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SEANNET
FINAL RESEARCH REPORT

COMMUNITY-LED SOLUTIONS FOR ENVIRONMENTAL RESILIENCE: A PARTICIPATORY STUDY IN ALDEIA MORIS FOUN, FOMENTO 1 COMORO DILI AND ALDEIA ERKOATUN-AILEU

RESEARCH TEAM

JULY 2024

DILI –TIMOR LESTE

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1. Introduction.

Dili, the capital of Timor-Leste, is a rapidly urbanizing city, but it faces a range of pressing challenges, including widespread educational, economic, health, and employment concerns. Among these, socio-economic inequalities have exacerbated vulnerabilities to natural disasters, particularly during the rainy season when heavy flooding poses significant risks to the city's most densely populated areas. One such area is the Comoro neighbourhood, which is frequently affected by destructive floods, despite ongoing government efforts to mitigate these dangers. The recurring nature of these floods not only threatens lives and property but also disrupts social and economic activities, further marginalizing an already vulnerable population.

Flooding in Dili is more than just a seasonal crisis it is an issue deeply connected to broader socio-economic and environmental dynamics. As such, the need for localized, community-driven insights into flood vulnerabilities has become critical. Previous research on flooding in Dili, particularly in Comoro, has primarily relied on questionnaires and secondary data sources, providing valuable yet limited perspectives. These methods often fail to capture the lived experiences and day-to-day realities of those who are directly impacted. Ethnographic studies, particularly those utilizing participatory methods, have been notably absent in addressing these gaps.

This research project seeks to bridge this gap by examining the intersection between neighbourhood-level practices and the broader issue of urban flooding. Focusing on Comoro, the study adopts an ethnographic approach to explore how community behaviours such as waste disposal, hillside construction, traditional farming, and sand collection contribute to both flood risk and public health challenges. Moreover, this study introduces a participatory framework, engaging the local community in every step of the research process, an initiative undertaken as part of the SEANNET-INCT collaboration. For the first time, Comoro residents will play an active role in not only sharing their experiences but also shaping the research outcomes.

The findings from this research are expected to offer valuable insights for public advocacy and policy formulation, particularly in promoting community-based flood mitigation and adaptation strategies. By highlighting the vulnerabilities of Comoro's residents and their responses to recurring floods, this study aims to support the development of sustainable and inclusive flood management strategies that enhance community resilience and health.

2. Emerging Issue

2.1. How do people's practices in terms of waste disposal, hillside construction, traditional farming methods, and sand collection in the Comoro River impact community health and vulnerability to flooding?

2.2. How effective are community-led initiatives in Comoro, Dili City, at mitigating environmental degradation, promoting sustainable practices, and reducing vulnerability to flooding?

2.3. How do stakeholders, including communities, universities, government authorities, and legal bodies, engage in activities such as waste management, environmental cleanliness, and flood prevention in Comoro, Dili City?

2.4. What challenges impede collaborative efforts among NGOs, higher education institutions, research agencies, government, and communities in preventing flooding in Comoro, Dili City?

3. Objective

The objective of this research is to assess the socio-environmental dynamics contributing to community health and flood vulnerability in Comoro, Dili City, by investigating local practices such as waste disposal, hillside construction, traditional farming, and sand collection. It further aims to evaluate the effectiveness of community-led initiatives, examine stakeholder engagement—including the roles of communities, universities, government authorities, and legal bodies—in promoting sustainable practices, and identify challenges hindering collaborative efforts among NGOs, higher education institutions, research agencies, government, and communities in flood prevention.

Below are the specific objectives aligned with each of the emerging issues;

To analyse the impact of local practices—including waste disposal, hillside construction, traditional farming, and sand collection in the Comoro River—on community health and vulnerability to flooding.

To evaluate the effectiveness of community-led initiatives in mitigating environmental degradation, promoting sustainable practices, and reducing flood vulnerability in Comoro, Dili City.

To assess the engagement of key stakeholders, including communities, universities, government authorities, and legal bodies, in activities related to waste management, environmental cleanliness, and flood prevention in Comoro, Dili City.

To identify and analyse the challenges impeding collaborative efforts among NGOs, higher education institutions, research agencies, government, and communities in preventing flooding and promoting environmental sustainability in Comoro, Dili City.

4. Research Team, Research Methods, Locale and Informants of Studies

4.1.*Research Team*

The research project is led by a Research Coordinator, who is supported by two Researchers. Moreover, three Field Research Focal Points, including the heads of Aldea

Fomento I, Fomento II, and Aldeia Moris Foun, along with the Head of Suco Comoro, are actively involved in the project. In addition, six students, comprising three females and three males, were selected to actively participate in the project. Specifically, two students were chosen from UNPAZ, two from DIT, and two others from UNTL. Furthermore, the project aims to expand participation by increasing the number of students and Civil Society members in the future.

In June 2023, the INCT-SEANNET initiated a project to collaborate with the community on sustainable waste management. To support this, two separate bins were provided, one for non-organic litter and another for organic litter. Moreover, the students are responsible for monitoring the project's progress every two weeks. The ultimate goal of the project is to empower students and Civil Society members to advocate for community-led waste management, thus promoting a cleaner and more sustainable living environment.

4.2. *Research Methods*

This study adopts Participatory Action Research (PAR), a research methodology that promotes collaborative inquiry and action to address real-world issues affecting communities. Grounded in the pioneering works of Orlando Fals-Borda (1970) and Paulo Freire (1968), PAR is a dynamic, reflective approach that encourages active involvement from both researchers and participants throughout the research process. By fostering this engagement, the study aims to create meaningful and sustainable social change.

What sets PAR apart is that it does not treat participants as mere subjects of research but instead as co-researchers. According to Fals-Borda (1970) and Freire (1968), PAR is based on principles of democratizing knowledge production, thereby dissolving the traditional power dynamics between researchers and participants. Consequently, this egalitarian approach ensures that the knowledge generated is not only academically valuable but also directly applicable to improving the lives of those involved.

Moreover, Freire's concept of conscientization—the process of developing a critical awareness of one's social reality—is central to PAR. It encourages community members to identify the root causes of their problems and take collective action to address them. Thus, PAR is as much about education and empowerment as it is about research (Freire, 1970).

The Objectives of PAR in this study are primarily aimed at creating positive social impact, not merely to observe and document issues, but to contribute to tangible improvements in the community's well-being. Through active involvement, the study intends to catalyse social interventions that will bring about long-lasting solutions.

PAR values local knowledge and the lived experiences of community members. Instead of imposing external theories or solutions, the study integrates the community's insights to address specific environmental and public health challenges, such as flooding, which are deeply rooted in their context (Fals-Borda, 1987).

By involving participants in every phase of the research process, from the formulation of research questions to the development of solutions, the study seeks to build the community's capacity for self-governance. Consequently, participants will develop new skills, strengthen their critical thinking abilities, and gain confidence in advocating for their needs and rights (Reason & Bradbury, 2001).

One of the defining characteristics of PAR is its cyclical and iterative nature. In particular, this study follows a cycle of planning, action, observation, and reflection (Kemmis & McTaggart, 1988).

Initially, researchers and participants collaboratively identify key issues, set research goals, and develop action plans based on community needs and priorities.

Subsequently, interventions are implemented based on the agreed-upon plans. These actions are intended to address immediate problems (such as flooding and related public health issues), while also providing learning opportunities for the community.

Next, the effects of these actions are systematically observed and documented, with community members playing an active role in assessing the outcomes.

After each cycle of action and observation, the research team and participants engage in reflection. This phase allows them to evaluate the successes and shortcomings of the actions taken, and adjust the research and action plans as needed for the next cycle. The cycle continues until the research questions are answered or the desired outcomes are achieved. By continually refining strategies based on real-time feedback, PAR ensures that the solutions developed are both practical and sustainable.

Data Collection Methods

The study employs a variety of qualitative data collection methods, all designed to capture the rich, diverse experiences of community members. Because these methods are participatory in nature, they ensure that all voices are heard and that the data collected reflect the community's unique perspectives. To achieve this, the data collection techniques include:

In-depth interviews with key stakeholders such as local and national leaders, parents, and youth, aiming to gain detailed insights into the challenges they face (Bryman, 2012).

Focus Group Discussions (FGD) to foster dialogue among different community groups, encouraging collective problem-solving (Morgan, 1997).

Seminars and roundtable discussions to engage with Civil Society Organizations (CSOs) and Higher Education Institutions (HEIs), thus broadening the scope of inquiry and gathering expert input on environmental and public health issues.

Storytelling and drama as innovative, culturally resonant methods that allow participants to express their experiences and concerns in creative ways. Particularly, these techniques are

useful for engaging children and youth, ensuring that their voices are included in the research (Banks, 2001).

Drawing contests, which encourage children to visualize and express their understanding of environmental issues, providing unique insights into their perspectives.

Systematic observation, where researchers and participants observe real-world conditions in the community, particularly focusing on how environmental issues, such as flooding, impact daily life.

Fieldwork

The field study is conducted in several villages, including Moris Foun, Fomento 1, Comoro in Dili, and Erkoatun in Aileu. These locations were selected based on their vulnerability to environmental challenges such as flooding, as well as their diverse socio-economic and cultural contexts. By engaging with a broad range of participants—parents, youth, children, local and national leaders, CSOs, and HEIs—the study ensures a comprehensive understanding of the issues at hand.

The formulation of research questions is a collaborative effort between researchers and community members. This participatory approach ensures that the questions address the most pressing concerns of the community, such as environmental degradation, public health risks, and the social impacts of flooding. By involving the community in this process, the study fosters a sense of ownership and responsibility, thereby increasing the likelihood that the solutions developed will be embraced and sustained (Cornwall & Jewkes, 1995).

One of the key commitments of this study is to empower the community by enabling them to take an active role in the protection of their environment and the promotion of public health. Through the research process, participants will acquire new skills in areas such as data collection, critical thinking, and problem-solving, thereby enhancing their capacity to address future challenges independently (Gaventa, 1993).

Moreover, by focusing on long-term empowerment rather than short-term fixes, the study aims to create a sustainable model for community-driven action and resilience. In doing so, it seeks to build not only the community's capacity to address flooding and public health concerns, but also its broader ability to tackle future environmental and social challenges.

4.3. *Locale*

The field research was conducted in Comoro Village, which is situated in the Dom Aleixo Administrative Post of Dili Municipality. Specifically, the study focused on three areas within Comoro Village: Aldeia Moris Foun, Aldeia Fomento 1, and Aldeia Fomento II in Suco Comoro, as well as Aldeia Ercoatun in Suco Aisimou, Aileu Municipality. Notably, these three Aldeias are positioned along the Comoro River, the largest river in the city of Dili, while

Aldeia Erkoatun is situated in Aileu Municipality. Each Aldeia is led by a Head of Aldeia, who plays a crucial role in local governance.

The selection of these four Aldeias was deliberate. On one hand, Aldeia Moris Foun, Aldeia Fomento 1, and Aldeia Fomento II, located along the Comoro River, significantly influence the lives of people residing along the riverbanks. On the other hand, Aldeia Erkoatum in Aileu Municipality was included in the research project with the aim of facilitating collaboration between INCT-SEANNET researchers and the residents of the hilltop in Comoro. The objective here is to develop methods for conserving rainwater at the household level, thus mitigating the accumulation of water in the Comoro River. Furthermore, the community will receive guidance on sustainable agricultural practices, particularly discouraging the burning of gardens before planting crops such as corn and cassava.

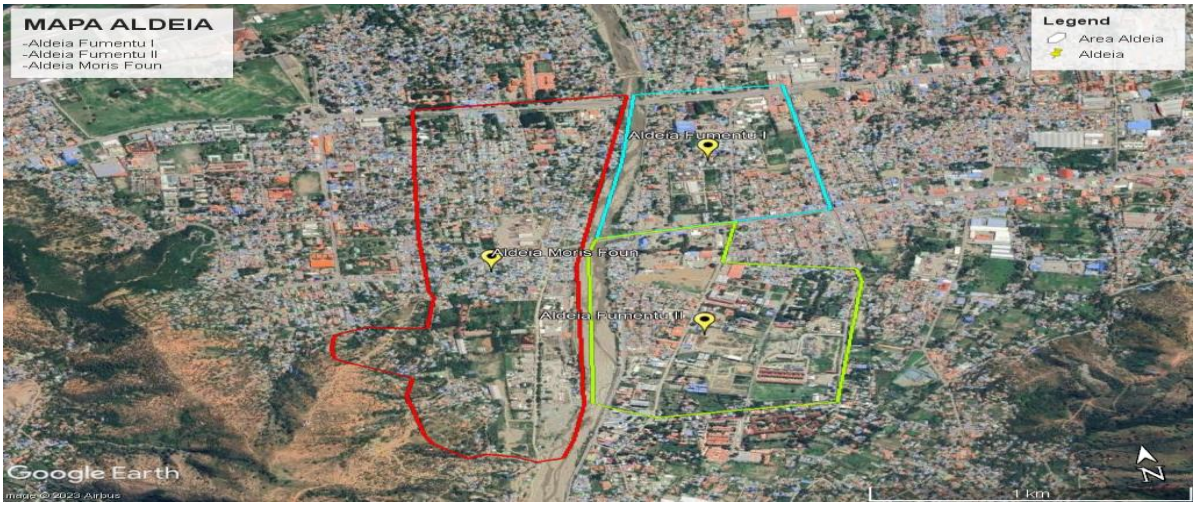


Figure 1. Map of research location

4.4. *Respondents and Key Informants*

The informants for this study were carefully selected from 55 families residing in the two hamlets of Moris Foun and Fomento I, ensuring that their profiles, perspectives, and experiences were well represented. Specifically, for the focus group discussions (FGDs), the informants were divided into four groups: Parents, Children, Women, and Youth, each representing important demographics within the community. Additionally, key informants were identified, including the Head of Comoro Village and the Heads of Aldeia Moris Foun, Fomento I, and Fomento II. These key informants played a crucial role not only in providing context-specific information but also in fostering smooth interactions and building trust between the research team and the broader community. According to Creswell (2013), key informants are vital in qualitative research as they help contextualize data and bridge the gap between researchers and participants.

Following best practices in qualitative research, creating an environment conducive to the free exchange of ideas and knowledge was a top priority. To achieve this, separate interviews and in-depth discussions were held with each group of informants. This approach aligns with

Bryman's (2012) recommendation to provide a psychologically safe space where participants feel comfortable sharing their experiences openly. By conducting interviews in this manner, the study aimed to minimize psychological barriers or power imbalances, particularly among vulnerable groups such as children and women (Fontana & Frey, 2000).

Moreover, focus group discussions were employed to encourage collective dialogue and community-driven insights. These discussions helped uncover shared experiences, allowing informants to reflect on common challenges and collaboratively brainstorm potential solutions. As Morgan (1997) notes, FGDs are particularly effective in community-based research, as they facilitate the exploration of group dynamics and collective problem-solving, which were central to this study's goals.

In conclusion, the careful selection of diverse informants, combined with the thoughtful use of data collection methods, ensured that the study not only gathered comprehensive data but also respected the community's social and cultural fabric. This approach guaranteed that the voices of parents, children, women, youth, and key local leaders were heard and incorporated into the research findings, fostering a participatory and inclusive process in line with the principles of Participatory Action Research (Fals-Borda, 1987; Freire, 1968).

Figure 2: FDG with community members at Aldeia Fomento I and II

5. Presentation of findings.

This report presents the final findings and insights gathered during the SEANNET-INCT cooperation project, conducted between 2023 and 2024. Over the span of one year, the research team explored various aspects of urban development, land use, and social dynamics in Dili, Timor-Leste. Through a combination of Focus Group Discussions (FGDs), questionnaire distribution, in-depth interviews, and field research, the team compiled comprehensive data on issues such as garbage collection, sand mining, hillside construction, and traditional farming.

5.1. *Profiles of Respondents/Informants*

Questionnaires were distributed among the communities of Fomento I Hamlet, Moris Foun Hamlet, of Comoro Village (Dom Aleixo Sub-District, Dili Municipality), with a total of 55 samples collected (100% response rate). This allowed the research team to classify respondents based on gender, age, family status, responsibilities, family size, education level, and employment status, as follows:

1.1. Classification by Gender

The data collected from 55 respondents in Fomento I and Moris Foun villages shows that 39 respondents (70.9%) were women and 16 (29.1%) were men. This discrepancy can be explained by the fact that the research team encountered more women during their field visits, as many men were away at work.

1.2. Classification by Age Group

Among the respondents, 15 individuals (27.3%) were aged 36-40, 14 (25.5%) were aged 26-30, 12 (21.8%) were aged 21-25 and 31-35, and 2 (3.6%) were aged 15-20. These results show that the 36-40 age group is the most represented, followed closely by the 26-30 age group, indicating that these highly productive age groups are actively seeking opportunities for personal and community development.

1.3. Classification by Family Status

The study surveyed 55 respondents from Fomento I and Moris Foun Hamlet, revealing that 87.3% of them were married, while 12.7% were single. This data indicates that the majority of the population in these areas is engaged in family life, which is a common characteristic in communities that emphasize family-centered social structures.

1.4. Classification by Responsibility Type

A total of 48 respondents (87.3%) reported having family responsibilities, while 7 respondents (12.7%) indicated they were responsible for themselves only.

1.5. Classification by Family Size

The data reveals that most respondents came from households with 7-10 family members (40 respondents, 72.7%). Households with 4-6 members comprised 13 respondents (23.6%), and those with 1-3 members consisted of 2 respondents (3.6%). On average, each head of household is responsible for approximately 6-10 family members.

1.6. Classification by Education Level

The education levels of the 55 respondents were as follows: 28 individuals (50.9%) had secondary education, 13 (23.6%) had basic education, 8 (14.5%) held a bachelor's degree, 4 (7.3%) had university-level education, and 2 (3.6%) had no formal education. The majority of respondents had attained secondary education.

1.7. Classification by Employment Status

Among the 55 respondents, 27 individuals (49.1%) had permanent employment, 22 (40%) had temporary employment, and 6 (10.9%) were employed part-time.

5.2. ***A general overview;***

Dili, the capital of Timor-Leste, has played a central role in the nation's history, weathering centuries of foreign rule and occupation. Under Portuguese colonial rule for 450 years, Japanese occupation for four years during World War II, and 24 years of Indonesian military invasion, Dili has emerged as a symbol of resilience and a reflection of Timor-Leste's complex past. Today, the city is a vibrant cultural hub, showing a rich tapestry of traditions, languages, and cuisines, drawing on its diverse population and historical influences.

The city's landscape is marked by a striking architectural diversity that tells the story of its colonial past, modern development, and local heritage. Iconic landmarks such as the towering statue of Christ the King, which overlooks the bay, and the monument of Commander Nicolau Lobato, a national hero, are key features in Dili's cityscape. These cultural symbols, along with nativity scenes (Presépio) that adorn public spaces during the Christmas season, give the city a unique and festive atmosphere, reflecting both its spiritual devotion and its sense of community.

However, Dili's rapid urban growth has brought with it significant challenges, particularly regarding housing and land use. Based on information gathered from Focus Group Discussions (FDGs) and in-depth interviews, many people who migrated to Dili initially had no land on which to build homes (Domingos,2023). This led to the informal occupation of areas near the Comoro River, where land was either unclaimed or inexpensive. One respondent shared, "We really had no land to live on. We came to Dili to gather sand to earn money. It's easy work, and that's how we make a living. Since we couldn't afford land to build a house, we just occupied areas near the riverbank where there are no owners, or it's cheaper to buy.

The community members of three hamlets in Comoro indicated that they are originally from different municipalities. Many migrated to Dili for various reasons, often economic in nature, or to follow family members who had moved there in earlier decades (Araujo, 2023). One resident noted, "We came here following our ancestors and parents who have lived here since the 1970s, 1980s, and 1990s. For us, it was for economic reasons—to collect sand and earn money for our household needs and to send our children to school (Ximenes, 2023).

According to the head of the Village of Comoro, some residents have occupied government-owned land illicitly and then sold it to others at a low price (Eurico, 2023). Over time, these community members have obtained land titles for their properties, leaving the government with limited authority to confiscate the land. The village head explained,

“Currently, the Comoro area has more than 300 households. The community living here consists of a mix of people, including government servants, military personnel, and police officers. As the chief of the Suco (village), I have sent a formal notice to the government, specifically to the Public Works and Land & Property departments, requesting that they take stronger control over this area. (Eurico, 2023).

This situation underscores the ongoing tension between informal land occupation and formal urban planning, highlighting the complexities of land ownership and housing in a rapidly growing city like Dili. The growing population, driven by both economic opportunities and historical migration patterns, has created challenges for both residents and the government as they seek to balance development with legal land management (Smith, 2023).

Figure 3. In Depth interview with Chief of Suco Comoro.

5.3. *THE PEOPLE’S EVERYDAY PRACTICES IN TERMS OF WASTE DISPOSAL, HILLSIDE CONSTRUCTIONS, TRADITIONAL FARMING METHODS, AND SAND MINING PROCESS IN COMORO RIVER IMPACT COMMUNITY HEALTH AND VULNERABILITY TO FLOODING.*

5.3.1. *Everyday Waste Disposal Practices*

Waste is a residual material generated from various activities, including markets, offices, accommodations, hotels, restaurants, and industries. This waste is the result of human activities, and its management is a significant challenge that needs to be addressed. The waste problem can be interpreted as a human attitude issue, as it has a substantial impact on various aspects of life, including health and the environment. The presence of waste requires proper management; it often becomes a complex issue due to its environmental sensitivity. A lack of discipline and sensibility in its management can lead to an unsatisfactory environment, affecting people's quality of life.

Through systematic observation and in-depth interviews, it has become evident that community members generally lack knowledge regarding effective garbage management. The

researchers observed that most individuals do not know how to distinguish between organic and inorganic waste. One participant noted,

"Most of the garbage comes from our domestic needs for example; leftover food, including vegetables, meat, and fruit, along with plastic waste from markets, such as instant noodle wrappers, water bottles, soft drink cans, sausage packaging, and boxes. We often gather everything together in a plastic bag or box and keep it in our house or in the kitchen for two to three days, which results in bad smells."

Most of community member from Aldeia Moris Foun and Fomento I stated further that *we do not separate organic from non-organic waste. In fact, we just mixed all together and we don't yet the waste separation system that can significantly benefit our health and environment as well they also may provide manure for our crops fertilization*."

Further interviews and observations revealed that community members tend to dispose of their garbage improperly, often throwing it anywhere—on the street, in front of their houses, or along riverbanks—without considering the consequences. One respondent stated;

"We usually throw garbage on the street or in the riverbank, the entrance way, waiting for the government truck to pick it up. However, sometimes it takes a week or two weeks for them to come. Frankly, in our area, there aren't many suitable places to store garbage. We can't keep it in our houses for long because of the terrible smell. Whether we like it or not, we have to throw it on the street or outside our houses. That's just how it is."

Additionally, many community members still raise pigs in their yards and near the river, which contributes to various health problems, including the spread of diseases and contamination of water sources. One resident explained, *"Our ancestors taught us to raise pigs for traditional rituals and to sell some to support our children's education. We have no other sources of income, so we rely solely on raising pigs."*

In further discussions, the researchers also noticed that community members are unaware of the health risks associated with their waste disposal practices. One respondent expressed concern;

"*Dumping garbage on the streets or riverbanks creates health hazards by attracting disease-carrying organisms, such as flies, which can contaminate food for children and the elderly, potentially leading to illness. Additionally, throwing waste into rivers not only pollutes the water but also harms marine life. Finally, improper garbage disposal can block drainage systems and exacerbate flooding during heavy rainfall."*

In conclusion, improper waste disposal significantly contributes to water pollution, adversely affecting aquatic life and the ecosystem, while also posing serious public health risks by creating breeding grounds for disease-carrying pests. Furthermore, mismanaged waste clogs drainage systems, exacerbating flooding, particularly in vulnerable areas.

5.3.2. *Sand Collection Practices and Riverbank Erosion*

House as basic needs and secure

A house is a fundamental necessity for people, serving as a refuge that protects families from adverse weather conditions, dangers, and providing a sense of security and comfort. However, living in a house encompasses more than just having a physical structure. In this section, we will explore the significance of residency and the various aspects related to it.

Next, a good house is characterized by several criteria that determine its suitability for living. These criteria include safety, which ensures protection from environmental hazards and threats; accessibility, indicating the house should be located near essential services such as healthcare, education, and transportation; comfort, which requires the living space to be conducive to well-being (…); community, where the surrounding neighbourhood fosters social connections and support; and affordability, meaning the cost of the house must be manageable for its occupants.

Several factors influence housing decisions. Location is crucial when selecting a place to live, with considerations such as safety, accessibility, and proximity to public facilities like schools, hospitals, and commercial centers being essential. Additionally, price plays a significant role in choosing a residence, as the cost of rent or purchasing a house must align with the financial capacity of individuals or families. Although minimum criteria exist for families to consider when deciding on a location, economic conditions often compel them to prioritize affordability over ideal living conditions.

In this research, while we will not extensively discuss housing conditions, this section will focus on the decisions families make regarding their choice of location. Insights gathered from interviews conducted by enumerators with respondents in Fomento I Village and Moris Foun Village will be presented below.

Current History of Living

The population residing along the Comoro River is diverse, predominantly comprising low- and middle-income families. People live there for a variety of reasons. During our Focus Group Discussion (FGD) with elderly residents, many revealed that they have lived in the area for decades, with some having settled as far back as the 1960s, 1970s, 1980s, and 1990s. Thus, the community has deep-rooted ties to the land. However, some residents are only temporarily living there, staying with others to have easier access to work and schools.

While some have been living in the area for a long time, others have arrived more recently, each with different reasons for settling there. As one informant explained, *"We want to live here because it's close to our workplace. We have no other alternatives, and we cannot afford to rent a house elsewhere. We used to live in other locations, but we moved here after purchasing land from the community at a cheaper price."*

Other residents shared that they moved from municipalities to Dili in search of work. Since this area is more affordable and offers easy access to jobs, they settled here. One individual stated, *"We moved from a municipality to this place because we were forced to find work. We couldn't find a cheaper place to live, so when our neighbours invited us to stay here, we accepted."*

Similarly, some residents decided to purchase land here due to the lower prices, allowing them to build permanent homes. As a community member remarked, "*we live here permanently because we bought land and built our house. If the government supports us in building better housing conditions, we might move, but for now, this is home. The land was vacant, and we purchased it for $500 from a friend. Before, we rented a house in Taibesi, but it caused many problems. Now that we own the land, we live here to avoid those issues."*

Another community member shared a similar story, explaining that they moved to the area in 2009: "*we bought land for $280 and built our house here. Even though this area belongs to a company and the price is relatively high, many people continue to buy land because they need a place to build homes. While we're still working on completing the construction—especially the kitchen, which was damaged by the rain—we're glad to have found this land."*

However, some residents view their stay as temporary. Since the area is close to their workplace, they plan to return to other land they own in Dili. As one resident explained, "*we live here temporarily, as we also have land in other parts of Dili. When the time is right, we'll move. For now, we're here because it's close to work and schools for our children. We also want to reduce costs. The government has mentioned that they may ask us to leave, and if that happens, we'll relocate to Hera, where we own land."*

Working as sand miner;

One community member we interviewed explained: "*we have lived here since the 1960s or 1970s when our ancestors came to this area to start small businesses. As time passed, we came to consider this land our property. We mine sand here and sell it to earn an income, which helps meet our household needs and, at the same time, allows us to send our children to school."*

Similarly, another resident shared her experience living and working in sand mining: *"our ancestors have lived here for a long time, and sand mining has been part of our livelihood for generations. Indeed, much of the city's construction depends on this sand, and this business has become vital to our community. Moreover, the income we generate is crucial for supporting our households, sustaining our family life, and, most importantly, ensuring our children's education."*

Figure 4. Community activity as miner sand in Comoro River

One community member expressed reluctance to leave the area, stating: "*we don't want to move away from the riverbank because living close to the river makes it easier to collect sand. Selling sand has greatly benefited us. For years, many companies have come to the Comoro River to buy sand for construction since the 1970s, 1980s, and 1990s, and they still come today. From this business, we can earn between $15 and $25, depending on the quality and demand. Therefore, it would be difficult for us to leave this place."*

Furthermore, a sand miner emphasized the significance of this livelihood, sharing: "*over the years, sand mining has provided us with financial stability and enabled us to offer educational opportunities to our children. We earn between $40 and $50 a day, demonstrating how crucial this work is in sustaining our livelihoods."* Benvinda Vaz also shared her experiences; "*a long time ago, my husband worked here by collecting and selling sand to companies. Since the beginning of year 2000s he worked by collecting and selling sand. For one load of number 1 sand, we can earn between $20 and $25, while number 2 sand brings in $15 to $18. My husband's sand business depends on demand, and sometimes there's a high number of requests."*[1][2]

Consequently, another resident whose livelihood depends on sand mining said: *"we will continue this work to support our families. This occupation has been passed down through generations, and as a result, more people are engaging in sand mining activities in this area."*

However, the question arises: have the residents explored other business activities as alternatives to sand mining? Some residents responded, saying: "*we have tried to switch to other businesses, like selling at the market, but the earnings were much lower or non-existent. For this reason, we prefer to continue sand mining because, at least, we earn regular money for our daily consumption."* In addition, some community members have attempted to return to their respective municipalities due to the challenging living conditions in Dili. One resident shared: *"I tried to go back to my home municipality, Baucau, for two years, but my family and I had to return to Dili because of our children's education."*

Due to the risks associated with living by the riverbank, some residents have considered moving farther away to ensure the safety of their families. However, they pointed out several

[1]. The result of interview with Benvinda Vaz, in Aldeia Moris Foun on January 25th 2024

challenges, including: (1) “We can’t afford land, which is very expensive.” (2) “we don’t have the money to rent a room or house elsewhere.” Therefore, they decided to continue living near the riverbank for three main reasons: (a) the land here is cheaper; (b) the proximity to the river makes it easy to access sand for mining; (c) there are no transportation costs, as everything is nearby.

The residents also made a clear request to the government. If the government insists on relocating them, they demand the following: (1) “we need the compensation for the money we have spent buying land and constructing homes, which cost a significant amount; (2) job opportunities that would allow them to cover their daily expenses and continue paying for their children's education.

On the other hand, a local leader raised concerns, warning: “*although sand mining has undoubtedly benefited some families, we must also consider its negative impacts. In particular, it contributes to land erosion, flooding, and environmental degradation. As a result, many families living near the riverbank have suffered from flooding and the destruction of their homes, leading to the loss of property, livestock, and other valuable assets.”*

In conclusion, the sand mining practices along the Comoro River have provided substantial economic benefits to the local community by supporting livelihoods and ensuring access to education for their children. Many families, deeply rooted in the area, view the land as their own and are hesitant to relocate due to the reliable income that sand mining provides. Although some residents have considered alternative livelihoods or relocation, financial challenges and the economic benefits of remaining near the river keep them anchored. However, the environmental c6onsequences of these practices, including land erosion, flooding, and home destruction, pose serious threats to the community. As a result, residents are urging the government to offer compensation and job opportunities if relocation becomes necessary, highlighting the need to balance economic stability with environmental sustainability.

5.3.3. *Hill side Construction and Urban Challenges in City*

Geographically, Dili City is situated in a valley surrounded by hills and bordered by the sea, making it highly susceptible to flooding, particularly during the rainy season. The city's natural topography, combined with the challenges of population growth, contributes to its vulnerability to floods.

Figure 5. Hill side Constructions and its environmental impacts

Due to the rising population and the limited availability of affordable land in the central areas of Dili, many families have been compelled to move and build homes on the surrounding hillsides. The cost of land in the city has become unaffordable for many, leaving them with no alternative but to seek shelter on the hills. As one resident explained: "*We had to move and live here because there were no other options for housing in Dili, and we couldn't afford to buy land in the city. We had no choice but to settle here."*

Moreover, the lack of infrastructure in these hillside areas has worsened the flooding problem. Many residents are unable to install water tanks or other systems to store rainwater, which leads to increased runoff during the rainy season. This unchecked flow of water from the hills increases the risk of flooding in Dili. One informant commented: *"So far, we haven't figured out how to contain the rainwater. Without proper storage, the rainwater flows straight into the city, which worsens the flooding."*

Figure 6. hill side construction and increase rainwater volume in Comoro river

In conclusion, the growing number of homes being built on Dili's hillsides is contributing to the city's flooding risks. Without proper planning and water management systems, rainwater accumulates on the hilltops and increases the volume of water in the Comoro River. This heightened water flow poses a serious risk of flooding, which could lead to the destruction of homes, the loss of lives, and damage to livestock and property.[3]

5.3.4. *Traditional Farming Methods and Environmental Sustainability*

This section focuses on the environmental consequences of traditional farming methods in Timor-Leste, especially in Dili City.

Many farmers still engage in practices such as clearing land by cutting trees and burning vegetation, which, while effective for preparing soil for planting, contribute to significant environmental degradation. A local leader explains that "*this traditional method of land preparation has led to deforestation, soil erosion, and increased flooding, especially during heavy rains. The loss of forest cover diminishes the land's natural ability to retain water and prevent soil erosion, leading to long-term sustainability issues for agriculture and the environment."*[4]

Figure 7. method of gardening by burning vegetations

For improving environmental sustainability, there is a need for more awareness and introduction of sustainable farming techniques, like agroforestry and conservation agriculture, which could reduce the need for slash-and-burn practices while preserving the ecosystem.

[3]. Result of FDG with local authorities in Aileu Municipalities.

[4]. Interviewing head of Village of Loro and Luru Matain Aileu Municipality, May 23,2023

5.4. *EVALUATING THE EFFECTIVENESS OF COMMUNITY LED INITIATIVES IN MITIGATING ENVIRONMENTAL DEGRADATION PROMOTING SUSTAINABLE PRACTICES AND REDUCING FLOOD VULNERABILITY E IN COMORO DILI.*

5.4.1. *Community Awareness and Education Programs*

I would like to present several community initiatives and autonomous approaches aimed at addressing environmental management issues, specifically in terms of waste disposal, sand mining, rainwater conservation, and the avoidance of burning vegetation.

To begin with, one of the notable behaviours observed in the field is the tendency to dispose of waste improperly, such as on streets, riverbanks, and front yards. This harmful practice not only poses health risks but also contributes to flooding, disrupts marine biodiversity, and causes various other environmental problems. In response, some community members have resorted to burning waste as a temporary solution while waiting for government trucks to collect it.

As one community member expressed: *"In our efforts to manage waste, we gather it in front of our homes or throw it along the riverbanks, after which we burn it every morning. We do this because if the waste is left to accumulate for too long, it poses serious health risks to us and affects the well-being of our neighbors."*[5]

Figure 8: people practicing of waste management by burning them

Secondly, both the community and local leaders are aware of the dangers posed by improper waste management, recognizing that it can be hazardous to health and the environment. Therefore, when invited to participate in discussions on these issues, some community members were eager to attend the meetings.

[5]. Result of FDG from Aldeia Fomentu II.

The Head of the Hamlet of Moris Foun stated, *"For the sake of our common good, we are ready to cooperate with the valuable initiatives of INCT. Once again, I am happy to collaborate with INCT, and I will organize community members to participate in the meeting to learn how to care for our environment."* Additionally, another community member expressed, *"I think this is a very positive initiative by INCT to explain to us how to separate organic and non-organic waste. I need to participate in it."*

On the other hand, some individuals were reluctant to cooperate, believing that their participation should come with compensation. One community member commented, "*Our family has no time to participate in this kind of activity. If you bring money to distribute to us, we will join, but if you come just to talk, we will not spend our time on such activities. Sorry."*

Figure 9. discussion on waste management

5.4.2. *Waste Management and Pollution Control*

Firstly, the SEANNET-INCT project also introduced the community to the process of separating organic and non-organic waste into different bins. During the meetings, the research team explained that separating these types of waste is important. Otherwise, if they are mixed, they can cause bad smells, especially when thrown on the streets or in public places.

Figure 10. INCT-SEANNET Researcher has distributed trash buckets for 5 families in Aldeia Moris Foun

To help with this, the team gave two buckets to some households, showing them how to separate the waste. The focus was mainly on the mothers, students and some youths in each home. They also taught the community how to compost organic waste, turning it into fertilizer. The waste should be tightly covered and watered every day to break down into fertilizer for crops.

Figure 21. INCT-SEANNET started a waste management project by providing trash buckets

While some students, young people, and older women from two hamlets followed these instructions, others had trouble. For example, some households didn't use the buckets properly, putting all waste in one. Some even used the buckets for other purposes, like storing rice and water, or just threw them away.

Besides this, the research team also taught them how to build small gardens and plant vegetables, so they could use the compost as fertilizer. From the team's observations, some households, especially young people, students, and women, managed to plant vegetables and use the composted waste as fertilizer.

Secondly, to encourage children to care for and respect the environment from a young age, they were taught how to draw pictures about proper waste disposal. The SEANNET and INCT research team, together with local leaders, organized children from the hamlets of Moris Foun and Fomento I to take part in these activities. The goal was for the children to learn how to care for their environment through drawing and other activities such as drama.

Figure 12. Focus Group Discussion with Community in Aldeia Moris Foun

One of the events was witnessed by the SEANNET international team from Southeast Asian countries, including the Philippines, Brunei, Singapore, Indonesia, and Timor-Leste, during their visit to Moris Foun on June 22, 2024.

The children from both hamlets who achieved first, second, and third place were awarded by SEANNET and INCT. Additionally, all children who participated in the drawing activity received books and pens as recognition from SEANNET and INCT.

Thirdly, to promote the reuse of non-organic waste, the SEANNET and INCT research team instructed the youth in the hamlets of Moris Foun and Fomento I to create chairs and tables using plastic bottles collected in the communities.

The youths in both hamlets were very actively participated in these activities. Additionally, they had the opportunity to showcase their work during the visit of the SEANNET international team from Southeast Asia, including participants from the Philippines, Brunei, Singapore, Indonesia, and Timor-Leste, on June 22, 2024. Looking ahead, the youths plan to continue making these items and selling them as an alternative source of income.

Fourthly, to raise environmental awareness, a group of youths from the two hamlets of Moris Foun and Fomento I were encouraged by the SEANNET and INCT research team to paint murals illustrating the proper separation of organic and non-organic waste along the walls of LLAJR in Comoro, Dili.

The research team, along with local leaders, organized these activities to engage the youth. The murals serve as a reminder to the public that everyone has a responsibility to care for the environment by disposing of waste properly. In recognition of their efforts, the youths were awarded certificates. These murals will stand as a public lesson for everyone.

5.4.3. *Flood Prevention and Water Management.*

The Comoro River has no downstream outlets, meaning the volume of rainwater that flows into the river comes from every household or building on the hills surrounding Dili City. To reduce the amount of rainwater flowing into the Comoro River and mitigate flooding in Dili City, SEANNET, INCT, and community members can consider the following solutions:

Engaging the community in discussions on how to build hillside retaining walls to slow down the flow of rainwater into the Comoro River.

Collaborating with community members to construct water tanks in each household to store rainwater. This would help reduce the volume of water flowing into the river, preventing floods in Dili City. Additionally, the stored water could be used for watering crops, feeding animals, and other household purposes.

Encouraging the community to plant trees, which would help absorb rainwater and prevent it from directly flowing into the Comoro River. Moreover, trees can help prevent soil erosion during the rainy season.

5.4.4. *Sustainable Agriculture and Land Use*

To adopt sustainable agriculture, the people of Timor-Leste need to transition from traditional farming methods. The INCT and SEANNET research teams have been working with communities around Dili City, encouraging them to stop burning crop waste and instead compost it to create organic fertilizer.

Alternative farming methods to replace slash-and-burn practices.

In Timor-Leste, many farmers still practice slash-and-burn farming, a method that clears land by burning vegetation, leading to deforestation and degraded soil health. An NGO in the Aileu Municipality stated, "*the method of burning vegetation may damage the soil and the trees surrounding, ultimately affecting the entire forest. Therefore, the best approach is we teach the community to compost grass and incorporate it into the soil to fertilize the crops. Changing their traditional mindset is not easy, but we always do our best to care for our environment, particularly for our springs."*

Another method is crop rotation, where farmers grow different crops each season to improve the soil and prevent pests from becoming a problem. Some communities also plant cover crops like legumes, which enrich the soil and protect it during the rainy season.

Adopting agroforestry practices.

Agroforestry is a sustainable method where trees and crops are grown together, improving soil quality and creating a balanced ecosystem. In Timor-Leste, farmers can plant trees such as coffee, coconut, or moringa alongside food crops like maize and cassava. This not only provides multiple sources of income but also reduces soil erosion and helps retain moisture in the soil, which is essential in the dry season.

Supporting reforestation and land rehabilitation efforts.

Communities in Timor-Leste can take the lead in restoring degraded lands through reforestation. For instance, planting native tree species like sandalwood, which is valuable both economically and environmentally, can help regenerate areas affected by deforestation. Farmers can also use techniques like terracing on hilly terrains to reduce water runoff and soil erosion. This approach helps manage rainfall, especially during the wet season, and preserves the fertility of the land for future farming.

5.5. *THE ENGAGEMENT OF KEY STAKEHOLDERS, INCLUDING COMMUNITIES, UNIVERSITIES, GOVENRMENT AUTHORITIES AND LEGAL BODIES IN WASTE MANAGEMENT, ENVIRONEMNTAL CLEANESS AND FLOOD PREVENTION ACTIVITIES.*

5.5.1. *Role of Communities in Waste Management and Environmental Initiatives in Comoro, Dili*

Communities in Comoro, Dili, play an essential role in managing waste and promoting environmental initiatives. Through active involvement, residents contribute significantly to local cleanliness and the overall health of their environment.

Firstly, community-led waste management practices are fundamental to addressing waste disposal in Comoro. For example, local residents have organized clean-up campaigns to remove litter from streets and riverbanks. Additionally, initiatives such as informal waste segregation help separate organic and inorganic materials, reducing the amount of waste sent to landfills. Consequently, these practices contribute to a cleaner and healthier community.

Moreover, raising public awareness is vital for the success of waste management efforts. In this regard, community workshops and educational programs have been established to inform residents about the significance of proper waste disposal and recycling. Furthermore, involving local schools fosters environmental stewardship among younger generations. As a result, increased public awareness leads to higher participation in community clean-up activities and waste management initiatives.

In addition to waste management, communities in Comoro are also engaged in local initiatives focused on flood prevention and land management. For instance, residents have collaborated to plant trees along riverbanks, which helps mitigate flooding and enhances local biodiversity. Furthermore, community members participate in workshops on sustainable agricultural practices, allowing them to manage land effectively and reduce runoff during heavy rains. Thus, these initiatives highlight the proactive approach of the community toward environmental stewardship.

In conclusion, communities in Comoro, Dili, are vital to effective waste management and environmental initiatives. By leading waste management efforts, raising public awareness, and participating in flood prevention initiatives, residents contribute to a healthier and more sustainable environment. Therefore, fostering community engagement and support will be crucial for enhancing these initiatives and promoting environmental sustainability in Comoro.

5.5.2. *Involvement of Universities in Environmental Research and Community Outreach*

HEIs like UNPAZ, UNTL, DIT and IOB in collaboration SEANNET and INCT play a significant role in addressing environmental research and community outreach efforts in Comoro, Dili. Through collaboration with local communities, they contribute significantly to understanding and addressing environmental issues such as waste management and flood prevention.

Firstly, universities in Dili conduct extensive research on waste management and flood mitigation strategies. For instance, studies may focus on effective waste segregation techniques, recycling methods, and sustainable waste disposal practices. Additionally,

research initiatives might explore the causes and impacts of flooding in the area, providing valuable data to inform local policies and community practices. Consequently, this research lays the groundwork for developing effective solutions tailored to the unique challenges faced by Comoro.

Moreover, collaboration between universities and local communities enhances the impact of environmental research. For example, universities often partner with community organizations to implement research findings in real-world settings. Furthermore, these partnerships enable the sharing of knowledge and resources, empowering communities to adopt sustainable practices. As a result, such collaboration fosters a sense of ownership and responsibility among residents regarding their environmental impact.

In addition to research and collaboration, universities offer educational programs that engage students in environmental initiatives. Through internships, volunteer opportunities, and service-learning projects, students can participate in community outreach activities focused on waste management and environmental awareness. For instance, students may assist in organizing clean-up campaigns or educational workshops for local residents. This involvement not only enhances students' understanding of environmental issues but also reinforces the importance of community engagement in sustainability efforts.

Lastly, universities serve as advocates for sustainable practices in Timor-Leste. By promoting research-based policies and practices, they can influence local and national discussions on environmental issues. Moreover, universities can host conferences, seminars, and public forums to raise awareness and share insights on effective environmental strategies. Thus, they play a crucial role in shaping the discourse around sustainability and environmental protection in the region.

In conclusion, universities in Comoro, Dili, are instrumental in advancing environmental research and fostering community outreach. Through rigorous research, collaboration with local communities, student involvement in initiatives, and advocacy for sustainable practices, universities contribute significantly to improving waste management and promoting environmental awareness. Therefore, strengthening these university-community partnerships is essential for achieving long-term sustainability goals in Comoro.

5.5.3. *Government Authorities' Role in Policy Making and Implementation*

Government authorities play a vital role in shaping and implementing policies related to waste management and flood control in Comoro, Dili. By developing strategic initiatives, these authorities work towards ensuring a cleaner environment and enhancing community well-being.

To begin with, both national and local governments establish policies aimed at effective waste management, flood prevention, and flood risk intervention. For instance, the government may introduce regulations promoting proper waste segregation at the household level and set guidelines for the disposal of hazardous materials. Additionally, flood control

policies often include initiatives such as improving drainage systems and conducting regular maintenance of riverbanks. These policies are crucial for minimizing environmental hazards and promoting public health within the community.

In response to the April 4, 2021, flood that severely impacted Dili City, particularly Comoro, the government and various international agencies took immediate action. As the chief of Comoro Village mentioned, *"In May 2021, a collaborative effort was initiated by the government, the UN Resident Coordinator, and various agency partners. This joint initiative launched a seven-month recovery plan focused on several key objectives. The primary goal was to ensure the continued provision of essential supplies and services to displaced families, including those from the Comoro riverside area. Special attention was given to protecting vulnerable groups, such as women, children, individuals with disabilities, and the elderly, from the adverse effects of the disaster."* [6]

Moreover, the recovery plan supported the rebuilding efforts within the affected communities, focusing on the restoration and rehabilitation of key infrastructure damaged by the disaster. By restoring these critical structures, the plan aimed to reinstate normalcy and functionality in the disaster-affected regions.

Furthermore, collaboration between government agencies and local communities is essential for effective environmental protection. By working closely with community leaders and organizations, government authorities can gain insights into the specific needs and challenges faced by residents in Comoro. For instance, involving community members in the development of waste management plans fosters local ownership and accountability. This collaboration helps create tailored solutions that resonate with the community.

In conclusion, government authorities play a pivotal role in policy-making and the implementation of waste management and flood control initiatives in Comoro, Dili. By establishing effective policies, executing community programs, fostering partnerships with local stakeholders, and promoting sustainable practices, these authorities significantly contribute to improving environmental quality and enhancing community well-being. Their continued efforts are vital in creating a cleaner and safer environment for the residents of Comoro.

5.5.4. *Legal Framework and Enforcement of Environmental Regulations*

The legal framework surrounding environmental regulations is crucial for addressing waste management and flood prevention in Comoro, Dili. Effective laws and their enforcement play a significant role in safeguarding the environment and ensuring community health.

To start with, various environmental laws have been enacted to regulate waste management practices. For example, laws may mandate proper waste disposal methods and

[6]. Result of an in dept interview with director from civil protection.

outline penalties for illegal dumping. These regulations aim to reduce pollution, protect public health, and preserve local ecosystems. Furthermore, specific provisions may address the disposal of hazardous waste, ensuring that dangerous materials do not harm the environment.

In addition, the enforcement of these laws is crucial for their effectiveness. Government agencies responsible for environmental protection must actively monitor compliance with waste disposal regulations. For example, regular inspections of waste management facilities and public areas can help identify violations. Furthermore, penalties for non-compliance, such as fines or legal actions, serve as deterrents against improper waste disposal. This enforcement is vital for upholding community standards and encouraging responsible behaviour. As the Comoro Village leader states:

"People dispose of waste everywhere, which is why we have asked the national government to enact a law to regulate this behaviour. Improper waste disposal can affect people's health. It's not enough to simply educate the community on proper disposal; we need laws to regulate people, and if they break the law, they must be punished."[7]

Furthermore, legal bodies play an integral role in addressing environmental violations. By investigating complaints and pursuing legal action against offenders, these bodies help uphold environmental laws. For example, community members can report illegal dumping or pollution incidents, prompting legal action to resolve the issue. This accountability reinforces the importance of following environmental regulations.

Despite these frameworks, there are often gaps in the legal system that can hinder effective environmental protection. For instance, insufficient resources for enforcement agencies may limit their ability to monitor compliance effectively. Additionally, a lack of public awareness regarding existing laws can lead to non-compliance. Addressing these gaps is essential for creating a robust legal framework that effectively protects the environment.

In conclusion, the legal framework and enforcement of environmental regulations are vital components of waste management and flood prevention efforts in Comoro, Dili. By establishing clear laws, enforcing compliance, and addressing violations, legal bodies contribute significantly to environmental sustainability. However, ongoing efforts are needed to strengthen the legal system, enhance public awareness, and ensure that environmental protections are effectively implemented. Ultimately, a strong legal framework will support the community in maintaining a clean and safe environment.

5.5.5. *Collaboration Between Stakeholders for Sustainable Solutions*

Collaboration among various stakeholders is essential for achieving sustainable solutions to environmental challenges in Comoro, Dili. By working together, communities, universities,

[7]. In dept interview with head of Village of Comoro.

government authorities, and legal bodies can effectively address issues related to waste management and flood prevention.

To begin with, engaging multiple stakeholders in environmental protection initiatives fosters a sense of shared responsibility. For example, community members can collaborate with universities to conduct research on local environmental issues, while government agencies can provide the necessary regulatory support. This engagement helps to ensure that all voices are heard and that diverse perspectives inform decision-making.

Moreover, examining successful case studies can provide valuable insights into effective collaborative practices. For instance, a partnership between local NGOs and community groups in Comoro may have led to the implementation of a waste recycling program that significantly reduced litter and improved public awareness. Similarly, joint efforts between the government and educational institutions can result in flood mitigation projects, such as creating rainwater harvesting systems in vulnerable areas. These examples illustrate the potential benefits of collaboration in achieving sustainable outcomes.

In addition, local communities have welcomed interventions from NGOs and other international agencies during times of crisis. As the chief of the Hamlet shared, *"when the community faces crises like flooding, they receive assistance from the government, especially the Secretary of Civil Protection, which distributes food, beverages, tarpaulins, medications, and other necessary supplies. NGOs and Charismatic Groups also provide basic needs like food and clothing."*

The chief further noted, *"International NGOs like the Red Cross also assist, not only by providing aid but by creating databases of the victims. The local community of Fomento II, for instance, was visited by CVTL, an NGO that brought valuable assistance and resources." He added, "Following the flood, the community in Moris Foun received support from Proteção Civil, who conducted a thorough assessment of casualties and property damage."*

In conclusion, collaboration among stakeholders is crucial for developing sustainable solutions to environmental issues in Comoro, Dili. By engaging communities, universities, government authorities, and legal bodies, stakeholders can create a comprehensive approach to waste management and flood prevention. While challenges may exist, effective collaboration can lead to innovative solutions that benefit the entire community. Ultimately, fostering strong partnerships will be key to achieving a sustainable and environmentally friendly future in Timor-Leste.

5.6. *IDENTIFYING AND ANALYZING THE CHALLENGES IMPEDING COLLABORATIVE EFFORTS AMONG NGOs, HIGHER EDUCATION INSTITUTIONS, RESEARCH AGENCIEIS, GOVERNMENT AND COMMUNITIES IN PREVENTING FLOODING AND PRMOTING ENVIRONMNETAL SUSTAINABILITY IN COMORO, DILI CITY.*

5.6.1. *Institutional Barriers to Collaboration*

Despite the potential benefits of collaboration among NGOs, universities, research agencies, and government bodies in Comoro, Dili, several institutional barriers hinder effective cooperation. These challenges can significantly impact efforts to address environmental issues such as waste management and flood prevention.

To begin with, a primary barrier to collaboration is the lack of coordination among various stakeholders. Often, NGOs, universities, and government bodies operate in silos, which can lead to duplicated efforts and missed opportunities for synergy. For instance, if an NGO is conducting a waste management program independently of local government initiatives, valuable resources and community engagement may be wasted. Thus, fostering better communication and collaboration is essential to ensure that all efforts are aligned toward common goals.

Additionally, conflicting goals and priorities among stakeholders can create significant hurdles. While some organizations may prioritize environmental education, others might focus on immediate waste management solutions. This divergence in objectives can lead to disagreements and ultimately hinder collaborative efforts. For example, if a university aims to conduct research on long-term flood prevention strategies while local NGOs focus on immediate relief efforts, their initiatives may not align effectively, resulting in fragmented actions.

Moreover, bureaucratic challenges and slow decision-making processes can impede collaboration. Government agencies, in particular, often have lengthy approval processes that can delay projects and frustrate other stakeholders. For instance, if an NGO proposes a joint initiative to improve waste management but faces bureaucratic red tape, it may miss the opportunity to implement timely solutions. This slow response time can discourage stakeholders from pursuing collaborative efforts in the future.

Finally, limited capacity and resources for implementing joint initiatives pose a significant barrier. Many organizations may struggle with inadequate funding, personnel, or expertise, which can limit their ability to participate in collaborative projects. For example, if a university lacks the necessary resources to conduct a study on flood prevention, its potential contributions to a collaborative initiative may be diminished. As a result, stakeholders may feel overwhelmed and unable to engage effectively in partnerships.

In conclusion, institutional barriers such as a lack of coordination, conflicting goals, bureaucratic challenges, and limited capacity hinder collaboration among stakeholders in Comoro, Dili. Addressing these challenges is vital for fostering effective partnerships that can lead to sustainable solutions for waste management and flood prevention. By promoting better communication, aligning priorities, streamlining decision-making, and enhancing resource availability, stakeholders can work together more effectively to address environmental issues in the community.

5.6.2. *Funding and Resource Allocation Challenges*

The effectiveness of flood prevention and environmental management in Comoro, Dili City, faces significant challenges, particularly regarding funding and resource allocation. These challenges not only limit the scope of current initiatives but also hinder the long-term sustainability of collaborative efforts among key stakeholders. The following issues are central to these difficulties:

First and foremost, many floods mitigation projects in Dili, especially in Comoro, suffer from a lack of adequate funding. While the government allocates a budget for disaster risk reduction and environmental conservation, these funds are often insufficient to meet the scale of the problem. As a result, crucial activities such as the construction of resilient infrastructure, improvements in drainage systems, and reinforcement of flood-prone areas are either delayed or remain incomplete. Furthermore, without consistent investment in early warning systems, disaster preparedness education, and local capacity-building initiatives, flood management efforts tend to be reactive rather than preventive.

Additionally, the distribution of resources among stakeholders is often uneven. While larger institutions, such as government agencies and well-established NGOs, may receive the bulk of available funding, smaller community groups and local research institutions often struggle to access the necessary financial support. Consequently, this unequal distribution can lead to a misalignment of priorities, reducing the overall effectiveness of flood prevention efforts. Local organizations, which are often best equipped to implement community-based solutions, may find it difficult to initiate or sustain projects, thus limiting their contribution to broader flood management strategies.

Moreover, securing long-term financial support remains a persistent challenge. Many flood prevention initiatives rely on short-term grants or project-based funding, which can disrupt progress when the funding cycle ends. Without sustained financial backing, collaborative efforts between NGOs, universities, government bodies, and local communities are difficult to maintain. As a result, projects often lose momentum once initial funding is exhausted, undermining the sustainability of flood prevention strategies. This short-term approach makes it challenging to invest in lasting infrastructure improvements and capacity-building programs, which are essential for effective flood management.

Finally, while international aid plays a crucial role in providing financial support for flood prevention and environmental management in Timor-Leste, its effectiveness is not always optimal. On one hand, international aid provides much-needed resources, but on the other hand, it can suffer from misalignment with local needs. Donor priorities may not always match the specific challenges faced by vulnerable communities in Comoro, leading to a disconnect between funding and local realities. Furthermore, international aid projects tend to be time-limited, making it difficult to sustain results after the aid period ends. This overreliance on external funding can also reduce the incentive for local authorities to develop self-sustaining initiatives funded by local sources.

5.6.3. *Community Engagement and Participation*

Community engagement and participation are essential for the success of flood prevention and sustainability efforts in the Hamlet of Moris Foun and Fomento 1, Comoro, Dili City. However, several barriers hinder the effective involvement of local communities, particularly regarding the utilization of waste management systems.

A community member shared her experience: *"We prefer to use only one bucket while keeping another aside. When one of the buckets gets damaged, and we have no money to buy a new one, we can use the other to replace it."* Another family member from the same community added, *"We really face a problem—every night, we have to bring the buckets inside the house to safeguard them and prevent them from being stolen by individuals in the area. We have experienced losing our belongings to unauthorized individuals, resulting in significant personal losses. As a result, we keep the waste inside the house every night, but it smells and might cause other diseases, so we just throw it away.*

Figure 3. The Researcher doing the monitoring for utilization of trash bucket after bi-week

Furthermore, some cultural and socio-economic factors also hinder participation; traditional practices like hillside construction are often essential for economic survival, making change difficult. Low-income households prioritize immediate financial needs over long-term environmental concerns, and socio-cultural barriers, including power imbalances and distrust of external organizations, further limit engagement.

To overcome these barriers, several strategies can be employed to enhance community ownership and involvement in sustainable practices. *First,* increasing public awareness through targeted environmental education campaigns is crucial. These campaigns should focus on making the link between community practices and flood risks clear, while also offering practical guidance on how residents can contribute to flood prevention. *Second,* fostering a sense of ownership within the community is essential. This can be achieved by actively involving local leaders and community members in the design and implementation of flood mitigation projects. When residents see that their input is valued and that they have a direct role in shaping solutions, they are more likely to take ownership of the outcomes. *Third,*

offering economic incentives or alternative livelihoods, such as promoting eco-friendly businesses or sustainable farming practices, can help alleviate the socio-economic pressures that hinder participation. Finally, building trust between the community and external organizations is key to overcoming cultural barriers.

5.6.4. *Challenges in Research and Data Sharing*

Data sharing is essential for effective flood risk management and environmental sustainability in Dili City. However, several challenges hinder progress in this area. INCT's science mapping efforts in Timor-Leste revealed that *"collaboration among higher education institutions (HEIs), research agencies, and government institutes remains weak, resulting in fragmented efforts and missed opportunities to leverage expertise and resources. Moreover, the collection and accessibility of flood-related data are inconsistent, with no centralized system for information sharing. This lack of coordination leads to duplicated efforts and gaps in critical data, ultimately obstructing effective flood prevention planning."*

Moreover, existing research on flood risk often overlooks social, economic, and cultural factors, limiting the development of a comprehensive understanding of flood vulnerability. Strengthening partnerships among academic institutions, government agencies, and community organizations is crucial to enhancing data sharing practices and developing integrated, evidence-based strategies for managing flood risks in Dili City.

5.6.5. *Policy and Regulatory Gaps*

Policy and regulatory gaps significantly hinder effective flood risk management and environmental sustainability in Dili City. The following points highlight key challenges related to policies and regulations in flood-prone areas:

One of the foremost challenges is the absence of robust environmental policies and regulations tailored specifically for flood-prone regions. Current policies may not adequately address the unique vulnerabilities and risks faced by communities in these areas, leading to ineffective flood prevention measures. Without clear and comprehensive guidelines, stakeholders are left without a framework for action, which can exacerbate flood risks and environmental degradation.

Even when effective policies exist, weak enforcement often undermines their intended impact. In Dili City, existing laws related to flood prevention and waste management are frequently poorly enforced, resulting in non-compliance and continued environmental challenges. This lack of enforcement can stem from inadequate resources, insufficient training for regulatory bodies, and a lack of accountability, allowing hazardous practices to persist and endangering community safety.

Another significant barrier is the misalignment between national and local government priorities regarding environmental protection. National policies may focus on broad objectives

that do not necessarily address the specific needs and concerns of local communities in flood-prone areas. This disconnect can lead to inadequate resource allocation and ineffective implementation of flood prevention measures at the local level, undermining the overall effectiveness of environmental policies.

Integrating community knowledge and experiences into government policies is crucial for developing effective flood risk management strategies. However, there are often challenges in bridging the gap between local insights and formal policy-making processes. Community members may have valuable knowledge about local conditions and practices, yet their voices are frequently overlooked in policy discussions. This lack of integration can result in policies that are disconnected from the realities faced by communities, ultimately limiting their effectiveness.

5.6.6. *Socio-Economic and Infrastructure Limitations*

Socio-economic and infrastructure limitations significantly contribute to flood vulnerability in Comoro, Dili City. The following points elaborate on the key challenges related to socio-economic factors and infrastructure:

Rapid urban density in Dili City has led to the proliferation of informal settlements, particularly in flood-prone areas like Comoro. These informal settlements often lack adequate planning and infrastructure, increasing the community's vulnerability to flooding. The density of these areas can impede natural water flow and drainage, resulting in heightened risks during heavy rainfall. Moreover, the absence of proper land use regulations further exacerbates the challenges associated with urbanization and informal housing.

The existing infrastructure in Comoro, including drainage systems, is often inadequate and poorly maintained. Insufficient drainage capacity leads to water accumulation during heavy rains, increasing the likelihood of flooding. Additionally, blockages caused by debris and waste in drainage channels further compromise their effectiveness. The lack of investment in infrastructure development hampers the community's ability to manage flood risks effectively.

Socio-economic challenges, including high levels of poverty and limited access to essential services, significantly affect the resilience of the communities of Hamlet of Moris Foun and Fomento 1, in Comoro Village. Many residents lack the financial resources to invest in flood-proofing measures or to relocate to safer areas. Furthermore, inadequate access to basic services, such as education, healthcare, and sanitation, exacerbates the vulnerability of these communities, making it difficult for them to recover from flood events and adapt to changing environmental conditions.

Infrastructure development is key to enhancing environmental sustainability and mitigating flood risks. Investing in resilient infrastructure, such as improved drainage systems, flood barriers, rainwater storage, and planting trees on hillsides, can significantly reduce the impact of flooding on vulnerable communities. Additionally, sustainable infrastructure

practices, like incorporating natural drainage solutions and promoting eco-friendly construction, can help restore ecosystems and boost overall community resilience.

5.6.7. *Communication and Information Flow Among Stakeholders*

Effective communication and information flow among stakeholders are vital for successful flood risk management and environmental sustainability in Dili City. The following points outline the key challenges and considerations related to communication:

Firstly, a significant challenge in managing flood risks is the absence of established communication channels between non-governmental organizations (NGOs), government agencies, and local communities. Consequently, this disconnect hampers collaborative efforts and prevents stakeholders from sharing valuable insights and resources. Without effective communication, the ability to coordinate initiatives and mobilize community engagement is severely limited, which can undermine flood prevention strategies.

Moreover, the dissemination of critical information regarding flood risks and best environmental practices often faces obstacles. For instance, many community members may lack access to timely and relevant information, which can lead to unpreparedness during flood events. Additionally, the complexity of environmental issues can hinder the effective communication of key messages. Therefore, efforts to raise awareness about flood risks and promote sustainable practices must consider language barriers, educational levels, and the diverse needs of the community to be effective.

Furthermore, transparency in communication is essential for building trust among stakeholders. In this regard, regular feedback mechanisms can help identify gaps in communication and allow for adjustments based on community input. By establishing platforms for open dialogue, stakeholders ensure that local communities feel heard and that their concerns are addressed. Ultimately, this iterative process not only strengthens relationships between stakeholders but also enhances the effectiveness of flood management initiatives.

To improve communication and collaboration among stakeholders, several best practices can be adopted. These include establishing multi-stakeholder platforms for dialogue, utilizing various communication channels (such as social media, community meetings, and informational workshops), and promoting participatory approaches that actively involve community members in decision-making processes. In addition, developing clear messaging tailored to the audience's needs and preferences can facilitate better understanding and engagement.

5.6.8. *Climate Change and Environmental Impact*

Climate change significantly influences flood risks and poses challenges to environmental sustainability in Dili City. The following points outline the key aspects related to the impact of climate change and environmental considerations:

Firstly, climate change is a major factor contributing to the increased frequency and intensity of flooding in Dili City. As a result, rising temperatures and shifting weather patterns lead to more severe rainfall events, overwhelming existing drainage systems and increasing the likelihood of flash floods. Moreover, sea-level rise exacerbates the vulnerability of coastal areas, further heightening the risks associated with flooding.

In addition, environmental degradation, including deforestation, urbanization, and land-use changes, significantly impairs flood prevention efforts. For instance, the loss of natural vegetation reduces the land's ability to absorb rainwater, increasing runoff and contributing to flooding. Consequently, poor land management practices hinder the effectiveness of existing flood mitigation strategies and compromise overall environmental health.

To address these challenges, long-term strategies for promoting environmental sustainability are essential. These strategies may include implementing reforestation programs, enhancing green infrastructure (such as parks and wetlands), and promoting sustainable land-use practices that restore ecological balance. By adopting an integrated approach to environmental management, stakeholders can improve resilience to climate change while mitigating flood risks.

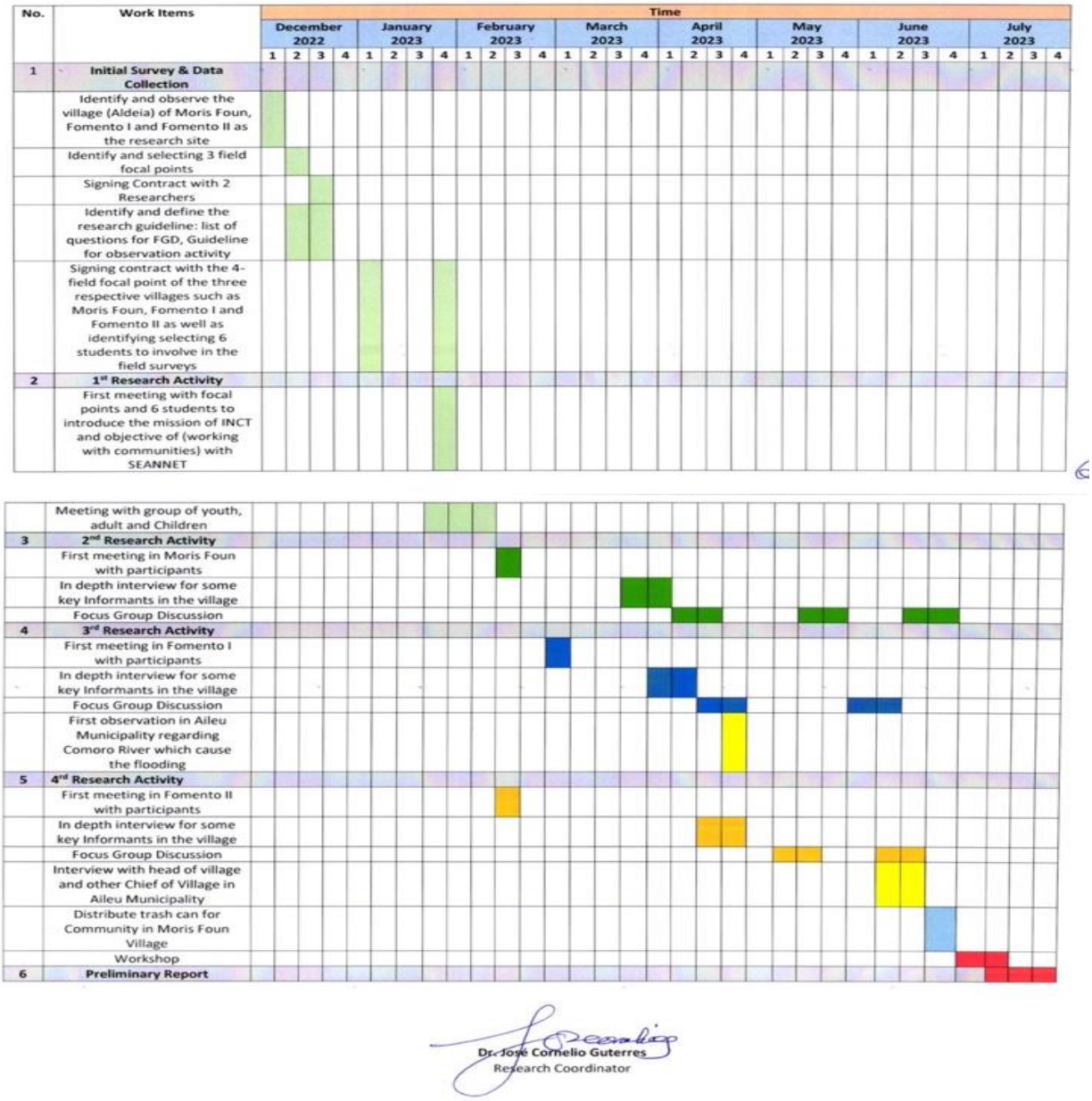
Furthermore, collaborative approaches are crucial for effectively addressing the environmental impact of floods. By engaging various stakeholders—including government agencies, NGOs, community members, and academic institutions—efforts can be coordinated to develop comprehensive flood management plans. Such collaboration can also facilitate knowledge sharing, resource allocation, and the development of community-driven initiatives that enhance environmental sustainability and resilience.

In conclusion, recognizing the interconnectedness of climate change and environmental impact is vital for developing effective flood management strategies in Dili City. By implementing long-term sustainability initiatives and fostering collaboration among stakeholders, the community can better navigate the challenges posed by climate change and work towards a more resilient future.

6. Time Schedule

The time schedule during December 2022 until July 2023 as shown in the Table 1. It is start with initial survey and data collection. Data collection has done by research team in activity I and II as well as with stakeholder workshop and now write a final report.

Time Schedule Research INCT- SEANNET
December 2022-July 2023



No.	Work Items	Time																													
		December 2022				January 2023				February 2023				March 2023				April 2023				May 2023				June 2023				July 2023			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	**Initial Survey & Data Collection**																																
	Identify and observe the village (Aldeia) of Moris Foun, Fomento I and Fomento II as the research site																																
	Identify and selecting 3 field focal points																																
	Signing Contract with 2 Researchers																																
	Identify and define the research guideline: list of questions for FGD, Guideline for observation activity																																
	Signing contract with the 4-field focal point of the three respective villages such as Moris Foun, Fomento I and Fomento II as well as identifying selecting 6 students to involve in the field surveys																																
2	**1st Research Activity**																																
	First meeting with focal points and 6 students to introduce the mission of INCT and objective of (working with communities) with SEANNET																																
	Meeting with group of youth, adult and Children																																
3	**2nd Research Activity**																																
	First meeting in Moris Foun with participants																																
	In depth interview for some key Informants in the village																																
	Focus Group Discussion																																
4	**3rd Research Activity**																																
	First meeting in Fomento I with participants																																
	In depth interview for some key Informants in the village																																
	Focus Group Discussion																																
	First observation in Aileu Municipality regarding Comoro River which cause the flooding																																
5	**4rd Research Activity**																																
	First meeting in Fomento II with participants																																
	In depth interview for some key Informants in the village																																
	Focus Group Discussion																																
	Interview with head of village and other Chief of Village in Aileu Municipality																																
	Distribute trash can for Community in Moris Foun Village																																
	Workshop																																
6	**Preliminary Report**																																

Dr. José Cornelio Guterres
Research Coordinator

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