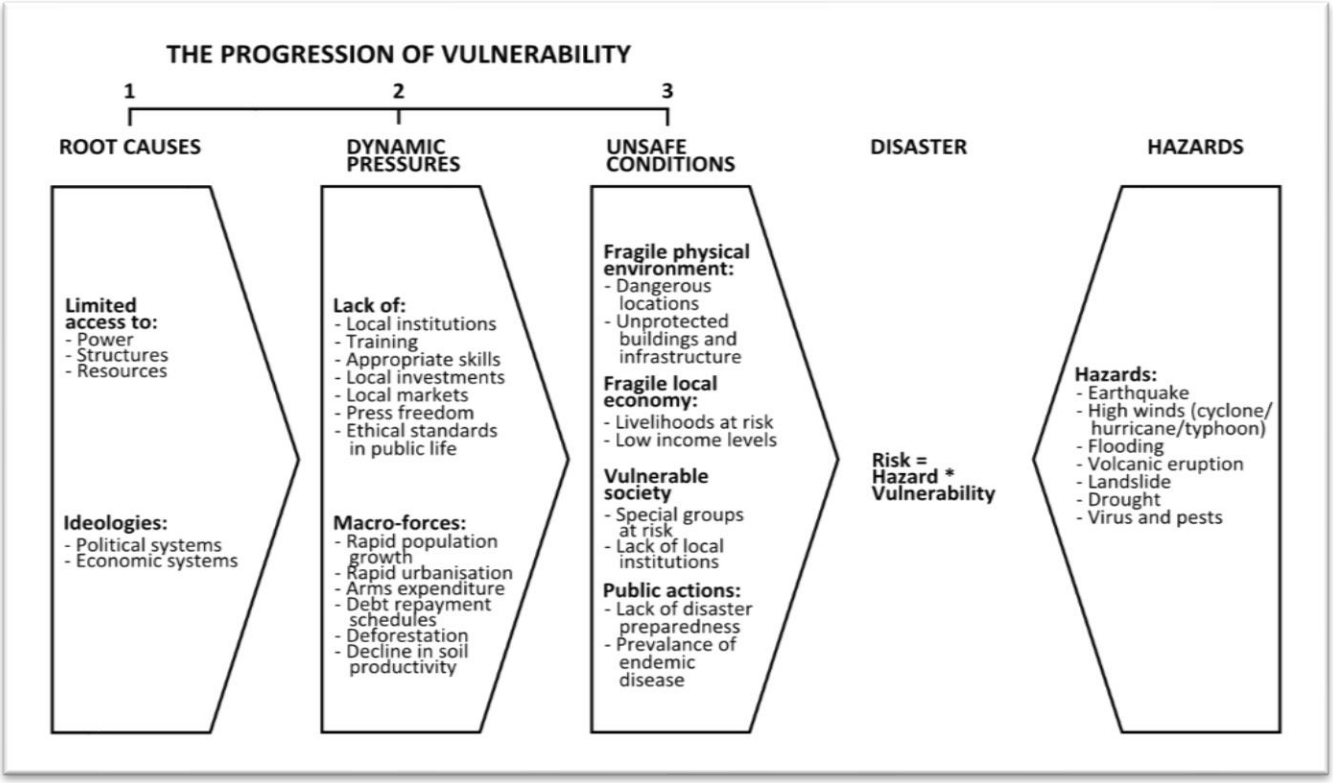

Figure 3. Pressure and release model. Source: (Winser, 2004, p. 47).

The disaster happens when two opposite forces intersect. The processes generate vulnerability on one side, and the physical exposure to hazard on the other. The PAR model is modified to the context of Bangladesh climatic hazards.

When physical exposure and Scio-economic pressure intersects, the production of this intersection will be a disaster. This model has three components on the social side: Root cause, Dynamic pressure and unsafe condition, and another component on the natural side is a natural hazard themselves.

Root cause included an economic, political and demographic process which affects the allocation and resource distribution between different vulnerable groups of people. Dynamic pressure is added with the economic and political process in local circumstances. Unsafe conditions are identified in a specific form in which vulnerability is expressed in time and space, such as those induced by the physical environment, the local economy and social relations. For example-

For example, people who live frequently flood affected areas:
"Unsafe conditions" can be: Dangerous livelihood, weak infrastructure, disaster prone location, inadequate disaster preparation skills etc.
"Dynamic pressures" can be: Lack of community-based organization (CBO) working to reduce the flood effects, inadequate and distanced local market for local farmer to sell their produced agricultural product or to buy the agricultural instruments.
"Root causes" can be: Inaccessible to flood mitigation project and emergency response training, negligence of send minning, lack of government policy on flood warning system, land use planning etc.

Progression of Vulnerability: Vulnerability can be defined as the conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (Sapam Ranabir Singh, 2014). Any disaster can happen from any hazard with the progression of vulnerability to climate change and in attach with the root cause, dynamic pressure and unsafe condition.

The elements that cause vulnerability are explained by the "progression of vulnerability" as well as their relationship. This model is defined as a pioneer model that bought the human factor in disaster management. Disaster management practitioners use this model to identify the vulnerability in the time of Disaster risk assessment.

A "Release Model" was introduced as a counter model and has helped practitioners to identify disaster risk reduction measures in a more comprehensive manner.

Root causes are shaped by this model by a series of dynamic pressure and the rise of an unsafe condition. The three factors are defined as follow:

Root cause: In pressure and release model, root causes are the most important process which concerned about social, economic and political scenarios in association with distribution of power in a particular area. The root causes that can make the people of Bangladesh vulnerable are:

- Mismanagement of Industries of our country.
- Policy gaps and shortcomings in government steps.
- The powerlessness of locals in decision making.
- Highly Depends on agriculture.

Mismanagement of Industries of our country: All the industries of our country are controlled by big industrial corporations. These Industrial sectors are only focusing on the profits and neglecting the local peoples. Because of this, local people are depriving of increasing their economic capacity and getting more vulnerable. And they are responsible for creating a lot of mismanagement in the industrial sector. They are openly polluting the surrounding areas and breaking the environmental ethics. No effective measures are not taken yet to control the pollution to save the air and water. Because of this pollution, the surrounding peoples are affecting a lot of problems such as breathing ailments, polluted drinking water, low agricultural yield etc. Though many assessments were conducted I didn't make any change in this sector. And the situation of people is getting worse but that is unknown to them sometimes. Figure 4 illustrates the number of industry in Savar (most densely industrial area in Bangladesh.

Regulatory gaps and government deficiencies: There are a very serious and a big regulatory gap is identified on part of our government. There is no system of paying compensation by the industry owner or the government to the people affected directly or indirectly. Government and the ministry of environment and forest are also neglecting the pollution created by these industries. But the ground reality is opposite to the claims of the government officials. This study clearly illustrates that the population loving is this industry area are severely affected by many diseases and facing many social problems.

A study shows that-

The chromium released from the Hazaribag tannery industries has been contaminating the water of the river Buriganga for the last 45 years. A statistic available from the Department of Environment reveal that 95 per cent of the tannery industries have been built in unplanned way at the congested places of Hazaribag during the last fifty years. According to a recent estimate, about 60,000 tons of raw hides and skins are processed in these tanneries every year, which release nearly 95,000 litres of untreated effluents into the open environment daily, resulting into the dead river Buriganga (Rusal, 2006).

The powerlessness of locals in decision making: In our country. Local people are totally excluded from the decision making process, no matter whether those decisions are in favour of them or against them. The people sometimes are aware of their situation but don't know how to manage it because they don't have any access to make a decision about them. Even when Industry or any legislative framework is drawn, there doesn't happen any consultation with the local people from whom the low is activated. Therefore, the local people were clearly excluded from the important decisions taken by these industries.

Highly Depends on agriculture: The population of Bangladesh is highly reliant on agriculture.

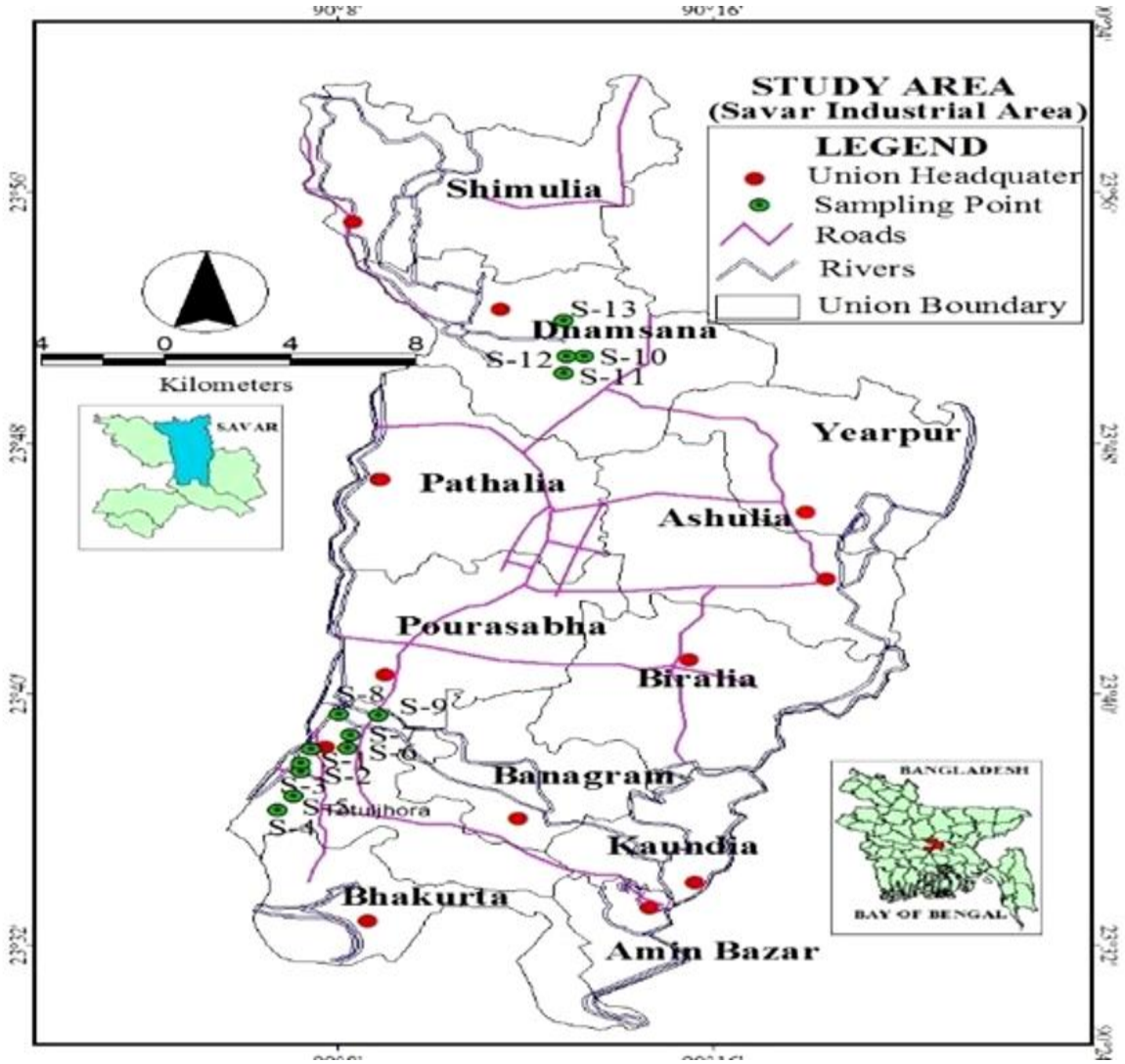

Figure no. 4. The density of industry in Savar. Source: (Faisal, Haydar, Ali, Paul, Majumder, & Uddin, 2014, p.132).

Farming is the main occupation of most of the people of Bangladesh. About 26% of the rural households subsisted on agriculture as their only or principal occupation, while another 13% took it as a secondary source of income. Thus, 13 million rural Bengalis were fully or partially dependent on agriculture. In 1900, about 6,00,000 rural people (7% of the total rural population) of Bengal had farming as the primary occupation (Agriculture and Bangladesh, 2000). But the environmental condition id deteriorating day by day and making agriculture an unavailable option for earning a livelihood. Recently the HAOR area of Bangladesh affected by severing flood. That area only grows one crop throughout the year. But their harvest is totally damaged by the flood. According to the UNO of Deraiy Upazilla, this year in his upazilla approximately 50 million priced crops was destroyed. The villagers have low education and less technical skills; therefore, they do not have any alternate occupation to bank upon. This situation creates food insecurity as well as low their capacity to face a disaster.

Dynamic Pressure: Dynamic pressure is the processes or activities that change the effects of root causes into vulnerability. Dynamic pressures create an unsafe condition by working on underlying root cause. Dynamic pressures work on the underlying root causes to create unsafe conditions. In Bangladesh, dynamic pressures that lead to the vulnerability are access to lack of basic services like water, sanitation, health services, educational opportunities, local investment, micro-financing and proper training.

Water and Sanitation: Over 21 million people in Bangladesh lack access to an improved water source, 38% don't have access to improved sanitation in Bangladesh, over 63 million people and over 4,100 children under five years old die annually from poor water and sanitation in Bangladesh (Water aid Bangladesh, 2016)

In Bangladesh, last year water aid reached: 451,000 people with safe water and 777,000 people with improved sanitation (Water Aid Bangladesh, 2016).

The opportunity of education: The net enrolment rate of Bangladesh at the primary school level increased from 80 percent in 2000 to 98% in 2015, and secondary school net enrolment is now around 54%, up from 45% in 2000. Furthermore, the percentage of children completing primary school is close to 80%, and Bangladesh has achieved gender parity in access, in addition to dramatic decreases in disparities between the highest and lowest consumption quintiles at both the primary and secondary levels.

Quality of education: Bangladesh's workforce of 87 million is largely undereducated (only 4 percent of workers have higher than secondary education), and the overall quality of the country's human capital is low. National learning assessments conducted by the Government of Bangladesh show poor literacy and numeracy skills among students – only 25% to 44% of the students in grades 5 through 8 have mastery over Bangla, English and math, and performance on these measures is especially low among poor students (World Bank, 2014). These are the basic needs that should be fulfilled to make people strong enough to withstand any type of disaster.

Some people are suffering from polluted underground water and inadequate supply of good quality of drinking water.

The unplanned roads and drains of the city corporation cause of waterlogging, making the local population vulnerable to water-borne disease. There is no provision of waste management that cause of various vector-borne diseases. People dump their garbage in an open place that causes suffering from respiratory and skin diseases.

Local investment and micro-finance are also missing in some areas of Bangladesh which render the people more vulnerable. Proper training must be provided by the government or the industrial authorities to make this community strong enough to cope with the adverse effects of the hazards created by these industries.

Since 2011, CDMP has trained 30,000 volunteers in nine cities, and aims to reach 62,000 by 2020.Trainees must be at least high school graduates and aged between 18 and 40. They must pass an exam before becoming certified volunteers. Bangladesh already has nearly 50,000 cyclone preparedness volunteers. A cyclone warning system was established in 1972 after the devastating 1970 Bhola cyclone that killed about 500,000 people. There are nearly 7,000 women urban volunteers (Medway, 2015).

Though the government of Bangladesh is working to increase the number of volunteers, but how she has is not enough to build a resilient society. Bangladesh needs trained volunteer. In Rana Plaza scenario, it was seen that many people were enthusiastic about voluntary work, but they didn't have any knowledge to overcome this type of emergency situation. 3.1.3 Unsafe condition leading to vulnerability:

Unsafe conditions are the specific forms in which the vulnerability of a population is expressed in time and space in conjunction with a hazard (At Risk: natural hazards, people's vulnerability and disasters, 2003, Wisner, Blaikie, Cannon and Davis). This may occur through fragile economic condition, Lack of disaster preparedness plan and a vulnerable environment. It is also included the dangerous location of livening, vulnerable sources of livelihood and minimal food entitlements. It is important to consider the pattern of access to tangible resources such as shelter, food stocks, agricultural equipment) and intangible resources such as networks of support, knowledge regarding survival and sources of assistance, morale and the ability to function in a crisis (Cannon 2000).

PHYSICAL VULNERABILITY

Geophysical location of Bangladesh: The geographical setting and meteorological characteristics has made Bangladesh vulnerable to different geo-hazards and hydro-metrological hazards. The major disasters concerned in the country are floods, cyclones, droughts, tidal surges, tornadoes, earthquakes, river erosion, fire, infrastructure collapse, high arsenic contents of groundwater in Chandpur, water logging, water and soil salinity, epidemic, and various forms of pollution etc. These events can be turned as disasters when the

negative effects of the climate change have accumulated those effects human beings, shelters and the resources essential for livelihoods. As Bangladesh is a low-lying country and has many rivers, the water of high land area enters in our country. This is one of the main causes of the flood that affects every year. The climate change is responsible for sea level rise. Though Bangladesh is contributing less to climate change, it suffers most. Because of low lying delta, the southern part of Bangladesh can go under water if sea level rise more.

Unsustainable infrastructure: The local infrastructure in our country is quite unsafe in the purpose of physical strength. In a conference, the speakers said if an earthquake with seven Richter scale occurs, 70000 building will completely damage in the capital city in Bangladesh. This will be a major human tragedy in the history of the world (MOMIN, 2018). The best example of weak infrastructure in terms of Bangladesh is "Rana Plaza" collapse. We all remember the Rana Plaza tragedy of 2013 where an eight-storey commercial building collapsed. The death toll was more than a thousand. And it took three weeks to carry out the salvage operations. In old Dhaka city, more than 50000 buildings are vulnerable to collapse. The roof of the building is unstable and has several cracks in it. In case of any explosion or blast in the nearby factory, the buildings can easily collapse which may result in serious casualties. The road is not sustainable too. Many people died in a road accident every year (Figure no. 5). Some of the roads are prone to waterlogging that can cause water-borne diseases. There is no particular waste management system in Dhaka city. People dump waste here and there every day that pollutes the water. The house in the coastal belt in Bangladesh is not much resilient to face disaster. Every year for the disaster they stuck is a vicious poor cycle.

ECONOMIC VULNERABILITY

Livelihood source at risk: A major portion of the population of Bangladesh lives in the village and depends on only agriculture. The people who use river water to cultivate crops is facing some difficulties because of populated water. The yield to crops is quite low now. The farmer who uses water from the river is suffering from various skin diseases and water-borne diseases. The farmers are unable to fulfil their own requirements. For water pollution, fish is decreasing day by day. The livelihood of the fisherman is at risk now. They have no alternative work too. Because of less education, people have no alternative employment source of economy.

Low-level income: The level of income in Bangladesh is quite low. Though Per capita income rises $1605 (planning commission), it is not enough to meet the needs of people. 13% of people of Bangladesh live below the national poverty line earns the US $2 per day (World Bank). Though most of the people of Bangladesh depends on agriculture the remunerations derived from agriculture is getting insufficient and agriculture is becoming an unavailable means of livelihood day to day. The people of Bangladesh are unable to enjoy a good quality of life because of low income, thus increasing their vulnerability to any kind of disaster.

SOCIAL VULNERABILITY

Low education problem: A major portion of people of Bangladesh is illiterate. 30% of our total population is illiterate now. The number of the educational institutes is not as many as the people needs. The students of the remote area have to travel a long distance for their higher education. This could be a discouraging factor which has resulted in the low level of education in Bangladesh. As a result, people are engaging in a primary occupation which doesn't need any special knowledge or technical training. The low level of education reflects less empowered and more vulnerable to any kinds of disaster.

Poor health condition: The people of Bangladesh are facing many problems due to various types of pollution. Dhaka's air quality has been ranked as third most polluted in the world according to an air quality data compiled by the World Health Organization (WHO) for megacities with a population of 14 million or more (Reporter, 2018). Moreover, three Bangladeshi cities have been put among the top 25 cities with the poorest air. Many people have developed asthma and skin problems. The industry is increasing the problems of water, soil and air pollution. Both human beings and livestock are getting affected. Over the past few years, many infants are died due to skin diseases and allergies. In the city area of Bangladesh water logged drains and streets are untreated wastewater which acts as various types of vectors. In the northern part and city of Bangladesh have no facility of pure drinking water. These various problem sources are increasing the vulnerability of people of Bangladesh.

Increasing limitations to implementing of disaster preparedness plan: The Government if Bangladesh has

shown a remarkable progress in disaster preparedness sector by the implementation of the early warning system, making of cyclone shelters in different disaster-prone areas. It has also developed a good system and invested relief system and the flood forecasting system. But due to some shortcomings, the implementation of disaster management plan doesn't become fruitful. The limitations in implementing plans are given below:

- Limited participation of vulnerable people.
- Limited information about plans to local people.
- Decentralization of power and resources to the community level.
- Poor perspective, leadership and fulfilment of political commitment.
- A blanket approach to disaster mitigation and faulty criteria for fund distribution leading to insufficiency of resources when and where it matters.
- Lack of capacity, skills, resource management at various levels.

Table No. 1: Gaps in local-level predaredness plans.

District to community-level plans	Total Unit	Status (existence of plans)	Status (gaps in existence of plans)	Remarks
District disaster management plans	64	29	35	7 plans are ongoing under the CDMP
City corporation disaster management plans	6	0	6	
'Upazilla' disaster management plans	501	74	427	57 plans are ongoing under the CDMP
'Pourashava' disaster management plans	308	24	284	19 plans are ongoing under the CDMP
Union disaster management plans	4,489	744	3745	525 plans are ongoing under the CDMP

Sources: (UNDP, 2010; GoB, 2012).

CONCLUSION

Because of the geographical location, Bangladesh is one of the worst victims of climate change that could seriously affect the socioeconomic system of Bangladesh. The principal causes that enhance the vulnerability of people of Bangladesh are poor management practices of industries, policy and regulatory gaps, disaster exclusion, less decision-making power etc. The dynamic pressures like lack of pure drinking water, sanitation, health services, education opportunities, social investment, local investment, micro-financing and proper training are increasing the vulnerability of the villagers and making their living conditions unsafe. The low income and low literacy rate of the residents of these villages make them more vulnerable. It is observed that pressure is developed due to the occurrence of climatic hazards in Bangladesh. The vulnerable people of Bangladesh must be trained through seminar and mock-drills to prepare them to face the disaster and decrease their vulnerability.

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