

Mapping for Women's Evacuation Plans During Climate-Induced Disasters

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Abstract

Increasingly disasters like floods, droughts, cyclones, and heat waves are recurring in the wake of climate change impacts. Women and children are among the most vulnerable, particularly in developing countries. At the same time, young people are among the most eager to respond with solutions to protect populations affected by disasters. In the low-lying riverine country of Bangladesh, YouthMappers are working to create fundamental maps to support the information needs of women who seek safety from climate-induced disasters, but currently must rely on their husbands for evacuation. Initiatives like our open data mapping that entails participation of young women to alleviate such vulnerabilities toward disasters contribute to global goals for climate (SDG 13) and gender (SDG 5).

Keywords

Climate change · Women · Disaster vulnerability · Emergency response · Bangladesh · Gender inequity



1 Youth and Women Affected by Climate-Induced Disasters

Disasters are engendered from extreme climatic events when anomalies in normal temperature occur, initiating heat waves and a more intense precipitation than normal. This causes a higher rate and intensity of floods, landslides, avalanches, and soil erosion with associated damages. Climate-induced disasters like floods, droughts, cyclones, and heat waves are the most recurrent disasters and bring about deaths, whereas women and children have died mostly. They also dismantle the economy which disproportionately affects the young generation of a country.

What happens when these forces come together? The answer is found in the example of Bangladesh where the percentage of workers seeking jobs is the highest, and the percentage of dependents is the lowest. Climate impacts are among the most severe and gender inequality is high. Considering this scenario, young people,

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mostly women and children, are highly affected by the process of these forces converging.

Climate change, the focus of action for SDG 13, apparently aggravates the frequency and intensity of disasters, raising economic costs associated with mitigating it. The threat is greatest in the so-called developing countries as there is an unequal impact of climate change within high-income countries and low- and middle-income countries like Bangladesh. The disasters and their costs inevitably affect gender equality and result in being evaluated as the single biggest threat to development in the future. If true, the young generation would be the hardest-hit victims of this compounded threat. It is worth noting that young people largely did not create the problem of climate change, and especially those of us living in Bangladesh are disproportionately not the ultimate cause of increased sea level rise or more frequent cyclones as a result of oil consumption.

So why are youth, especially young women, so willing to respond to a problem we did not create? Maybe because we have the most to lose. We are the ones who need to design our escape from this problem.

2 Present Scenario of Climate Change in Bangladesh

Bangladesh is our home. Being a low-lying riverine country of South Asia with unique geographical vulnerability to climate-induced disasters, this place where we were born, where we live, is regarded as one of the climate change “Hot Spots” suffering frequent climate change-induced disasters, impeding sustainable development goals. However, the present scenario of climate-induced extreme weather events exposes the coastal region of Bangladesh to cyclones, the most prominent ones causing immense loss of lives, properties, and economic infrastructure. These are our mothers and fathers, cousins, our family homes, and our livelihoods. These extreme weather events are creating vulnerabilities categorized as biophysical and socioeconomic vulnerability among coastal communities, and

young women are at utmost risk of not only losing their lives but also because they are exposed to socioeconomic insecurities at critical moments.

2.1 Impact of Climate Change-Induced Disasters on the Coastal Area of Bangladesh

In the past 20 years, Bangladesh has managed to face this problem and reduce the death rates significantly, though the rate is still alarming for Bangladesh. The Bay of Bengal is a perfect breeding ground for tropical cyclones where on average 12–13 depressions form annually, leading to at least one or two powerful cyclones (Paul and Routray 2010; Alam and Rahman 2014), for example, cyclones Sidr (2007), Rashmi (2008), Bijli (2009), Aila (2009), Mahasen (2013), Komen (2015), Roanu (2016), Mora (2017), Titli (2018), Fani and Bulbul (2019), and Amphan (2020). Now, tropical cyclones have become an annual occurrence.

In 2020, The cyclone Amphan washed away embankments, mud homes, and fisheries, which thousands of families relied upon for their livelihoods, and sanitation infrastructures collapsed. On 15 November 2007, a huge cyclone brutally struck the coast of Bangladesh which caused thousands of deaths where unfortunately most of the casualties were women and children.

One major reason for the large number of casualties is the lack of implementation of disaster awareness programs along with proper planning, in our viewpoint. We mention proper planning since, at that time, disaster awareness programs were offered in generalized ways. According to Mallick B (2014), Community-based disaster management must take into account people’s capacities, perceptions, and resources, as well as their participation. So, we set our eyes on this perspective that women and children need different interventions compared to men because of different vulnerabilities of women in remote areas, such as: physical weakness, health conditions, and dependency on their husbands or a male representative of their family

for preparedness and mobility. Some women have less information about disasters and have less decision-making power given that they are unaware about the disaster and uneducated about preparing for them (Kibria 2016). This grave scenario is still the same after a decade.

In this YouthMappers project, we visited one of the unions from the Bagerhat district where women find it difficult to understand the warnings of disasters and are not really aware about the programs. They still depend on their husbands for evacuation. We are motivated by the thought that young women need to be more cautious as we need to face the problem together and make our world more resilient toward climate-induced disasters.

2.2 Gendered Impacts of Climate Change

Climate change-induced disasters strike the coastal areas almost every year in Bangladesh and various research data show that women die more often than men during disasters. Vulnerabilities toward the natural hazards for men and women are determined by the differences in biological and social responsibilities. Men are considered to be the income source of a family, basically covering all the expenses for the loss after natural hazards. As men are the provider of economic safety and most of the families in Bangladesh are headed by men, they take all of the decisions to respond along with the preparedness in advance for any uncertain climate change-induced hazards.

On the other hand, women are usually expected to be the nourisher of children and carry out all the household chores. Hence, women depend on their husbands or a male representative of their family when it comes to taking any major decision. Moreover, women's access to information and control over taking any precautions for any natural hazards are less compared to men. Women have less disaster information and have less decision-making power. They may even

be unaware about a coming disaster which makes them more vulnerable compared to men.

2.3 Role of Gender in Emergency Response and Evacuation Planning During Cyclones

Evacuation Planning is one of the basic components in the phase of preparedness and Emergency Response. Studies into the role of gender in evacuation efforts have found that women may be more likely than men to evacuate their homes as hurricanes approach. In developing countries, socioeconomic conditions are different and so can be the determinants of evacuation behavior. One important factor causing low evacuation here is identified to be the failure to perceive the potential risk from warning messages by the general public due to both lack of awareness and knowledge gap between them and the experts.

According to Mallick and Vogt (2009), a study conducted after Cyclone Sidr among 124 sample households found that two-thirds did not evacuate. They decided to stay at their home but sent some of the elderly and children to the safe shelters or a relative's house. Research indicates that the overall evacuation rate during Cyclone Sidr in the study areas was only 33% (Paul and Routray 2010: 96). Even a recent study after Cyclone Roanu shows that the evacuation rate was less than 16% (Rezwana 2017). Among the overall number of fatalities, Ikeda (1995) sees a gender effect in terms of loss of lives.

According to Rezwana (2018), women and children do not know from where and which way to follow as they are mostly dependent on the male head of household about any evacuation issues during cyclones. Again, it has been seen that women tend to put the lives of their children and family members before their own. They may grow too busy saving their children and even livestock and household items before making arrangements for themselves. Therefore, they can end up being the biggest sufferers during a crisis (Collins and Edris, 2011).

3 **Voices of Women and Men Facing Climate-Induced Disasters**

For our work, we have found most of the women from Rayenda union, a highly disaster-prone area, are indifferent about evacuation plans. Some of them are still unaware about what preparation should be taken during climate-induced emergencies. As women and children suffer the most due to disasters, and still there is lack of implementation of evacuation planning, the participation of YouthMappers using open data like OpenStreetMap (OSM) might be helpful to increase the evacuation rate, especially among women as well as their resilience against natural disasters like cyclones.

We interviewed a woman from Rayenda Union named Rumi. She told us, before Sidr, there were not enough cyclone shelters in the union. However, after the deadly consequences of Sidr, authorities tried to build more cyclone shelters in the area. We asked her about plans to evacuate and how she would know, when and if she has to go to a cyclone shelter. She told us, she would just know with a smiling face and mentioned that she will wait for her husband and ask neighbors about the situation. We then asked her, “What will you do if your husband isn’t at home?” She was surprised at the question and said, “I may wait for him.”

We also interviewed one of the survivors of Cyclone Sidr, Afzal kha, a fisherman from Rayenda union, Shrankhola, Bagerhat, Bangladesh who lived near the riverbank of Boleshwar river with his wife and two baby girls. Usually, Afzal kha catches fish from the Bay of Bengal, to sell them in the local market. Afzal kha was stuck out at sea while his family perished at the terrible hand of Cyclone Sidr. His wife was caught dead on a date tree wrapped by her Sharee, a traditional Bengali cloth. His two baby girls’ dead bodies were found in the paddy field. After

a couple of days, Afzal kha returned from the sea and found this dreadful consequence of his family. The whole family lost 26 members and most of them were women and children.

Afzal kha still lives along the same riverbank with all the difficulties. We were there to interview one of the female members of his neighbor’s house. As he told us during the interview, “I lost my family during Sidr, and the key scenario is still the same despite having many cyclone shelters in our village. Women and children are still not trained enough to take steps forward during disasters. People are not as afraid of cyclones nowadays because most of them happen in daylight. If it somehow attacks in the night, that would be more deadly.” Every year, during cyclone season, women and children face the same problem and are still not getting enough training or resources to prepare against climate-induced disasters in Rayenda Union (Figs. 22.1 and 22.2).

4 **Integration of Open Data and Youth Participation in Emergency Response Management Through YouthMappers**

The integration of open, publicly created, and publicly available data and YouthMappers can enhance the capacity-building program for women and children which promises to reduce the vulnerabilities of women. Technology-based capacity development could be a door for women to build resilience. The following case study is showing that women in the local areas of Bangladesh need capacity building and the traditional process has not been working. The combination of open data and youth could be a revolutionary change inside the traditional Emergency Management System (EMS) of the country.



Fig. 22.1 A roundtable discussion with women from Rayenda union, a highly disaster-prone area, informs YouthMappers work in Bangladesh for evacuation mapping



Fig. 22.2 Evacuation from cyclones, flooding and hurricanes requires planning, mapping, and training with families in communities to build knowledge and resilience

The growing availability of mobile applications and technology-based emergency management in cities has had a remarkable impact on the overall emergency management system. However, remote populations of Bangladesh are still facing problems in navigating mobile apps or technology-based approaches. These coincide in the remaining places where women are deprived of higher education, health facilities, and basic needs. In this regard, the technology-based emergency management approaches are quite impractical in the context of a remote area in Bangladesh. Bridging between technology and manual approaches needs to be emphasized to obtain better outcomes in primary level preparedness and the open data and participation of YouthMappers aim to make this happen.

4.1 YouthMappers and OSM

YouthMappers introduces voluntary geospatial initiatives building on OpenStreetMap (OSM) as a platform, where women are leading information and analysis programs, such as under the YouthMappers campaigns of EverywhereSheMaps and LetGirlsMap. These campaigns are being regarded as an active way to engage young women in not only collecting, gathering, and analyzing data but also encouraging more women in this profession so that we can make systems change, which further may be used in mapping structures, identifying evacuation paths and engaging more women in this process to abridge women's vulnerabilities to potential disaster risk.

Cyclones are considered one of the major natural hazards in Bangladesh. Every year, many people die or lose their livelihoods in the coastal and offshore islands of Bangladesh due to cyclones and storm surges. The government has taken many initiatives such as the National Plan for Disaster Management (NPDM) to build resilience for sustainable human development and reduce the vulnerabilities of communities from disaster-prone areas.

But most of the people from remote areas in Bangladesh are not as socioeconomically well

off to facilitate the technology-based emergency management system. It is not possible to fully prevent natural hazards but preparedness can mean less damage. Upgrading awareness-raising initiatives according to the demand and situation can curtail the damages even further. Considering the socioeconomic conditions of remote area populations, manual approaches with proper guidance are needed. An awareness program and training designed in the native language with the help of OSM platform might change the situation through the leadership of YouthMappers.

Under the YouthMappers Research Fellowship program, we have experience working in a cyclone-prone coastal area, Rayenda, Sharankhola, Bangladesh. Rayenda inhabitants, vulnerable to frequent cyclones, are more concerned about their livelihoods than preparing themselves for uncertain natural hazards. Studies found that, in a household, women consider their cattle's safety before taking decisions on evacuating themselves to the shelters. Apart from that, lack of interest in attending awareness-raising programs has been perceived among women and children. During our fellowship research, we tried to figure out why women and children are more vulnerable and how to help them regarding the preparedness for cyclone disasters.

One woman from the union described her situation during Cyclone Aila. Though she managed to reach the cyclone shelter, she arrived asking "Where is the nearest cyclone shelter?" She had the idea to seek out safe shelter but did not know the exact name or location, and that made her more confused. She told us, "I managed to save myself because Aila (another major cyclone in Bangladesh) stuck during daylight, otherwise me and my family would have died during cyclone Aila."

Under the program, we trained some women from the union with a Bengali (Native Language of Bangladesh) Version of Evacuation Planning created by using OpenStreetMap (OSM) data. Figures 22.1 and 22.2 show the training initiated by the YouthMappers with collaboration of local authorities. Figures 22.3 and 22.4 exhibit part of our Bengali Version Evacuation Planning for Rayenda, Sharankhola Bangladesh.

Now, YouthMappers chapters from different universities in Bangladesh can play a vital role to continue this process and expand to other areas. Our training program covered a small portion of Upazila. Considering the whole coastal area, YouthMappers could put their eye on mapping all cyclone shelters and finding out the shortest routes. We can exhibit it in a Bengali version which is easier to explain to local people.

Arranging such a program is not easy, yet we must try. Contacting local government could be a plus point in this regard as the government has many programs to provide proper guidelines and building resilience. It will not only leverage the conduction of the training but also catches the attention of government authorities to take into account how women are more vulnerable and differently affected during disasters. Making preparedness decisions, and managing everything to evacuate on time is rather an issue of women's empowerment. The more women we train with proper guidance, the better feedback on preparedness we can get. It could arm a new generation with environmental knowledge as mothers are the first teachers for the children. Once we succeed in training women, we are on our way to ensure family safety (Figs. 22.3 and 22.4).

4.2 Climate Change Education and Emergency Response Awareness

Environmental education and awareness programs on natural disasters can easily reduce the possible loss as well as make people more resilient for an uncertain future of climate-induced disasters. In developing countries like Bangladesh, a native language-based preparedness program can play a vital role in inaugurating climate change and its impact. Why native language? In most remote areas, poverty devours the possibilities of getting proper education, and women and girls are the main victims. To introduce climate change and its impact we need to understand the present educational conditions of the region and take measures according to these needs.

4.3 Youth Advocating Climate Action That Inspires Us

With the UN-led celebration of the International Year of Youth from August 2010 to August 2011, there was a renewed interest in young people and the vital role they can play in important issues, such as disaster risk reduction (DRR). This cele-

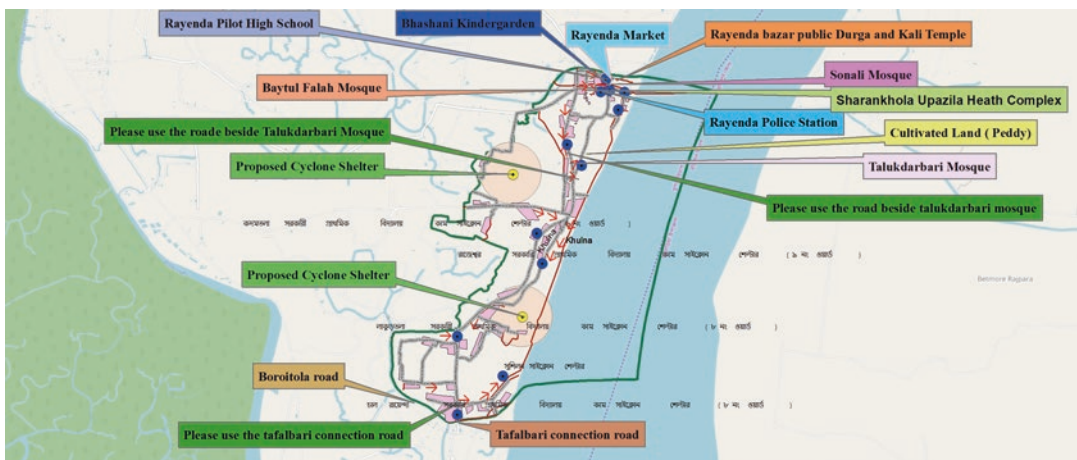


Fig. 22.3 A final evacuation plan map has been produced for Rayenda, Sharankhola Bangladesh

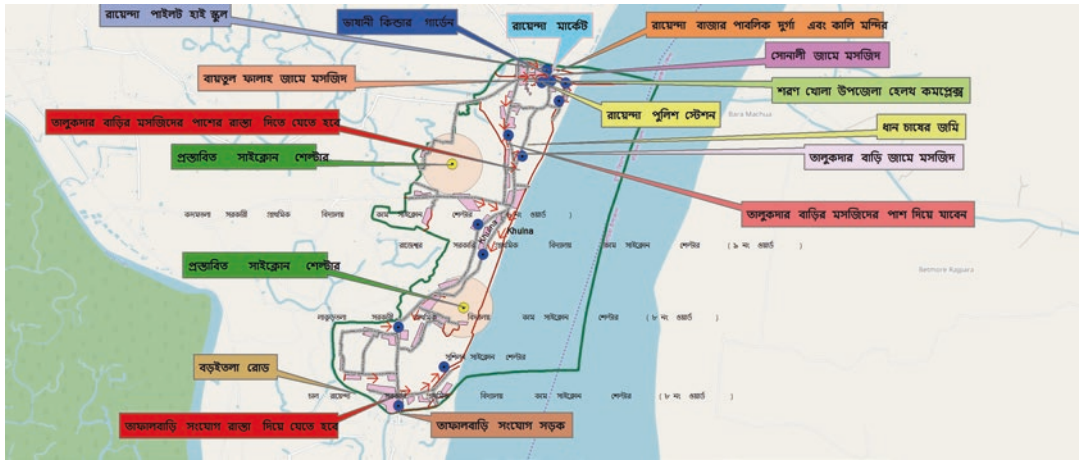


Fig. 22.4 The Bengali version is shown of the resulting Evacuation Plan for Rayenda, Sharankhola Bangladesh

bration not only created a major framework but also inspired us to work in the field of disaster risk management with the understanding that any comprehensive disaster risk management can be improved when it is incorporated with dynamic and lively young women in its programs. The first campaign of the United Nations International Strategy for Disaster Reduction (UNISDR) designated as “Disaster Prevention, Education, and Youth” (UNISDR 2000), focused on the emine- nce of recognizing youth participation.

Young women are enthusiastic when it comes to sharing and contextualizing knowledge about disaster risk management incorporating local and scientific knowledge which aids in decision making and brings about a potential change. However, the younger generation, especially women, have often been neglected while shar- ing and communicating knowledge through a risk communication network (Mitchell et al. 2008). But we can play an impressive role in increasing and disseminating awareness among people who lack this knowledge, for instance, hazard education programs (Finnis et al. 2010) science clubs (Fernandez and Shaw 2014), or youth-centered participatory videos (Haynes and Tanner 2015).

At a regional and global level, YouthMappers, a network of students, takes initiatives like EverywhereSheMaps, LetGirlsMap, Leadership Program, and Research Fellowships to create

leaders from different regions of the world. It also focuses on the women leading programs to impact on the development of women around the world by giving a platform to the young women which has been experiencing a tremendous growth in the sector of young women development.

As the repercussions of climate change are not distributed homogeneously, some would have to confront a direct impact while some would have an indirect impact slowly. But we need to walk this arduous path together to create changes and make our world live up to the goals of the UN SDGs. How might we further connect SDG 13 on climate action, and SDG 5 on gender equality? Why are young women considered the key actors regarding the discussion of Emergency Response in Bangladesh? There are several opportunities, such as to:

- Raise awareness among women from different cultural views
- Grow understanding regarding the issues of women
- Act with considerably more reach in the con- text of village women, as most of the women in villages feel uncomfortable to talk freely with men in Bangladesh because of their reli- gious views
- Promote how young women can be examples of decision-making for other women

Youth climate activists are trying to transform the world by putting their step outside their horizon, and that inspires us to work under the umbrella of YouthMappers to make this initiative to bring changes along our horizon as well.

5 Conclusion

Gender equality and climate change are inevitably considered to be among the major concerns to ensure sustainable development. There are close relationships among gender impact, climate change, youth, and development which need to be understood to make sustainable change in the world.

Bangladesh has been working on disaster management for a long time but gender aspects of vulnerability still need more attention. Integration of gender perspectives with climate change and disaster risk management can help ameliorate vulnerabilities as well as it can be considered as the stairway to sustainable development. Moreover, educating women can be another approach toward change because intensive preparedness plans for disaster risk will not be effective if women are not educated to understand them, and trained young women can be an asset in this regard. Different types of approaches include native language-based evacuation plans along with local community engagement. As our experience shows, open data platforms like OSM are a convenient technology for people, and if young women could get training, they easily can identify their evacuation path. We are working to engage more women in this platform so that they can be a part of this intervention, including aims to create a women's club in remote areas where the awareness training would be given on a monthly basis. Gendered impact can be addressed by the open mapping explained through native language, where young women themselves would lead this process to profoundly reduce the disproportionate vulnerabilities of women compared to men.

We, young women, have been experiencing tremendous growth and contributing toward the

future of our country, albeit a climate insecure future. Our initiatives like open data mapping with the participation of young women to alleviate our vulnerabilities toward disasters will make us more resilient.

References

- Collins EA, Edris A (2011) Cyclone disaster vulnerability and response experiences in coastal Bangladesh. *Disasters* 34(4):931–954. <https://doi.org/10.1111/j.0361-3666.2010.01176.x>
- Fernandez G, Shaw R (2014) Participation of youth councils in local-level HFA implementation in Infanta and Makati, Philippines and its policy implications. *Risk Hazards Crisis Public Policy* 5(3):259–278
- Finnis KK, Johnston DM, Ronan KR, White JD (2010) Hazard perceptions and preparedness of Taranaki youth. *Dis Prev Manag*
- Haynes K, Tanner TM (2015) Empowering young people and strengthening resilience: youth-centered participatory video as a tool for climate change adaptation and disaster risk reduction. *Children's Geogr* 13(3):357–371
- Ikeda K, (1995) Gender differences in human loss and vulnerability in natural disasters: a casestudy from Bangladesh. *Indian Journal of Gender Studies* 2, Page: 171–193
- Alam K, Md., Rahman H (2014) Women in natural disasters: A case study from southern coastal region of Bangladesh. *International Journal of Disaster Risk Reduction* 868–882. <https://doi.org/10.1016/j.ijdr.2014.01.003>
- Kibria G (2016) Why are women more vulnerable to climate change? Climate change implications on women with reference to food, water, energy, health, and disaster security. Research Gate Online Publication. 10p. <https://doi.org/10.13140/RG.2.1.2577.9683>
- Mallick B (2014) Cyclone shelters and their locational suitability: an empirical analysis from coastal Bangladesh. *Disasters* 38(3):654–671. <https://doi.org/10.1111/disa.12062>
- Mallick B, Vogt J (2009) Analysis of disaster vulnerability for sustainable coastal zone management: a case of Cyclone Sidr 2007 in Bangladesh. *IOP Conf Ser Earth Environ Sci* 6. <https://doi.org/10.1088/1755-1307/6/5/352029>
- Mitchell T, Haynes K, Hall N, Choong W, Oven K (2008) The roles of children and youth in communicating disaster risk. *Child Youth Environ* 18(1):254–279
- Paul SK, Routray JK (2010) Household response to cyclone and induced surge in coastal Bangladesh: coping strategies and explanatory variables. *Natural Hazards* 57:477–499

- Rezwana N (2017) Refusing safe shelter during cyclone warning: dilemma or limitations? A case study of recent Cyclone Roanu in Bangladesh. Unpublished paper, DRTMC, Dhaka University
- Rezwana N (2018) Disasters, gender and access to healthcare: women in coastal Bangladesh. Routledge, London
- UNISDR (United Nations International Strategy for Disaster Risk Reduction) (2000) Mobilizing Local Communities in Reducing Disasters. ISDR, Geneva.

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