

# A STUDY ON THE IMPLEMENTATION OF THE UN EARLY WARNING FOR ALL INITIATIVE: A CASE STUDY IN THE KATTANKUDY URBAN COUNCIL AREA IN BATTICALOA DISTRICT, SRI LANKA

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## ABSTRACT

Frequent flooding is the most devastating disaster, affecting almost all the population in the Kattankudy urban area. Growing population, limited land area, increasing rainfall events, lack of early warning and poor coping capacity are the major challenges for stakeholders and communities to ensure resilience and adaptation to flood disasters in this region. This study examines the effective implementation of the UN's Early Warnings for All initiative at the grassroots level to ensure that everyone is protected from flood disasters. The UN initiative is built on four pillars (i.e., Pillar 1: Disaster risk knowledge, Pillar 2: Detection, observation, monitoring, analysis, and forecasting, Pillar 3: Warning dissemination and communication, and Pillar 4: Preparedness and response capabilities). This study reviewed displacement data and mapping, and conducted expert interviews, questionnaire surveys and group discussions with key government stakeholders and vulnerable communities to assess disaster risk knowledge, preparedness and coping/response capacities of vulnerable communities. The results of this study showed that about 51% of the population and 42% of the land area are vulnerable to floods. The level of preparedness with the existing Community-Based Disaster Risk Management (CBDRM) system is low, the implementation of regulatory measures for flood mitigation is unsatisfactory, and limited funds and resources to improve mitigation measures. The degradation and encroachment of the natural drainage system (*Thona*) that passes through the identified vulnerable communities is the major challenge for flood mitigation in the study area. In addition, the community relies heavily on offline means for hazard information. Based on the findings, the study recommends to adopt the concept of "Disaster Resilience and Sustainability by All" and to form an effective CBDRM system with the approval and support from the Disaster Management Centre of Sri Lanka. The proposed system will lead the regular meetings and workshops to enhance community coping/response capacity, support for regular flood mitigation activities (e.g., maintaining the blockage free *Thona* system and drainage facilities), identification of evacuation centers and food supplies, organized post disaster relief activities, and financial proposals for the improvement of the *Thona* and drainage system. This study is expected to be an empirical model for other urban areas in the country to effectively response to the flood disasters.

**Key words:** Flood Disaster Risk, Flood Disaster Risk Management, CBDRM, Early Warning for All.

## INTRODUCTION

Mass flooding events, induced by climate change are becoming one of the most consistently serious natural disasters afflicting communities throughout the world (Pathak et al., 2016, Ceddia et al., 2017; Htein et al., 2018; Krunarathne, 2021). The disasters that threaten Sri Lanka mostly involve weather and water related, such as flooding, landslide, lightning, and drought (Community Resilience Framework Sri Lanka), and the severe flood events in 2016 and 2017 adversely affecting urban and rural dwellings, small and medium enterprises, micro business, education and health services, and public and private infrastructure.

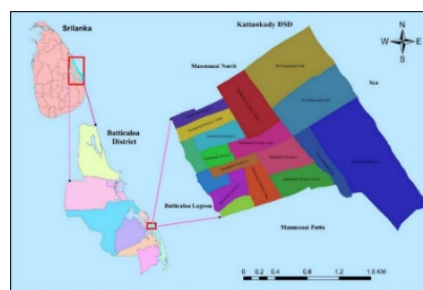


Figure 1. Study area.

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Kattankudy, a high-density coastal urban area (6,276 inhabitants per square kilometre in 2012) and a leading business hub in the Eastern Province of Sri Lanka, which was strongly affected by the ended civil war and the 2004 -Tsunami, has been affected by annual monsoon floods. The Batticaloa District, where the Kattankudy urban area is located, has recorded the highest number of people, 2.25 million, affected in Sri Lanka by the floods that occurred between 2002 and 2012 (Sri Lanka Comprehensive Disaster Management Program 2014-2018, March, 2014).

In the previous 10 years, 60 – 100 % of the location was affected, by displacing an averagely of 20 % of the total families and 349 houses damaged in Kattankudy. This condition is increasing annually due to natural population growth, increasing rainfall and a lack of mitigation measures. In addition to philanthropists' and NGO contributions, the government has spent LKR.17.97 million for post- flood disaster activities (Kattankudy Divisional Secretariat, 2024). The Kattankudy Urban Council spends around LKR.0.5 million to renovate the damaged infrastructure annually (Kattankudy Urban Council, 2024).

A range of recent studies ensure the need for Community-Based Disaster Risk Management (CB-DRM) approach for managing natural hazards effectively, while Community-Based Flood Disaster Risk Management (CB-FDRM) is crucial component of CB-DRM, to build the community resilience through a bottom-up approach ( Boshier & Dainty, 2011; Shaw, 2006; Bhattacharai, 2018).

Accordingly, this study examines the effective implementation of the UN's Early Warnings for All (EW4ALL) initiative that is built on four pillars, at the grassroots level to ensure that everyone is protected from flood disasters, by reviewing displacement data and ArcGIS-structured layout mapping, and conducting expert interviews, questionnaire surveys and focus group discussions to assess disaster risk knowledge, preparedness and coping/response capacities of vulnerable communities in the study area.

## DATA

Three-day-event rainfall data for five years were collected from the Meteorological Department. Data on flood-driven displacement, population and land extent and disaster response expenditures were obtained from the Kattankudy Divisional Secretariat. The Kattankudy Urban Council provided the data on annual flood-damaged rebuilding expenditures and the Green City Master Plan.

## THEORY AND METHODOLOGY

This study mainly focuses on investigating the current conditions of Flood Disaster Risk Knowledge and Management in the study area, which is the first and foundation Pillar of EW4All, and the development of effective CB-FDRM groups for the implementation of the remaining three Pillars: (ii) Detection, observation, monitoring, analysing and forecasting, (iii) Warning dissemination and communication, and (iv) Preparedness and response capabilities.

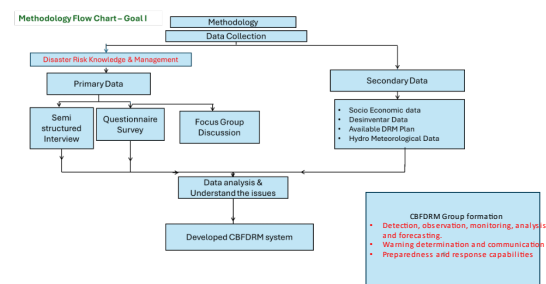


Figure 2. Methodology flow chart.

The methodology used in this study is presented in a flow chart (Figure 2).

This is a qualitative study and follows a case study research approach with the support of the real voices of vulnerable communities. The methodology comprises a literature review, field work, data collection, and data analysis and understanding of the issues. For the purpose of data collection, we relied on both secondary and primary data.

**Secondary data:** Drawn from annual reports on rainfall from the Meteorological Department and flood disaster events, flood- prone GN divisions, displacement, relief, and recovery measures published by the Kattankudy Divisional Secretariat and the Urban Council. The last five years of data on displacement in the study area were plotted in the GIS-based structured layout map, converting the GN-wise displacement data into a raster dataset that was then reclassified into five classes of displacement

levels for each GN division: Very low, Low, Moderate, High and Very High, using natural break value method for each year.

Then, for an overlay analysis of the five-year cumulative displacement level of all 18 GN divisions, all 5 displacement maps of five years were combined by applying natural break value method in ArcGIS (10.8) platform, and identified frequent most affected GN divisions which are of High and Very High displacement level throughout the five-year period.

**Primary data:** Data were through semi-structured interviews, focus group discussions, and questionnaire surveys, which generated qualitative primary data. Semi-structured interviews were conducted with two key government stakeholders, the Kattankudy Divisional Secretariat and the Urban Council, on their past and present flood disaster management initiatives. Focus group discussions were held with the members of selected five CBDRM committees of the five GN divisions with High and Very High displacement levels in the study area. Questionnaire surveys were conducted with the participation of 166 people in the five GN divisions using purposive sampling techniques and descriptive analyses, using the Statistical Package for Social Science (SPSS) software.

## RESULTS AND DISCUSSION

This chapter consists of three components, based on the specific objectives of the study.

### (a). Flood disaster risk knowledge.

3 Days maximum rainfall (mm)

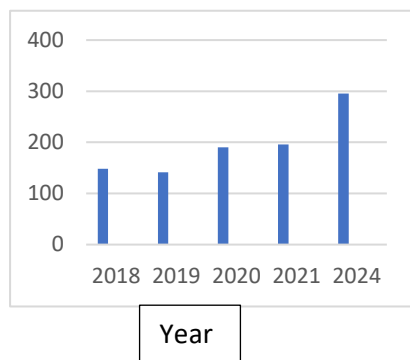


Figure 3. Event rainfall.

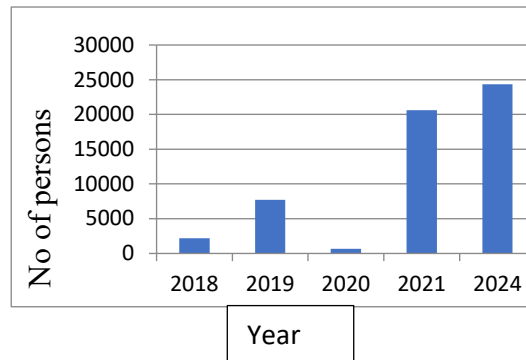


Figure 4. Persons displaced.

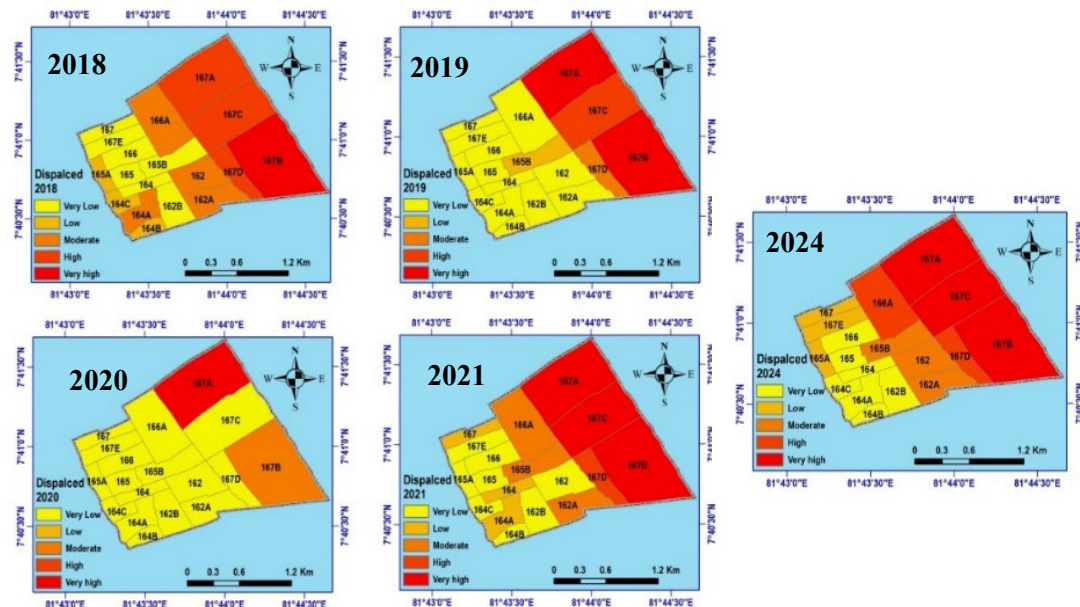


Figure 5. Year wise map of spatial distribution of displacement

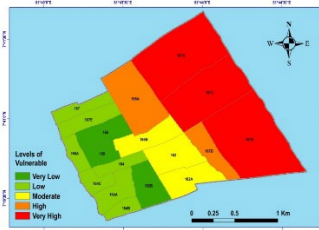


Figure 6. Cumulative map of spatial distribution of displacement in the five-year period of 2018, 2019, 2020, 2021 and 2024.

As shown in Figures 3 and 4, in the last five years of 2018, 2019, 2020, 2021, and 2024, there has been a significant increase in the displacement with increased rainfall. In the year 2020, however, although the rainfall increased by 48.5 mm/3 days compared to 141.5 mm/3 days in 2019, the displacement was recorded as the lowest in the period due to country wide lockdowns and mobility restrictions in the wake of the COVID-19 pandemic.

In 2018, the displacement was recorded as approximately 5% of the total population of 48,093, with 148 mm/3 days rainfall in the study area. This figure increased to 16%, 40%, and 45% in 2019, 2021, and 2024, respectively; this constituted a significant 11-fold increase in displacement in 2024 of 53,561 total population, with 295.7 mm/3 days rainfall.

Figure 5 shows the GIS-based structured layout of spatial distribution of displacement for each year separately with displacement levels of Very Low, Low, Moderate, High and Very High in all 18 GN divisions. Figure 6 indicates the cumulative of displacements occurred throughout the five-year period in the study area of total 18 GN divisions, and identified five GN divisions as frequently most affected GN divisions with High and Very High displacement level. The five GN divisions represent 42% of the total land area and 51% of the total population of the study area.

#### (b). Investigating the coping/existing responsive capacity:

This task was carried out through semi-structured interview, focus group discussion, questionnaire survey and field visit.

##### Semi-structured interview

Under this task, two key government stakeholders – the secretary of Kattankudy Divisional Secretariat and the secretary of Kattankudy Urban Council– were interviewed with questions about flood preparedness and mitigation measures implemented by them.

According to the first respondent, the Kattankudy Divisional Secretary, the Kattankudy Divisional Secretariat has formed 18 CBDRM committees in compliance with Disaster Management Act No. 13 of 2005 of Sri Lanka, however, committees are in need of updated capacity training and awareness on flood preparedness. The respondent emphasised that annually growing rainfall, limited fund for the improvement of mitigation activities, unauthorized construction, and degradation of the natural drainage (*Thona*) system are the root causes for the floods. Accordingly, it is clear that the CBDRM committees have not been revitalized or afforded updated disaster risk knowledge and management, and there is a lack of integration of Disaster Risk Reduction (DRR) into regular developments.

According to the second respondent, the Secretary of Kattankudy Urban Council, growing population, limited land area and consequent high density, blockage of the *Thona* system by unplanned structures and cabbage dumping, and extra rainwater flow from neighbouring territories are the prime reasons for the floods in the urban area. Although the Urban Council has a flood DRR integrated Green City Master Plan (GCMP), due to a lack of funds, the Council is unable to implement some important strategies such rehabilitation of *Thona*, construction of systematic drainages and rainwater management proposed in the GCMP. Owing to insufficient human resources and machinery shortages, the Urban Council is struggling to maintain the existing drainage system clean.

##### Focus group discussion

Of the five CBDRM committees, two were established in 2014 and, one in 2017. All the five committees confirmed that, except for the tsunami awareness and first-aid training program conducted in 2017, no such programs were provided to them thereafter. Three out of the five committees responded that they have no knowledge of the flood risk management in their area. Regarding flood preparedness programs, three responded that no such programs were conducted, and all five committees confirmed that the 2024 flood caused huge displacement; however, no any preparedness measures with community participation were taken. About the main reasons for the flood in their area, they reported encroachment on the *Thona* system and state reserved land, improper maintenance of existing drainage systems and blockage

of the drainages by unauthorized construction, poor drainage maintenance by the Kattankudy Urban Council, and insufficient drainages in the flood prone area as the main reasons for the floods, while urging the construction of structural mitigation, strict enforcement of related laws and orders, and proper flood preparedness activities with communities' participation. Although CBDRM committees exist, community participation in the area is poor. Moreover, a lack of policy implementation and good governance has resulted in increasing flood disasters in the five GN divisions.

### **Questionnaire survey of those affected**

166 people among the affected communities in the five GN divisions were interviewed. To analyse the data, a *t*-test for specified values, which presents the fundamental characteristics of the data in a study and, provides straightforward summaries of the sample and measures, was followed using Statistical Package for Social Science software.

The respondents in the study area provided their opinions and insights. The majority of the participants in the survey were female (80.1%), and the largest group falls within the 45–54 years range, while the smallest group was those above 65 years old. Respondents believed that floods were more frequent, whereas cyclones and droughts were less likely in the study area. Regarding statements on the level of disaster knowledge, the participants in the study area possessed substantial knowledge. Regarding the level of disaster preparedness, it can be concluded that the participants in the study area possessed a considerable level of preparedness. Regarding disaster management, the participants in the study area possess a poor level of disaster management practice. Regarding statements on emergency disaster preparedness, the participants possessed a lower level of emergency disaster preparedness with basic goods, equipment and tools. During a disaster, a substantial 80.7% information are obtained through offline means. This indicates a heavy reliance on traditional offline methods for information and maintaining them in DRR strategies. In the study area, grassroots-level organizations play a crucial role in addressing local needs and facilitating community developments; 61.4% of these organizations are non-governmental (NGOs), while the others government-run. This distribution highlights the significant presence and influence of NGOs in the area. These organizations often work directly with community members.

### **Field visit**

The visits were made with special focus on the areas of frequently most affected five GN divisions of High and Very High displacement level in the study area (see Figure 6). The visits were formally supported and guided by the CBDRM committees in the five GN divisions. During the visits, observations were made on the root causes for the frequent flood disaster in the study area, the existing flood disaster risk and management conditions reported by the stakeholders, the CBDRM committees, the vulnerable families and preparedness and mitigation measures carried out by the individual on their own.

### **(c). Proposal of effective CB-FDRM committees to enhance the disaster risk knowledge and preparedness/responsive capacity:**

#### **Formation of CB-FDRM Committees**

Under this component, five CB-FDRM committees in the five most frequently affected GN divisions (see Figure 6 and Table 1) were proposed and formed.

Table 1. GN divisions with Very High and High displacement levels.

S/N	GN Division	Vulnerability Level	The proposed CB-FDRM committees, which are absent in the study area, were formed with the communities’ participation in the five GN divisions, to be linked to the Disaster Management Centre (DMC) under the Disaster Management Act of Sri Lanka. The committees consist of five sub-committees: Early Warning, Evacuation and Search and Rescue, Relief Camp and Food, Health and Welfare, and Immediate Restoration of Service/Village Security, for the implementation of the three Pillars (2,3 and 4) of the UN’s agenda for
1	167 B	Very High	
2	167 C		
3	167 A		
4	167 D	High	
5	166 A		



Early Warning for All: Detection, observation, monitoring, analysing, and forecasting, Warning dissemination and communication and Preparedness and response capabilities.

## CONCLUSION AND RECOMMENDATIONS

Climate changed induced flooding is a frequent natural disaster which affects more than half of the residents of Kattankudy urban area, a densely populated coastal urban centre in the Eastern Province of Sri Lanka. Year-by-year, there are both gradual and significant increases in the rainfall and flood-driven displacement in the urban area. Growing population, limited land space, and increasing rainfall are the key challenges for the government stakeholders and communities in ensuring resilience to the disasters. Although the CBDRM system, a widely accepted natural hazard management approach, exists under the National Disaster Management Act of Sri Lanka, the practices of the system are at a poor level. There persists significant gap in the area of coordination and partnership among stakeholders, other actors and the vulnerable communities. Strict enforcement of regulator measures and public cooperation in protecting the natural drainage (*Thona*) system is not in satisfactory level. Despite the communities being aware of the local hazards, their knowledge on the risk management is little and capacities to act in an emergency situation is low. The community relies heavily on offline means for disaster data and information. The Government stakeholders face resource shortage for undertaking preparedness activities and have limited fund for updating mitigation measures. Local non-profitable organizations, mostly NGOs play a crucial role in fulfilling the local needs, and have strong partnership with the vulnerable communities.

Based on the finding, an effective CB-FDRM system is proposed and recommended in the study area, to be functioned under the authorization of the Disaster Management Centre (DMC) of Sri Lanka for the implement of the concept of “Disaster Resilience and Sustainability by All”. The proposed system was initiated by forming five CB-FDRM committees in the five most frequently flood affected GN divisions in the study area during this study. The DMC, with multi stakeholders’ participation, will take actions to implement soft and hard flood DRR measures of capacity training, maintain the *Thona* drainage system and post disaster response activities through the sub-committees of the CB-FDRM committees. The DMC will continue to work with the Kattankudy Urban Council (UC) and the CB-FDRM committees to implement preparedness and mitigation strategies proposed in the UC’s Green City Master Plan (GCMP), by giving top priority to the strategic activities under the DMC’s annual budget allocation. The DMC will also present the proposed strategic activities at the district level development forums seeking external financial source for implementation.

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