NH12E-0322

A Framework for Climate-induced Multi-hazard Resilience Index in Conflict Contexts: Assessing Resilience of Rohingya Refugee-hosting communities in Bangladesh based on Secondary and Remote Sensing Data

Sakib Imtiaz

Ronin Institute for Independent Scholarship

ABSTRACT

The present study aims to develop a framework for Multi-hazard Resilience Index for Refugee-hosting high-risk areas based on secondary and remote sensing data. The framework has been piloted in Bangladesh's 3 Rohingya refugee hosting sites, namely Raja Palong, Palong Khali, and Ratna Palong. This framework is an adaptation of the Climate Disaster Resilience Index (CDRI) model introduced by the International Environment and Disaster Management Laboratory of Kyoto University Graduate School of Global Environmental Studies in 2008. The new framework is mainly developed by identifying a list of indicators and variables following an extensive literature review. The study also incorporated the "Rapid Index of Stress to the Refugee Crisis," which is an adaptation of "Rapid Index of Stress to the Syrian Crisis" developed by UNDP.

Secondary data were collected from the Bangladesh Bureau of Statistics, Community Risk Assessment reports, government documents, and Inter Sector Coordination Group (ISCG) survey reports. Satellite-based remote sensing data were collected from U.S. Geological Survey Archive. The framework has five dimensions of resilience: physical, social, economic, institutional, and natural, each of which includes several parameters. Weighted Mean Index (WMI) method is used to compute the resilience scores.

Considering overall resilience, Ratna Palong shows higher resilience than Palongkhali and Raja Palong. Regarding the natural dimension, Palong Khali scores highest (3.25), whereas Ratna Palong scores lowest (2.83). Palong Khali scores lowest (3.90) in the physical dimension. Ratna Palong shows a significantly higher score (3.31) than other communities. All the communities show good scores in the institutional dimension but comparatively lower scores in the social dimension.

Increasing labor competition, deforestation, price increase, and damage to the physical and natural resources are challenges for host communities to build more resilient and safer communities. Policies for housing and land use planning, natural resources and ecosystem management, alternative livelihood opportunities, and budget allocation for implementing these policies are required to build community resilience during a protracted refugee crisis.

STUDY AREA

METHODOLOGY

Weighted Mean Index (WMI) method is used to compute the resilience scores.

$$\text{WMI} = \frac{\sum_{i=1}^{n} Xi * Wi}{\sum_{i=1}^{n} Wi}$$

where w = the weights and x = the value.

Rapid Index of Stress of communities affected by the Rohingya crisis, $\text{IS(R)} = \sqrt{\text{PRxRP}}$

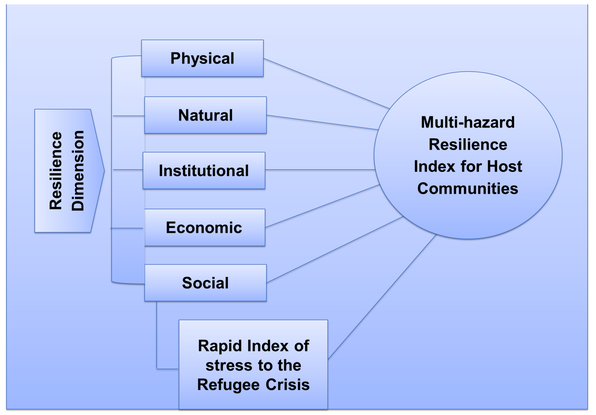
Where, PR = the percentage of households living below the national poverty line

RP = The ratio of refugees to total Population

Deforestation was measured using Normalized Difference Vegetation Index (NDVI).

NDVI= (Band 5-Band 4) / (Band 5+Band 4)

THE FRAMEWORK



Resilience Dimension	Variables
Physical	• Access to electricity • Availability of electricity • Alternate source (Solar power) • Access to safe water • Availability of safe water • Access to sanitation • Buildings with non-permanent structure
Social	• Population growth • Age dependency • Population density • Stress due to Rohingya crisis • COVID vaccination • Literacy rate
Economic	• Population below poverty line • Access to social safety nets • Household Food Consumption Score
Institutional	• Access to early warning system • Existence of Disaster Management Committee
Natural	• Intensity/severity and Frequency of Hazards 1) Floods 2) Flash Flood 3) Cyclones/storm surge 4) Heat waves 5) Droughts/water scarcity 6) Excessive Rainfall 7) Landslide 8) Waterlogging 9) Coastal flooding • Deforestation

Each variables were assigned score from not available/very poor being 1 to best being 5. all variables are ranked between each other in the range of not important being 1 to very important being 5 in order to give a particular variable a higher or lower weightage in the calculation of resilience scores. Only secondary and satellite remote sensing data from open sources were used.

RESULT

	Ratna Palong	Palongkhali	Raja Palong
Overal Resilience	3.52	3.44	3.3
1) Physical Resilience	4.16	3.9	4.16
2) Social Resilience	2.82	2.43	2.21
3) Economic Resilience	3.31	2.61	2.52
4) Institutional Resilience	4.46	5	4.46
5) Natural Resilience	2.83	3.25	3.16

CONCLUSION

The framework has been piloted in Bangladesh's 3 Rohingya refugee hosting sites. Climate hazards impact the lives and livelihoods of the most vulnerable people living in these sites and pose significant threats to the overall resilience of these communities. The framework proposed in this study can be replicated in any other refugee-hosting community worldwide for better decision-making.

REFERENCES

- Bailey, S., and Barbelet, V. (2014). Towards a Resilience-based Response to the Syrian Refugee Crisis. *A Critical Review of Vulnerability Criteria and Frameworks. United Nations Development Programme, Overseas Development Institute*.
- Shaw, R., and Team, I. E. D. M. (2009). Climate disaster resilience: focus on coastal urban cities in Asia. Asian Journal of environment and disaster Management, 1(1), 101-116.

ACKNOWLEDGEMENT

The author wishes to thank Regional Integrated Multi-Hazard Early Warning System (RIMES) and BRAC for their work related to this study.

CONTACT INFORMATION

sakibimage@gmail.com

sakib.imtiaz@ronininstitute.org

www.sakibimtiaz.com