ANTIRIVER TEAM

RESEARCH REPORT & SOLUTION PROPOSAL

ASSIGNMENT 4

RIVER SCAN CHALLENGE 2024

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RESEARCH REPORT

INTRODUCTION

1.1 Background of the Study

In retrospect, the civilizations of ancient times have always seen rivers as crucial elements of life – a dear friend, a *kaibigan*, that lent a hand and allowed life to thrive. It indeed is safe to assume that these rivers that hold fresh water have become essential in the emergence of basic communities in the past and great and complex cities and societies in the present.

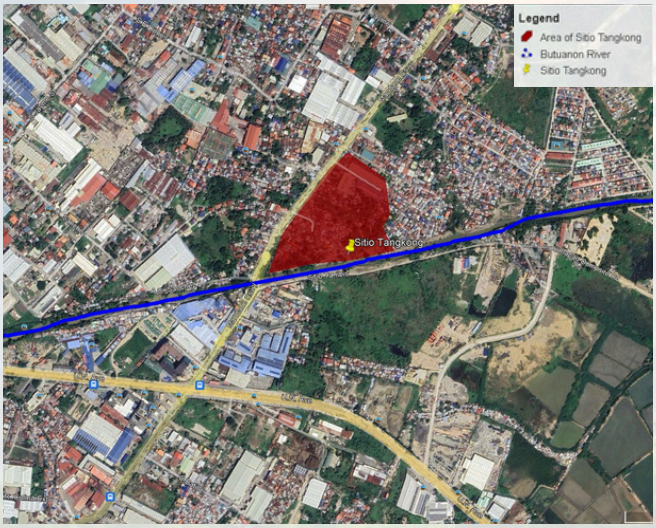


Figure 1 Barangay Paknaan, Sitio Tangkong

In different parts of the modern world, many bustling cities have been established near rivers. London, for one, is close to the Thames while Paris also has its Seine. Similarly, the Philippines also has its fair share of cities that utilize the advantages of rivers and waterways. Cebu City and Mandaue City, the locale of the study, hold vast numbers of different rivers which, with the advent of globalization, industrialization, and urbanization, have contemporarily placed on the brink of biological death and have been the foremost victims of severe pollution. It has been our *kaibigan* for most of our history yet we have left it to suffer the consequences of our incautious actions.

The Butuanon River, a vital waterway stretching 23 kilometers, traverses from the mountainous regions of Cebu City down to Mandaue City going straight to the Mactan channel. The river's course bisects Mandaue City for approximately 15 kilometers, encompassing eleven (11) barangays. Significantly, it serves as a vital drainage system and a valuable natural resource for the city. As such, many studies showed that the river was considered to be one of the major water sources for residents. In 1992, it was unfortunately declared biologically dead.

In a data comparison from 2022 to 2023, the Water Quality Monitoring Average Results show that the river's water quality has gone beyond the required threshold set by the Mandaue City Government. The data provided shows that there has been a significant increase in dissolved oxygen, biochemical oxygen demand, and the overall total of suspended solids where the Butuanon Bridge area has sought the highest increase amongst the other stations in the city. The drastic changes that have occurred in the river's water quality are a result that needs the intervention of proper solution-making and implementation of policy.

As the river witnessed growing urbanization, various types of solid waste were absentmindedly dumped into the river by riverside settlements. A report by the Mandaue City Environment and Natural Resources Office (MCENRO) also indicated that about 62 industrial and commercial facilities discharge wastewater into the Butuanon River. Thus, significant efforts and different courses of action have been undertaken to revitalize the river, to restore its ecological balance and ensure its sustainability for future generations.

In recent developments, the Mandaue City Government has allocated a budget for flood mitigation programs for the Butuanon River, with P1.082 billion allocated for the area as of 2024. Additionally, the involvement of a Watershed Governing Board in the rehabilitation of the river has been a significant agency to monitor and tackle the existing issues that the Butuanon River has faced, as years of natural disasters, urbanization, and other factors have created a precedent need to take action.

To deal with the challenge, the present research will concentrate on rehabilitating the river through a thorough assessment of the needs of affected stakeholders and the development of sound infrastructures to alleviate the current situation of the river. Furthermore, it is expected that the study will also formulate significant policy proposals that highlight a strong collaboration between the communities involved, data-providing institutions, and the local government units to ensure stronger and more sustainable reforms for the benefit of the Butuanon River.

1.2 Statement of the Problem

In the accomplishment of the primary task – providing possible solutions to the problems present within Sitio Tangkong, Brgy. Paknaan, Mandaue community – the study aims to answer this research question: *In what ways can the City of Mandaue initiate concrete efforts and deploy solutions to mitigate specific environmental problems in Sitio Tangkong, Brgy. Paknaan?*

Specifically, the following sub-questions would be used as a guide in the search for an answer to the primary question:

- What are the current challenges faced by the communities along the Butuanon River?
- What are possible factors that have contributed to these challenges?
- What are the impacts that these challenges bring to the communities as well as the environment of the concerned locality, i.e., Mandaue City?
- What possible practical solutions can be made to address these issues?

1.3 Objectives of the Study

This study aims to assess the ecological challenges confronting Sitio Tangkong, Barangay. Paknaan, particularly, the environmental condition of the Butuanon River. This is to produce potential and significant solutions and plausible recommendations by proposing both engineered infrastructures and policy-related developments. Specifically, the study aims to fulfill the following objectives:

- Gather significant information on the status quo of the Butuanon River.
- Acquire first-hand information on the specific needs of the community residing on the banks of the Butuanon River
- Analyze the gathered data by identifying the main problem faced by the community based on the residents' statements.
- Develop practical and sustainable solutions for the rehabilitation of the Butuanon River.

METHODOLOGY

The various methodologies used by the researchers to obtain the necessary information, where the resulting data shall be presented in the Results and Discussion section and utilized by the researchers for solution proposals, shall be discussed within this section.

During the River Scan Challenge, the team proposed two major activities that aim to not only gain information but also understanding from the residents and authorities residing along Sitio Tangkong, Barangay Paknaan. These activities are the Community Workshop and the Community Walk.

Community Workshop

The community workshop aims to encourage the local community to voice out their concerns over their livelihoods along the Butuanon River. The primary objective of the workshop is to not only enhance the researchers' understanding and knowledge of the riverside community but also to understand the issues previously or currently faced by the residents and to determine whether action is currently being taken to improve the livelihoods of those residing along the river. The inputs provided by the community will serve as the basis for the innovation of solutions proposed by the researchers to solve the problems currently being faced by the community. Under the community workshop, there shall be two activities to be conducted in cooperation with the local community, namely The Problem Tree Analysis and The Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis.

The Problem Tree Analysis

The researchers onsite shall conduct an activity known as the Problem Tree Analysis which encourages the local community to share and voice out their experiences and concerns as residents near the Butuanon River. It involves two smaller activities. The first involves respondents being asked about the situation in their community. The second involves the use of cards which are color-coded depending on the response. The respondents are asked questions, which could either be a problem, cause, or effect. Answers related to the question about problems, causes, and effects, shall be written on the red, pink, and orange cards respectively. The responses are then placed accordingly on a Manila Paper showcasing the tree to form the Problem Tree.

The SWOT Analysis

The Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis is another activity that the researchers shall conduct onsite with the local community. The researchers shall ask the local community some questions that correspond to the strengths, weaknesses, opportunities, and threats concerning the situation in the community. Yellow cards shall be dedicated to responses to questions concerning strengths and opportunities, while green cards shall be dedicated to responses to questions concerning weaknesses and threats. All responses shall be organized accordingly on a manila paper containing a table for the SWOT analysis.

Community Walk

The researchers onsite shall conduct a community walk with the local community to map out Sitio Tangkong of Barangay Paknaan and determine sections that may either have positive or negative characteristics. Examples include locations prone to flooding or areas that are protected from flooding. The community walk shall be split into three groups to maximize efficiency in mapping the local community.

RESULTS

In this section, the team discusses the findings gathered from the community workshop and community walk conducted in Sitio Tangkong, Barangay Paknaan, Mandaue which aimed to understand the environmental challenges affecting the community, particularly concerning the Butuanon River.

Problem Tree Analysis

Problems

The issue of garbage pileup emerges as a pressing challenge within the barangay, with residents noting its prevalence and detrimental impact on both the environment and community well-being. Rivers, local areas, and drainage systems are reported to be clogged with garbage and debris, which not only causes pollution but also leads to environmental degradation that affects the quality of life for the locals.

Moreover, the accumulation of garbage exacerbates the problem of flooding within the barangay. Residents attribute the floods to the blockage of the natural path of the river during heavy rainfall due to the buildup of waste. This obstruction impedes the flow of water, causing it to overflow its banks and inundate surrounding areas. Some residents describe the flooding as reaching ankle-deep levels of mud and soil displacement, with the water itself rising to chest level.

Causes

Deforestation and loss of trees are identified to be a major contributor to the problems faced by the locals regarding the Butuanon River. Residents highlighted the issue of trees getting chopped down and those destroyed by floods as a key driver of deforestation. This loss of tree cover not only reduces the aesthetic and ecological significance of the area but also disrupts the vital ecosystem functions that trees offer, such as soil stabilization, erosion prevention, and water regulation.

Improper disposal of garbage is determined to be another major cause. Residents expressed their concern about the widespread practice of improper waste disposal, where both locals and outsiders discard trash within the vicinity, including directly onto the river, which not only pollutes the environment but also poses health risks to the residents. The accumulation of garbage in the river and local areas exacerbated issues such as flooding and soil erosion.

The lack of a proper drainage system also plays a role in the challenges faced by the locals regarding the Butuanon River. Residents pointed out how the absence of adequate drainage infrastructure allowed various pollutants, including trash, excrement, and factory secretions, to directly flow into the river, leading to its pollution, and therefore affecting the water quality. Such an issue also poses risks to public health and safety. Moreover, during heavy rainfall events, inadequate drainage aggravates flooding, which causes further damage to property and infrastructure.

Effects

The challenges faced by the locals have profound implications for both the environment and the community's well-being, with soil and floral erosion being one.

The constant overflow of the river, exacerbated by pollution, has rendered the soil unsuitable for planting and cultivation, as a result of its deteriorated quality. This has led to a decline in agricultural productivity and threatens food security in the community. Furthermore, the absorption of murky water by plants near the riverbanks leads to its deterioration, contributing to ecosystem degradation.

As flooding becomes more frequent and severe, residents are forced to evacuate, disrupting their lives and livelihoods. The forced relocation of individuals uproots them from their homes and communities, leading to a loss of social cohesion and cultural ties. The influx of refugees and displaced individuals from other barangays creates social tension and strains local resources, which creates additional challenges for the community to address.

The deterioration of river quality poses risks to public health and well-being. The pungent color and repulsive appearance of the river signal widespread pollution, making it unfit for drinking, bathing, or fishing. This poses a direct threat to the health and livelihoods of the residents who rely on the river for sustenance and domestic use.

The lack of trees, attributed to deforestation and soil erosion, aggravates the impact of intense heat waves on the community. Without tree cover to provide shade and regulate temperatures, residents are exposed to heightened temperatures, increasing the risk of health-related illnesses and discomfort. This increases the health burden on the vulnerable population, including the elderly, children, and those with pre-existing health conditions.

Proximity or contact to the polluted river exposes residents to various health risks, including skin allergies, respiratory illnesses, and gastrointestinal infections. The contamination of water sources with pollutants and pathogens compromises public health and contributes to the prevalence of waterborne diseases. The lack of access to clean water amplifies health disparities and hampers efforts to improve community health outcomes.

SWOT Analysis

Strengths

With the challenges faced by the community with the state of Butuanon River, there are ongoing efforts to address the issues at both the community and government levels. Locals actively engage in clean-up efforts and reforestation initiatives to demonstrate their commitment to mitigating environmental damage. Waste management efforts, including segregation practices at the household level, also indicate a proactive approach to addressing these issues. These initiatives are further bolstered by support from the local government through the implementation of a mandated mechanism for garbage collection, which is organized based on a schedule for segregation.

Weaknesses

Despite the community's proactive stance, several factors hinder effective environmental conservation efforts, one of which is the lack of information among certain segments of the population, particularly newcomers and refugees as a result of relocation, who may be ignorant or unaware of the current state of Butuanon River, as well as the proper waste disposal practices of the community. Without a comprehensive understanding of the environmental issues facing the barangay, these individuals may inadvertently contribute to pollution by improperly disposing of waste.

Additionally, a lack of discipline among some residents when it comes to waste management. Despite repeated warnings from local authorities and community members, individuals continue to throw trash into the river. This lack of self-initiative and disregard for environmental stewardship pose a significant barrier to achieving meaningful change within the community. Children are being used as carriers to dispose of garbage to elicit sympathy and urgency from the authorities and the locals.

Opportunities

The residents have also pointed out several opportunities that exist for enhancing environmental conservation efforts and fostering sustainable development in the community, such as having enhanced cooperation between stakeholders, including community members and government agencies.

By fostering a culture of collaboration and understanding stakeholders can pool their resources and expertise to implement coordinated cleanup drives, segregation routines, and other initiatives, which have the potential to yield significant benefits for all the stakeholders involved.

Investing in adequate cleaning materials is essential for supporting ongoing cleanup drives and rehabilitation efforts. While current efforts have shown promise, the lack and inadequacy of materials provided hinder their effectiveness. By allocating resources toward procuring the necessary equipment and supplies, stakeholders can conduct more efficient and comprehensive cleanup activities.

The "Liga for a Cause" also presents an innovative approach to raising awareness and funding for river rehabilitation efforts. Leveraging sports as a platform for community engagement, this initiative has the potential to mobilize a broad audience and garner support for the conservation of the Butuanon River. The prize money and donations generated through sports leagues can be directed towards funding physical and technical assistance for river rehabilitation projects.

Ground-level waste management efforts, such as segregation and proper waste collection, should be prioritized and sustained to effectively address pollution issues. By engaging community members in waste management practices and fostering cooperation with government authorities, stakeholders can ensure the proper collection and disposal of garbage.

The completion of government projects, such as the riffraff project alongside the river, holds promise for addressing the challenges posed by informal settlements and protecting vulnerable communities from environmental hazards. Concrete housing for displaced people not only provides safer living conditions but also helps mitigate the risks associated with overflow during flooding events. Additionally, addressing the issue of informal settlements aligns with broader efforts to promote sustainable urban development and environmental resilience in the barangay.

Threats

Multiple factors pose significant challenges to the ongoing efforts of the community towards environmental conservation and rehabilitation, such as the current state of the sitio's drainage system. With its deteriorating condition and given the frequent occurrence of calamities and the resultant damage to the river, the functionality of the drainage system is compromised. As the last sitio before the sea border, the community bears the brunt of garbage overflow during flooding events, hence aggravating pollution and posing risks to public health.

As part of the Butuanon River's downstream side, the actions of the business companies situated in the upstream portion of the river affect the downstream portion and its surrounding communities. The dumping of highly corrosive waste directly into the river alters its natural ecosystem, turning its color from healthy hues to a murky translucent gray. Despite their role in polluting the environment, these companies often evade accountability for their actions.

Natural disasters also represent a significant threat to the progress of environmental rehabilitation and development efforts in the barangay. The occurrence of soil displacement and chest-level flood waters during calamities emphasize the vulnerability of residents and the environment to the destructive forces of nature, therefore posing immediate risks to community safety and well-being.

Lastly, the apathy and indifference of certain segments of the population present a formidable challenge to the community's efforts. Despite the concerted actions of the current population to rehabilitate the river and address environmental issues, the diffusion of the population and the assumption that there is a lack of awareness among newer generations threaten the continuity of these efforts. Without sustained community engagement and awareness-raising initiatives, the gains made in environmental conservation may be lost.

CONCLUSION & RECOMMMENDATIONS

Conclusion

The Butuanon River plays an important role in the city's ecosystem and many local communities. With this, there is a need for a course of action and sustainable/long-term solutions to help tackle these challenges and to also address the improvement of the river's water quality and its waste management as one of its main focuses. Creating the vision of a clean and thriving river in the city is a necessity as it not only paves the way for clean water for households and other industries but also restores biodiversity and prevents future disasters such as flooding. By mitigating the current problems of the Butuanon River, specifically the current condition of the river's garbage pileup, this study and its analysis of what can be done to contribute to such matters represents the collective responsibility of everyone to achieve a sustainable future for the government, the academe, and citizens alike.

Recommendations

It is imperative that the study not only assess the status quo of the Butuanon River but also craft plausible solutions to address its pressing problems. As such, the researchers advance the following recommendations:

1. Espouse the proposed engineered solution as to be discussed in the solution paper.
2. Stringent implementation of regulations for industrial wastewater discharge and comprehensive water quality monitoring.
3. Consider initiating pilot-to-waste resource programs in riverside settlements such as river clean-up drives along the riverbanks.
4. Organize community awareness programs that can foster responsible waste management and sustainable water conservation practices.
5. Create a local river clean-up agency that monitors the build-up of solid waste along the river on a monthly basis and performs the necessary procedures in cleaning such.
6. Initiate gradual relocation programs to relocate riverside residents into safer homes in order to adopt long-term sustainable solutions to the river's problems given the predominantly reduced possible sources of solid waste.

SOLUTION PROPOSAL

UNDERSTANDING THE PROBLEM

The river in the area of Barangay Paknaan is a downstream path of the Butuanon River. The river downstream poses many problems that are caused mainly by human activities. The river's water quality has deteriorated, becoming pungent and repulsive, which is concerning as it was previously a source of drinking water, food, and bathing for locals around 50 years ago. Proximity to the polluted river has caused locals to contract skin allergies, coughing fits, and diarrhea, posing health risks.

According to data gathered, the root cause of Butuanon River demise could be the lack of trees (due to deforestation), improper garbage disposal, industrial waste, livestock manure and human negligence. These causes plus the climate change contributes to flooding, soil and floral erosion, garbage pileup and clogged rivers, problematic river quality, sickness and many more.

The government has been aware of the situation and has made precautions such as widening and installing riprap on the river banks, making the river bed deeper, and more to solve the problem of flooding. With the ongoing installation and excavation of the river, the community of Brgy. Paknaan is still vulnerable to problems such as garbage pile and clogged rivers, unusable and problematic river quality, sickness and many more.

With these, the students of the universities would like to present possible solutions that might improve the situation of the river and the residents living near it.

THE OBJECTIVES

- Provide a design of a low cost and low tech solution to address the problem.
- The solution must involve and engage with the community.
- The solution must be practical and impactful.

THE PRACTICAL SOLUTION

DESIGN OF THE SOLUTION

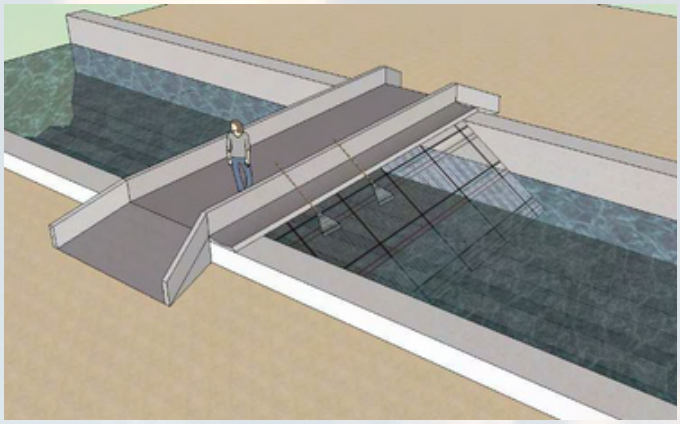
Three Step Process:

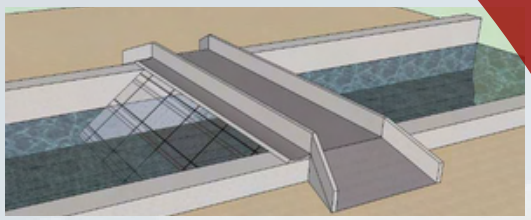
1. General Clean Up - A thorough cleaning around the site locations to visibly clear up the waters and provide hope and inspiration for what the river could become.

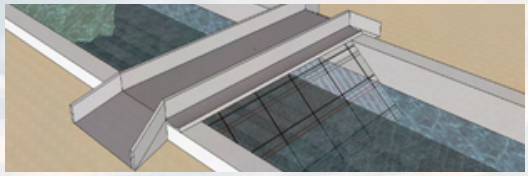
- **Community involvement:** Engaging communities in clean-up drives, neighborhood watch programs, and environmental initiatives can foster a sense of ownership and collective responsibility towards maintaining a clean environment. Community-led efforts are often more effective and sustainable than top-down approaches.
- **Protection:** The use and supply of PPE and tools in order to catch the garbage, and the need for sufficient garbage collection and disposal sites.

2. Construction of a Bridge with Net Catchments - Gives access and traps trash along the river. This is to solve the garbage pileup issue and allows easy access to cleaning the flowing waters, so that residents no longer need to go down the river which could possibly cause health issues.

- **Bridge:** Made out of reinforced concrete for long term use. Can allow people to go to the other side of the river.
- **Catchment Net:** Made out of steel for sustainability and captures floating trash on the flowing river. Installed diagonally so that cleaners can easily pick up the trash using a long rake to scrape trash to the bridge space, this also gives the added advantage of protecting the collectors from harmful bacteria and injuries by doing away with having to immerse themselves in the polluted river water during collection. The use of steel trap instead of using net as a trap, makes the Catchment more rigid and carries more trash
- **Community engagement:** establishing bridge and net will allow community involvement for its maintenance and constant monitoring for pile up, making them mindful of the situation of the river.
- **Cleaning equipment:** Use of rakes and other equipment to drag trash upwards and sorted out for disposal.



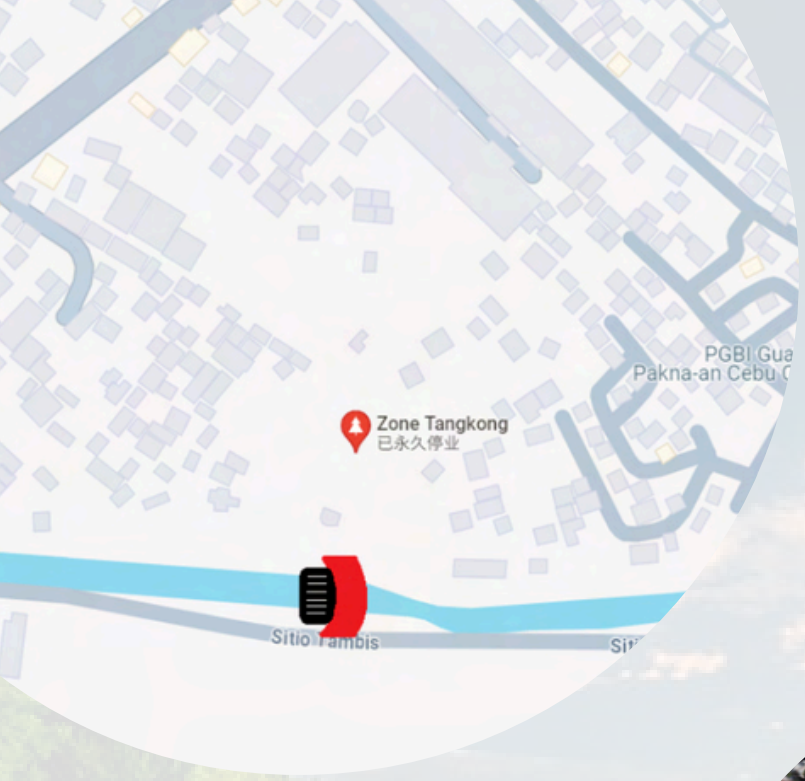




3. Waste Management Campaign - A comprehensive initiative addressing waste management challenges through strategic interventions and community engagement.

- **Community Education:** Focuses on raising awareness regarding the importance of responsible waste management. This is done through structured workshops, seminars, and educational forums; mainly to impart relevant knowledge to the community about the importance of proper waste segregation and disposal, ways of recycling, the detriments of environmental negligence, and the benefits of observing eco-friendly practices.
- **Garbage Bin Provision:** Emphasizes the adequate catering of garbage bins in key areas such as residential neighborhoods, recreational areas, and commercial spaces. Ensuring the accessibility of garbage bins motivates people to dispose of their trash properly and discourages littering.
- **Availability of infrastructure:** Adequate infrastructure, such as proper waste management systems, recycling facilities, and sanitation services, should be readily available and accessible to the public. This infrastructure makes it easier for people to dispose of waste properly and maintain cleanliness.

END GOAL: Habit formation and maintenance



LOCATION ANALYSIS

Start with one bridge, situated near the open space near the basketball court everyone stands by for easy access and visibility

SOCIAL COST BENEFIT ANALYSIS

STEPS	COSTS	BENEFITS
General Clean Up	Cleaning materials, PPE, workforce, vehicular equipment.	Cleaner river, elimination of majority of visible pathogenic sources, less flooding, community cohesion. Can create a more conducive environment for the bridge construction while simultaneously improving the overall quality of life for residents and promoting environmental sustainability.
Construction of Bridges with Net Catchments	Construction Materials, government permits, construction workforce	By installing a net trap under the bridge, the community can benefit from a convenient and effective method of trash collection, contributing to a cleaner and more sustainable environment while also reducing maintenance costs and potential hazards associated with accumulated waste.
Education and awareness	Venue, organizational planning and equipment	Raise awareness and instill good habits among residents regarding waste management. Additionally, the strategic placement of properly labeled garbage bins throughout the area encourages responsible waste disposal and reduces littering, contributing to a cleaner and more hygienic environment. This campaign can lead to improved waste management practices and a more sustainable community.

PLANNING AND IMPLEMENTATION

To implement the proposed solution effectively, the following steps can be taken:

Phase 1: General Clean-up

Allocation of funds: Identify the required budget for the cleaning materials, and personal Protective equipment (PPE). Secure funds with the Barangay Officials, NGO, and other potential sponsors

Community engagement: Organize a 4 day General Clean up with the residents of Sitio Tangkong and with the collaboration of the Brgy Officials in Barangay Paknaan, Mandaue City, Cebu in Facilitating the General Clean up. Allocating 2 days in cleaning the river and 2 days in cleaning the surrounding area.

Phase 2: Infrastructure Development

Before the infrastructure Development starts, Phase 1 should be done to develop discipline in maintaining the river and the surrounding area clean.

Bridge with net catchment Design: A detailed proposal and blueprint for the construction of bridges with the consultation of engineers and architects to design the bridge. Secure all necessary government permits and documents for the construction of the Bridge. Obtain bids from reputable contractors and suppliers for the construction of the bridge with net catchment.

Net Catchment Installation: Involving the residents of Sitio Tangkong in installing the Steel Catchment to promote ownership and responsibility to the net catchment maintenance.

Phase 3: Waste management campaign

Community Education: Organize community workshops that demonstrate the effective waste segregation and recycling practices. The Facilitator of the community workshop will introduce the Garbage Bin where the Facilitator will demonstrate how to properly dispose of trash to its proper labels.

Garbage Bin Provision: With the collaboration of the Brgy Officials to strategically place an sufficient number of Garbage bins throughout the Sitio Tangkong, this will encourage proper waste disposal and minimizes littering in the Sitio. The trash bins should be labeled properly and designed for easy disposal.

STAKEHOLDERS INVOLVED

The main stakeholders for this project are:

- The community members of Sitio Tangkong are directly involved, they are the key stakeholders in participating in the General Clean-up, maintaining the bridge, the steel trap, and disposing their waste properly
- Government body of the Barangay LGUs themselves must take charge in managing the process, and also working alongside the community, both for regulation and monitoring, safety, and resource management.

The secondary stakeholders:

- City government bodies for further cooperation and smoothening interactions with the barangays involved. They must be able to monitor and review the progress being made, and with their specialized departments, make notes for improvement.

The Tertiary stakeholders:

- Barangay LGUs upstream and outside of the scope of the Butuanon River but also play a part in the dumping of waste into the river, more for advocacy purposes and awareness of the effects of their dumping, to hasten the need for their own tighter regulation on waste dumping
- Corporations and their employees located within the Sitio Tangkong with business premises on site can also use this opportunity to instill goodwill, and work towards environmental friendliness.

OPERATIONS AND MAINTENANCE

1. Conducting a training within the community on proper cleaning techniques, safety procedure, and equipment usage.
2. Equipment Maintenance: A regular inspection and maintenance of the cleaning equipment such as rakes, and Personal Protective Equipment. Repair and replace any damages on the equipments during the inspections to prevent accidents and ensure safety for the residents in cleaning the river
3. Catchment Monitoring: Monitor the Catchment steel traps on a regular basis, clear any debris that is caught in the trap.
4. Waste Management Campaign: Continue conducting the community workshop about waste management to instill discipline in the community about proper waste segregation, recycling practices, and the importance of making the river clean.
5. Garbage bin Maintenance: Install signage and educational materials near the garbage bin to encourage the community about waste disposal, and to ensure that the Garbage bin is regularly emptied, cleaned, and maintained by the community.

BUDGET PROPOSAL

Description		Estimated Unit Quantity	Estimated Amount
Phase 1: General Clean Up			
Full Personal Protective Equipment	A. Safety Boots	₱1,000 per set	₱20,000
	B. Raincoat (Pants and Jacket with hood)		
	C. Rubber Gloves		
	D. Face Mask		
	E. Safety Goggles		
Tools	Trash Pickers	₱150 per set	₱3,000
	Trash Bags		
Phase 2: Construction of Bridge Trap			
Bridge Construction with Steel Net Catchment		₱ 20,000 per sq.m.	₱ 600,000- ₱ 1,000,000
PHASE 3: Waste Management Campaign			
Trash Can 100/120 L (Biodegradable and Non-Biodegradable)		₱ 1,500 per container	₱ 15,000