HANDOG
A WEBSITE-BASED APPLICATION FOR OFFICE OF CIVIL DEFENSE

A CAPSTONE PROJECT

Presented to the Faculty of College of Engineering, Architecture, and Technology

Notre Dame of Dadiangas University

General Santos City

In Partial Fulfillment of the Requirements for the Degree of

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

By

Jaymarc T. Bagang

Karl Vincent A. Dumaguing

Marc Danel M. Trinidad

November 2025

Table of Contents

Chapter 1

INTRODUCTION

1.1 The Problem and its Setting

Why this Project is Important? Due to the fact that lives rely on precision and swiftness in times of crisis. In the crucial moments after a natural disaster, information is equally vital as taking action. Hesitations in gathering and validating situational data can cause postponed emergency responses, improper resource distribution, and unnecessary loss of lives and property. Although there are different national frameworks for disaster response in the Philippines, a significant gap persists due to the absence of a quick and dependable system for real-time, on-the-ground reporting—especially in rural or inaccessible regions.

The Philippines, situated in the Pacific Ring of Fire and consisting of more than 7,000 islands, ranks among the most disaster-prone nations globally. It endures an average of 20 typhoons annually, along with regular earthquakes, landslides, volcanic activity, and flooding. Even with the National Disaster Risk Reduction and Management Plan (NDRRMP) in place, information blockages during emergencies frequently lead to slow or inadequate reactions. Conventional reporting techniques depend on structured, manual workflows that aren't suited for processing real-time civilian feedback—particularly in a nation where geographic and infrastructure obstacles further hinder communication

At the international level, countries like Japan, the United States, and Australia have begun integrating citizen-sourced data through mobile apps, social media, and

GIS-based dashboards. These systems not only allow real-time situational awareness but also enhance decision-making through AI-powered hazard assessments. The United Nations Office for Disaster Risk Reduction (UNDRR) has recognized the importance of digital tools, and crowdsourced information in modern disaster resilience (UNDRR, 2022). The HANDOG system aligns with these best practices by using modern technologies—such as web dashboards, and GIS—to process and visualize hazard reports submitted by the public.

Nationally, the Office of Civil Defense (OCD) is tasked with coordinating disaster preparedness and response in the Philippines. While tools and hazard maps from agencies like DOST and PHIVOLCS provide valuable resources, these are largely static and not integrated with direct citizen input. The Philippines has a high rate of smartphone usage and internet connectivity, yet there is no existing official system that channels real-time visual reports from civilians into OCD's workflow. The NDRRMP 2020–2030 emphasizes the need for adaptive, timely, and localized disaster information systems. The HANDOG system addresses this exact gap by offering OCD a dashboard where they can receive civilian-submitted photos that include metadata such as date, time, location, and hazard type.

At the community level, numerous barangays and municipalities do not have the resources to swiftly communicate incidents to regional or national officials. In numerous instances, local authorities depend on text messages or radio communications, which frequently get interrupted during emergencies. Though civilians occasionally share images or photos of floods, landslides, or fires on social media, these are hard to authenticate and are not officially utilized by OCD. The HANDOG system closes this gap by allowing civilian-uploaded reports from a companion mobile app and presenting them on a centralized, secure web dashboard that is only accessible to OCD personnel. The system categorizes the seriousness of every incident through reports sent and displays them on a shapefile-based map to aid in hazard observation and decision-making.

The HANDOG system can greatly enhance disaster readiness, response efficiency, and resource distribution by offering a dependable, real-time, and visual communication link between the community and the OCD. It enhances the connection between national agencies and communities, enabling both parties to react more efficiently during critical moments.

1.2 Literature Review

Recent technological progress has showcased the increasing capability of real-time data integration in managing disasters. As stated by the United Nations Office for Disaster Risk Reduction (2022), digital instruments that enable bidirectional communication between the public and agencies can greatly enhance disaster preparedness and response. Studies have indicated that dashboards can act as efficient tools for aggregating data from multiple sources and converting it into clear visual representations for those making decisions (UNDRR, 2023).

A research project by Dela Cruz and Castañeda (2021) focused on crowdsourced information in Southeast Asia highlighted that community-submitted materials like images and photos offered early signs of real-world disaster effects. Nevertheless, the difficulty persisted in incorporating this information into official government frameworks. Additional research on Geographic Information Systems (GIS) emphasizes the usefulness of shapefiles in effectively illustrating geographic risk areas, including flood plains or regions susceptible to landslides. Simultaneously, artificial intelligence has progressively been applied in emergency systems to identify patterns, assess severity, and support decision-making processes.

Regardless of these advancements, no current system completely merges real-time civilian photo reporting, AI-powered hazard evaluation, and shapefile visualization into a cohesive dashboard tailored for national disaster organizations such as the OCD. This research seeks to address that void by creating a targeted, operational platform.

1.3 Conceptual Framework

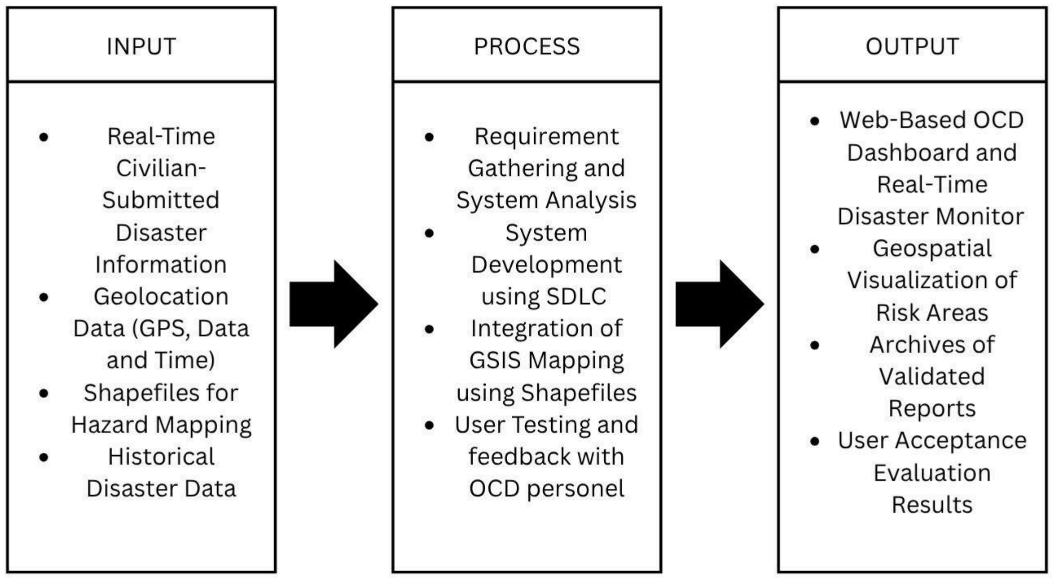


Figure 1. Conceptual Framework

1.4 Statement of the Problem

This study aimed to implement a centralized dashboard system for the Office of Civil Defense (OCD) to improve the collection, classification, and visualization of real-time civilian-submitted disaster reports.

Specifically, the research project answered the following questions:

1. What are the current challenges and limitations encountered by the Office of Civil Defense (OCD) in receiving and processing real-time hazard reports from civilians during disaster events?
2. How can a centralized web-based dashboard be developed to feature a user-friendly interface that integrates real-time photo submissions, geolocation metadata, and GIS-based mapping?
3. To what extent is the OCD Dashboard System accepted by users in terms of:

a. Program Design

b. Content and Features

c. Usability

d. Acceptability

.

1.5 Scope and Delimitation

Scope of the Study

This research concentrates on creating and implementing a centralized online dashboard system for the Office of Civil Defense. The system will obtain photos uploaded by civilians via an external mobile application, created by another team and excluded from this project's scope. The dashboard will show the reports as well as important metadata such as geolocation, time, and date.

Delimitation

The photo feature will be passed down to the next developer who wishes to adapt the system. This means that the current scope focuses only on images instead of the proposed photo. The machine learning component has been removed. Instead of a severity level indicator, the dashboard will now fetch user-submitted data and display it on the map, providing additional information for each report sent by the user.

1.6 Significance of the Study

This study is significant in several aspects. For the Office of Civil Defense, the dashboard system provides a vital tool to modernize and streamline the collection and evaluation of civilian hazard reports. The integration of data analytics and geospatial visualization directly supports faster decision-making and enhances emergency coordination. The system enables OCD administrators to assess risks more efficiently and respond promptly, thereby potentially saving lives and mitigating the impact of disasters.

For the general public, the system allows their reports to directly inform official actions, encouraging civic participation and reinforcing community-level disaster awareness. For developers and future researchers, the system serves as a reference for integrating real-time reporting, artificial intelligence, and mapping technologies into emergency applications. Academically, the project offers a meaningful contribution to the field of information systems with real-world application in public safety and governance. By developing this system, the researchers hope to support ongoing efforts in building a disaster-resilient Philippines where technology plays an active role in saving lives and strengthening national readiness.

CHAPTER 2

METHODOLOGY

2.1 Research Design

This research employs a developmental design grounded in the System Development Life Cycle (SDLC) to facilitate the methodical development of a strong and functional web-based dashboard system specifically designed for the Office of Civil Defense (OCD). The stages of the SDLC applied in this project consist of planning, system analysis, design, development, testing, deployment, and documentation. Every phase is executed with repetitive feedback cycles, enabling continuous confirmation and enhancement according to user requirements and system efficiency.

During the planning phase, researchers held preliminary discussions with OCD staff to pinpoint the agency's issues in collecting real-time disaster information. The analysis stage concentrated on identifying functional requirements, including photo ingestion, severity categorization, geospatial representation, and cloud storage archiving. These guided the technical and architectural choices during the design phase.

The development phase utilized a combination of technologies including HTML5, CSS3, JavaScript, and PHP to create the user interface and backend services. The system additionally incorporates shapefile-based mapping through GIS libraries and utilizes a data analysis framework designed to evaluate hazard information based on user-submitted reports and associated metadata.

The testing process included unit testing, integration testing, and user acceptance testing (UAT), all carried out with the involvement of OCD personnel. The testing phase emphasized user-friendliness, responsiveness of the GIS element, and dependability of the cloud storage procedure. Insights gained from these assessments were applied to refine interface components, enhance performance, and guarantee that the final system closely matched the users' workflow.

Implementation will take place in collaboration with OCD's IT support team, guaranteeing alignment with government systems and cybersecurity measures. Documentation is created in parallel with development to assist in system training, problem-solving, and scalability for future upgrades.

Throughout this methodology, the design process emphasizes user-centered principles, placing OCD administrators at the core of design decisions. Their ongoing participation ensures that the dashboard will meet actual operational needs, particularly in areas of real-time data collection, rapid risk assessment, and geographic situational awareness.

2.2 Selection of Respondents

The proposed system's primary stakeholders and end-users are the employees and administrators within the Office of Civil Defense. Given that the OCD is actively participating in this project and acts as the requesting entity, the pool of respondents is restricted to OCD staff who will likely utilize or assess the dashboard system after its launch.

The insights, assessments, and usage patterns will form the primary foundation for confirming the dashboard's effectiveness and practicality in real disaster response situations. Extra participants, like IT consultants or GIS specialists from the agency, might also assist during testing and feedback sessions.

2.3 Locale of the Study

The study is conducted in partnership with the Office of Civil Defense's central or regional office, depending on availability and cooperation. The researchers collaborated with these institutions for system testing, feedback collection, and user validation sessions. Access to staff and technical data was granted in accordance with ethical research practices and project agreements.

2.4 Research Instrument

The main tools utilized in this research comprise system prototypes, technical documentation, and assessment checklists. Dashboard prototypes will showcase features and gather user feedback. OCD staff will utilize evaluation checklists to evaluate system performance, user-friendliness, and responsiveness. These checklists might encompass metrics like accessibility, visualization clarity, data processing velocity, and accuracy in hazard categorization. Additional tools comprise semi-structured feedback forms to collect qualitative insights throughout the testing and validation stages. Insights gained from these sessions will further aid in enhancing the system.

2.5 Data Gathering Procedure

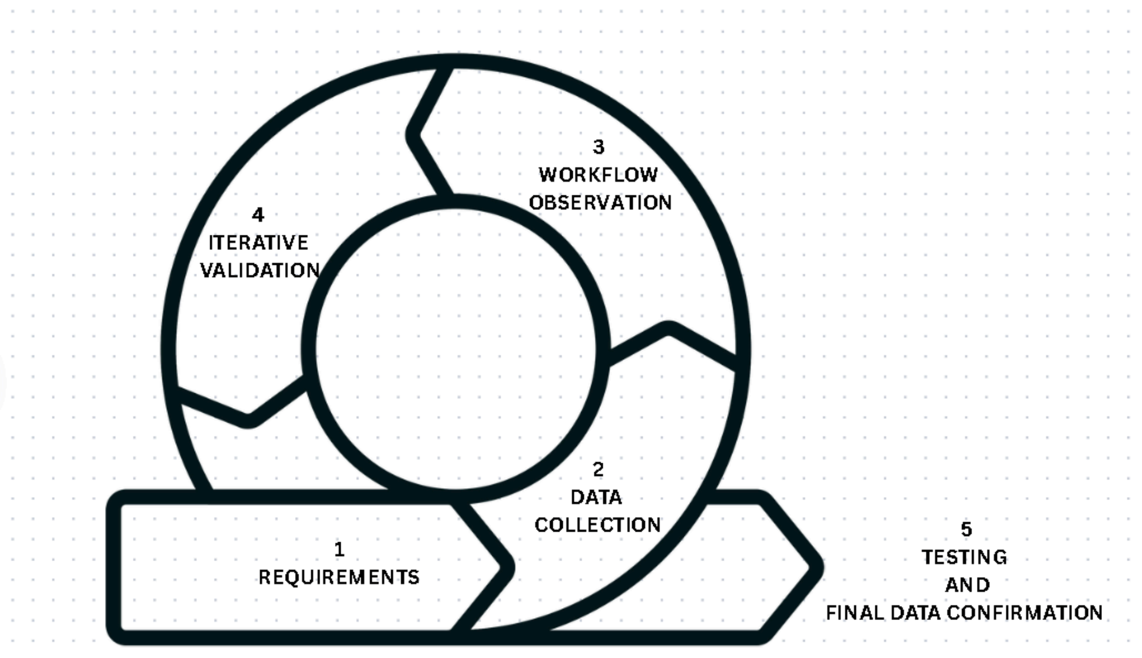


Figure 2. Agile Development

The data gathering process for this project follows a structured series of phases designed to ensure that the system is built on accurate, operationally relevant, and validated data. Since the project is conducted in collaboration with the Office of Civil Defense (OCD), civilian surveys are not required; instead, all information is acquired directly from the agency's personnel, data repositories, and procedural documentation.

Phase 1: Initial Consultation and Requirement Elicitation

In this phase, the development team engages directly with designated OCD stakeholders—typically IT staff, disaster response coordinators, and GIS personnel—to discuss the organization's challenges, goals, and workflow needs. Interviews and focus group discussions are conducted to understand how disaster reports are currently handled, what kind of metadata is essential, and which features the dashboard must support (e.g., mapping, photo archiving, classification). This consultation defines the core functionality required for the system.

Phase 2: Data Collection from Existing Resources

Following initial consultations, OCD provides the developers with access to relevant internal documents, shapefiles, hazard maps, classification criteria, and reporting templates. These resources serve as the foundation for designing the system's back-end data architecture and front-end visualization tools. The development team analyzes this material to extract hazard categories, geospatial data formats, severity indicators, and standard metadata structures.

Phase 3: Workflow Observation and Process Mapping

During this stage, developers observe actual OCD workflows (or simulations) to identify pain points, bottlenecks, and opportunities for automation. This includes examining how incoming reports are processed, validated, categorized, and stored. These observations are then translated into visual process maps or use-case diagrams that guide interface design and inform the development of automated feeling such as data validation and report classification within the system.

Phase 4: Iterative Validation with OCD Staff

As development progresses, prototypes are demonstrated to OCD personnel to validate that gathered data is being correctly implemented. This is done in iterative cycles (e.g., agile sprints), where small features are released, reviewed, and refined based on OCD's feedback. This ongoing interaction ensures that system components such as report intake, map overlays, classification logic, and archival workflows reflect the actual needs and expectations of the agency.

Phase 5: Testing and Final Data Confirmation

In the final phase, OCD staff conduct comprehensive user acceptance testing (UAT) using sample reports and real-world shapefiles. The team evaluates whether all gathered and integrated data behaves as expected, and whether the system performs reliably under simulated disaster scenarios. Any gaps or errors discovered during this phase are addressed before full deployment.

2.6 Software Process Model

The software development process follows the SDLC model, beginning with planning, requirements gathering, and proceeding through design, implementation, testing, and deployment. The model includes continuous iteration and user validation, with features such as real-time photo report processing, hazard classification, and GIS integration developed incrementally based on OCD's input.

2.7 Data Analysis

The data collected during system testing will primarily consist of qualitative, observational, and experiential inputs sourced directly from OCD personnel, who are the intended end-users of the dashboard. Evaluation tools include structured feedback forms, usability testing checklists, real-time observation logs, and post-interaction interviews. These instruments are designed to capture both quantitative feedback (e.g., ratings of performance or accuracy) and qualitative insights (e.g., ease of navigation or perceived value of real-time data visualization).

A systematic approach will be used to analyze this data, beginning with the categorization of responses according to key performance indicators such as interface usability, processing speed, map accuracy, hazard classification precision, and system responsiveness. Feedback will be reviewed to determine how effectively the dashboard supports actual workflows during disaster monitoring scenarios. For example, analysts will assess whether the real-time feed of civilian-submitted reports enables timely and accurate situational updates and whether the integration of shapefiles and data visualization features enhances hazard awareness and decision-making.

Similarly, any latency or visual rendering issues within the GIS mapping module will be noted and corrected to ensure smooth and interpretable geographic overlays.

The analysis process also considers the operational value of cloud archiving, focusing on upload success rates, data integrity, and the traceability of stored reports. Logs will be examined to ensure that each submission is properly attributed, stored securely, and retrievable for later use.

Recurring patterns in usability challenges or feature inefficiencies will be identified and compiled into a revision plan for the system. These findings will inform the final adjustments to the dashboard before deployment and help prioritize future updates. Through this rigorous and user-centered analysis, the system will be refined to meet OCD's high standards for disaster readiness, reliability, and institutional integration.

2.8 Ethical Considerations

The researchers assert their dedication to ethical research methods. Every system testing and feedback session will take place with the complete awareness and voluntary involvement of OCD staff. Civilians' personal or sensitive information will not be gathered since the researchers hold no responsibility for the mobile app or the submission of field data.

The initiative will adhere to all data protection and security regulations established by the OCD and relevant national IT benchmarks. The utilization of shapefiles, datasets, or photo submissions will be restricted to development and demonstration, guaranteeing that no sensitive information is revealed or improperly utilized.

Chapter 3

RESULT AND DISCUSSION

3.1 System Overview

The proposed OCD Dashboard System is a centralized, web-based disaster response and monitoring platform designed to assist the Office of Civil Defense (OCD) in receiving, organizing, and responding to real-time reports of natural hazards. It bridges the gap between on-the-ground civilian observations and centralized government response by providing an interactive environment for viewing, classifying, and archiving reports. While the mobile application used for photo submission is handled by a separate development group, this dashboard serves as the OCD's primary interface for all received data.

The system receives civilian-submitted photos through the external app and processes accompanying metadata such as GPS coordinates, date, and time. These details are critical for verifying the location and timing of disaster events. The dashboard immediately displays new reports in a real-time event feed where each entry includes a photo preview, severity classification, report location, and submission timestamp. This stream of data ensures that OCD administrators can stay up to date with the latest developments across multiple regions.

One of the standout features of the platform is its integration with a Map with the Location reports from the application that automatically sends each event based on report of the users from the application. This reports assists in prioritizing reports and ensuring that critical events are flagged and responded to promptly.

The dashboard also includes a robust mapping interface that uses shapefile-based GIS technology. These shapefiles are used to display hazard-prone areas visually, allowing OCD personnel to analyze the spatial distribution of events and identify high-risk zones. Through interactive map overlays, users can view submitted photo reports directly on a geographic interface, helping correlate the data with physical terrain and pre-identified hazard areas.

Administrators can use the system's upload mechanism to archive selected reports directly to a secure cloud server. This ensures the availability of data for post-disaster analysis, audits, and future policy formulation. The system logs each upload along with metadata and admin credentials for transparency and traceability.

The OCD Dashboard System is built using a combination of HTML5, CSS3, JavaScript, and PHP to ensure performance, scalability, and ease of maintenance. Its modular design supports expansion and future integration with other government platforms. Optimized for daily operations in OCD offices, the system runs on standard government computer setups and requires only a reliable internet connection to function effectively.

With its blend of real-time data visualization, automated classification, geospatial intelligence, and cloud-based archival, the dashboard offers a comprehensive solution to the challenges faced in modern disaster management and reinforces the OCD's capacity to respond with speed, accuracy, and accountability.

3.2 System Objectives

The proposed OCD Dashboard System is designed to serve as a comprehensive disaster monitoring and response platform by integrating cutting-edge technologies such as geospatial visualization. The following are the system's core objectives, explained in greater detail:

1. Streamline the Reception of Civilian-Submitted Disaster photo Reports

The system is intended to accept photo reports directly from individuals who see or encounter disaster-related incidents as they happen. These entries are submitted via an external mobile app and contain vital metadata like GPS coordinates, timestamps, and user input. By providing a unified platform for gathering these reports, the system lessens reliance on slow and manual reporting practices like phone calls, paper documents, or social media tracking. This goal guarantees an ongoing and effective transmission of field-level data into OCD's command framework, especially important in high-risk, isolated, or swiftly changing disaster situations

2. Visualize Reports on an Interactive GIS Map Using Shapefiles

The dashboard includes a GIS-driven interface that utilizes shapefiles to illustrate the sites of reported incidents. Shapefiles are vector data formats utilized to outline limits and hazard areas like flood zones, earthquake-sensitive regions, and landslide pathways. By displaying each report on this interactive map, administrators can observe the distribution and concentration of disaster occurrences throughout barangays, municipalities, and regions. This goal allows for a geographically informed method to disaster management, assisting responders in linking civilian accounts with high-risk areas and enhancing situational understanding

3. Improve OCD's Disaster Monitoring and Response Efficiency

In the end, the system is designed to improve the operational functions of the Office of Civil Defense by delivering immediate, practical insights from the field. By combining various technologies—civilian reporting, GIS visualization, and secure data storage—into a single cohesive platform, the system greatly accelerates the interval between incident occurrence and agency reaction. This results in enhanced distribution of emergency resources, quicker risk evaluation, and improved collaboration between local and national disaster agencies. Consequently, the OCD is enabled to act more quickly, precisely, and efficiently to safeguard vulnerable communities

3.3 System Scope and Limitations

Scope

The proposed system focuses on the development of a centralized web-based dashboard designed specifically for the Office of Civil Defense (OCD). Its primary function is to receive, display, process, and archive real-time disaster photo reports submitted by civilians via a separate mobile application. The dashboard provides administrators with a structured environment to monitor natural hazard events as they unfold.

Key components within the system's scope include:

1. A responsive and secure dashboard interface that allows OCD administrators to view submitted photo reports in real time.
2. Metadata integration including GPS location, date, and time, enabling contextual understanding of each event.
3. A mapping module that uses shapefile-based GIS to visualize the geographic distribution of disaster reports and hazard-prone areas.
4. A MongoDB-based archival system that securely stores submitted reports along with their classification results and metadata for future reference and auditing.

The scope is limited to the back-end and front-end components necessary to operate the dashboard effectively in the OCD's operational environment. It is optimized for use by disaster monitoring personnel and does not extend beyond administrative use.

Limitations

While the system offers essential functionalities for centralized disaster report monitoring, certain limitations are acknowledged in its implementation:

1. **Exclusion of Mobile Application Development**: The system does not cover the creation, maintenance, or functionality of the mobile application used by civilians to record and submit disaster photos. The mobile application is developed by a separate group and is considered an external component integrated into this project through API or data feed mechanisms.

2. **No Support for Physical Emergency Response Operations**: The system is purely informational and analytical. It does not include features for dispatching or coordinating emergency response teams, nor does it provide real-time communication tools for field units or rescue personnel.

3. **Dependency on OCD-Provided Infrastructur**e: The MongoDB cloud database server hosting are assumed to be provided or maintained by the OCD. Therefore, system reliability and availability depend in part on existing infrastructure, internet stability, and organizational cybersecurity protocols implemented by OCD or its IT division.
4. **Geographic and Network Constraints**: The system assumes consistent internet connectivity and sufficient server bandwidth to process photo uploads and GIS data. It may not function optimally in remote areas with limited digital infrastructure or during network outages caused by disasters.

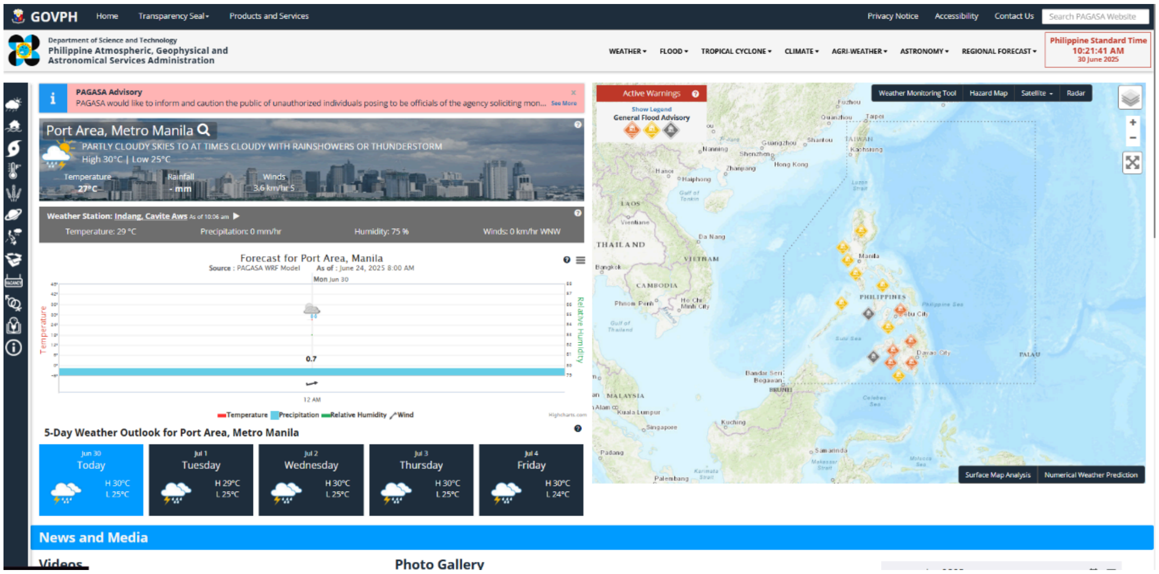
3.4 Architectural Design

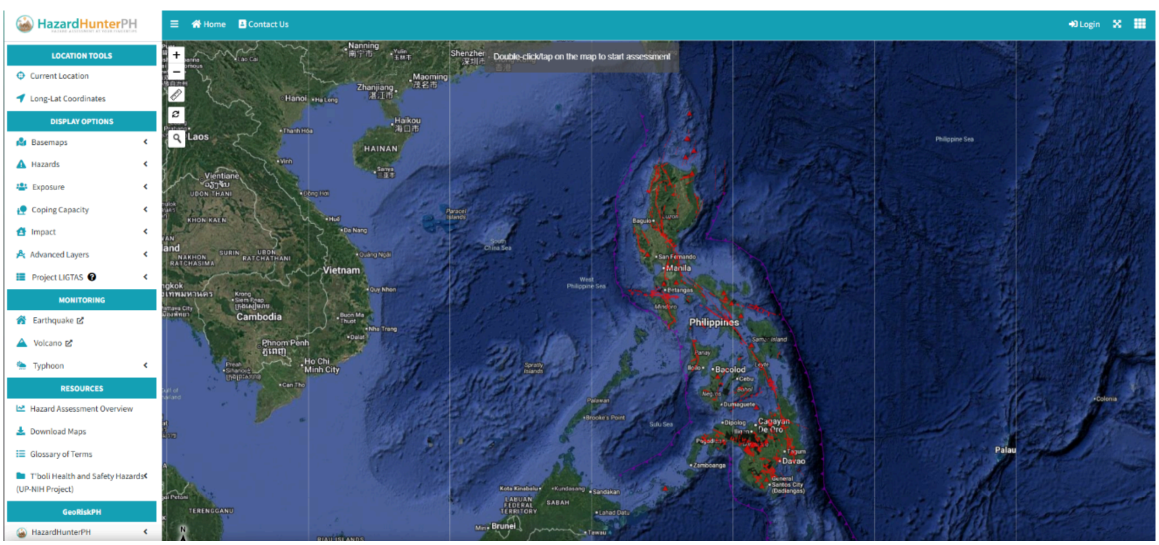
The architecture of the dashboard follows a modular design with distinct components for data ingestion, processing, display, and storage. The front end is developed using HTML5, CSS3, and JavaScript, ensuring a responsive and user-friendly interface that allows OCD staff to navigate photo reports, maps, and upload functions effectively. The back end is developed using PHP, which handles data processing, system logic, and communication with the MongoDB cloud database service.

Geospatial components use shapefile-based mapping integrated with tools like Leaflet.js or Mapbox, enabling administrators to visualize hazard zones dynamically.

The system's architecture also includes secure MongoDB cloud database service for archiving submitted reports, ensuring accessibility for post-disaster assessment and long-term data retention. Each component works cohesively to provide OCD with a real-time, reliable, and scalable platform for disaster monitoring and response.

UI DESIGN REFERENCES





WEBSITE UI DESIGN

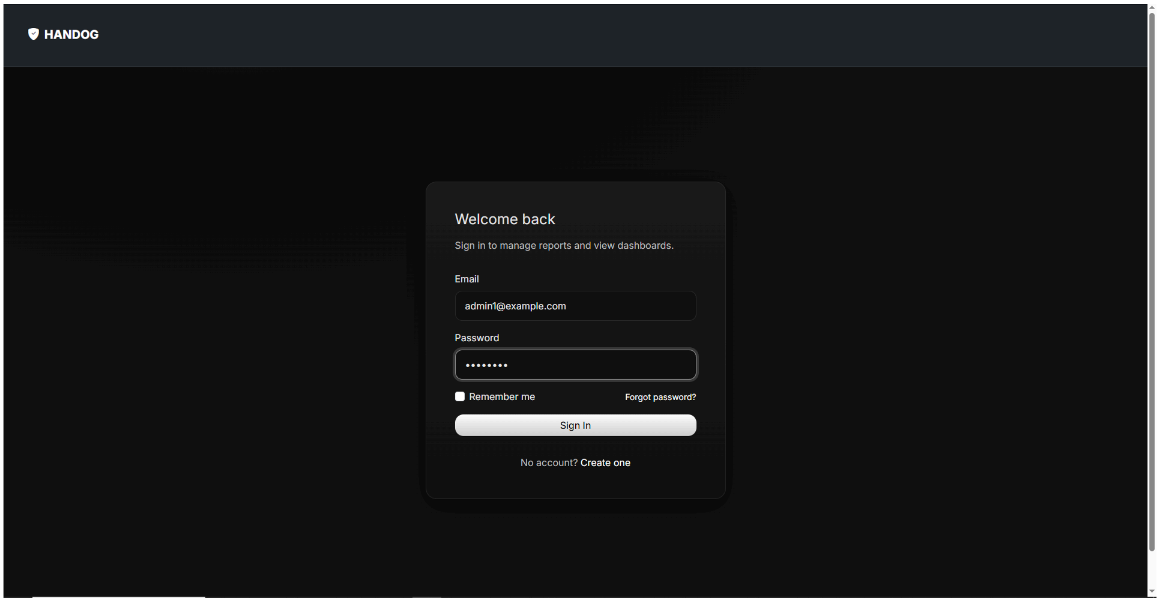


Figure 1. Admin Login

This interface serves as the secure entry point for system administrators. It requires the admin to provide valid login credentials such as a username and password before gaining access to the system's backend functions. The design emphasizes authentication and system security.

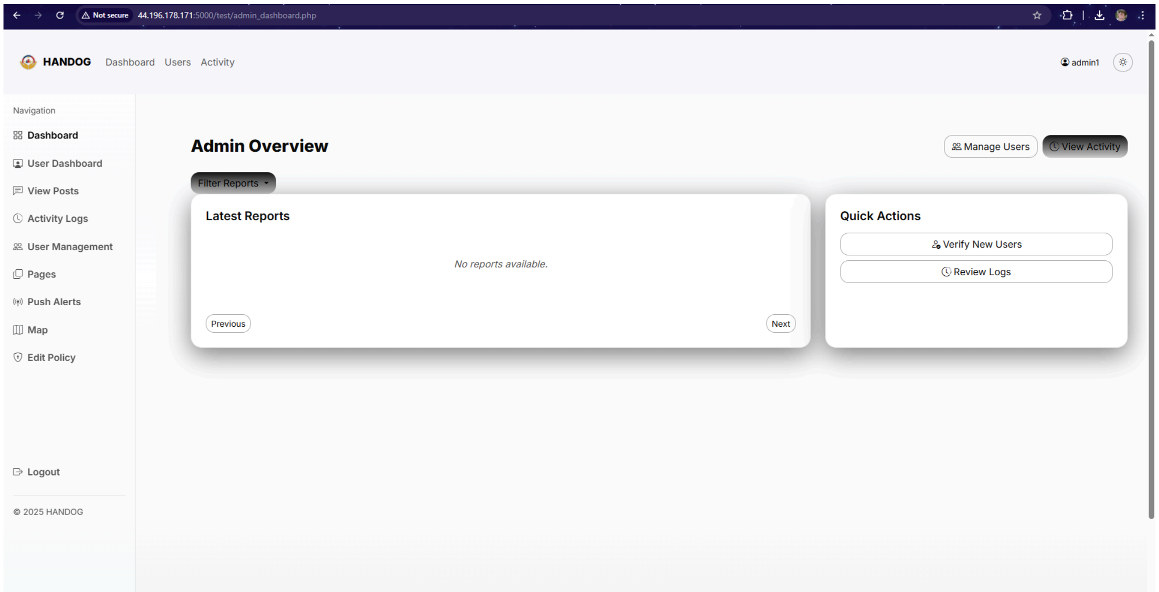


Figure 2. Admin Dashboard Panel

The admin dashboard acts as the central control panel where administrators can monitor system activities. It provides an overview of important data, shortcuts to key features, and system statistics, allowing efficient management and real-time monitoring of the platform's performance.

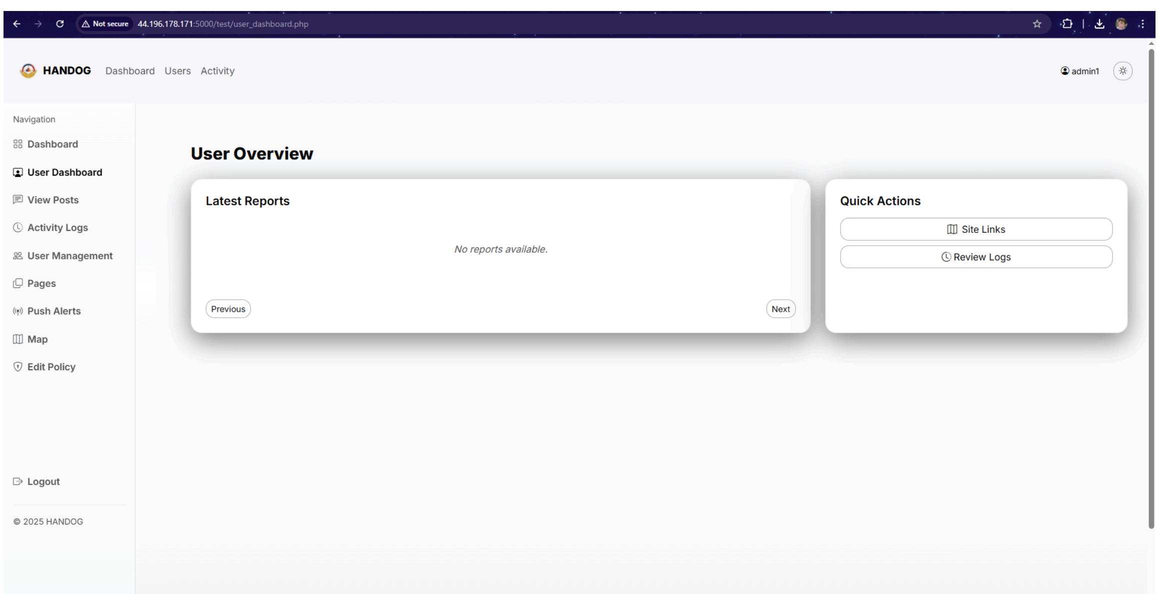


Figure 3. *User Dashboard*

This interface is dedicated to regular users, allowing them to access personal information, manage their profiles, and interact with system features. The user dashboard aims to provide a user-friendly environment that promotes engagement and convenience.

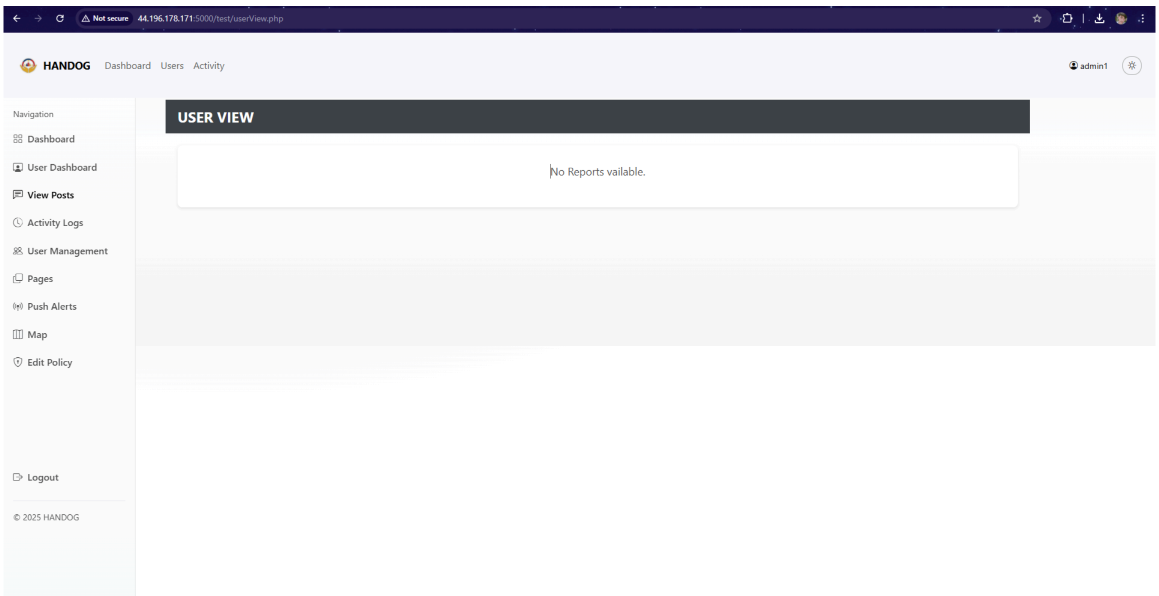


Figure 4. View Posts

The View Posts section displays a comprehensive list of posts made by users or administrators. Each post entry includes options to view details, edit content, or delete entries. This interface supports content management and moderation.

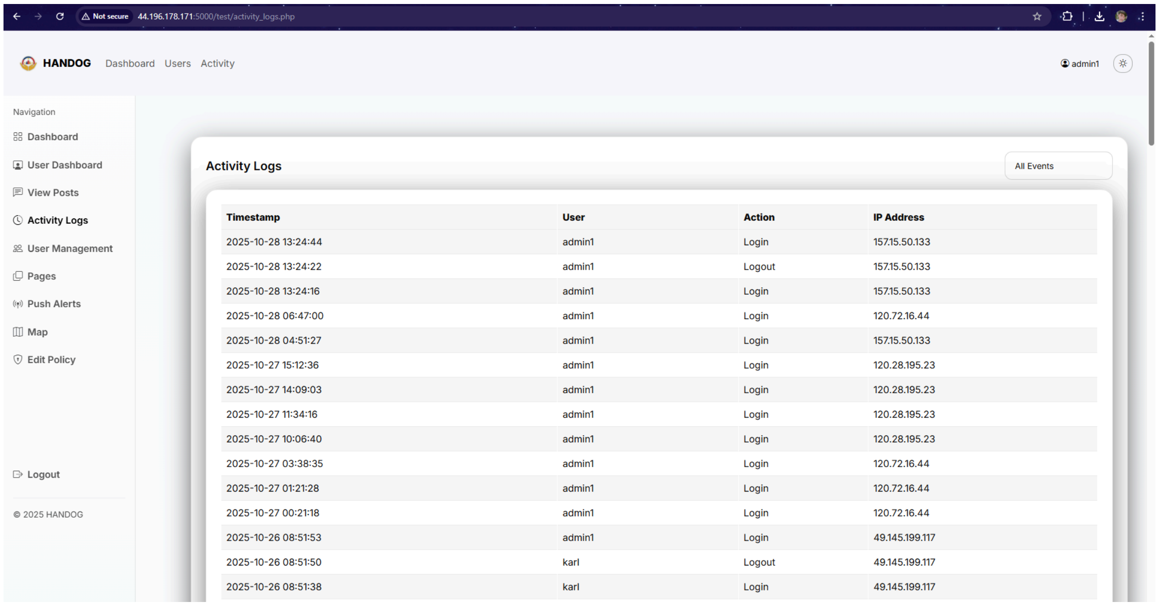


Figure 5. Activity Logs

The View Posts section displays a comprehensive list of posts made by users or administrators. Each post entry includes options to view details, edit content, or delete entries. This interface supports content management and moderation.

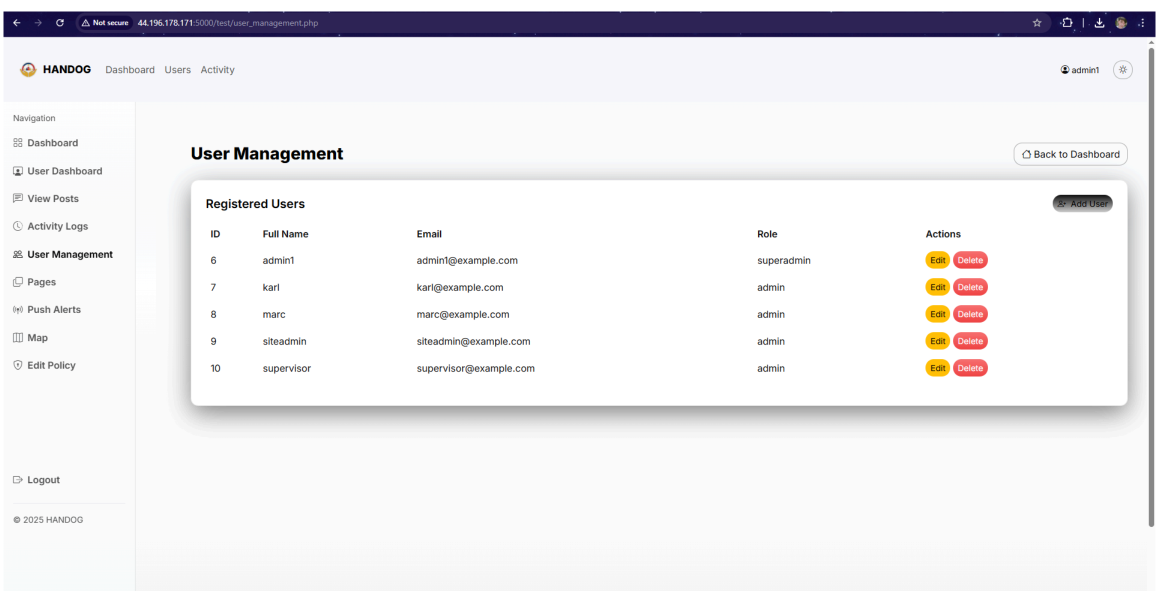


Figure 6.User Management

The User Management module allows the administrator to oversee user accounts. Admins can add, update, or remove users, as well as assign specific roles and permissions. This feature ensures proper access control and user organization.

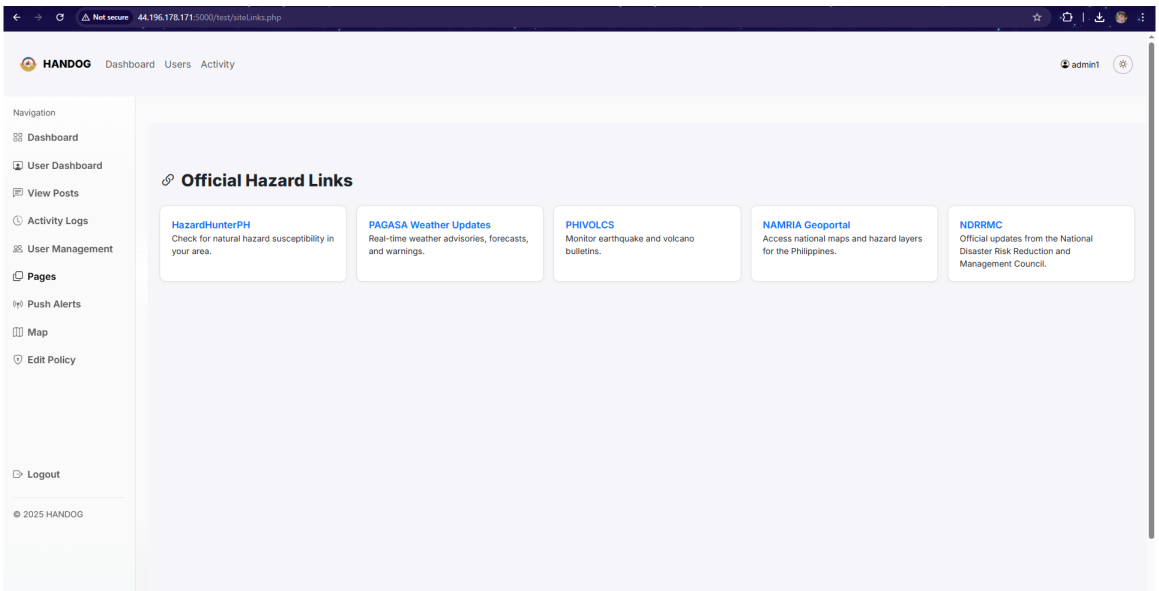


Figure 7.Pages

This section lists all static or dynamic web pages within the system, such as “About Us,” “Contact,” or “Privacy Policy.” Administrators can edit, publish, or unpublish these pages as necessary, ensuring that website content remains up to date and accurate.

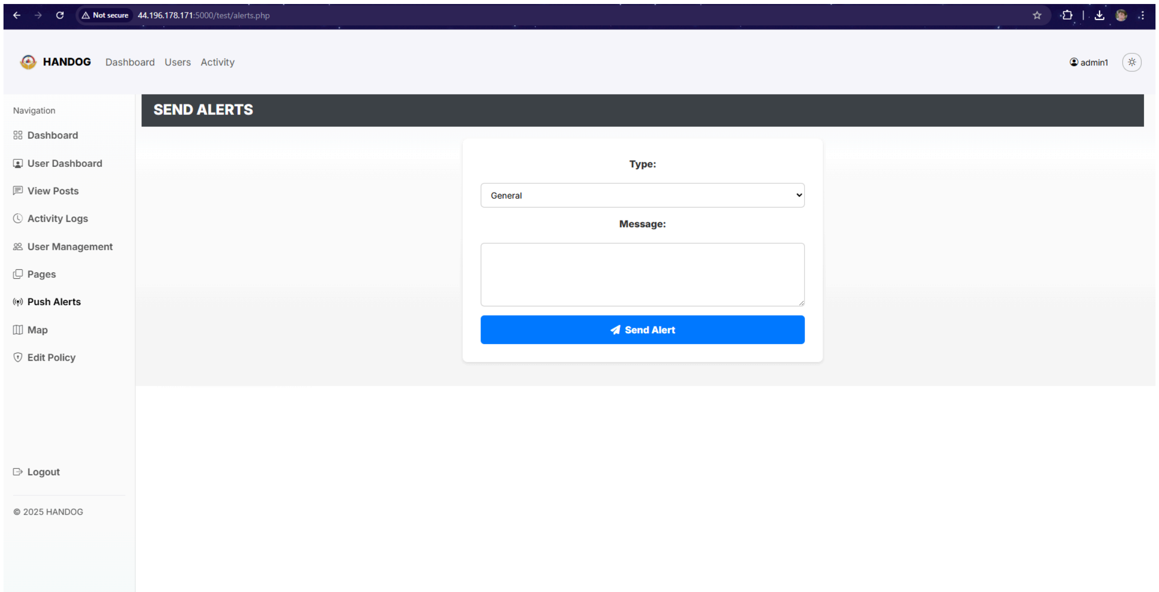


Figure 8. Push Alert

The Push Alert interface enables administrators to send notifications or important announcements directly to users. It serves as an efficient communication tool for disseminating updates, warnings, or system reminders.

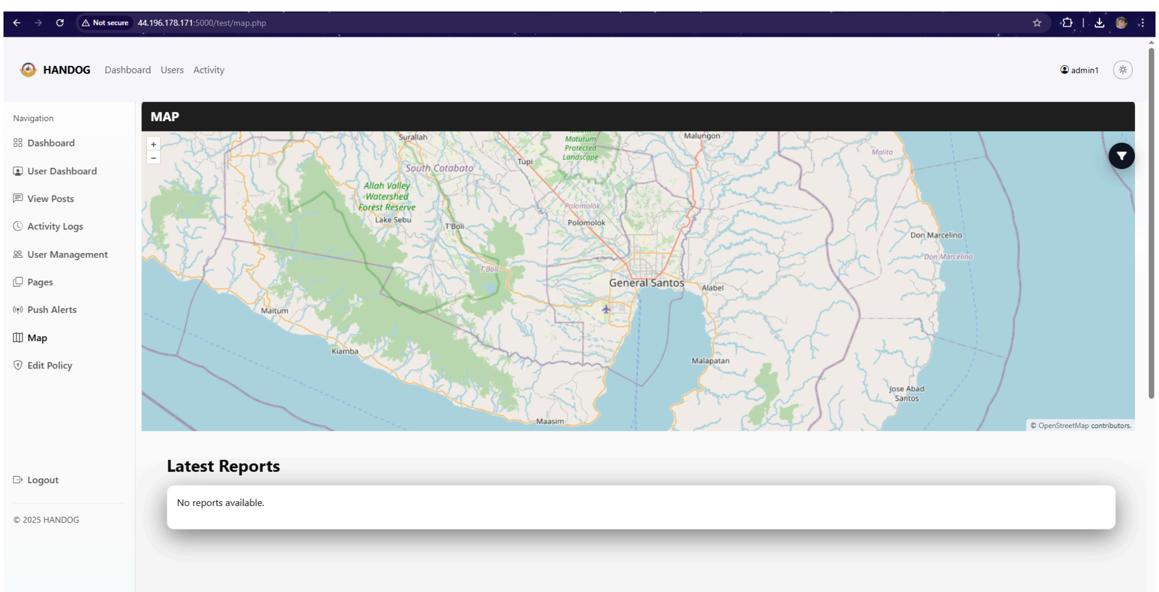


Figure 9. Maps

This interface integrates mapping features to visualize location-based data. It may be used for tracking, navigation, or displaying specific geographic information relevant to system activities or reports.

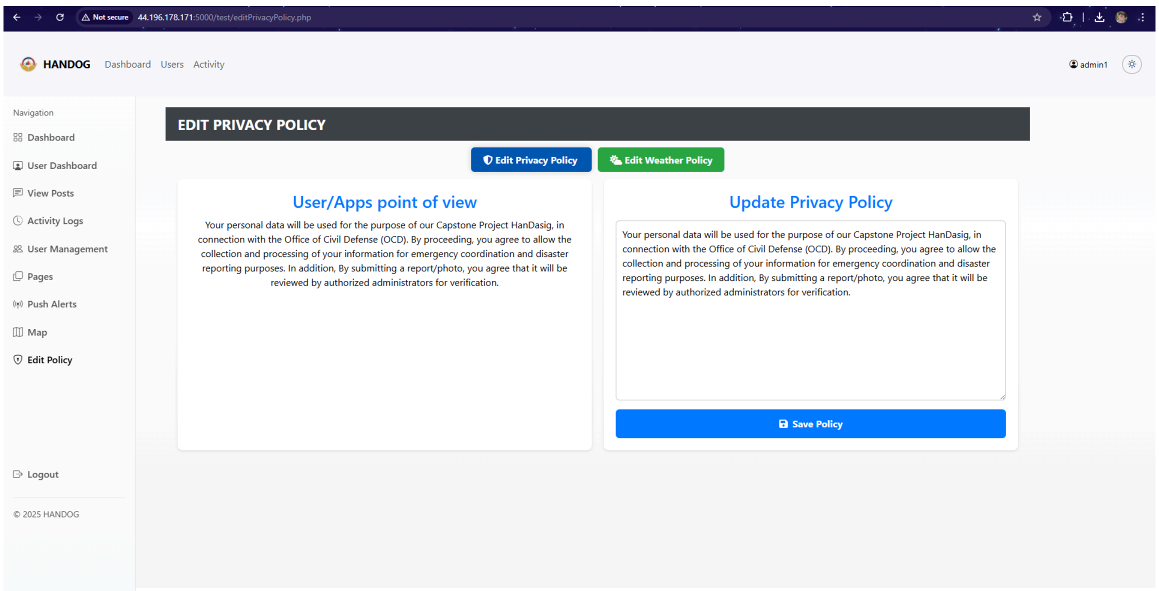


Figure 10. Edit Policy

The Edit Policy page allows administrators to create or modify website policies, privacy statements, and terms of use. It ensures that the system’s legal and procedural guidelines remain current and transparent to all users.

3.5 System Function

The OCD Dashboard System is designed with several core functional components to support real-time disaster monitoring and enhance the efficiency of emergency response coordination. Below is a detailed breakdown of each key function:

Receiving Photo Submissions from Civilians via External Mobile App

The system is built to accept photo reports sent by citizens via a different mobile application. Every submission contains metadata including geographic coordinates (using GPS), a timestamp (date and time), and optional comments from users. These documents act as immediate firsthand testimonies of environmental threats like floods, landslides, or storms. The dashboard features a backend API that collects and saves these submissions in a secure database for prompt processing and presentation.

Processing Metadata and Integrating it into the Dashboard

Once the report is received, the system retrieves the metadata (such as latitude, longitude, recording time, and type of hazard). This metadata is subsequently utilized to classify, sift through, and arrange the entries in the dashboard interface. The dashboard presents these reports in a sequential stream, enabling OCD administrators to swiftly determine where, when, and what kind of hazard was reported. This function allows administrators to prioritize reports based solely on metadata before reviewing the photo.

Plotting Reports on a GIS-Based Map

A crucial aspect of the system is the implementation of shapefile-compatible Geographic Information Systems (GIS) mapping. This enables every report to be displayed on an interactive digital map based on its geographic location. Administrators can see the spread of incidents among various barangays, municipalities, or regions. The map interface features overlays for identified hazard zones (such as flood-prone regions or landslide pathways), facilitating visual connections between ongoing events and risk locations. This function improves spatial awareness and supports focused disaster response.

Maintaining Secure Logs for Audit and Review

All actions taken on the dashboard, including uploading, reviewing, classifying, or archiving, are recorded securely. Every log entry contains the admin ID, action performed, timestamp, and related report ID. These records are kept in a protected database, creating an audit trail that guarantees transparency and responsibility in the system's utilization. In case of conflicts or assessments, these records offer a confirmable account of actions performed by administrators during disaster management.

3.6 Physical Environment and Resources

Users are primarily OCD administrators and disaster response personnel requiring real-time geospatial and visual hazard data for timely decision-making.

Software and Hardware Resources for Developers

Software:

- Development Environment: Visual Studio Code
- Backend: PHP, MySQL
- Frontend Framework: HTML5, CSS3, JavaScript
- GIS Integration: Leaflet.js with shapefile support
- Version Control: Git

Hardware:

- Processor: Intel Core i3 or equivalent
- RAM: 8GB minimum
- Storage: 500GB SSD or equivalent
- Internet: Stable high-speed connection for development

Software and Hardware Resources for End Users

Software:

- Modern Web Browser: Google Chrome, Mozilla Firefox, Microsoft Edge, Safari
- Operating System: Windows, macOS, Android, or iOS

Hardware:

- Device: PC, laptop, or tablet used in OCD command centers
- Processor: Any modern dual-core processor or equivalent
- RAM: 2GB minimum
- Internet: Stable connection for real-time data visualization and report streaming

3.7 Development Cost

Personnel Cost

Personnel	**Salary (PHP)**
Computer Programmer (2)	P50,764
UI/UX Designer (1)	P35,000
Quality Assurance (1)	P26,034

This Box presents the assumed salary scale for the Computer Programmer, responsible for both frontend and backend development, earning approximately P25,382 per month. The Quality Assurance role, essential for ensuring system stability and bug-free deployment, earns around P26,034 per month based on the data obtained from (Indeed, 2025).

A UI/UX Designer, tasked with enhancing user experience and designing intuitive interfaces, has an average monthly salary of P35,000 according to (Glassdoor, 2025). These roles are critical to the successful implementation of the OCD real-time disaster dashboard.

Taking into consideration these salary figures, the total cost of employing two Computer Programmers, one UI/UX Designer, and one Quality Assurance specialist amounts to ₱111,798.

Software Cost

Software / API	**Cost**
Visual Studio Code	Free
HERE Maps API	Free
IP Geolocation API	Free
NAST hosting & domain	Free

This Box shows that all required software tools and API services used in this project offer free-tier plans suitable for development. Visual Studio Code, an open-source IDE, provides a powerful environment for writing and debugging code. The APIs used—OpenWeatherMap, TomTom, HERE Maps, PredictHQ, and IPGeolocation—all offer limited but sufficient free access tiers. Hosting and domain services can be covered by GitHub Pages, making this component free of cost for the project's duration.

Hardware Cost

Hardware Component	**Unit Cost (PHP)**
Developer Laptop (2)	P44,800
Internet Plan (1)	P2,699

This Box outlines hardware expenses related to development. Two laptops, each priced at approximately P44,800, are based on market data from Philippine e-commerce platforms such as Lazada and Shopee (2025). An internet plan costing around P2,699 per month ensures stable and high-speed connectivity for remote coding, API testing, and version control operations (Pagkatotohan, 2023). These hardware components are vital for ensuring the productivity and efficiency of the development team.

Total Development Cost

Cost Category	**Total Cost (PHP)**
Personnel Cost	₱111,798
Software Cost	₱0
Hardware Cost	₱47,499
Grand Total	₱159,297

This Box summarizes all associated costs in developing the OCD dashboard system. While software and APIs incur no expense, the combined personnel and hardware requirements bring the total project cost to ₱159,297. This amount is assumed to be funded by the Office of Civil Defense as part of their digital transformation initiatives for disaster preparedness and monitoring.

References

Dela Cruz, J., & Castañeda, ,. J. (2020, April 22). *National Disaster Risk Reduction and Management Plan.* Retrieved from Department of National Defense: https://ndrrmc.gov.ph/attachments/article/4147/NDRRMP-Pre-Publication-Copy-v2.pdf

Program, U. N., & Reduction, U. N. (2022, November). *Data and Digital Maturity for Disaster Risk Reduction.* Retrieved from United Nations Development Program: https://www.undp.org/sites/g/files/zskgke326/files/2022-11/UNDP-UNDRR%20 Data%20and%20Digital%20Maturity%20for%20DRR-2022_0.pdf