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WATER RESERVOIR DEVELOPMENT AND MANAGEMENT IN THE 2ND DISTRICT OF ALBAY AS STRATEGIC MINE REHABILITATION INITIATIVES

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ABSTRACT

Mining as a key factor to the global economy by supplying the essential raw materials for the construction, manufacturing, technology, and renewable energy systems. The study evaluated the proposed Water Reservoir Development and Management in the 2nd District of Albay as a strategic mine rehabilitation initiative purposes to give a clean, reliable, and sustainable water supply while enhancing environment and community resilience. The research was conducted in the barangays of Maslog, Lamba, and Puro to assess the existing water sources, evaluate the level of acceptance, and determine the perception and feasibility of the water reservoir development and management as a rehabilitation initiative in response to the increasing water shortage and environmental challenges in the said barangays. A descriptive sequential quantitative-qualitative mixed approach employed using nested survey questionnaires distributed to 593 households. Data were analyzed using the determination of most to least used sources by ranking, Likert Scale, and interpreted by using the IPAIL outline. Findings showed that the natural springs remain as the primary water source, while the alternative sources, such as seepage water and floodwater are minimally utilized. The results revealed that high levels of acceptance in community, social, environment, economic, and institutional, showing that residents understand the proposed water reservoir project as sustainable, beneficial, favorable, and supportive to the long-term community welfare of the three barangays. The project was rated as Highly Acceptable in all Indicators, showing a strong support from both local stakeholders, NGOs, and government agencies. The study concludes that the project is feasible and widely supported. It is recommending that the company should strengthen the community participation, improving technical systems, and enhancing information campaigns and stakeholder's collaboration to ensure successful and sustainable implementation.

KEYWORDS: Water Reservoir Development, Management, Post-Mining Rehabilitation Initiative, Community Acceptance, Social Acceptance, Environmental Acceptance, Economic Acceptance, Institutional Acceptance, Sustainability, 2nd District of Albay.

1.0 INTRODUCTION

Mining remains has a very important role in global economic growth by supplying essential raw materials such as gold, iron, nickel, and other metallic or non-metallic minerals needed for construction, manufacturing, technology, and renewable energy development. Globally, the mining industry supports significantly to the Gross Domestic Product (GDP), employment generation, infrastructure development, and technological advancement, while also supporting public services through government revenues. The most significant contribution of mining is more to economic growth and the creation of jobs. Millions of individuals were directly employed in the mining industry around the world, which in turn supported an extensive network of companies and service providers, ranging from equipment suppliers to transport and logistics providers. In particular, in some resource-rich countries, for example, Australia, Canada, and Chile, the industry provides revenues for the country's economy to support environmental and social programs, healthcare, education, and other public services (World Bank, 2020; International Council on Mining and Metals, 2022). Mining companies usually commit their capital to create infrastructures not only for mining but also for transporting the minerals, including building access roads, railways, and ports, which can predate the company's projects. The said projects often improve local communities' lives by accessing this road as an essential service that could provide better and smoother connectivity to markets, healthcare facilities, and improved transport of goods and farm products.

In ASEAN Region, countries such as Indonesia, Philippines, and Thailand significantly contribute to GDP through mining activities, which also generates employment and supports local economies via suppliers, contractors, and service providers. The industry assists in the regional development through funding infrastructure, social services, and livelihood programs, improving the welfare of the community. Increasingly, ASEAN countries are adopting policies that emphasize responsible and sustainable mining practices to balance economic benefits with environmental protection and social responsibility.

Mining-related activities in the Philippines are governed by the RA 7942, the Philippine Mining Act of 1995. It institutes guidelines and procedures for the exploration works, development stage, utilization, and conservation of the country's mineral resources. It generates domestic revenues and foreign investments while protecting the environment and ensuring the strict implementation of social responsibility by mining companies. Individual/Corporation/Incorporation may enter into agreements with the government, such as an Exploration Permit (EP) and/or Mineral Production Sharing Agreement (MPSA), which allow the private entities to explore and/or operate on private or public lands under specific regulations and conditions. As the main government agency tasked with conserving, managing, developing, and properly utilizing the country's mineral resources, the MGB, which operates under the DENR, oversees compliance with the environmental, safety, social development, and operational standards.

The mining industry in the Philippines also supported the local infrastructure development, construction of access roads, establishment of rural and/or urban schools, and healthcare services, which benefit the affected host and neighboring communities. Further, mineral-rich areas such as nickel, copper, and gold are crucial to the economy, making the Philippines a significant competitor in the international markets. Likewise, the rise in global demand for mineral-rich resources that are used in renewable energy and eco-friendly technology makes the industry well-positioned to help and support the sustainable development goals of the country. Policies that recognize the need for environmental protection and sustainable and responsible mining, emphasizing the consideration of economic impacts, developing social and personal responsibility goals, while maintaining corporate interests (Philippine Extractive Industries Transparency Initiative, 2020).

Mining has been a significant contributor to GDP and the creation of jobs in every region of the country. The contribution of mining to GDP from 2022 – 2025 is 553.2 Billion Pesos with an average percent of contribution to GDP of 0.7975% from the 60 operating mines, and approximately 853,195 jobs were created or employed directly and/or indirectly from mining activities. Likewise, in return, mining communities also support local economy by providing the local demand goods and services, alongside the major income tax contributions to country such as Fees, Charges and Royalties Collected by the national and local government units concerned, amounting to 123,268.4 Million Pesos where taxes typically fund public services and local community development projects (Mines and Geosciences Bureau, 2022-2024).

Mining in Bicol Region remarkably contributes to regional economic development through generating of revenues and payment of taxes, fees, and royalties for the local government units, which support public services such as education, healthcare, and infrastructure. It also serves as a major source of employment in the region, helping reduce poverty and improve living conditions. The industry produced a total of 6.46 million metric tons of minerals, which is amounting to approximately 3.99 million pesos, with a total local worker approximately 2,872 employed for 2024. Additionally, mining companies provide skills training and capacity-building programs that enhance long-term employment. Government collections from mining activities total to 72.53 million pesos, further supporting local development initiatives.

Mining in the Province of Albay, particularly in Legazpi City, contributes significantly to local development through the extraction of non-metallic minerals such as perlite, limestone, and clay, which support construction and infrastructure projects. The industry produced a total of 117,172.82 metric tons of minerals, which is amounting to approximately to 18.1 million pesos in sales and 32.2 million in tax revenues for the national and local government agencies. These revenues help fund the infrastructure, healthcare, and education programs, while mining activities also create employment opportunities within the urban and rural areas. Overall, the mining industry supports economic growth, reduces poverty, and improved livelihoods for the host and neighboring communities.

UBS Marketing Corporation operates under Mineral Production Sharing Agreement (MPSA) No. 186-2002-V issued by the DENR through the MGB Region V, authorizing the extraction of perlite in the Barangays Maslog, Lamba and Puro, Legazpi City, Albay. In 2024, the company produced

15,216.80 metric tons of perlite, generating 5.7 million pesos in sales and 231,000 pesos in taxes remitted to national and local government agencies. Apart from the economic contributions, the company also implements community development initiatives through its Social Development and Management Program (SDMP), including infrastructure improvements, health and education service, and livelihood support projects. As mining operations near closure, the company faces the critical task of developing a sustainable rehabilitation plan that aligns with the regulatory requirements and community expectations.

In conclusion, valuable outcomes in relation to mining on global, regional, national, and local levels provide resources and contribute to the economic development of each country. From Global industry sustainability to funding of LGUs projects in Albay, we may say that mining supports economic stability and social development while regulatory policies promote sustainable practices.

2.0 FRAMEWORK

Integrated Water Resources Management (IWRM) was created evolved decades of conferences by United Nation, expert meetings and institutions, which was placed by 1977 UN Water Conference in Mar del Plata and 1992 Dublin Principles and was promoted globally as Global Water Partnership (GWP) on 1996. It supports the combined planning and management of natural resources such as water, land and other enhance socio-economic welfare and ensure sustainability for future generations (Pahl-Wostl et al., 2021). IWRM developed in response to increasing population pressures, climate change, and the overexploitation of water resources, emphasizing that water must be managed in relation to ecosystems and land use.

The core principle of IWRM is the integrated and coordinated management of water resources across sectors such as agriculture, urban development, and environmental protection. It promotes an equal, efficient, and sustainable water use. In post-mining rehabilitation, IWRM provides a framework for managing water systems that support ecological recovery and community development, such as the proposed water reservoir project of UBS Marketing Corporation in Albay. Stakeholder involvement is the very important element in IWRM, highlighting the participation of the local communities, government agencies, and other stakeholders in decision the making processes (Wang et al., 2020). This participatory approach is particularly important in post-mining areas, where communities are directly affected by environmental changes and resource extraction. It fosters ownership and improves the effectiveness of rehabilitation initiatives.

According to William & Brown (2021) that adaptive management ensures resilience against challenges such as climate variability, water scarcity, and changing local demands. According to the Global Water Partnership (2021) that IWRM highlights the equal and sustainability in water distribution, ensuring that the access is fair and for all, especially vulnerable communities, while maintaining ecosystem integrity.

Sustainable Development Theory was disseminated by Gro Harlem Brundtland during 1987 Brundtland Report, Our Common Future, which describes as meeting the current needs without endangering the future generations. This theory is coming from the principle to satisfy the necessities of the new generation without risking the capability of meeting the needs without

aggravating the future. According to Hak et.al. (2020), this theory was developed to consider all dimensions of human development through an integrated lens that considers the socio-economic, environmental, and cultural factors as we make decisions today, ensuring the sustainability of the future. According to UNESCO (2021) that the theory focuses on the environmental sustainability.

In the concept post-mining rehabilitation such as the proposed water reservoir project of UBS Marketing Corporation in Albay, sustainable development promotes environmental restoration, improved the water quality and availability, and the biodiversity enhancement while addressing environmental degradation. Economically, sustainable development promotes green growth, prioritizing efficiency and low-carbon strategies that enable development without depleting natural resources (Baker et al., 2020). According to UN-Water (2021) and United Nations Development Programme (2022) that social sustainability can be achieved through equal access to resources in terms of water, ensuring that communities actively participate in the decision-making process, ensuring that all members of the community, have fair access to water strengthens acceptance and promotes long-term sustainability. According to Jabareen (2020), by adopting a participatory approach, social capital may develop, facilitating community access to resources, skills development, and exploring governance.

Moreover, adaptive governance is essential for sustainability, allowing policies and strategies to evolve in response to environmental and social changes. According to Pahl-Wostl (2021), for water resource management of post-mining sites, adaptive management provides assurance that the project will remain sustainable despite the insecurity associated with climate, water availability, and population pressures.

Environmental Rehabilitation Theory does not originate from a single theorist but rather evolved as an interdisciplinary framework grounded in the principles of ecology, restoration science and sustainable development. Early contributions is from Aldo Leopold and Ian Mcharg who advanced the concept of the land ethic and emphasized the ecological planning, helped to shape the philosophical foundation of environmental restoration and later introduced by C.S. Holling the resilience and adaptive management, which are essential in addressing environmental degradation under changing while Anthony Bradshaw significantly contributed to the scientific awareness of the ecosystem recovery, particularly in the post-mining areas. This theory includes interventions that attempt to restore the degraded ecosystem and its conditions, signifying that it uses, however not necessarily in its original state, sustainable, and can provide biodiversity and ecosystem services.

According to Hobbs & Harris (2020), in the concept of post-mining rehabilitation, environmental rehabilitation comprises a series of steps aimed at reversing the environmental degradation caused by mining, such as soil erosion, water contamination, and loss of biodiversity. An important aspect of this process involves restoring the soil in terms of contamination, nutrient loss, or compaction, and ensuring it is suitable for agricultural/ecological land use after the cessation of mining. According to Food and Agriculture Organization of the United Nations (2021) and Tibbett (2021) that it is important manage and restore the physical, chemical, and biological properties of soil in order for vegetation to grow and stabilize the land. Effective soil rehabilitation improves

environmental recovery by improving its fertility, microbial activity, and structure, which are very important for sustaining the life of the plants.

A second principle of Environmental Rehabilitation Theory is ecosystem connectivity. Efforts to rehabilitate ecological functions must consider the landscape beyond the isolated patch of degraded land. According to DeFries et al. (2023) that rehabilitation projects should acknowledge the importance of the surrounding landscape bond and ecological integration, which indicates that maintaining this bond within the habitats promotes species movement and sustains biodiversity in a disturbed environment. According to Jordan et al. (2020), effective rehabilitation projects should engage local communities during the planning and execution of rehabilitation.

Overall, Environmental Rehabilitation Theory synthesizes ecological, social, and adaptive aspects of ecosystem restoration that allow landscapes modified by mining to be restored in a sustainable, functional, and equitable manner.

Community-Based Natural Resources Management (CBNRM) Theory does not originate from a single theorist but rather emerged from an interdisciplinary research on a common-pool resources governance. However, the work of Elinor Ostrom, Governing the Commons in 1990 is widely recognized as the foundation, demonstrating that local communities are capable of sustainably managing shared resources through a collective action and was further developed through global development initiatives and scholarly contributions emphasizing decentralization, local participation, and the integration of indigenous intellectual traditions. CBNRM acknowledges that communities, especially the ones that area dependent on the local ecosystems, should take part on a principal decision-making and in the management of the resources.

The fundamental of CBNRM is the idea of decentralized governance, wherein the local communities have the responsibility and combined authority to manage their natural resources. According to Ribot & Larson (2021) that decentralization promotes community participations, enabling the locally to an adaptive decision-making that liked to broader conservation and sustainability outcomes. According to Ingram et. al. (2021) that CBNRM promotes the combination of natural resource management with the local economic needs so that the community understands that there are evident from sustainable practices.

Another important factor of CBNRM is the community empowerment. This is very important because the local people have the ability to access the available resources, skills and authority to make decisions about the natural resource management. According to Matulis & Moyer (2021) and O'Brien et al. (2023) that empowerment includes an idea of providing necessary supports that enable the communities to build social capital, strengthen trust, and improve common outcomes. According to Williams (2021) that as adaptive management is a very important principle within the CBNRM, as it highlights the continuous learning and the ability to adapt management practices in acknowledgement to new information, changing ecological conditions, and participatory community.

Finally, CBNRM is a combined design that pursues to balance the ecological sustainability of the natural resources with the socio-economic welfare of the community.

OBJECTIVES

This study aims to assess the development and management of water reservoir as strategic mining rehabilitation of UBS Marketing Corporation in the 2nd District of Albay. This paper particularly aims to:

1. Determine the profile of the community as regards to water resources:
    a. Households per barangays;
    b. Source of water in the said barangays; and
    c. Other water sources in the community.
2. The challenges encountered by the community in terms of access to:
    a. Potable water; and
    b. Domestic water.
3. Determine the community of level of acceptance to the proposed water reservoir development project as a post-mining rehabilitation initiative, to wit:
    a. Community Acceptance;
    b. Social Acceptance;
    c. Environmental Acceptance;
    d. Economic Acceptance; and
    e. Institutional and Stakeholder Support Acceptance.
4. Proposed Community Management Sustainability Program.

3.0 METHODOLOGY

3.1 Research Design

The study used a descriptive sequential quantitative-qualitative mixed method which combines numerical data and non-numerical data within a single study to deliver a comprehensive, complete understanding of the research problem. This approach used for measuring, testing, and finding patterns. This as it describes the reservoir occurrence in the locality of the research, utilizing both quantitative and qualitative data. A nested mixed-methods research approach that involves gathering and analyzing data at multiple hierarchical levels, where units at a lower level are embedded or "nested" within units at a higher level (National Institute of Standards and Technology (NIST). The framework allows for examination at multiple levels, with three levels of community structure focus: barangay (community-level), household, and individual, to portray a comprehensive depiction of water management practices in the 2nd District of Albay.

The systematic levels of examination allow consideration of how community and household dynamics blend with individual practices and then propose ideas from these observations for strategic action initiatives.

3.2 Research Locale and Respondents

This study was conducted within the vicinity of Albay in the Bicol Region, particularly in Legazpi City where the mining operation is located. It is consisting of three (3) Barangays namely, Maslog, Lamba and Puro. These barangays were selected as the research locale due to their relevance to

water resource management and post-mining rehabilitation. Also, the availability of the data, also the proximity to the location of the researcher are the main components that affected the selection of the study.

Participants were restricted to those eighteen (18) years of age and older. This age restriction was included as part of informed consent to ensure that the individuals are capable of providing their informed consent, and the ability to understand and correctly answer the questions regarding socio-economic impacts and issues of access, availability, and supply of potable and domestic water. Barangay officials and members of the community water management committee provided a broader community view of the policies and infrastructure for community water management, whereas household respondents demonstrate a range of individuals' socio-economic status and domestic water-use behaviors. Individual respondents were selected to provide representation of household roles and demographic characteristics, which would help develop a degree of understanding of water use practices at all levels of the community.

Figure 1

Respondents of the Study

Barangay	Total Household	Sample Size (e = 5% level)
Lamba	419	210
Maslog	1,539	308
Puro	1,355	339

3.3 Research Instrument

The research instrument used in this study was carefully developed and validated to ensure its relevance, clarity, and reliability. The instrument was made based on the study's conceptual paradigm on water resource management, environmental rehabilitation, and community-based approaches, ensuring alignment with the research objectives. The questionnaire was reviewed by the panel of experts in environmental management, research methodology, and local governance to establish content validity. a pilot test was conducted among a group of respondents who shared similar characteristics with the target population. This process helped identify issues related to doubt, comprehension, and response formats. The results of the testing informed further the enhancement of the instrument. This step-by-step validation process shows the principles of Mixed Methods Research, wherein qualitative procedures guide the development and enhancement of the instrument, followed by the quantitative methods to establish its reliability. A Likert scale was utilized to measure perception of the respondents of the water reservoir project, ranging from 1 to 4, where 4 indicates highly acceptable and 1 indicates not acceptable.

4.0 RESULT AND DISCUSSION

4.1 Profile of the Community as Regards to the Water Resources

a. Households per Barangay

Table 1

Profile of the Community as Regards to Number of Households Per Barangay

BARANGAYS	TARGET HOUSEHOLD TO BE SURVEYED	ACTUAL HOUSEHOLD SURVEYED
Maslog	308	308
Lamba	210	210
Puro	339	75

Table 1 presents the total number of households initially targeted for data collection, which the Maslog and Lamba were accomplished accordingly and the number successfully surveyed for each barangay is included in the study. The data gathered were from the community surveys validated through the official barangay local government units' and the company records. However, in Puro, the targeted were not attained due to community's negative interventions towards the mining. The data showed a discrepancy in accomplishing the survey questionnaire in the three (3) barangays subject to the study. The targeted household to be surveyed in Barangays Maslog and Lamba achieved a 100% survey coverage, with all targeted households successfully surveyed, which indicates in full participation from the community and a complete dataset for both barangays. However, the targets for Puro were not accomplished in the actual survey, and there was a significant gap between the target and the actual surveyed households. This shows that 22% of the intended respondents were reached. The discrepancy proposes possible challenges in data collection are due to several respondents refusing to provide their perception on the provided questionnaires. Some of the reasons why they did not provide their comments on the said project were that they don't want to get involved in the issue arising concerning mining-related activity/ies, some are not knowledgeable of the said mining operation, and some already have a stable water supply through the distribution from the Water District.

According to Akhmouch & Clavreul (2021) and UNESCO (2023) that understanding the community profile in relation to the water resources is a very important aspect in effective water management, as it enlightens decision making, promotes sustainability, and ensure equal distribution of resources. Assessing local water use arrangements, socio-economic conditions, and community needs allows more flexible and integrated management strategies. According to Jones and Taylor (2020), these profiles are most likely emphasizing the main challenges that the households encountered, including but not limited to uneven distribution, poor water quality, and over extraction and/or over-pumping of the groundwater. This profile is very important in a region experiencing severe water shortages. Likewise, in the essence of post-mining rehabilitation initiatives, according to the World Bank (2020), this tool is essential in the planning and development stage, wherein a mined-out area converts into a useful and sustainable water reservoir, which requires a comprehensive analysis of the area's hydrology, soil conditions, environmental considerations, and ecological factors.

b. Source of water in the said barangays

Table 2

Profile of the Community as Regards to the Source of Water

PARAMETER/S	Maslog	Lamba	Puro	Total	Ranking
Natural Springs in upland or mountainous areas.	267	174	16	457	**1**
Rainwater harvesting through drums, tanks, or other storage systems during rainy season and filtering to use as potable and/or domestic water.	191	96	33	320	**2**
Bottled water (Absolute, Wilkins, Purified Water, etc.)	135	47	23	205	3
Groundwater wells through hand pumps or electric pumps.	150	26	24	200	**4**
Community water refilling stations that purify water to provide an accessible and safe drinking water source.	88	21	44	153	**5**
Water deliveries (via trucks) by the private company/ies or government agency/ies.	91	18	23	132	**6**
Assistance from the private and/or government agencies as part of their work programs/plans and social responsibilities for engaging business ventures in the barangay.	90	25	16	131	**7**
Traditional methods where bamboo is used to collect and transport water from springs or streams.	28	0	5	33	**8**
Rivers and streams through irrigation system	25	0	0	25	**9**
Public or Government Water System via Legazpi City Water District (LCWD), Prime Water, etc.	0	0	2	2	**10**

Table 2 presents the arrangement of the primary water sources among the households in the said barangays. Based on the survey responses, the highest-ranked source or the most sources of water is the natural spring, with a total of 457 responses while the lowest-ranked source or least source of water is the public or government water system with a total of 2 households.

The data show that the natural springs are the major or the highest-ranked water source in all the barangays, especially in Maslog with 267 responses, which are geographically speaking, the said

barangays are located in upland or mountainous areas. The continued dependence of the households on the spring emphasizes both accessibility of the said sources and the limited presence of proper water distribution systems.

According to Garcia et.al. (2022) that community involvement or participation is very important in the creation of the profile because it reflect the actual conditions and meet the current needs of the marginalized groups or the community. The households from Lamba stated that "Kami sir digdi sa arong namo, ang source kang tubig namo ay ali sa mga bubon lalo duman sir sa may palaog kang samong barangay. Duman kadaklan samo na mga residente nagakuwa tubig pang inom buda pangkarigos, panglaba, at iba pa". [Here in our house, the source of water came from the deepwell located at the entrance going to the barangay]. "Ang pinakamain na source namin na tubig sir ay yung burabod diyan sir sa bungad/palaog sa barangay mi buda su bubon sa upper portion kang Barangay Lamba ang problema arayo sa sentro at na sa upper na buda limitado lang tapos masarok pa bago makakuwa tubig bakong arog didi sa bungad arani na lang sa sentro. Iyan na main source na tubig na tigkukuwaan kang mga residente ay aluyon na po iyan na panahon. Siguro mga 100 years na. Araki pa kami or warara pa gayod kami, yaon na po iyan sir. Puon pa kang mga gurangan samuya. Wara pa ngani po kami sir yaon na iyan na burabod na yan." [The households confirmed that the source of their primary and alternative water came from the groundwater/deep well located near the entrance going the proper of the barangay]. The Barangay Officials of Maslog stated that "Iyan na din sir na respondents ang nagagamit kang tubig." [The Barangay Captain and the Barangay Councilor stated that the presented respondent is indeed dependent on the water source in the barangay].

c. Other water sources in the community

Table 3

Profile of the Community as Regards to Other Source of Water

PARAMETER/S	MASLOG	LAMBA	PURO	Total	Ranking
Seepage water from soil or riverbanks	10	14	0	24	**1**
Floodwater collection and treated for specific use only.	7	8	0	15	**2**
Use of saltwater wells (brackish water) for non-potable purposes.	4	1	0	5	**3**
Reservoir built on abandoned mining site.	2	0	0	2	**4**
Water extracted from banana trees or other trees with high water content.	1	0	0	1	**5**
Factories or industrial plants share excess water with the community.	0	0	0	0	-
Hot springs primarily for bathing purposes.	0	0	0	0	-
Using nets or other materials to collect water from fog or dew	0	0	0	0	-
Collect water from the natural pools in tree hollows or rock formations.	0	0	0	0	-
Water from waterfalls that was diverted to the community for agricultural and household use.	0	0	0	0	-

Based on Table 3, the most commonly used other water source in the three (3) barangays is the seepage water from soil or riverbanks, which ranked first with a total of 24 responses, followed by the floodwater collection treated for specific use only with a total of 15 responses. The sharing of the responses shows that Maslog and Lamba reported with greater reliance on these alternative sources compared to Puro, showing varying levels of water availability and access among the communities. The highest-ranked alternative water source is seepage water, with a total of 24 households, primarily from Barangay Maslog with 10 households and Lamba with 14 households. This reveals that the residents are resorting to shallow ground and filtered the water when other

sources are limited and unreliable. The occurrence of seepage water as the highest-ranked alternative water source emphasizes the communities' reliance on the nature-driven and easily available groundwater during shortages. This may show that lacking access to reliable communal or piped supply, urging the households to tap into vulnerable and potentially unsafe water sources.

According to Hejase et.al. (2020) that implementing controlled drainage systems will appropriately manage the water table and improve the yield and reduce the nutrient runoff in the common practice in the areas close to water surfaces or places with notable groundwater at or near the surface. The Barangay Captain and the Councilors in Lamba stated that "Ang alternative na tubig namin sir ay ang mga water refilling stations na naglalaog digdi na ali luwas kang barangay at itong main source namin sir iyo na din tiggagamit na alternate water sources na tigagamit sa paghugas, pagglaba, pangkarigos at iba pa. Sa katunayan ngani sir, ang maslog, Camilla Subdivision buda mga tagaDaraga ay diyan sa may burabod kang Barangay Lamba nagasarok buda tigpapabakal sa iba." [The Barangay Captain and the Barangay Councilors stated that the alternative water in the barangay is the water refilling stations outside the barangay, and stated main source. They confirmed that the alternative water sources are utilized for washing of food plates and clothes, for bathing, and other purposes. They also confirmed that the Camilla Subdivision and some of the residents of the Municipality of Daraga gathered water in the water system of Barangay Lamba and sell it to different entity/ties].

4.2 The challenges encountered by the community

a. Potable Water

Table 4

Challenges Encountered Per Barangay in Terms of Access to Potable Water

PARAMETER/S	MASLOG	LAMBA	PURO	TOTAL	RANKING
Water sources like rivers and rainwater are unreliable specially during dry seasons or droughts.	211	109	60	380	1
Typhoons, floods, and landslides destroyed the water sources or contaminate them with debris and waste.	176	116	25	317	2
Absence of water supply systems like pipelines, pumps, and/or filtration facilities.	180	105	29	314	3
Lack of sufficient funds or program by National Government Agencies and/or Local Government Units (LGU) to develop sustainable water systems.	138	61	11	210	4
Forest loss reduces natural water retention, leading to the drying of the springs and rivers.	133	65	7	205	5
Remote areas often lack access to nearby water sources due to rugged terrain and long distances.	149	26	23	198	6
Poor water quality as water from wells, ponds, and rivers is often contaminated and many households do not treat their water properly.	89	67	1	157	7
Conflict over shared water resources (e.g. well or irrigation canals) in the barangay-level specially during dry season or droughts.	79	12	41	132	8
Infrastructure like hand pumps, pipes, and tanks deteriorates because of poor maintenance and lack of funds.	21	23	4	48	9
Industrial effluents or mining runoff contaminate nearby water sources.	26	1	19	46	10
Informal settlements near the water sources such as rivers, streams, springs, etc., contribute water pollution through improper waste disposal.	23	12	1	36	11
Excessive pumping or over-extraction of groundwater due to over population that leads to the drop of water tables, making water harder to access.	21	7	3	31	12
Unregulated tapping into water systems reduces pressure and availability for legitimate users.	21	4	5	30	13
Water is often polluted by the agricultural runoff such as pesticides and fertilizers, waste disposal or industrial discharge, making it unsafe for consumption.	1	12	1	14	14
Inconsistent water pressure damages pipes, leading to inefficiencies.	2	3	0	5	15

Table 4 delineates these challenges and their rate of recurrence in the three barangays, suggesting a broad perception of the factors that hinder the water supply in the said barangays. The result show that the most commonly encountered challenges are the unreliability of water sources such as rainwater during dry seasons or droughts, rated with a total of 380 responses while the slighest experienced challenges are the unregulated tapping into water systems rated with a total 30 responses, agricultural runoff pollution with 14 responses and the inconsistent water pressure with 5

responses. Likewise, typhoons, floods, and landslides, damage or contaminate water sources, rated with 317 responses, followed by the absence of water supply systems, such as pipelines, pumps, and filtration facilities, with 314 responses. These findings reveal strong patterns of environmental resistance and infrastructural deficiency in the communities in the said barangays. The highest-ranked challenges show the communities' heavily dependent on rivers, streams and rainfall as their primary sources for potable water. These sources reduce significantly, making the water supply persistent risk, especially in Maslog and Lamba.

According to UNESCO (2023) and UN-Water (2021) that climate change and increasing of demand of water resouces are the major problem of global water shortage, which pose significant risks to human populations, animals and ecosystems. Rising of temperatures, altered precipitation, and population growth are expected to intensify water stress worldwide, potentially affecting billions of people by year 2050. The households from Lamba stated that "Ang problema lang samo sir ay ang tubig sa tigaarokan ming tubig duman baga sir sa may palaog kang Lamba lalo na pagmauranon ay minalabugon buda maation sir bata iyo na din baga sir ang tigpapang-inom mi buda pangkarigos, panglaba, at kung manlain-laing mga panggagamitan sa arong nangangaipo ki tubig sir." [The households disclosed that the only problem for access to water, especially during the rainy season, is the murky and silted water quality in the deep wells located near the entrance going to Lamba, which they used for drinking, washing clothes, and other purposes needed in their house chores]. The Barangay Officials from Lamba confirmed that "Wara man sinda na encountered na problema manungod sa potable water. Uning mga burabod sir ay drinking water na din kang mga resident kang barangay. Actually, ngani po sir, nagdidi su UST tigpawater sampling ninda ang resulta okay man po siya. Didi sa water system sir, may nailing lang sinda diit na problema, ay yung takla sir." [The Barangay Officials confirmed that they have no issues/problems encountered in regards to potable water. Besides, these water systems serve as drinking water for the residents of Barangay Lamba. Actually, the University of Santo Thomas takes some samples of these water systems, and the results pass the standard for drinking. In these water systems, only the siltation in the water is a minor issue for the community]. The Barangay Officials from Maslog stated that "So far wara pa man. Dae ko lang aram sa ibang farland and sa ibang sitio's na dae tig-aabot kang delivery su mga refilling stations. Baka sa distance siguro like su transport kang potable water kasi halos kadaklan digdi sa maslog, ang potable water ninda na tiggagamit ay ali na sa water refilling. So ang nagiging challenge na lang duman ay duman sa mga ararayo. Su mga dae naabot. Dae ko aram kung ano mga tiggigibo ninda pero sailing ko sa iba lalo na su mga gilid ki dagat na dae man ki kuyan talaga, nagapractice sinda kang mga pakalakaga na style." [The representative of UBS Marketing Corp., disclosed that they will gather again sample for laboratory analysis to finally confirm if the coliform is still very high. The said result of the laboratory analysis will be forwarded to the barangay to notify the community, especially the one collecting near the dike or flood control, that the water in the said site is not suitable for drinking; however, it may be considered for domestic purposes only].

b. Domestic Water

Table 5

Challenges Encountered Per Barangay in Terms of Access to Domestic Water

PARAMETER/S	MASLOG	LAMBA	PURO	TOTAL	RANKING
Prolonged dry seasons and/or droughts, and rising of weather temperatures reduce water availability from the rivers, wells, and rain-fed sources.	269	158	63	490	**1**
Insufficient involvement of locals in planning and maintaining water projects.	75	26	16	194	**2**
Disputes arise between the households over limited water sources.	59	30	9	98	**3**
Transporting water to remote areas is expensive and often unsustainable.	64	4	15	83	**4**
Lack of adequate tanks or reservoirs leads to supply interruptions during peak season.	57	12	4	73	**5**
Remote areas struggle to find trained personnel to operate, maintain or repair water systems.	38	4	1	43	**6**
Mismanagement in distribution of water.	17	7	6	30	**7**
Households resort to costly water refilling stations.	19	10	0	29	**8**
Pumping systems are often hindered by inconsistent electricity.	27	0	0	27	**9**
Piped systems often provide water only a few hours per day or week.	26	0	1	27	**9**
Water prices dramatically rising specially during dry seasons, making it unaffordable for many.	8	4	14	26	**10**
Most systems lack modern tools to identify and repair leaks immediately.	17	8	0	25	**11**
Landless families often limited or no rights to water sources on private property.	18	6	0	24	**12**
Small communities struggle to secure funding for water systems.	5	9	1	15	**13**
Expanding towns and cities often divert water resources, leaving rural areas underserved.	4	1	1	6	**14**

Table 5 indicates that the identified issues associated with domestic water, emphasizing environmental obligations, community involvement, limited presence of infrastructure for water supply, and socio-economic concerns. The highest-ranked challenges that the community encountered is the reduction of water accessibility during the prolonged dry seasons, droughts, and rising temperatures, with a total of 490 responses. The highest-ranked challenges show that the

climate factors strong affected the domestic water supply of the communities such as prolonged dry seasons considerably lower the water levels in the wells, rivers, rain fed sources, making these sources insufficient for daily domestics needs. This high responses in the three barangays, especially in Maslog and Lamba indicates extensive reliance on the climate-sensitive water sources.

According to Magwilang et.al. (2023) that areas with lesser access to the groundwater reserves and expose from high to extreme weather phenomena are at greater risk of experiencing intense water shortage, which aligns with the findings in Maslog, Lamba and Puro, where respondents reported increase in terms of difficulties in accessing or securing enough water supply due the drought or prolong dry season. The Barangay Captain and Councilors of Lamba stated that "Same lang kang potable water sir, wara din masyado problema. Nagkakaproblema lang talaga pagmauran at naglalapok ang tubig." [The Punong Barangay in Maslog confirmed that the Potable and Domestic/Household Waters are used for the same purposes by the community].

4.3 Level of Acceptance of the Water Reservoir Development Project as a Post-Mining Rehabilitation Initiative

a. Community Acceptance

Table 6

Community Acceptance

Indicators	Maslog		Lamba		Puro		Total Weighted Mean	Interpretation
	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation		
1. The project will provide the community with a reliable, clean water supply, improving daily living conditions and overall well-being.	3.94	Highly Acceptable	3.87	Highly Acceptable	3.79	Highly Acceptable	**3.87**	Highly Acceptable
2. By increasing access to water and addressing environmental concerns, the project will make the community more resilient to future challenges, such as droughts and floods, fostering a sense of security.	3.91	Highly Acceptable	3.90	Highly Acceptable	3.80	Highly Acceptable	**3.87**	Highly Acceptable
3. As a successful example, the water reservoir project can serve as a model for future development projects in the area, encouraging a more collaborative approach to community-based initiatives.	3.91	Highly Acceptable	3.88	Highly Acceptable	3.80	Highly Acceptable	**3.86**	Highly Acceptable
4. The community will be involved in important decisions, ensuring that everyone's opinions are heard and respected during the project's planning and implementation.	3.91	Highly Acceptable	3.86	Highly Acceptable	3.79	Highly Acceptable	**3.85**	Highly Acceptable

Table 6 presents the level of acceptance in the community in the three (3) barangays of Maslog, Lamba, and Puro, Legazpi City, Albay. All indicators attained weighted means ranging from 3.85 to 3.87, all interpreted as Highly Acceptable. The highest-ranked indicator is the Maslog with weighted means of 3.94, emphasizing that the project will provide a stable, reliable and clean water supply to the community. The overall average weighted means is 3.86, which is interpreted as Highly Acceptable, for all indicators falls from 3.85 to 3.87; responses were consistently positive, which shows strong and extensive support from the community for the proposed project.

According to Li et.al. (2021), residents likely support any infrastructure-related projects that have a direct impact, particularly in education, health, sanitation, and practical needs that will benefit them. The households from Lamba stated that "Ang samuya na nailing na magayon na benipisyo po kaini ay kaming mga residente digdi sa Lamba ay matatawan ki maray and malinig na patubig na

pinakatigaproblema digdi sa samong barangay." [The households stated that the perception of the residents of Barangay Lamba on the proposed project will give them enough/stable, and clean supply of water, which is the primary problem of the said barangay]. Community members living in the area see this project as a project that will surely address and greatly benefits the current problems from "no water" to "having water", that will positively impact their daily living.

b. Social Acceptance

Table 7

Social Acceptance

Indicators	Maslog		Lamba		Puro		Total Weighted Mean	Interpretation
	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation		
1. By ensuring that everyone's needs are addressed and creating equal access to benefits, the project will help reduce tensions and conflicts within the community.	3.93	Highly Acceptable	3.88	Highly Acceptable	3.80	Highly Acceptable	**3.87**	Highly Acceptable
2. The project will consider the community's culture and values, ensuring that it fits well with the way of life in the area.	3.91	Highly Acceptable	3.88	Highly Acceptable	3.80	Acceptable	**3.86**	Highly Acceptable
3. The project can include educational programs that teach community members about water conservation, environmental protection, and sustainable development, empowering them with valuable knowledge.	3.91	Highly Acceptable	3.87	Highly Acceptable	3.77	Highly Acceptable	**3.85**	Highly Acceptable
4. The availability of clean water will encourage healthier habits, such as drinking water instead of sugary drinks, and improved hygiene practices, contributing to a healthier population	3.93	Highly Acceptable	3.91	Highly Acceptable	3.79	Highly Acceptable	**3.88**	Highly Acceptable

The Table 7 reveals that the three (3) barangays, the Lamba, Maslog and Puro, Legazpi City scored each indicator as Highly Acceptable, showing that the project is socially aligned with the

community's value, practices and objectives. Based on the outcomes, the highest average weighted mean is 3.88, the availability of clean water will encourage healthier habits which observed in the Indicators 1 and 4, both interprets as Highly Acceptable. The overall average weighted mean is 3.87, which is interpreted as Highly Acceptable, for all indicators falls from 3.85 to 3.87; responses were consistently positive, which shows strong and extensive support from the community for the proposed project. These concentrate on reducing tensions and promoting healthy way of life. According to Suleiman et.al. (2021) that equal distribution of the water resources is very important as in most cases it minimizes the possible or potential conflict between households. Likewise, according Garcia et.al. (2021) that the availability of the drinking water in a low-resources area is suggested to have a lower chance of disease occurrence and a healthy way of living. The Barangay Captain and Councilors of Maslog disclosed that "Bale po sir. Duman po baga kami sir sa may Pinagbidayan. So far talaga, nangangaipuhan talaga kaming tubig duman. As of this time UBS, pagdae kaming tubig duman mga malibong ang payo haha. Pero grabe ang pasalamat mi at kami na lang din ang nag-aadjust na magbanga banga kang tubig kasi nangangaipo talaga kami ki maray pag may okasyon. Tapos si sir, representative of UBS, pag naglaog kami sa UBS, matext lang na pag may okasyon na sir mahagad tabi kami tubig, uruurada nagpapaarok/nagpapadeliver kang tubig." [The Barangay Councilors mentioned that in the area of Pinagbidayan, the residents in that area are in badly need of water. There is a time when the company is unable to deliver or supply water, and the residents sometimes become hard-headed. However, despite the unstable water supply of the company, they are still thankful, and among them, they have already adjusted by distributing the water equal to the needs of the residents living in the area. Likewise, when there is never an occasion or event in the barangay that we need water, the company immediately acts on our request by delivering the water supply using a water truck]. The Barangay Officials of Lamba confirmed that "Kung sa iilingon sir, maugma kami sa proyekto. Ta mas dakulaon ang benepisyo ta ang tubig baga number 1 namo kaipuhan/tigagamit. Sympre po baga sir, sa urualdaw iyo ang pangangaipo ta tapos su nag-aarok ki arayo, mabawasan su oras niya sa pag-arok, su paggamit kang gasoline sa motor mababawasan ang paggamit, pagbalik balik pagarok ta pira man sana ang capacity kang drum na dara sa pag-arok. Mababawasan ang expense, effort buda oras na dapat nagagamit sa dapat paggamitan." [From the point of view, the barangay is very thankful for the project, considering that water is the primary need of the community. This project will lessen the time that they will consume only in gathering water from the deep well far from their respective houses, and the use of gasoline in their motor vehicles just to fetch water back in forth due to the limited capacity of the galloons that they can carry. Also, this project will minimize expenses, efforts, and time which they can use in the very important events]. The Regional Director of the MGB RO V disclosed that the researcher should just focus on the sustainability of the proposed water reservoir project, considering that the community as a whole claimed that there is no sustainability in mining.

c. Environmental Acceptance

Table 8

Indicators	Maslog		Lamba		Puro		Total Weighted Mean	Interpretation
	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation		
1. The project will ensure that water quality is maintained through proper filtration and treatment systems, addressing concerns about contamination and ensuring the water remains safe for both consumption and the environment.	3.93	Highly Acceptable	3.94	Highly Acceptable	3.79	Highly Acceptable	3.89	Highly Acceptable
2. The project will include measures to restore and preserve local ecosystems, such as replanting native vegetation and protecting water sources, improving biodiversity and providing a healthier environment for wildlife.	3.91	Highly Acceptable	3.97	Highly Acceptable	3.79	Highly Acceptable	3.89	Highly Acceptable
3. Clear communication and involvement of local stakeholders in the planning and monitoring processes will build trust in the project's environmental goals, reassuring them that their concerns are taken seriously and that the project aligns with sustainability objectives.	3.94	Highly Acceptable	4.02	Highly Acceptable	3.77	Highly Acceptable	3.91	Highly Acceptable
4. Ongoing monitoring of water quality, wildlife, and ecosystem health will ensure that the project meets environmental standards and that any negative impacts are identified and addressed early, ensuring sustainability for future generations.	3.93	Highly Acceptable	3.98	Highly Acceptable	3.79	Highly Acceptable	3.90	Highly Acceptable

The Table 8 reveals that the three (3) barangays, the Lamba, Maslog and Puro, Legazpi City scored each indicator as Highly Acceptable, showing that the project is environmentally aligned with the community's value, practices and objectives. Based on the outcomes, the highest average weighted mean is 3.91, clear communication and involvement of local stakeholders in the planning and monitoring processes will build trust in the project's environmental goals which interprets as Highly Acceptable.

According to Dizon et.al. (2022) that when technical information is not duly communicated in an accessible way or in a straightforward manner, the residents tends to disengage or withdraw their support on such initiatives. The households of Maslog confirmed that "Kaming residente digdi sir

sa Maslog gusto man uning patubig sir na ali sa kumpanya ta kaipuhang maray sir kang kumunidad uning tubig." [The households confirmed that they are willing to participate since this proposed water distribution of the company is very important in the community]. The household of Lamba confirmed that "Willing man kami sir mag-iba sa mga pameeting kang kumpanya at kang barangay manungod diyan sir sa patubig na ali sa tigmiminahan." [The households confirmed that they are willing to participate in the public meeting that will be conducted by the company and the barangay in regards to the proposed water reservoir project as the post-land use of the mining operation].

d. Economic Acceptance

Table 9

Economic Acceptance

Indicators	Maslog		Lamba		Puro		Average Weighted Mean	Interpretation
	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation		
1. The development and operation of the water reservoir will create new job opportunities in construction, maintenance, and related industries, providing a boost to the local economy.	3.94	Highly Acceptable	3.98	Highly Acceptable	3.84	Highly Acceptable	**3.92**	Highly Acceptable
2. The project will stimulate local businesses by creating demand for goods and services during construction and operation, such as food, transportation, and materials.	3.96	Highly Acceptable	3.99	Highly Acceptable	3.80	Highly Acceptable	**3.92**	Highly Acceptable
3. By ensuring a sustainable water supply, the project will promote long-term economic stability, reducing the risks of water shortages that could disrupt local industries and livelihoods.	3.97	Highly Acceptable	3.99	Highly Acceptable	3.80	Highly Acceptable	**3.92**	Highly Acceptable
4. The improved infrastructure and amenities brought by the water reservoir project can increase property values, benefiting homeowners and encouraging further investments in the area.	3.96	Highly Acceptable	3.98	Highly Acceptable	3.80	Highly Acceptable	**3.91**	Highly Acceptable

Table 9 reveals that the three (3) barangays, the Lamba, Maslog and Puro, Legazpi City scored each indicator as Highly Acceptable, showing that the project is economically aligned with the community's value, practices and objectives. Based on the outcomes, the highest weighted mean is 3.92, which observed in the indicators 1, 2 and 3, the development and operation will create new job opportunities, the project will stimulate local businesses, and the project will promote long-term economic stability which interprets as Highly Acceptable.

According to Garcia-Lopez et al. (2022) that communities often gave importance to a water infrastructure mostly for its continuing economic benefits, especially its role in reducing the risk of water shortage, rather than for short-term employment benefits. The Barangay Captain and the Councilors confirmed that "Tapos ako talaga may nailing kanina about sir, the researcher, sa pag-explain mo na makakatabang samo cultural and tourism lalo na sa Maslog. Na sana sa pag-abot kang time sir nailing ko kaya na siyempre tigapromote mi po baga su kasulog festival adi and as part kang sa history kang Maslog ay tubig talaga and na maging eco-tourism talaga na magkaigwa na parang part siya na yaon na duman su water reservoir project as tourist attraction." [The Barangay Officials confirmed that they observed in the presentation of the researcher that this project will improve the cultural activities and tourism industry, especially in Maslog. When the time comes, this project will promote the Kasulog festival, and as part of the history, why the barangay is named Maslog due to the presence of water (Ma-su-log) in the area, and the water reservoir site will act as an additional tourist attraction of the barangay].

e. Institutional and Stakeholders Support Acceptance

Table 10

Institutional and Stakeholder Support Acceptance

Indicators	Maslog		Lamba		Puro		Average Weighted Mean	Interpretation
	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation	Weighted Mean	Adjectival Interpretation		
1. The project will receive support from both local and national government agencies, which will help ensure proper funding, resources, and legal backing, making the development process smoother and more efficient.	3.96	Highly Acceptable	3.98	Highly Acceptable	3.80	Highly Acceptable	3.91	Highly Acceptable
2. Active participation from local government agencies will lead to the improvement of community infrastructure, such as better roads, health facilities, and educational resources, benefiting residents in the long term.	3.96	Highly Acceptable	3.98	Highly Acceptable	3.80	Highly Acceptable	3.91	Highly Acceptable
3. Non-Governmental Organizations (NGOs) with expertise in environmental conservation, community development, and sustainability will actively participate in the project, providing valuable knowledge and ensuring the project's impact is positive and effective.	3.95	Highly Acceptable	3.90	Highly Acceptable	3.80	Highly Acceptable	3.88	Highly Acceptable
4. Active involvement from both government and NGOs will ensure that decisions made during the planning and implementation phases are well-informed, inclusive, and consider all stakeholder needs, fostering transparency and trust in the project.	3.95	Highly Acceptable	3.98	Highly Acceptable	3.80	Highly Acceptable	3.91	Highly Acceptable

As presented in the Table 10, the three barangays of Maslog, Lamba and Puro rated consistently in all indicators as Highly Acceptable showing that a strong institutional trust and support for the proposed water reservoir project. The overall results is 3.90, which is interpreted as Highly Acceptable, for all indicators fall from 3.88 to 3.91; responses were consistently positive, which shows strong and extensive support from the community for the proposed project, and highlights the insignificant difference in ratings, showing uniform confidence in the support of the LGUs, NGAs and NGOs in the implementation of the project.

According to Adjei et al. (2022), effective involvement of the stakeholders, including civil society organizations, promotes transparency, improves completeness, and ensures that the decisions for the project consider the needs of different groups. The Barangay Captain and the Councilors stated that "Overall sir okay ang community at ang barangay ay 100% approve and willing maging parte kang nasabing projects kang UBS Marketing Corp." [The barangay confirmed that the community and the barangay have 100 percent approval, trust and willingness to participate to the project of UBS Marketing Corp]. The Regional Director of MGB RO V disclosed that they confirmed that MGB ROV is willing to assist the company by means of aiding using the available equipment for determining the level of groundwater in the barangay to be used in the water reservoir project as post-rehabilitation initiatives.

4.4 Community Management Sustainability Program

The Community Management Sustainability Program (CMSP) is a structured framework that ensures the long-term planning, implementation, operation, and maintenance of the water reservoir project through active community participation (Aashiq, 2020). It integrates social, environmental, economic, and institutional components to sustain project benefits beyond its development phase.

Based on the study findings, the CMSP was developed in response to the community's reliance on natural water sources and varying levels of awareness and participation in water management initiatives. It aims to address gaps in water access, governance, environmental protection, and stakeholder coordination.

The program includes capacity-building activities, formation of community-based management committees, water conservation practices, financial sustainability mechanisms, and continuous monitoring and evaluation. Overall, the CMSP promotes community ownership, strengthens local governance, and ensures the long-term sustainability of the post-mining water reservoir project.

5.0 CONCLUSION

The study found that communities in Maslog, Lamba, and Puro mainly rely on natural springs and rainwater, which are highly vulnerable to climate change and become insufficient during droughts and extreme weather. Government water systems are largely unavailable in the site, which led to persistent problems on access to water and highlighting the need for a sustainable solution such as the proposed water reservoir for reliable supply and environmental rehabilitation.

The Water Reservoir Development Project of UBS Marketing Corp., was scored Highly Acceptable in all aspects of community, social, environmental, economic, and institutional and stakeholders support. It is seen as a feasible post-mining rehabilitation initiative that can improve water supply, climate resilience, public health, environmental restoration, and local economic opportunities. However, the Barangay of Puro revealed slight acceptance showing that said barangay the needs for stronger information and communication efforts.

Barangay officials confirmed that water scarcity is a major issue and expressed strong support for the project, while also raising concerns about water quality, costs, and long-term management. The barangay officials and local communities highlighted how important for them the transparency,

technical guidance, and participation. MGB RO V also supported the project, stressing inter-agency collaboration and community involvement as essential for its long-term sustainability.

6.0 RECOMMENDATION

The study recommends that the proposed project should be equipped with an infrastructure material such as durable or stable water pipelines and purification systems, household rainwater harvesting, runoff monitoring, watershed rehabilitation, and climate-resilient management practices. Active community involvement, conduct of technical trainings, and adoption of an advanced water quality monitoring systems are very important for effective implementation, together with a strong policy and government support to ensure sustainability and avoid conflicts. The project may can also be strengthened through a Community Management Sustainability Program (CMSP) to improve perception and acceptance, water supply reliability, and socio-economic and environmental benefits.

UBS Marketing Corporation is encouraged to strengthen their information, education, and communication campaigns with the local communities to improve public understanding of environmental protection, ensure transparency in employment and resource distribution, and strengthen collaboration among communities, LGUs, NGAs, and NGOs to promote equal, trust and confidence, and long-term sustainability of the project.

Finally, the project should implement a regular water quality monitoring system and establish a trained barangay-level management group or cooperative to oversee/supervise operations. Coordination with concerned water authorities and government agencies is necessary for the regulatory compliance and effective management, including a clear turnover plan for long-term sustainability. Further, it also recommends to include promoting eco-tourism, job creation, equitable water distribution, reforestation, and integrated institutional collaboration to ensure environmental protection and sustainable development in the 2nd District of Albay.

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