Enhancing Disaster Preparedness: Evaluating the Efficiency of Weather Advisories in Legazpi City

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INTRODUCTION

The City of Legazpi currently serves as the regional government center, education, tourism, and transport hub of the Bicol Region. The city acts as a gateway to several provinces, including Masbate, Camarines Sur, Catanduanes, Sorsogon, and Camarines Norte. It is made up of 70 barangays, 19 of which are coastal barangays, and is 16,165.05 hectares in total land area. The city is vulnerable to the effects of typhoons that originate in the Pacific Ocean, which can cause floods, storm surges, strong winds, and landslides caused by rain because it is located along the eastern shoreline and typhoon belt. Additionally, the city is vulnerable to earthquakes, tsunamis, and lahar floods due to its location within an active volcanic and seismic zone. (2015). *Legazpi City Local Climate Change Action Plan* [Review of *Legazpi City Local Climate Change Action Plan*]. United Nations Human Settlements Programme.

Several provisions in the Local Government Code of 1991 enjoin local government units to protect the welfare, safety, and security of its constituents from all kinds of hazards. The Climate Change Act of 2009 (Republic Act 9729) provides policies for the local governments to uphold the people's constitutional rights to life and property by addressing the root causes of vulnerabilities to climate change and strengthening its institutional capacity for adaptation to climate change effects and building the resilience of local communities. (2009, October 23). *Republic Act No. 9729*

In the past ten years, natural hazards such as volcanic activity, typhoons, and floods, caused major loss of human lives and destruction of properties and livelihood in Legazpi City. The disastrous events also destroyed production assets and infrastructure and caused damage to the environment. (2015). *Legazpi City Local Climate Change Action Plan* [Review of *Legazpi City Local Climate Change Action Plan*]. United Nations Human Settlements Programme.

BACKGROUND

Based on the Modified Coronas Classification, the city has a Type 2 climate. It is distinguished by the absence of a dry season and the exceptionally heavy rainfall that occurs between December and February. The months of April through May saw the least amount of rainfall. An average of 3,432.1 mm of rain falls on the city annually. There is the most rainfall in the latter quarter of the year, while the least amount falls in March, April, and May. Seasonal rainfall in the Philippines is strongly modulated by the severe phases of the ENSO phenomena. The extreme phases of the ENSO phenomenon have a strong modulating effect on seasonal rainfall in the Philippines with mature ENSO warm events (El Niño) often associated with drought and stresses on water resources and agriculture, while cold events (La Niña) often result in exercise rainfall (Jose 2022: Lylon et al. 2006).

Despite the local government's efforts to implement numerous disaster risk reduction measures, challenges persist in maintaining efficient early warning and advisory systems. Given the frequent severe weather conditions that affect the region, disaster preparedness is crucial for mitigating the impacts of these natural hazards. This study aims to evaluate the efficiency of weather advisory issuance in Legazpi City. By examining the local context and guidelines for issuing advisories, this research seeks to enhance the city's disaster preparedness and response capabilities.

Significance of the Study

It aims to give knowledge and a profound understanding of reinforcing local preparedness and response policies in weather disturbances. The output of this research is deemed significant to the community level and will help to educate and comprehend local preparedness and response to weather disturbances.

Objectives of the Study

This study was conducted to determine the significance of localized preparedness and the response of the local government of Legazpi City to weather disturbances. Specifically aims to:

1. Determine the efficiency of weather advisory issuance in Legazpi City;
2. Identify the challenges and difficulties in reinforcing weather advisories;
3. Determine actionable recommendations for enhancing the efficiency and effectiveness of early warning systems and weather advisories in Legazpi City.

Scope and Limitations

This study focuses on evaluating the efficiency of weather advisory issuance, identification of challenges encountered, and recommendations for enhancing weather advisory issuance in Legazpi City. Purposive sampling is used in survey questionnaires to select participants for their expertise.

LITERATURE REVIEW

These reviews of related literature provide studies and literature that serve as a guide and basis for conducting the study. The study was about the overview of Legazpi City's climate in the past decades.

As of 2016, the greatest one-day rainfall observed in Legazpi was 484.6 millimeters on November 3, 1967. The proximity of the city to the sea should mean regulated but warmer temperatures. The monthly mean temperature is lowest in January at 26 °C and highest in May at 28.9 °C. The average minimum temperature ranges from 23.2 °C in January and February to 25.3 °C in May. As of 2016, the highest temperature recorded was 37.7 °C on May 27, 1968, while the lowest temperature was 13.9 °C on December 28, 1971. (2015). *Legazpi City Local Climate Change Action Plan* [Review of *Legazpi City Local Climate Change Action Plan*]. Super typhoon Reming, in 2006, dropped an estimated 466 mm of rainfall in one day. It also carried 10-minute sustained winds of 195 kilometers per hour, which was classified as Category 4 on the Saffir- Simpson Scale (Source: NEDA Media Report as of December 16, 2007).

METHODOLOGY

It presents the study range, data collection, information investigation, and the strategies to be utilized in this study. The materials and methods of this ponder are a combination of methodologies from the document analysis, which involves reviewing existing documents related to the case.

Research Design

The study used descriptive and purposive sampling methods to analyze survey data, identifying trends and areas for improvement. The Likert 5-point scale was used to measure the efficiency in issuing weather advisories in Legazpi City.

Quantitative Data Collection:

- Surveys: Structured surveys was administered to local authorities and emergency responders to gather data on their experiences and perceptions of early warning systems and weather advisories.
- Data Analysis: Descriptive and inferential statistical methods was used to analyze survey data, identifying trends and areas for improvement.

Qualitative Data Collection:

- Interviews and Focus Groups: In-depth interviews and focus group discussions was conducted with key stakeholders, including community leaders, local government officials, and meteorologists, to gather qualitative insights into the challenges and successes of current systems.

Data Collection and Analysis

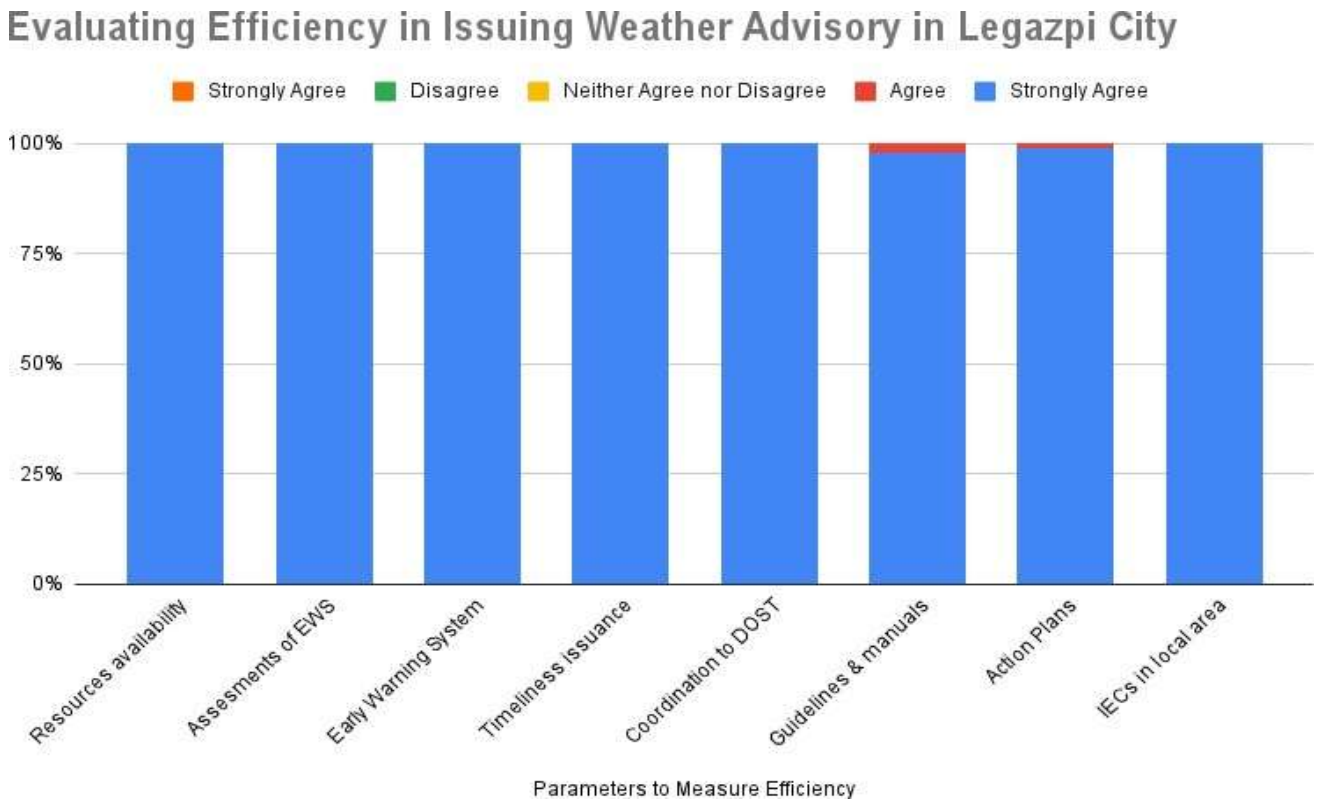
The data and results are shown in a bar chart and a donut chart. The bar chart is composed of the measurement of agreement on how efficient Legazpi City is in the issuance of weather advisories. The donut chart shows the most frequently to least frequently encountered challenges in the issuance of weather advisories.

RESULTS AND DISCUSSION

The data gathered and its interpretation of results in this study were discussed according to the following: (a) efficiency of issuance of weather advisories, (b) identified key challenges encountered, and (c) actionable recommendations to enhance the efficiency of early warning systems and weather advisories issuance.

Efficiency Of Issuance Of Weather Advisory

The bar chart represents the baseline on the efficiency of issuing advisories in Legazpi, with key indicators such as timeliness of issuance, community comprehension of the advisory, and a well-equipped DRRMC. It is scientifically based and follows guidelines and manuals of operation during and after a disaster.



The findings of this study show that Legazpi City is efficient in issuing weather advisories and early warning systems. A total of 20 individuals who answered the survey were local government officials, meteorologists, DRRM practitioners, and emergency responders. To gather qualitative insights into the challenges and successes of current systems. From the parameters of (a) resource availability of DRRMC, (b) assessment and an inspection of EWS in the area, (c) the comprehension of the community of EWS at their barangay level or based on their exposure to hazard (d) the timeliness of issuance of weather advisory, (e) the coordination of DRMMC to local agencies such as DOST- PAGASA, (h) the implementation of the IEC in the area are all one (100) percent strongly agree that it is efficient. The (f) guidelines or manual of operations for the basic measure of the EWS in local weather disturbances has a scale of ninety- nine (99) percent agree. The requirement for the local DRRMC to update its contingency or action plans in weather disturbances like rainy season has a scale of ninety- eight (98) percent agree. International studies stress the critical role of multi-hazard early warning systems (MHEWS) in reducing disaster mortality. The 2025 UNDRR Global Status Report found that countries with comprehensive MHEWS capabilities experience nearly six times lower disaster-related mortality compared to those with limited systems. Similarly, recent research from University College London emphasizes bridging gaps between research and practice by incorporating public response datasets into early warning design, ensuring that alerts are not only technically accurate but socially effective.

Key Challenges Encountered

The identified key challenges encountered in issuing weather advisories in Legazpi City are the following: (1) process and preparation of advisory, (2) dissemination of advisories (3) data inaccuracies, (4) communication issues delays and (5) action taken by the community. The donut chart shows the most frequently encountered is the (5) action taken by the community which has 29. 2 percent, and (4) communication issues delays which has 22. 5 percent, followed by (3) data inaccuracies which have 17.1 percent, and (1) process and preparation of advisory which has 16.4 percent, and the least frequently encountered challenge is (2) dissemination of advisories has 14.8 percent.

Recommendation for Improvement

Local government officials, meteorologists, DRRM practitioners, and emergency responders were given the study, which included practical recommendations: (1) the community should participate in all DRRM projects and programs pertaining to DRRM/CCA issued or implemented by the local government unit; (2) a quarterly orientation on DRRM/CCA course should be conducted for the community at the barangay level; and (3) the practice of implementing contingency plans during critical disaster situation to improve weather advisories and early warning systems effectiveness, particularly through process streamlining and possible technology fixes.

Recent scholarship emphasizes that effective disaster risk communication is not just about disseminating information but ensuring that messages resonate with diverse audiences. A 2025 UNDRR analysis highlighted persistent gaps in global risk communication, particularly in multilingual accessibility and clarity of instructions. (UNDRR, 2025).

Even technologically advanced systems fail when messages do not lead to protective action, underscoring the need for culturally sensitive and actionable advisories. Complementing this, systematic reviews of disaster communication interventions show that communication strategies must be tailored across the disaster cycle—preparedness, response, and recovery—to maximize impact (Pescaroli et al., 2025). Community resilience research has evolved toward dynamic, participatory frameworks. A 2025 longitudinal study using the Baseline Resilience Indicators for Communities (BRIC) demonstrated that resilience changes over time, influenced by socio-economic and spatial factors. Another conceptual exploration emphasized resilience as a proactive social dynamic, where communities leverage diverse resource pools during uncertainty through participatory approaches (Derakhshan et al., 2025).

CONCLUSION AND RECOMMENDATION

Efficient early warning systems and timely weather advisories are critical components of effective disaster preparedness. This study presents to evaluate the current practices in Legazpi City, identifying challenges and proposing improvements to enhance the overall efficiency of these systems. By incorporating insights from literature reviews and learning from recent operations, this study provides practical recommendations for optimizing disaster management strategies, ensuring timely and adequate support for affected communities. Efficient early warning systems and timely weather advisories are not only practical necessities but also embody deeper theoretical principles in disaster management. From a systems theory perspective, these mechanisms function as interconnected subsystems within a larger socio- technical framework. Their effectiveness depends on the seamless interaction between technology, institutions, and communities. A breakdown in communication channels or stakeholder coordination can compromise the entire system, underscoring the importance of holistic design and integration (Bradley et al., 2014).

The role of community engagement highlights the relevance of social capital theory. Strong networks of trust, cooperation, and shared responsibility among stakeholders, local leaders, and government officials enhance resilience by enabling collective action during crises. Communities with robust social capital are better positioned to absorb shocks, adapt to disruptions, and recover more quickly. This theoretical lens emphasizes that disaster preparedness is not merely technical but deeply social, requiring investment in relationships and participatory governance.

Risk communication theory further enriches the discussion by stressing the importance of clarity,

credibility, and timeliness in disseminating advisories. In critical moments, the way information is framed and delivered can shape public perception and influence behavior. Miscommunication or delays may lead to panic or maladaptive responses, while well-structured advisories foster trust and compliance. This aligns with information diffusion models, which suggest that messages spread unevenly across populations, requiring tailored strategies for vulnerable or hard-to- reach groups. (UNDRR, 2025)

Adaptive governance theory also provides a valuable framework for understanding disaster preparedness. It emphasizes flexibility, inclusivity, and continuous learning within institutions. By incorporating lessons from past operations and literature reviews, Legazpi City can strengthen its adaptive capacity, ensuring that disaster management strategies evolve alongside emerging risks and community needs. This theoretical orientation encourages iterative improvements rather than static solutions.

On a global scale, the study aligns with the Sendai Framework for Disaster Risk Reduction (2015–2030), which prioritizes understanding risk, strengthening governance, investing in resilience, and enhancing preparedness. The proposed measures—stakeholder engagement, monitoring data for IECs, and coordinated communication plans—directly support these priorities. Similarly, the principles of Integrated Disaster Risk Management (IDRM) highlight the need for a holistic approach that spans prevention, preparedness, response, and recovery, situating Legazpi City's efforts within a broader continuum of resilience-building.

The emphasis on community involvement reflects the philosophy of Community-Based Disaster Risk Reduction (CBDRR), which advocates for empowering local populations as active participants rather than passive recipients of aid. By fostering ownership and participation, disaster management becomes more sustainable and culturally attuned. Finally, resilience frameworks promoted by organizations such as the UNDP and World Bank reinforce the idea that preparedness is not only about immediate response but also about building long- term adaptive capacity to withstand and transform in the face of hazards.

Furthermore, the major concepts in the studies must be given more attention to (1) consistent engagement with key stakeholders, community leaders, and local government officials during preparedness for disaster, (2) monitoring data or reports for conducting IECs to the community, and (3) create an action plan for communication and coordination to deliver accurate and timely advisory in the critical time of disaster.

By understanding these factors, policymakers and disaster management teams can develop targeted strategies to address challenges and improve the overall disaster preparedness framework. This study contributes to the broader body of knowledge on disaster management, offering practical recommendations for enhancing community resilience.

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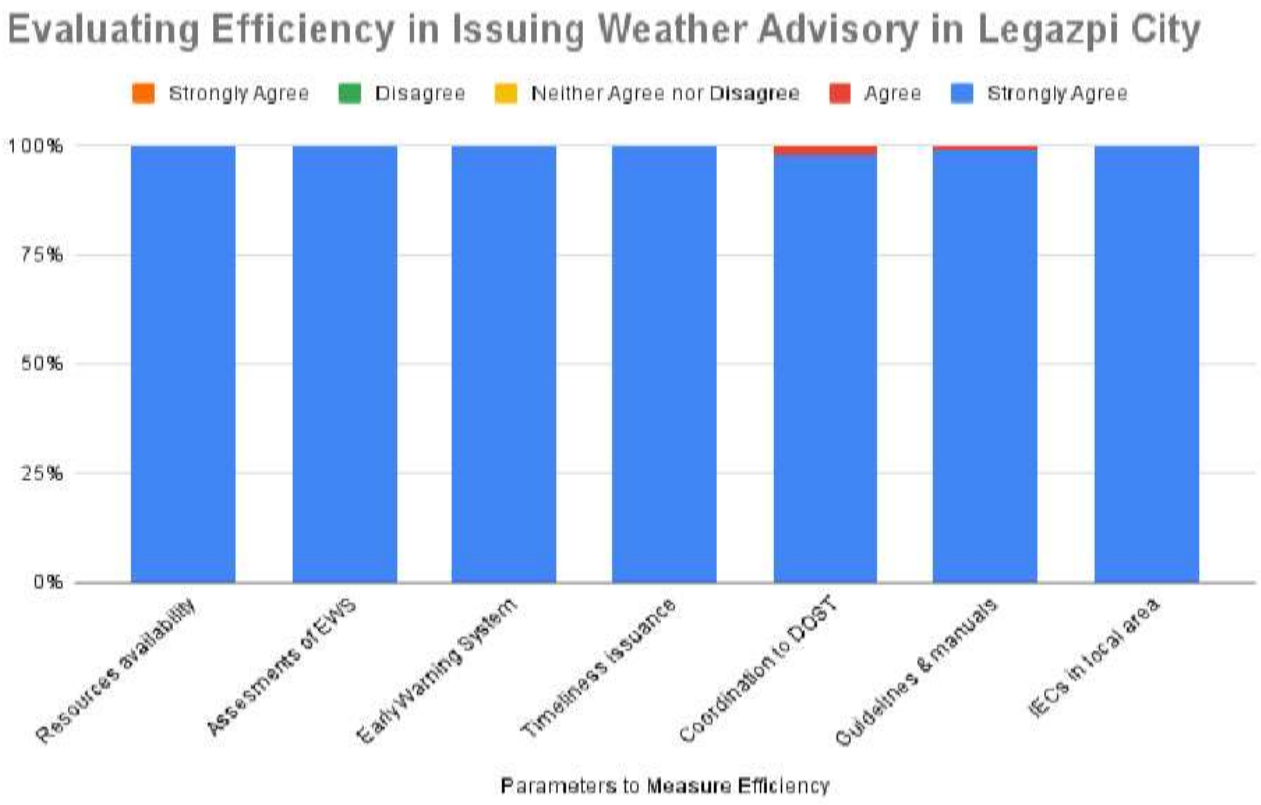
APPENDICES



1.

Matrix for Evaluating Efficiency in Issuing Weather Advisory in Legazpi City

Efficiency in disaster risk management demands effective actions in disaster prevention or preparedness, mitigation in the event of disasters, disaster responses, relief coordination, and long-term resettlement arrangements.

This survey form will represent the baseline on the efficiency of issuing advisories in Legazpi, with key indicators such as timeliness of issuance, community comprehension of the advisory, and well-equipped DRRMC. It is scientifically based and follows guidelines and manuals of operation during and after a disaster.

Name (Optional): _____

Occupation: _____

Designation: _____

Gender: _____

Age: _____

I. Key factors to measure the efficiency of issuing advisories in Legazpi City.

Parameters/ Factors to Measure Efficiency	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Agree
Is the local DRRMC required to have a facility staffed with appropriate resources and equipped with computer systems, communication tools, and monitoring tools to ensure the proper dissemination of weather advisories?					
Does the local DRRM need to conduct assessments and inspections of EWS, such as rain gauges and water level sensors, in their area?					
It should be necessary for the community to comprehend the EWS at their barangay level or based on their exposure hazard.					
The necessity of timely issuance and dissemination of protocols and weather advisories to the community?					

2.

Does it need to coordinate with DOST-PAGASA for local weather disturbances and other agencies that are members of the DRRM Council?					
Is it a requirement to have guidelines or a manual of operations used for the basic measure of the EWS in local weather disturbance?					
Is it a requirement for the local DRRMC to update its contingency or action plans during weather disturbances like the rainy season?					
Is it necessary for the local DRRMC to implement an information and education campaign to raise public awareness about weather disturbances in the area?					

II. Identified challenges encountered in issuing weather advisories in Legazpi City. Please rank the following challenges by their (5) most frequently encountered and (1) least frequently encountered.

Key Challenges	1	2	3	4	5	Comments and Suggestions
Process and preparation of advisory						
Dissemination of advisory						
Data Inaccuracies						
Communication issues delays						
Action taken by the community						

III. Recommendations

_____

_____

3. _____