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6/18/2025

Internship Report – Bachelor of Data Science – BUT Data Science – 2sd Year SY 2024-2025

Support for Updating the Land Use Plan and Assessing Climate and Disaster Risks

Republic of the Philippines
Province of Aklan
Ati-atihan Town of Kalibo

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Acknowledgements

I would like to express my deepest gratitude to all the individuals and institutions who contributed to the success of my internship experience in Kalibo.

First and foremost, I wish to thank **ENGR. Marlo Villanueva**, Municipal Planning and Development Coordinator (MPDC), for his leadership and for welcoming me into his department. His guidance and trust in my capacity to contribute meaningfully to the work of the OMPDC greatly motivated me throughout the internship.

My sincere thanks also go to the entire **OMPDC team**, particularly the heads of the Research and Statistics Division, for their day-to-day support, technical feedback, and their willingness to involve me in real planning activities. From data discussions to field insights, their patience and generosity have been instrumental in helping me develop both my technical skills and my understanding of local government operations in the Philippines.

Finally, I would like to thank my professors at the **university** and all those who helped me prepare for this internship both academically and administratively. The knowledge and tools acquired over the past two years have found a direct and rewarding application in this project.

This experience has been not only a learning opportunity, but a deeply enriching human adventure that I will carry forward in my academic and professional journey.

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1.Introduction

This internship, conducted from April 28 to July 11, 2025, was carried out at the **Office of the Municipal Planning and Development Coordinator (OMPDC)** in the municipality of Kalibo in the Province of Aklan in the Philippines. It was performed under the direct supervision of **ENGR. Marlo Villanueva, Municipal Planning and Development Coordinator**, and the various division heads of the OMPDC. The internship took place as part of the broader **Governance for Climate and Disaster Resilience (Gov-CDR)** program, an initiative supported by the Canadian government and integrated into the local government's planning structure.

My main assignment was within the **Research and Statistics Division** of the OMPDC, where I contributed to a number of transversal planning efforts. The central theme of the internship focused on the update of Kalibo's **Comprehensive Land Use Plan (CLUP)**, as well as the **integration of climate and disaster risk assessments** into various planning instruments.

In addition to this, I also participated in the **early-stage updating of Kalibo's Ecological Profile**, a critical foundational document that serves as a reference for several thematic plans of the municipality. This profile is used to inform and support the formulation of strategic planning documents such as the **Annual Investment Program (AIP)**, the **Local Development Investment Plan (LDIP)**, and the **Comprehensive Development Plan (CDP)**, among others.

2.Professional and Institutional Context

2.1. About the Municipality of Kalibo

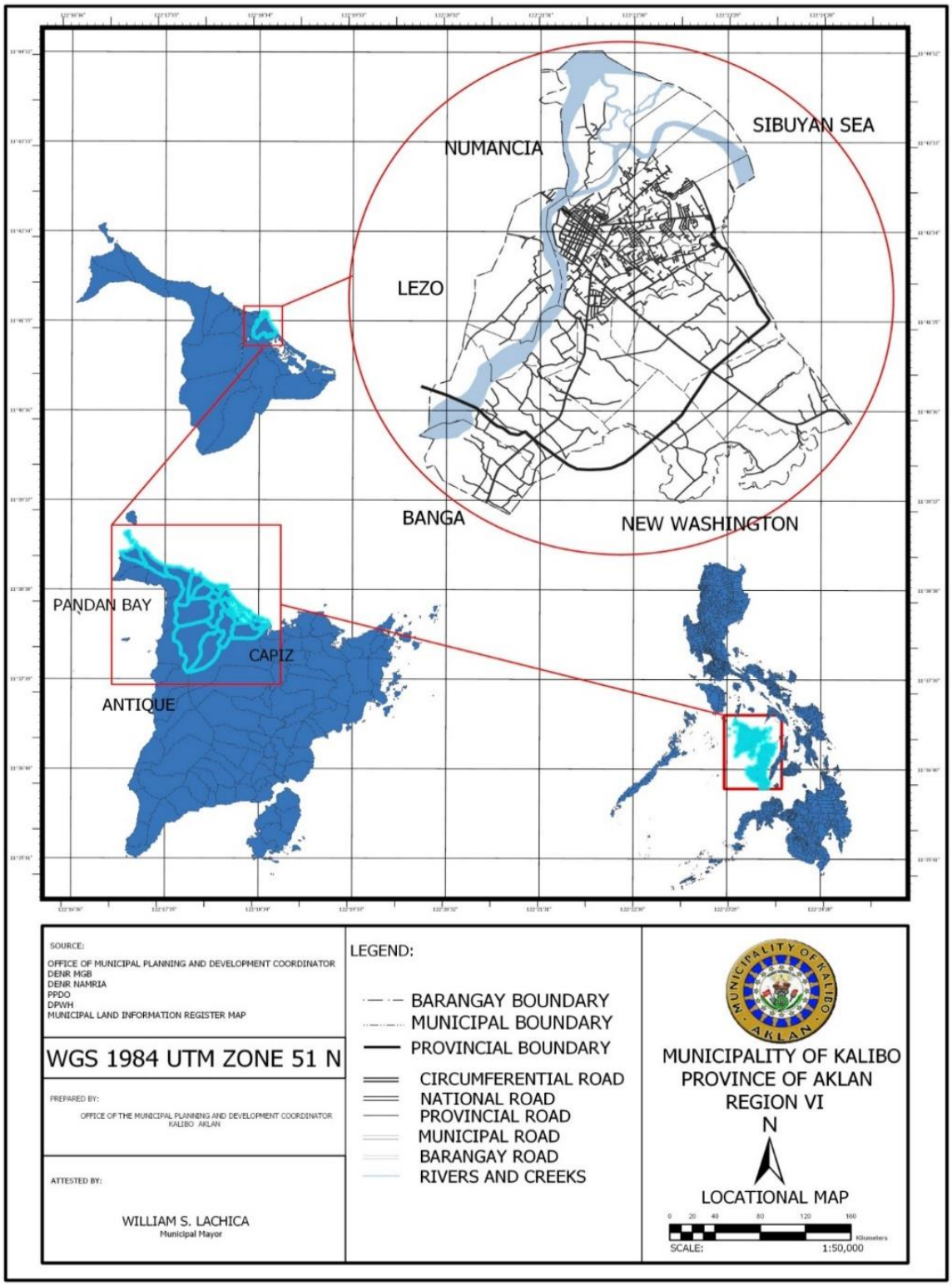
The Municipality of Kalibo is the capital of Aklan province, located in the northwestern part of Panay Island in the Philippines. It plays a central role in the socio-economic and administrative structure of the region. As a first-class municipality and seat of the provincial government, Kalibo is responsible for a range of planning mandates that must respond to both local development objectives and national policy frameworks.

During my internship, I had access to the most recent socio-demographic data through the **Community-Based Monitoring System (CBMS 2022)**. This allowed me to work directly with microdata aggregated at the barangay[1] level, which formed the basis of population-based indicators used in planning documents. Rather than referring to outdated or rounded figures, I relied exclusively on this official dataset to ensure that all statistical outputs were empirically grounded.

Kalibo, like many LGUs (Local Government Units) in the Philippines, is exposed to multiple natural hazards, including floods, typhoons, and coastal erosion. These hazards are further aggravated by rapid urbanization and the concentration of vulnerable populations in low-lying areas. This reality necessitates the integration of climate risk management and socio-spatial equity into municipal planning.

[1] Smallest administrative and political unit of the government (village or district)

Figure 1. Location Map



2.2. The Role of the OMPDC

The **Office of the Municipal Planning and Development Coordinator (OMPDC)** is the central planning body of the municipality. It is responsible for the formulation, monitoring, and updating of Kalibo's major strategic documents, including the Land Use Plan (LUP), the Comprehensive Development Plan (CDP), the Annual Investment Plan (AIP), and the Local Development Investment Plan (LDIP).

The OMPDC is organized into several functional divisions, such as:

- Administrative Division
- Research & Statistic Division
- Special Project Division
- CSO Desk Officer
- Planning Division
- Housing & Development Division
- Zoning Division
- CBMS

I was assigned to the **Research and Statistics Division**, where I worked alongside local planning officers, GIS technicians, and program coordinators.

This division plays a key role in compiling, validating, and transforming data into inputs for local policymaking. My involvement in this unit placed me at the intersection of statistical analysis and institutional planning, a positioning that offered both technical challenges and valuable insights into the inner workings of municipal governance.

3.Methodology and Tools

The core problem encountered at the beginning of my assignment was the **fragmentation and lack of standardization of municipal data** used for land use and disaster risk planning. Most of the existing datasets were either outdated, stored in incompatible formats, or not spatialized. Additionally, the challenges of **transforming raw socio-economic indicators into actionable insights** required the integration of different tools and methodologies that balanced technical precision with operational usability.

3.1. Choice and Rationale Behind Tools Used

To address this, I selected a suite of tools appropriate to each step of the data processing chain, starting from extraction to visualization:

- **CSPro 8.0 (Census and Survey Processing System)** was the tool of choice for querying and extracting indicators from the **Community-Based Monitoring System (CBMS) 2022** data. This government-mandated system contains granular socio-economic data for each barangay. CSPro was particularly well-suited due to its native compatibility with Philippine LGU datasets and its capacity to generate structured outputs tailored to local planning frameworks.
- After the extraction phase, I used **Microsoft Excel** not only for its familiar tabular interface, but more importantly for **initial data cleaning, pivot table analysis, and categorical recoding**. Excel allowed me to filter incomplete records, group values by age or vulnerability brackets, and apply conditional formatting to highlight discrepancies or statistical outliers.
- For spatial data transformation and analysis, I worked with **QGIS 3.28**, an open-source Geographic Information System. QGIS enabled me to **merge non-spatial data with administrative shapefiles**, perform spatial joins to overlay population vulnerability onto flood-prone areas, and produce **thematic maps** that visually communicated key risks and demographic concentrations. The ability to design custom legends, apply graduated symbols, and layer risk zones with municipal infrastructures made QGIS the most effective tool for communicating multi-variable issues to non-technical audiences.
- To support municipal coordination and stakeholder engagement, I used **Microsoft PowerPoint** to compile clear, visual presentations of statistical insights. These were presented during interdepartmental meetings and used to initiate discussion on planning priorities. The flexibility of combining maps, charts, and strategic summaries into slides facilitated a bridge between technical analysis and executive decision-making.

3.2. Workflow and Implementation Steps

The methodology I followed unfolded in several interrelated phases:

1. **Data Extraction and Preparation**: I began by identifying relevant CBMS variables related to population, disability status (PWD), employment, schooling, housing, and disaster exposure. With guidance from the statistics division, I formulated and ran CSPro queries to generate barangay-level tables.

2. **Data Structuring and Analysis**: Once extracted, these tables were cleaned and organized in Excel. I conducted **cross-tabulations**, such as comparing PWD presence with flood zone overlays, and developed composite indicators (e.g., vulnerability index by barangay). This step also included checking for internal inconsistencies and generating charts that summarized demographic distributions.

3. **Spatial Mapping and Risk Overlay**: Using QGIS, I joined the cleaned Excel files to geographic shapefiles of Kalibo's 16 barangays. I then created multiple **layers of spatial information,** including:

    - Locations of critical infrastructure (schools, health posts);
    - Household density in flood-prone areas;
    - Proportion of senior citizens or PWDs per area.

Each map was annotated with scales, legends, and interpretations designed to support policy discussion.

4. **Integration into Strategic Documents**: The cleaned tables and maps were then inserted into the **2024 Economic Profile**, both of which serve as official references in the upcoming Comprehensive Development Plan. The visual insights I produced were also circulated to department heads and used in technical planning sessions.

5. **Presentation and Feedback**: Finally, I participated in presenting these findings at the **Sectoral Municipality Meeting**, a high-level discussion forum bringing together various LGU departments. The presentation included slides on vulnerability distribution and proposed risk zones to be monitored under the next planning cycle.

4.Analysis of Results

The outputs generated during the internship were both quantitative and cartographic in nature. They directly contributed to the municipality's decision-making processes in land use and risk management. The analysis focused on translating large volumes of raw socio-economic data into strategic indicators that could inform investment and infrastructure planning.

4.1. Production of Thematic Maps

One of the most visible and impactful results of the internship was the production of **thematic maps**, developed using QGIS and validated by the OMPDC technical team. These maps (Annex I) addressed the following themes:

1. **Flood Hazard zone map of Person with Disabilities (PWD)**
2. **Flood Hazard zone map of Senior Citizen**
3. **Flood Hazard zone map of Women Population**
4. **Flood Hazard zone map of Children Population Below 18 Years Old**

Each map was accompanied by a short analytical note, summary statistics, and a legend tailored to municipal stakeholders. These deliverables allowed non-specialists, such as barangay captains and department heads, to better understand spatial disparities in vulnerability and infrastructure needs.

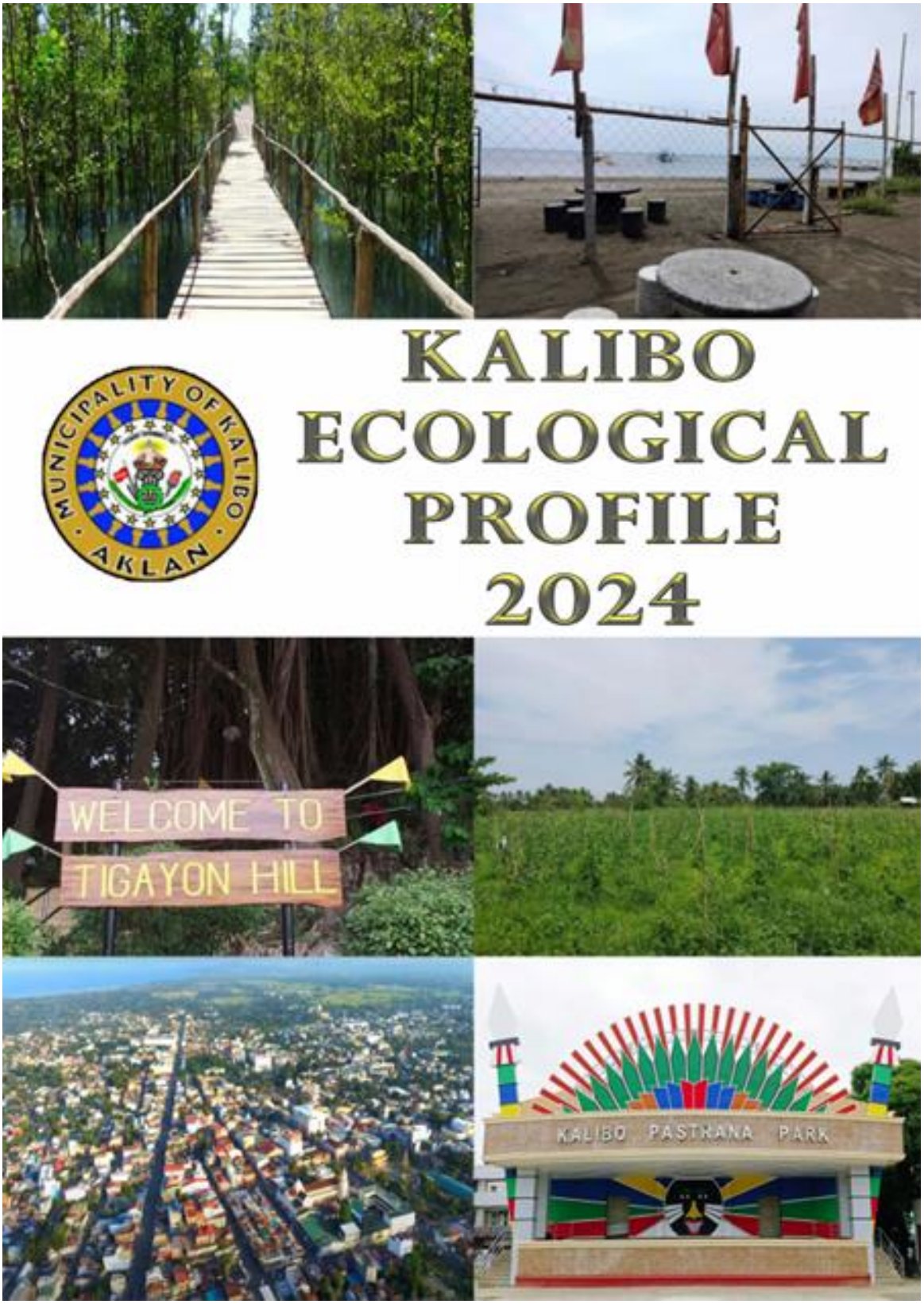
4.2. Contribution to the Economic and Ecological Profiles

The quantitative analysis I performed directly fed into the **2024 Municipal Ecological Profile**, a comprehensive publication that includes both socio-economic and spatial indicators. My work contributed notably to the chapters dealing with:

- Demographic structure
- Population at risk
- Access to education
- Employment

Furthermore, I assisted in the **early-stage update of the Ecological Profile**, which serves as the baseline dataset for the LGU's thematic planning frameworks. This included preparing cleaned CBMS tables, highlighting key indicators that had changed since the last profile (e.g. aging population growth, school dropout increase), and integrating visuals into the working document.

Figure 2. Kalibo Ecological Profil 2024 Cover



4.3. Presentation and Institutional Use

My outputs were presented at the **Sectoral Municipality Meeting** on May 9, 2025, where LGU heads from different departments were convened to assess the preliminary results of planning work. The visual clarity of the maps and summary charts sparked interest and generated constructive feedback, particularly on how to better prioritize investments in high-risk barangays.

Based on these results, my maps and charts are now being used internally by the OMPDC in preparation for:

- The **Annual Investment Plan (AIP)** for Financial Year 2025;
- The working groups on updating the **Comprehensive Development Plan (CDP)**.

5.Personal Contributions and Skill Development

This internship provided me with the opportunity to apply my academic knowledge in a real-world environment with direct impact on public policy. It also allowed me to develop both technical and soft skills in an international, multicultural setting.

5.1. Independent Contributions

Although I was guided by my supervisor and team leads, I exercised significant autonomy in several key areas:

- **Custom CSPro query building**: I constructed specific queries to extract only relevant indicators, reducing time spent on irrelevant data.
- **CSPro Manual**: With the transfer of the only statistician in the division, I was the only one who knows how used the tools he used.
- **Dashboard design**: I proposed and created summary tables that grouped indicators by vulnerability themes (e.g. age, mobility, income) to aid communication with department heads.
- **Cartographic decisions**: I selected symbology, data classification thresholds, and projection types to ensure consistency and usability of GIS products.
- **Document editing**: I reviewed draft pages of the 2024 Ecological Profile for clarity, coherence, double checking data’s and layout, especially for charts and visual consistency.
- **Opening class of tertiary classes for Scholl Year 2025-2026**: Some institution needed information about the first schedules and opening dates of all college of the Town. (Annex II)

5.2. Skills Gained

The internship helped me reinforce and deepen the following skill sets:

- **Technical**
  - Advanced spreadsheet analytics and formatting (Excel)
  - GIS data joining, map production and annotation (QGIS)
  - Use of CSPro for filtered data extraction
- **Analytical**
  - Statistical cross-analysis by socio-demographic categories
  - Identification of multi-variable correlations relevant to policy
- **Communication**
  - Slide design and oral presentation in a multicultural and administrative setting
  - interaction with municipal officers and LGU personnel
- **Project and data management**
  - Meeting deadlines in coordination with official planning timelines
  - Preparing documentation for archiving and future handover

6.Conclusion

This internship has been a significant step in both my academic and personal development. It allowed me to bring technical knowledge into direct contact with administrative and social realities, and to contribute meaningfully to local governance efforts focused on disaster resilience and equity.

The blend of data science, policy, and human geography that characterized this internship solidified my interest in **public sector data work**, particularly in domains such as urban resilience, vulnerability mapping, and policy analytics.

This experience has given me a first-hand understanding of the role data can play in strengthening community resilience, and has reaffirmed my motivation to pursue a professional path that combines technical analysis with social impact.

7.Annexes

Annex I. Thematic Maps

Table 1. Household that Experienced More Frequent Flooding by Barangay, 2022

Barangay	Number of Households	Experienced	Did Not Experience	Percentage
Andagaw	2,937	382	2,555	13.01
Bakhaw Norte	609	112	497	18.39
Bakhaw Sur	794	165	629	20.78
Briones	299	7	292	2.34
Buswang New	2,064	274	1,790	13.28
Buswang Old	690	12	678	1.74
Caano	452	75	377	16.59
Estancia	1,969	121	1,848	6.15
Linabuan Norte	935	99	836	10.59
Mabilo	570	78	492	13.68
Mobo	507	42	465	8.28
Nalook	714	10	704	1.4
Poblacion	2,596	236	2,360	9.09
Pook	1,416	515	901	36.37
Tigayon	1,286	155	1,131	12.05
Tinigaw	822	267	555	32.48
Total	**18,660**	**2,550**	**16,110**	**13.67**

Source: 2022 Community-Based Monitoring System (CBMS), Philippine Statistics Authority

Graph 1. Household that Experienced More Frequent Flooding in Kalibo, 2022

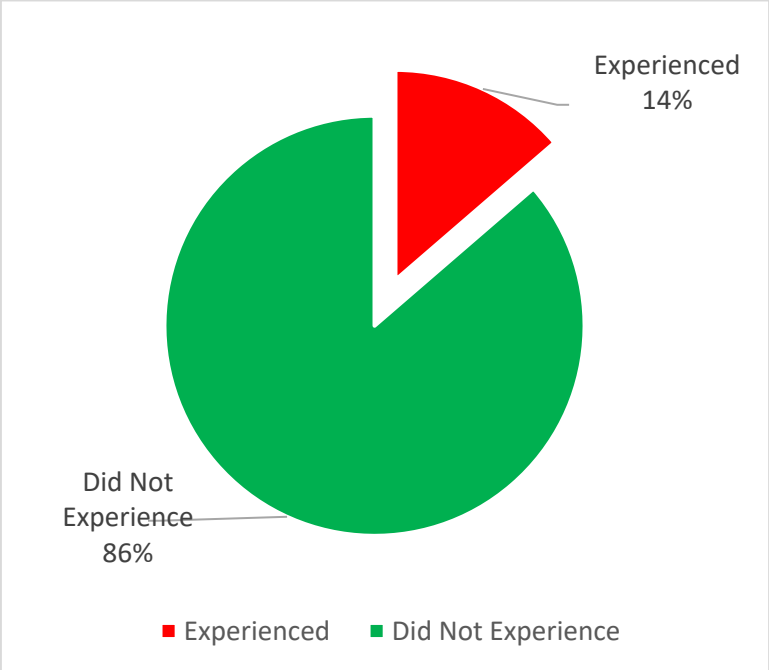
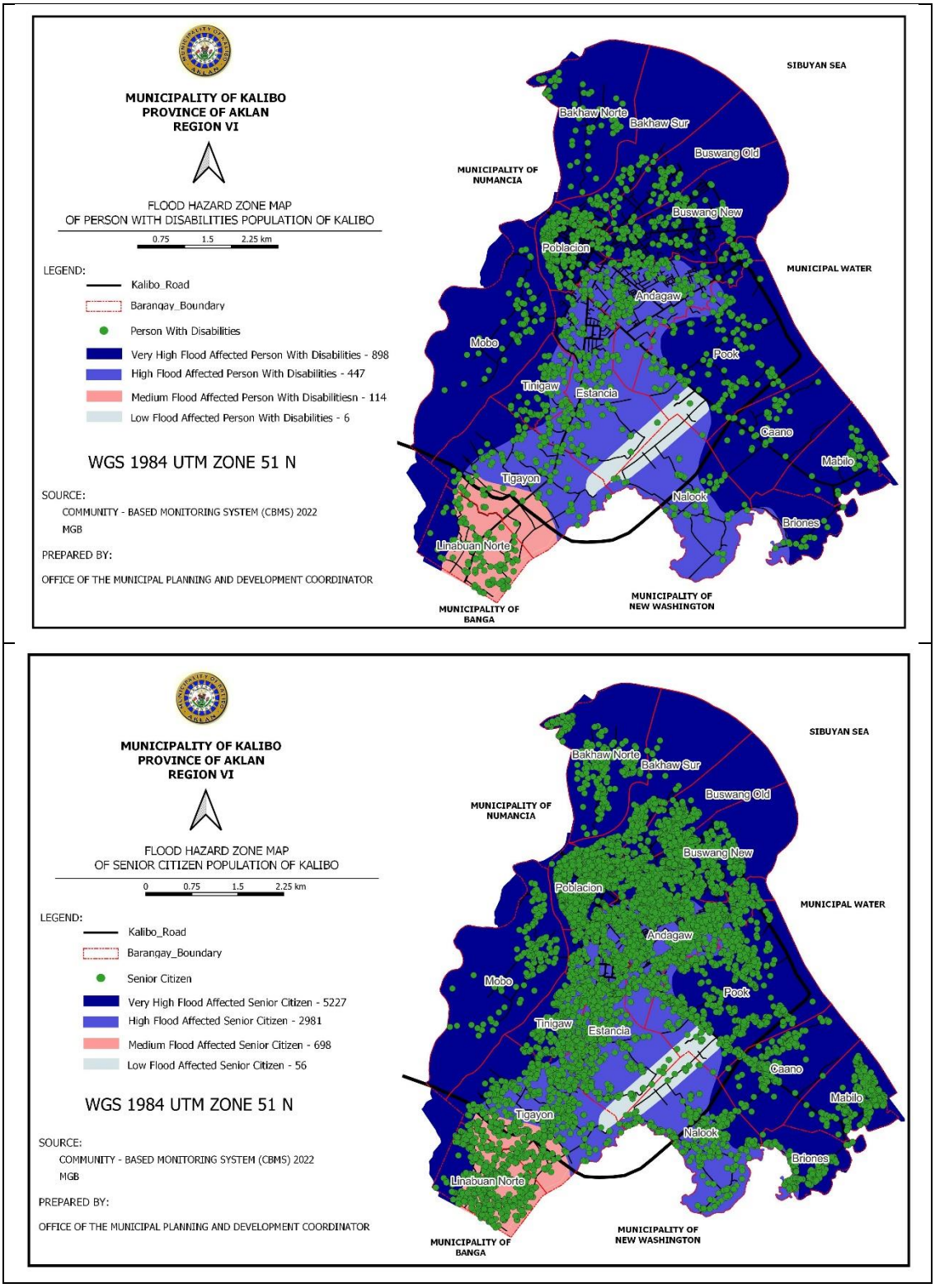
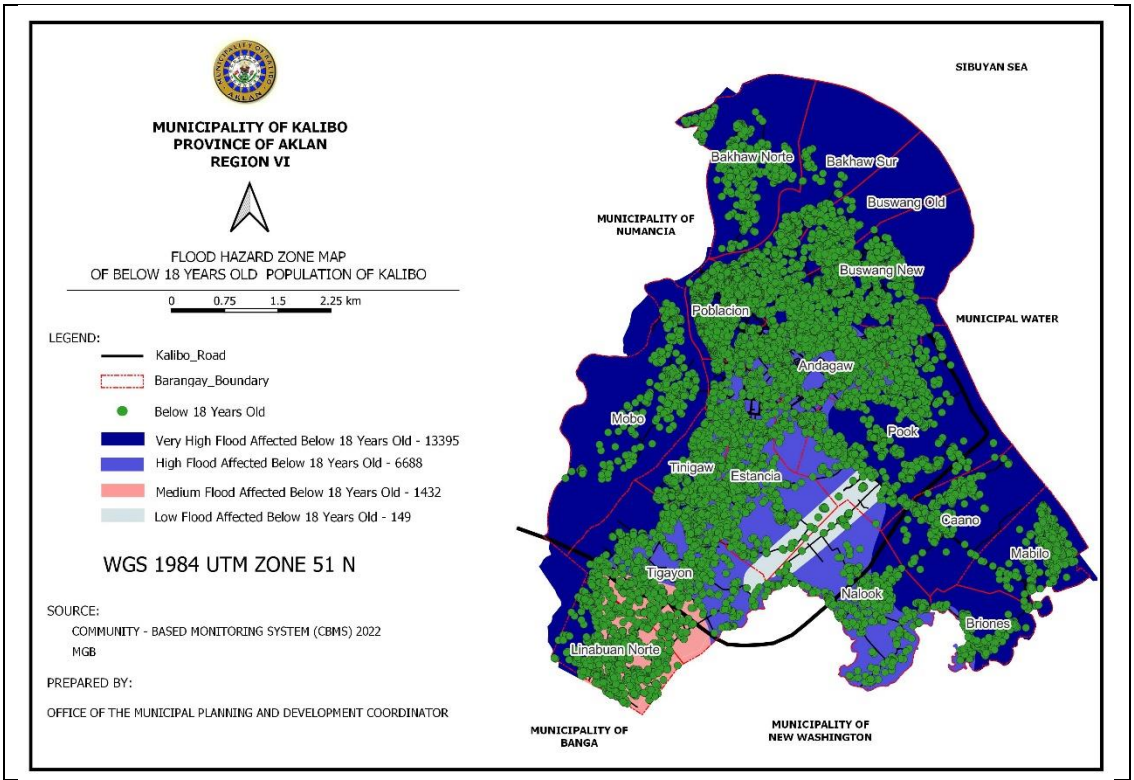
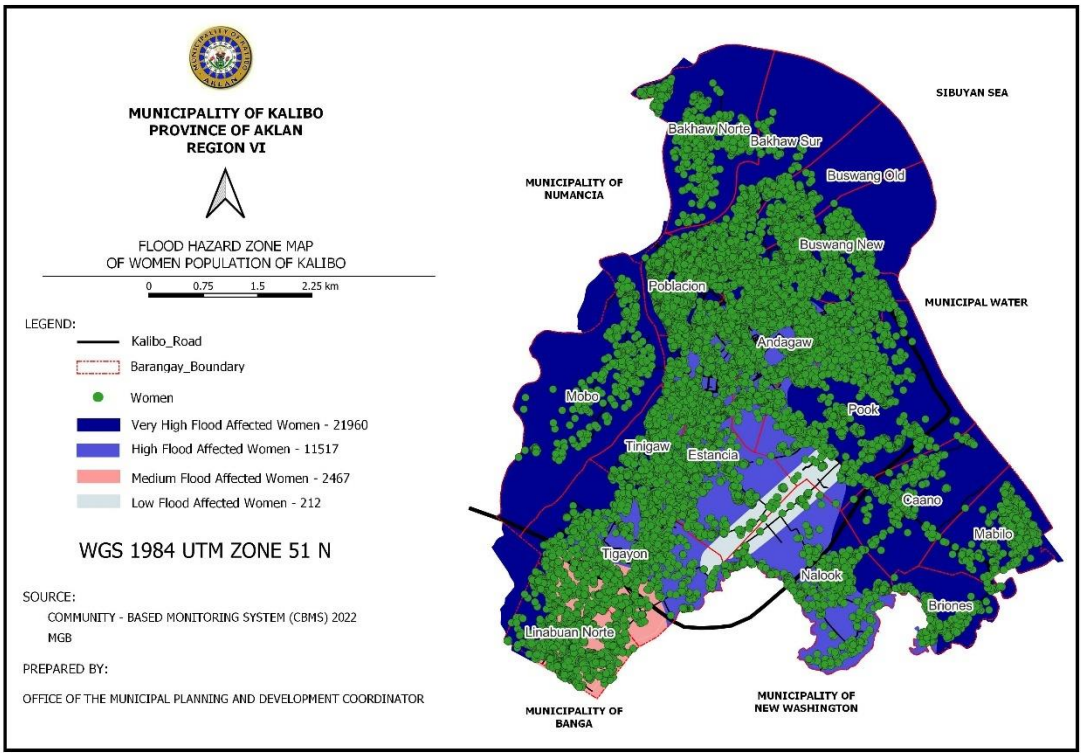


Figure 3. Flood Hazard zone maps




MUNICIPALITY OF KALIBO
PROVINCE OF AKLAN
REGION VI
FLOOD HAZARD ZONE MAP
OF BELOW 18 YEARS OLD POPULATION OF KALIBO
0 0.75 1.5 2.25 km
LEGEND:
Kalibo_Road
Barangay_Boundary
Below 18 Years Old
Very High Flood Affected Below 18 Years Old - 13395
High Flood Affected Below 18 Years Old - 6688
Medium Flood Affected Below 18 Years Old - 1432
Low Flood Affected Below 18 Years Old - 149
WGS 1984 UTM ZONE 51 N
SOURCE:
COMMUNITY - BASED MONITORING SYSTEM (CBMS) 2022
MGB
PREPARED BY:
OFFICE OF THE MUNICIPAL PLANNING AND DEVELOPMENT COORDINATOR
SIBUYAN SEA
Bakhaw Norte
Bakhaw Sur
Buswang Old
MUNICIPALITY OF NUMANCIA
Buswang New
Poblacion
MUNICIPAL WATER
Andagaw
Mobo
Pook
Tinigaw
Estancia
Caano
Mabilo
Tigayon
Nalook
Briones
Linabuan Norte
MUNICIPALITY OF BANGA
MUNICIPALITY OF NEW WASHINGTON


MUNICIPALITY OF KALIBO
PROVINCE OF AKLAN
REGION VI
FLOOD HAZARD ZONE MAP
OF WOMEN POPULATION OF KALIBO
0 0.75 1.5 2.25 km
LEGEND:
Kalibo_Road
Barangay_Boundary
Women
Very High Flood Affected Women - 21960
High Flood Affected Women - 11517
Medium Flood Affected Women - 2467
Low Flood Affected Women - 212
WGS 1984 UTM ZONE 51 N
SOURCE:
COMMUNITY - BASED MONITORING SYSTEM (CBMS) 2022
MGB
PREPARED BY:
OFFICE OF THE MUNICIPAL PLANNING AND DEVELOPMENT COORDINATOR
SIBUYAN SEA
Bakhaw Norte
Bakhaw Sur
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MUNICIPAL WATER
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Mobo
Pook
Tinigaw
Estancia
Caano
Mabilo
Tigayon
Nalook
Briones
Linabuan Norte
MUNICIPALITY OF BANGA
MUNICIPALITY OF NEW WASHINGTON

Annex II. Schedule/Opening of Tertiary Classes for school year 2025-2026

Name of School	Opening of Classes/Dates	Event label
Aklan Catholic College	July 7, 2025	Opening of Classes
	No Schedule	1st Event
		Parent orientation
Northwestern Visayan Colleges	2nd week of July	Opening of Classes
	No Schedule	1st Event
		Parent orientation
Aklan Polytechnic College	July 7, 2025	Opening of Classes
	No Schedule	1st Event
		Parent orientation
STI Kalibo	July 28, 2025	Opening of Classes
	No Schedule	1st Event
	August/no date	Parent orientation
Aklan State University (Kalibo Campus)	Still in classes	Opening of Classes
		1st Event
		Parent orientation
Garcia College		Opening of Classes
		1st Event
		Parent orientation
St. Gabriel College		Opening of Classes
		1st Event
		Parent orientation

Sources: College of Kalibo

8.Démarche Portfolio

Portfolio Approach: Alignment with the Learning Outcomes of the VCOD Track

This internship offered an ideal opportunity to activate and reinforce the core competencies of the **VCOD track (Visualisation, Conception d'Outils Décisionnels)** of the BUT Data Science program. Based on the national program framework for semesters 3 and 4, I present below a reflective synthesis of how each of the four competencies was addressed and deepened through my internship experience at the Kalibo Municipal Planning Office.

Compétence 1 : Traiter des données à des fins décisionnelles

Skill 1: Processing data for decision-making purposes

During the internship, I worked directly with raw CBMS data extracted using CSPro, a tool widely used in Philippine public administrations. I applied a full data processing chain: cleaning, filtering, aggregating, and transforming raw variables into planning indicators. These were then used to update strategic documents such as the Ecological Profile and the **Comprehensive Development Plan**.

Critical learning: I became aware of how crucial it is to adapt one's tools and methods to the institutional context, and how proper data documentation and traceability are key to ensuring the reliability and sustainability of a decision-making process.

Compétence 2 : Analyser statistiquement les données

Skill 2: Statistically analyzing data

The statistical analysis I carried out was mainly descriptive but had a direct impact on policy planning. I calculated ratios, proportions, and population distributions, which allowed me to highlight areas with high vulnerability (PWDs, seniors, school dropouts) and identify barangays requiring priority attention.

Critical learning: I realized that statistical work in a real institutional setting must balance precision and accessibility. The challenge is not to produce complex models, but rather to design clear and useful statistical summaries that support informed action.

Compétence 3 : Valoriser une production dans un contexte professionnel

Skill 3: Communicating and showcasing data in a professional context

I produced various data communication materials, including **maps**, **dashboards**, and **presentations**, tailored to different audiences from municipal technicians to external stakeholders. My work was presented during coordination meetings and contributed to the Sectoral Municipality Meeting.

Compétence 4 : Développer un outil d'aide à la décision

Skill 4: Designing and developing decision-support tools

While I did not develop a complete software tool, I designed **functional visualizations and tables** that were integrated into actual decision-support processes. My thematic maps and statistical summaries directly informed discussions on infrastructure investment, social vulnerability, and climate risk.

Critical learning: I now understand how even simple tools when well designed can support strategic decision-making. What matters most is not the sophistication of the tool, but its capacity to translate data into practical value for decision-makers.

Reflective Conclusion

This internship helped me develop a deeper understanding of how the VCOD skill set fits into real-world projects. I was able to apply what I learned in class in a socially useful context and improve my sense of professional responsibility. I now see myself not only as a data analyst, but also as a contributor to public interest projects that use data as a driver of resilience and development.

June 18, 2025

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2025