

# Challenges and recommendations for long-term rehabilitation of Boac River, Marinduque, Philippines, 20 years after the Marcopper mining disaster



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Date Received: 27 July 2023  
Date Revised: 06 December 2023  
Date Accepted: 15 December 2023

## Abstract

For more than twenty years, the province of Marinduque has felt the negative effects brought about by the previous mining operations of the Marcopper Mining Corporation (MMC) and the 1996 Marcopper mining disaster that contaminated the Boac River system. The 1996 Marcopper mining disaster was the most significant in the chain of events that transpired with MMC's operation on the island. Eleven mining and environmental-related policies were examined, exhibiting both critical juncture and path dependence, which could be associated with the mining disasters in Marinduque. The identified challenges in the study were grouped into three main areas: environment, health, and governance — all of which impede the long-term rehabilitation of the Boac River. From the identified challenges, problem-fit programs and policy reform recommendations were formulated that could be utilized in future policy and program creations or revisions. This study assessed the challenges related to the policies and prospects for the long-term rehabilitation of the Boac River with the 1996 Marcopper mining disaster that could serve as a reference for future mining policy reform mechanisms.

## Keywords

*Marcopper, mining, mining disaster, policy analysis, causal loop diagram*

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## 1. Introduction

There needs to be more studies on the Marcopper mining disaster focusing on the country's social and environmental policies. The Marcopper Mining Disaster on the island of Marinduque in 1996 was one of the worst environmental disasters in the Philippines. It wreaked havoc along and within the surrounding areas of the Boac River (Coumans, 2002). It induced a wide-scoping effect on the Boac River system, making it challenging to craft an integrated approach toward rehabilitation. Therefore, a ridge-to-reef approach is essential, providing a holistic intervention by looking at the degradation of the upland environment and its impacts as it goes down to the delta (Panorama, 2019).



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There is a need to address wicked problems such as mining in terms of multiscale and multidimensional approaches in social technology and human ecology. Catastrophes on the same scale as the Marcopper Mine Disasters cannot be addressed by individual disciplines alone and by fragmented policy approaches. A multiscale perspective integrates the different operating factors that cut across global or local scales (Caprotti et al., 2020), while a multidimensional approach combines the cross-level, cross-national, cross-time, and cross-policy areas for a comprehensive policy understanding (Heisler & Peters, 1977). Human Ecology captures the human and environmental interrelationships concerned with the sustainability of the processes involved with change and the social dimensions of present or future arrangements in the system. To obtain such an inquiry, an integrated body of knowledge from various disciplines is necessary (Dyball, 2011). Concurrently, social technology pertains to the provisioning role of the ecosystem, its sustainability, and the value of human stewardship, which ensures human-ecological security that is facilitated by the individual aspects or combination of social processes, roles, functions, and structure (Mendoza, 2021). The topic can be categorized under the Climate Change and Disaster Risk Management (CDRM) thrust of the Social Development Management Program (SDMP) for community-based disaster risk management and social health.

The general objective of this study is to assess the challenges related to the policies and prospects for the long-term rehabilitation of the Boac River 20 years after the Marcopper mining disaster. Specifically, it aims to:

1. discuss the significant events in the Marcopper mining disaster in Marinduque;
2. identify the mining and environmental-related policies in the context of the 1996 disaster;
3. examine the challenges in mining and environmental-related policies and programs implementation toward long-term rehabilitation of mine-affected areas in Boac River, Marinduque, and
4. recommend policy and program mechanisms to facilitate long-term rehabilitation of mined-affected Boac River, Marinduque areas.

This study is a policy analysis of mining and environmental-related policies concerning the Boac River system, which was the site of the 1996 Marcopper mining disaster. Therefore, the insights gathered solely apply to the Boac River system. This study encompasses a ridge-to-reef approach to the geographic characteristics of the entire Boac River system. Moreover, this study did not capture variations in the policies implemented in the nearby Mogpog River and Calancan Bay. The Mogpog River and Calancan Bay are located in different localities not situated along the path of the Boac River, making the policy analysis invalid in their case.

In addition, this study did not conduct any quantitative impact assessment. The study investigated the perceived relationships between the emergent themes aligned with the objectives of the study using a causal loop diagram. There is also a possibility of a recall bias due to the time difference between the occurrence of the disaster and the conduct of this study. A triangulation of data between the key informant interviews (KII) and primary and secondary documents was done to eliminate or reduce the recall bias in this study. Lastly, focus group discussions (FGD) were obtained with permission from the study of Mandia (2023) and incorporated into the results and discussion of the study.

The policy analysis framework on the Marcopper Mining Disaster is adopted from the Cultural Adaptation Template from Dyball and Newell (2014) and the Critical Junctures and Path Dependence Framework from Dangcalan et al. (2020) and Coleman's (1986) Boat Model (See Figure 1). The social and ecological aspects of the policy analysis were captured by combining the three frameworks. The framework color coded the macro, meso, and micro levels from Coleman's Boat Model. Macro refers to the policies and institutions, meso refers to the organizational level, and micro refers to the individuals in the community that deal with development capacity. The feedback mechanisms of the causal loop diagram demonstrate the linkages of the emergent themes in the policy analysis as demonstrated by the Cultural Adaptation

Framework. In addition, the previous and ongoing impacts of the Marcopper mining disaster were analyzed using Critical Juncture and Path Dependence.

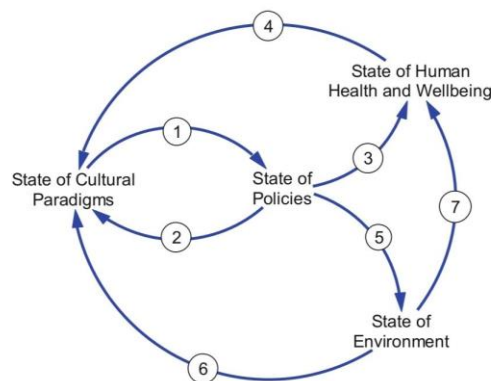


Figure 1. Social-Ecological Policy Analysis Framework on Marcopper Mining Disaster Adopted from Dyball and Newell (2014) and Dangcalan et al. (2020)

## 2. Methodology

### 2.1. Study Area

The province of Marinduque, known as the “heart of the Philippines,” is a part of the Luzon Island group located in the Mindoro-Marinduque-Romblon-Palawan or MIMAROPA Region. Marinduque’s land area spans 952.58 square kilometers with a population of 239 207 according to the 2020 census, wherein the computed population density is 251 inhabitants per square kilometer. The island’s population represents 7.41% of the MIMAROPA Region’s total population, 0.38% of the Luzon Island group, and 0.22% of the Philippine population (PhilAtlas, 2022).

The locale of the study is the Boac River Basin which is situated in Boac, Marinduque, Philippines. It cuts across minor portions of other municipalities in the island province. Boac is a first-class municipality that serves as the provincial capital in the island province of Marinduque. It is a coastal municipality consisting of 61 barangays with a 212.70 square kilometer land area accounting for 22.33% of the total area of Marinduque. The Boac River Basin consists of upstream, midstream, downstream, and coastal areas that run through 11 barangays in the locality (See Figure 2).

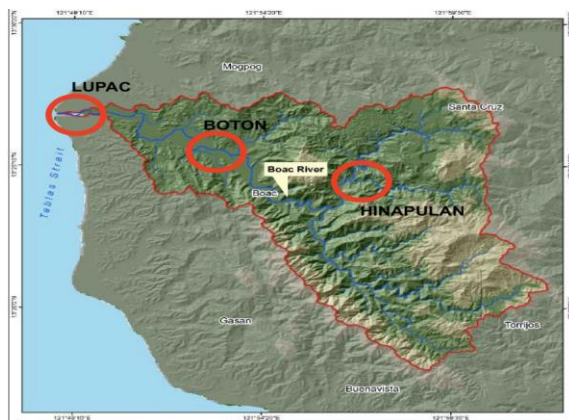


Figure 2. The location of the Boac River Basin taken from the study of Mandia (2023)



## 2.2 Research Design

A qualitative research method design was used in this study as it involved the observations of various facets of causal or descriptive inquiry. These various facets were addressed through fragments of non-comparable observations in which the answers to the inquiry are inferred. This method is appropriate for this research as it addresses the study's objectives using non-comparable observations.

## 2.3 Data Collection Procedures

Key informant interviews were conducted to gather more in-depth and complete answers to the study's objectives. The KIIs were done face-to-face and through the Zoom platform, which was subject to the availability of the informant for a more comprehensive data collection. The informants for the KII were policymakers, experts, and representatives from the academe and non-government organizations who were knowledgeable and provided insights about the history and impacts of the Marcopper mining disaster, and the significant policies related to the disaster and its aftermath.

Primary and secondary data were used to identify the significant events and the mining and environmental policies related to the Marcopper mining disaster. The primary data for the study were identified from the KIIs. Published and publicly available data on different data sources, such as libraries, government records, and legal websites about the Marcopper mining disaster and the mining and environmental policies, served as the secondary data for the study. The FGDs conducted in 2021 by the team of Dr. Evangeline Buella-Mandia of the College of Environmental Studies, Marinduque State College, were used in the study with permission. These were used in triangulating the data from the themes that emerged in the policy and KII.

Ethical considerations were observed in the conduct of this study, including having (1) informed consent, (2) confidentiality, and (3) cultural considerations and sensitivities. In addition, a letter of request seeking participation and a schedule for the most convenient time for the interview was sent to the key informants. Pertinent rules on research ethics for undergraduate thesis of the University of the Philippines Los Baños were followed throughout the research process.

## 2.4 Method of Analysis

Content analysis of policies and thematic analysis for KII and FGD were used for data analysis. To shortlist the mining and environmental policies to be analyzed in the study, those identified by key informants during rapid KII were used to determine the most relevant laws and policies, as more than 300 mining policies were identified yet exhibited replication. These were triangulated with Mandia's (2023) study. Furthermore, a full interview was conducted with the study's key informants to gather more policies and programs for analysis. The repealed or amended policies were included according to their significance to the national mining laws to obtain a chronological component of the policy analysis. The eleven (11) most significant policies for the study were analyzed according to their year of implementation, key provisions, strengths, and weaknesses.

The significant events in the Marcopper mining disaster were identified through a thematic analysis of the data gathered from the KII to determine the cumulative narrative of the key informants. Likewise, thematic analysis was used to analyze the mining and environmental policies related to the Marcopper mining disaster. The policies gathered from the rapid KII and the list of policies from the study of Mandia (2023) were included for analysis with the exclusion criteria to avoid repetition. Moreover, identified policies from the KII were included, and previous relevant mining policies from secondary sources were included for the chronological analysis of the policies enacted. The final list of mining and environmental policies was compared to distinguish the similarities and differences in their key provisions. The strengths and loopholes were also identified parallel to the case of Marcopper Mining Corporation (MMC) and Marinduque to examine the policies further.

The challenges and recommendations were analyzed through thematic analysis. In thematizing the challenges identified for analysis, the research objectives served as the basis for identifying and organizing the themes per objective. Emergent themes were then identified from the raw data in line with the research objectives that were input in a thematic analysis table for the causal loop diagram (CLD). Lastly, the recommendations analyzed through the thematic analysis were patterned with the identified challenges through a gap vs recommendation analysis for more problem-fitted data relevant to the study.

### 3. Results and Discussion

#### 3.1 Significant Events in the Marcopper Mining Disaster

The significant events in the Marcopper mining disaster include the events that led to the 1996 mining disaster and the events that transpired after, encompassing present circumstances in the affected areas (See Figure 3). The discussion is presented chronologically and divided according to the date of the events that transpired, drawn from the narratives of the key informants in Marinduque and environmental and mining experts. The results were framed using the lens of the people and the literature.

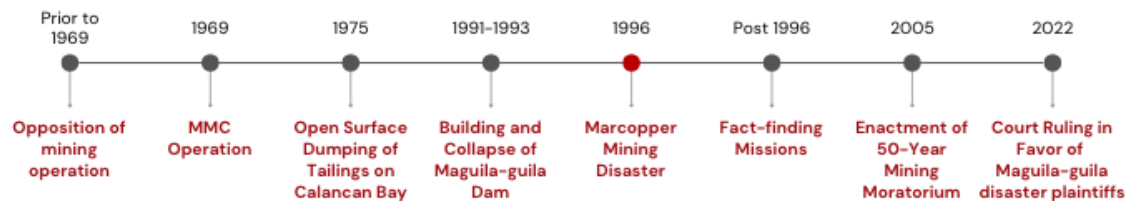


Figure 3. Historical timeline of the significant events in the Marcopper Mining Disaster

##### 3.1.1 Opposition of Mining Operation

Before the Marcopper Mining Corporation (MMC) operation in the province of Marinduque, it was found that some of the residents of Marinduque rejected a mining operation on the island, wherein rallies transpired to try to stop the proposed operation. This sentiment was echoed in the findings of Coumans (2002), in which MMC proceeded with their mining operation despite the lack of permission from the residents.

##### 3.1.2 MMC Operation

The economic benefits that the province might obtain from the mining operation outweighed the disapproval of some residents, which paved the way for the establishment of mining in the province. Along with the operation of MMC came the establishment of boarding houses and eateries for the company's workers around the mine area. The whole industry brought job opportunities to the residents and potential tax gains for the local and provincial government.

This finding illustrates the government's economic priority at that time regardless of the citizens' concerns and the environmental repercussions of mining. Moreover, the continuity of the enforcement of the operation of MMC in the province despite the people's opposition exhibited the unequal power relations that are tilted towards the corporate entities and elites. Enabling the mining operation of MMC would bring



additional economic benefits to the people involved in such power relations, including President Marcos Sr. as the co-owner of the mining company.

### **3.1.3 Open Surface Dumping of Mine Wastes on Calancan Bay**

Another significant event determined before the 1996 disaster was the documented government permission by the Pollution Adjudication Board to let the company conduct open surface dumping of mine wastes on Calancan Bay, which, according to KI003, was approved on November 2, 1975, and began on October 30, 1975. This was documented as the “blanket permit” given to MMC in the study of Tauli-Corpuz (1996). The residents of Calancan did not approve of the dumping method. Therefore, protests erupted as residents disagreed, and many noted the report from the National Pollution Control regarding open surface dumping. At this time, years after the dumping of mine tailing on Calancan Bay, physical illnesses of residents were reported, including cases of death. These were purportedly attributed to the dumping of mine tailings. Despite these events, then President Marcos Sr. signed a letter to continue the dumping of tailings on the Calancan Bay, which was documented by the Marinduque Council for Environmental Concerns (MACEC), an environmental non-government organization in the province. This was also captured by McDonald and Southall (2005), where the authorized dumping method in the blanket permit was through submerged ocean disposal that MMC did not do yet the national government still kept the validation of the permit.

After more than a decade of tailings disposal on Calancan Bay, a coast-way was formed made of piled-up mine tailings that are still visible today, as stated by KI003, which were the sources of heavy metal contamination on the marine life and health of the residents. This further resonates with the government's economic priority by allowing MMC to continue the tailings dumping on the waters of Calancan Bay despite the health implications to the residents and damage to marine life. In addition, the co-ownership of then-president Marcos Sr. to MMC (McDonald & Southall, 2005) indicates a personal interest in the resumption of Marcopper's activities using his executive power over national borders; this was also observed by a few of the key informants in the study. Furthermore, the dumping of mine tailings in Calancan Bay was deemed “legal” with the permission of the national government. This shows the corroboration of the previous Government administrations to the degradation of Calancan Bay. Therefore, the Philippine government was accountable for allowing the dumping of mine tailings in Calancan Bay over two presidential terms.

### **3.1.4 Building and Collapse of Maguila-guila Dam**

After changes in administration and the transfer of tailings dumping to the depleted Tapan Pit (Igual et al., 2018), the next significant events transpired with the building and collapse of the Maguila-guila Dam. According to key informant number 3 (KI003), the building of the Maguila-guila Dam was opposed by the residents of Marinduque, particularly in the surrounding areas of the Mogpog River. However, similar to previous rally initiatives, the building of the Maguila-guila Dam persisted. The dam was constructed to contain the silt from the Tapan Pit to prevent it from flowing to the Mogpog River, but in only a year, the dam could not hold its contents, leading to its collapse in 1993. The documented immediate effects of the collapse gathered from the KII were parallel with the findings of McDonald and Southall (2005), where the houses, livelihood, and livestock of the residents residing along the river were washed away by the flood, including the death of two children all without compensation. Before the disaster, the research findings of KI009 proved that the people already detected visible damages and hints of defects, and no course of action was taken. Until now, the Mogpog River has been declared biologically dead by the Department of Environment and Natural Resources (DENR) due to the disaster of the Maguila-guila Dam collapse in 1993. MMC's inaction to the dam structure's defects hints at their need for responsibility in properly implementing their mining activities in the province. Moreover, a lack of accountability can be observed from the total absence of compensation to the affected residents of both the Maguila-guila Dam incident and the Calancan Bay case.

Before the 1996 disaster, the statements of KI006 and KI007 revealed the release of MMC's wastewater containing heavy metals to the Boac River. This was observed during heavy rain when fish in the river died, and the wastewater was described as 'muddy' and yellowish. The release of wastewater to the Boac River was said to have been done about ten times before the 1996 disaster and may have been due to the company's fear of an overflow or leak in the Tapan Pit. This finding supports the report by De La Cruz (2017) wherein MMC tried to release built-up pressure in the tailings dam because of the design mistakes of the structure. Undeterred by the allegations, MMC denied ever releasing wastewater containing heavy metals to the Boac River despite the observed changes to the water and the sudden death of fish in the river when the incidents happened. However, Lindon et al. (2014) found that river-related industries in Boac had already been negatively affected before the disaster in 1996. Marcopper's rejection of these claims indicated two reasons: the lack of responsibility for their actions and negligence to the affected communities, and the lack of monitoring of their mine structures enabled an overflow of the wastewater during heavy rains. These were both unacceptable, especially in conducting mining operations, whether small or large in scale.

### 3.1.5 Marcopper Mining Disaster

The most significant event based on the answers of the key informants was the 1996 disaster itself, wherein the plug of the drainage pipe in the Tapan Pit ruptured, and the tailings flowed from the source to the mouth of the river. The key informants residing along the river recounted it being full of mud with a bad scent, as KI005 described it as sulfuric or with a hint of ammonia. The Hinapulan area, the first barangay that the spill passed through, was severely isolated, and supplies could only be obtained through air delivery or transport. The muddy description of the floodwater and the isolation of Barangay Hinapulan were like the data of Tauli-Corpuz (1996).

Right after the disaster, KI006 mentioned that fish and even the plants on the river were no longer present for their livelihood and consumption. The residents' water sources near the river were also limited after the disaster as they relied on deep wells for water consumption that became contaminated with heavy metals. De La Cruz (2017) also documented these negative effects, adding the declaration of the Boac River as "dead" by the government. Regarding the residents' water supply, the same key informants answered that MMC provided funds to the water-affected barangays to establish water refilling stations and irrigation systems for farming as a rehabilitation effort of the company. The answers of the key informants regarding the water supply rehabilitation efforts of MMC revealed the company's effort in helping the affected communities as the disaster caused by their mining activity destroyed the river and water sources of the residents.

### 3.1.6 Fact-Finding Missions

A series of fact-finding missions were conducted after the disaster that corrected previous testing and studies that showed normal results concerning the waters and the state of MMC's mine structures. According to KI003 and KI009, the results of these new data showed the presence of heavy metals in the waters of the Boac River and the defects in the structures of the Maguila-guila Dam and Tapan Pit. These called for actions from the Marinduque residents to immediately rehabilitate the mine-affected areas and the existing mine structures of MMC. This was critical since the previous studies were said to have been controlled to prevent the mining company from conducting further efforts to do the rehabilitation. However, without having this information checked, the negative effects on the health of the residents near the river would have been worse than the recorded data at that time.

The proposed river rehabilitation of MMC was through submarine tailings disposal (Coumans, 2002),



which the residents and the local and provincial government did not approve. However, KI003 recounted that the DENR and the provincial government almost agreed to the proposed disposal method, and KI001 supports the statements that the method was preferred because it was the cheapest rehabilitation method but banned in Canada. The local government and MACEC recommended submerging the tailings and containing them underwater beside the beaches on the river mouth for reclamation. This will also increase the land area, which will benefit the municipality. However, this was more expensive than the proposed submarine disposal, so MMC did not acknowledge it as a rehabilitation alternative. According to KI006, this rehabilitation method was not approved by then-Boac Mayor Engr. Madla since he wanted MMC to conduct a permanent rehabilitation effort, and the submarine tailings disposal was not deemed as a viable method for permanent rehabilitation.

The disapproval of the provincial government was also influenced by the rally initiatives of the people headed by MACEC due to the environmental damage that the submarine tailings disposal might pose to the marine ecosystem. This finding was similar to the narratives and documents gathered from previous studies, which show MMC's unwillingness to pay more for rehabilitation, which may include negligence of their mine structures that led to the disasters encountered.

### **3.1.7 Enactment of 50-Year Mining Moratorium**

With the pending status of the promised rehabilitation of MMC, the residents were still left with heavy metals on their rivers and waters. Some key informants stated that they expressed dissatisfaction through a series of rallies. Campaign signatures were also made to ban mining in Marinduque, supported by all 61 barangays in Boac, as mentioned by KI006, KI007, and KI008. The rally initiatives and campaign signatures paved the way for the 50-Year Mining Moratorium exclusively for the province of Marinduque, which states the ban on mining operations on the island. Documents from MACEC also contained different barangay no-mining and no-mining resolutions for several municipalities, including Sta. Cruz, the host municipality of MMC. This was very significant as it shows that the mobilization of people in Marinduque, despite their continuous failed attempts, can still bear successful results in their motion to ban mining in the entire province due to the cumulative negative effects experienced by the residents from the mining operation of MMC.

Impediment to the no-mining moratorium in Marinduque was the lifting of the 50-year Mining Moratorium in 2021 by the previous president, Duterte, before his presidential term ended in 2022, which was mentioned by a few of the key informants. This was objected to by the local government establishing Resolution No. 2021-074: A resolution declaring the protest and opposition of the municipality of Boac to EO No. 130, S. 2021, and reiterating the stand of the people of the Boac, Marinduque against mining. This resolution strengthened the people's stand against mining in Marinduque, securing the 50-year moratorium in the province.

### **3.1.8 Court Ruling in Favor of Maguila-guila Disaster Plaintiffs**

A year after the enactment of the lifting of no mining moratoriums, a significant event happened related to the disasters brought about by MMC. Some of the plaintiffs of the Maguila-guila Dam collapse won their case filed in 2001 through a regional court ruling in Marinduque. Most KIs relayed this as it was perceived as a step forward to the multiple cases filed against the mining company. The victory was a beacon of a long-held hope; however, KI003 mentioned that the court ruling might change in the higher court. Despite the uncertainties with the results of the cases, the plaintiffs and the people of Marinduque will remain hopeful and continue to fight for their long-awaited justice.

### 3.2 Mining and Environmental-Related Policies

The mining and environmental-related policies identified were sourced from the responses of the key informants and from secondary data accessible to the public (See Figure 4). The major policies were listed from the rapid KII and the more than 300 mining and environmental-related policies with the exclusion criteria of repetition. The listed policies were then triangulated with the most relevant policies in the Marcopper mining disaster identified in Mandia's (2023) study. Further triangulation and policy gathering were done through the conducted full KII. The remaining listed mining and environmental policies were obtained from the repealing clauses of the selected policies for the chronological analysis of the enforcement of the laws. This discussion investigated the identified policies, year of implementation, key provisions, strengths, and loopholes for analysis (see Appendix A).

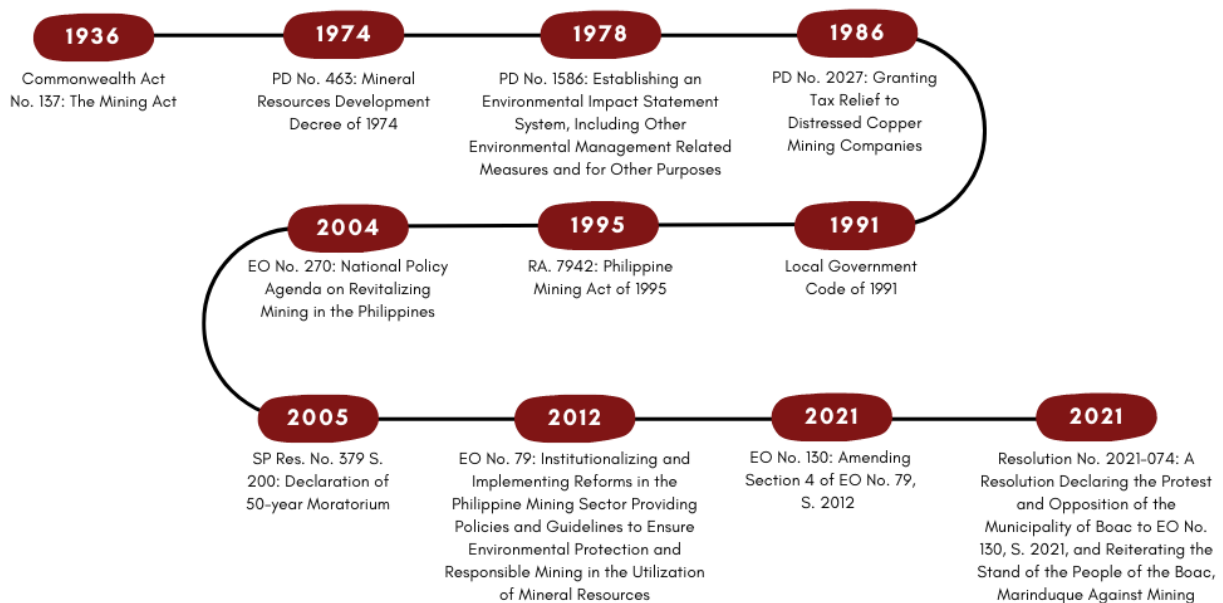


Figure 4. Chronological order of the analyzed mining and environmental-related policies

**Commonwealth Act No. 137: The Mining Act.** The Commonwealth Act No. 137 was enacted in 1936, almost four decades after the Philippines declared independence from the Spanish colonization, but was still during the American colonization. Therefore, this law would still have American influences compared to the other policies discussed under this objective. The Mining Act was deemed relevant in this policy analysis as it is the first mining act of the Philippines, making it the basis of succeeding mining acts wherein it was subsequently repealed by so. In terms of its contents, the First Mining Act was quite primitive as it housed sections that mostly declared mineral land claiming and the processes of securing the lease for mining. Despite its primitiveness as a mining act, its key provision on pronouncing the president's authority in proclaiming land classifications through executive power is still being upheld today.

In addition, mineral ownership is only 40% for foreign partners in the mining operation. However, due to the country's status as an American colony, a weakness of the law was that Americans at that time were given the same rights as Filipinos in acquiring a mineral land lease. The equal opportunities for US citizens in the Philippines in mining may override the paying capacities of normal Filipinos at that time to start their lease agreements. This, in turn, would not benefit Filipinos' economic growth but would benefit the Americans. Further weaknesses of the law include the continuity of the mineral lease even when the mineral lands are proclaimed into reserves and that reserves can be converted into mineral lands when



deemed valuable for mineral extraction. This indicates the government's economic priority in the extractive industry even at the conception of this first mining act. A striking strength of this law is the prohibition of government officials or employees with functions in and related to mineral processes from acquiring mineral land leases, as it somewhat secures the absence of possible political under-the-table agreements in line with mineral extraction. Moreover, the government has the power to regulate the auxiliary rights of leaseholders to ensure that resource supplies are equitably distributed and not monopolized. The rules and regulations on mine sanitation, tailings disposal, and easement drainage in the act make the Mining Act commendable regarding pollution control despite its early formulation.

**PD No. 463: Mineral Resources Development Decree of 1974.** Succeeding The Mining Act almost four decades after is the Mineral Resources Development Decree of 1974, which declares all public and private lands as state-owned and reserves the president the authority to convert reserved lands for mineral extraction purposes. A strength of the policy is introducing safe operation, sanitation, and pollution control laws and regulations for mining contractors' compliance with health and environmental safeguarding, which was not highlighted in the previous act. However, weaknesses of the policy were identified. The government's inclusion in the mineral extractive industry was now enforced as the government could use closed mineral deposits through the operation of selected agencies or contractors. This implies the government's awareness of the profitability of extractive industries that might have paved the way for mineral contractors to operate on more than one mining location in a certain province. However, the weakness of the policy is that it allows a five-year tax exemption for income tax on new mining contracts upon the approval of the mining application. This tax exemption incentive would be observed in the other laws pertinent to mining.

**PD No. 1586: Establishing an Environmental Impact Statement System, Including Other Environmental Management-Related Measures and for Other Purposes.** Following the first presidential decree in mining enacted by President Marcos Sr., PD 1586 exhibited its strength by establishing the Environmental Impact Statement System (EISS) that would monitor the environmental impacts of extractive industries through environmental impact statements. This policy recognizes the importance of balancing socio-economic growth with environmental protection mechanisms compared to the previous presidential decree. The Environmental Compliance Certificate (ECC) was created as a requirement in mining applications in critical areas, projects, and undertakings. However, the main loophole of the law is the non-applicability of the ECC to areas declared as non-critical, which would only partially capture the environmental impacts of mining in the country.

**PD No. 2027: Granting Tax Relief to Distressed Copper Mining Companies.** The third presidential decree of President Marcos Sr. explicitly states the suspension of accumulated taxes and other fees of distressed copper mining companies in the country, which is essentially its weakness. Due to its low market value, the law's intention, its identified strength, was to act as a cushion for copper investment. Therefore, as a mitigating factor in ensuring the continuous operation of distressed copper mines, the accumulated taxes, fees, and other charges to the selected mining companies were waived for an unspecified time. At this time, the president still co-owns Marcopper Mining Corporation in Marinduque, which would also imply some personal interest in enacting the law. However, a loophole in the presidential decree is that it needed to include specific inclusion criteria for the classification of distressed mining companies, making evaluating and certifying distressed companies easier for the Ministry of Trade if a criterion was given.

**Local Government Code of 1991.** Relevant to Marinduque's stance on mining is the Local Government Code of 1991, whose strength stems from the proclamation of the autonomy and jurisdiction of local government units (LGU) in their territories. This policy allows LGUs to implement their own rules and regulations with the guidance of the national government to ensure that they align with existing national policies and interests. This enabled the passing of various no-mining resolutions, ordinances, and the moratorium in Marinduque relevant to their cumulative advocacy on mining.

Aside from its core intent in decentralization, the inclusion of local sustainable development is promoted to secure an ecological balance in local territories; therefore, policies deemed sustainable in this sense

were locally made. Moreover, the Local Government Code of 1991 recognizes the role of non-government organizations as key players in the Government. This recognition paved the way for the active involvement of MACEC as a non-government organization in Marinduque in mining and environmental matters such as the Marcopper mining disasters and the filed legal cases against MMC. Despite the inclusion of sustainable development in this policy, outdated calculations and tax recommendations would impede local economic development as the values are not updated with the increase in inflation, which is the main weakness of the law.

**RA 7942: Philippine Mining Act of 1995.** The Philippine Mining Act of 1995 fully repels its predecessor, The Mining Act, as an updated mining law for mining rules and regulations. It declares all mineral resources as State-owned compared to “Filipino-owned” from the former and that the State is responsible for overhauls in rational processes in mining extractive industries. The strengths of the law include the social and environmental safeguarding mechanisms in place to protect the rights of indigenous cultural communities to their ancestral domains. In addition, such ancestral lands with mineral deposits shall only be opened for mineral agreement upon the approval of the concerned indigenous cultural communities. However, this weakness is that the given process might not secure a fair or unprejudiced agreement as the law does not include specific agreement processes between concerned parties. Upon approval of the mineral agreement, the indigenous cultural communities will be granted royalties and other fees. The amount will be based on their negotiations with the mining company. If disagreements arise between mutual agreements, the final decision will be up to the set Panel of Arbitrators composed of two members from the Philippine Bar and a recommended licensed engineer by the Bureau which is an identified weakness. Bias members toward the mining company will lead to losses for the indigenous cultural communities.

Aside from indigenous cultural domains, areas under the National Integrated Protected Areas System (NIPAS) are prohibited from mining operations and activities. However, another weakness is that mineral resources can be utilized for mining operations through mutual agreements. In addition to the weaknesses of key provisions of the Philippine Mining Act of 1995, the auxiliary mining rights provided to the mining entities were revised to be exclusively used only by the mineral extractors, prohibiting surrounding communities from a shared utility and reducing their access to basic resources. Furthermore, the assignment or transfer of mineral agreement during mine operation cancellation or abandonment is subject to the approval of the DENR Secretary, which would be deemed approved if not signed 30 working days after application. This would enable mining contractors to flee in times of mine disasters or other incidents related to the negative effects of the extractive industry on health and the environment, which is the main weakness of the law.

**EO No. 270: National Policy Agenda on Revitalizing Mining in the Philippines.** With the environmental movement that transpired in the ‘80s to the late ‘90s, President Arroyo enacted a policy to maintain the essence and significance of mining in the economy. Stated is the Government’s promotion of the “responsible exploration, development, and utilization” of mineral resources to enhance economic growth in the country. The strength of the policy is the formulation of a Mineral Action Plan (MAP) as implementing guidance for mineral exploration, development, and utilization to ensure that mineral extractive industries operate responsively and accordingly in line with this policy. However, the law’s weakness is the country’s opening to mining as a key component in economic development.

A different approach in this policy is the stated priority towards the remediation and rehabilitation of abandoned mines to address their negative impacts that might have been influenced by the 1996 Marcopper mining disaster that caught national and international attention and concern. Therefore, the utilization of efficient technologies was promoted in mineral extraction that aims to lessen the



environmental impacts of mining. However, the weakness of mining companies' presence and usage of such technologies is that they cannot be ascertained through policy monitoring mechanisms. Moreover, the provisions of the law were not comprehensive in covering the descriptions or the implementing mechanisms for complete enforcement.

**SP Res. No. 379 S. 2005: Declaration of 50-year Moratorium.** The most significant mining policy in the context of Marinduque, the host province of MMC, as identified by Mandia (2023), is the 50-year moratorium in the province, with its strength in the declaration of Marinduque as a mining-free zone after the 1996 disaster. This was promulgated from several resolutions in the province prohibiting mining operations (Mandia, 2023). The 50-year moratorium was established by the Sangguniang Panlalawigan in 2005 and should be in effect until 2055. However, the weakness of the moratorium is its policy status as a provincial moratorium that does not assure its temporary effectivity, as national laws can overthrow provincial moratoriums in the pursuit of reopening the province for copper extraction. Nevertheless, the 50-year moratorium still holds strong with the support and conviction of the residents of Marinduque.

**EO No. 79: Institutionalizing and Implementing Reforms in the Philippine Mining Sector Providing Policies and Guidelines to Ensure Environmental Protection and Responsible Mining in the Utilization of Mineral Resources.** This mining policy differs from the rest of the identified national policies on mineral extraction in the strength of its provision, as it states the closure of critical, protected tourism areas and prime agricultural lands to mining applications. This is in line with the environmental mechanisms of the provisions of the law. In addition, only existing and active mining corporations in the country were allowed to conduct mining operations. However, this weakness is that mining operations are subject to monitoring and review by the DENR which could be politicized. A public bidding process was also included in the opening of mineral sources and disposition of abandoned ores and mine wastes that would ensure a higher price and information dissemination to the Filipino people. Moreover, the provision of the law encourages public consultation in terms of developing mineral reservations for utilization. Despite these efforts to monitor the mining industry, the weakness of the policy is the establishment of a one-stop shop for all mining applications and procedures that enables a faster and more convenient process. This attracts and encourages existing mining corporations to pursue active operations in the declared open areas for extractive development. This weakness implies that if there are more mining concessions, the number of mining applications will increase. The increase in mining applications corroborated by a corrupt and inefficient government will lead to irresponsible mining practices of mining corporations.

**EO No. 130: Amending Section 4 of EO No. 79, S. 2012.** A recent policy relevant to the previous and the most significant policy of Marinduque is EO 130, which President Duterte enacted. The weakness of this policy is the direct amendment of Section 4 of the previous policy to re-open the country's mining industry to international contractors for economic development. Herein, it is stated that mining moratoriums in the Philippines be put in ineffectivity according to the new mineral agreement of the Philippine Mining Act of 1995. The inclusion of mine safety and environmental policies in the rules and regulations of this policy secures its intention to ensure environmental protection and responsible mining in the country as its strength. However, the main weakness of this policy is that the lifting of no mining moratoriums conflicts with the local autonomy and jurisdiction stipulated in the Local Government Code of 1991, as it supersedes the jurisdiction of local governments over their territories. This exhibits the wide range of discretion of the president in terms of initializing mining agreements in areas not open to mining for National economic development.

**Resolution No. 2021-074: A Resolution Declaring the Protest and Opposition of the Municipality of Boac to EO No. 130, S. 2021, and Reiterating the Stand of the People of the Boac, Marinduque Against Mining.** As an objection to EO 130, Resolution No. 2021-074 was enacted in Boac, Marinduque, to support the province's no-mining direction. The strength of this policy is its explicit objection to lifting the 50-year mining moratorium that has kept the island free from mineral mining for more than a decade.

This policy is still in effect, as well as the 50-year moratorium of Marinduque. However, the weakness of this policy is its form of a municipal resolution that is not as established as an ordinance that might be

changed in the future. A stronger mining policy is necessary to ensure the continuity of the no-mining direction of the province.

From the voices of the community, it was determined that MMC could contribute positively to the infrastructural aspect. The participants of the FGD answered that MMC built a daycare center, a small market, a Barangay Hall and court, roads, and bridges. This testifies to the social responsibility of MMC during the time of its active operation. However, the findings of this study showed that MMC used the supposed rehabilitation fund in building these infrastructural developments as a responsibility of the mining company toward the development of the mining community. On the other hand, the FGD data also indicated that negative health and environmental changes were shared throughout the operation of MMC in Marinduque. The participants of the FGD answered that during the mining operation, the agricultural yield of farmers decreased, the waters turned greenish, floods occurred from water-letting, and the plants in the rivers died. The iterated health effects were skin diseases and death due to heavy metal poisoning from water contamination through open wounds. This indicates that even with the environmental protection mechanisms and safeguarding provisions of the national mining policies enacted by President Marcos Sr. and the Philippine Mining Act of 1995, mining activities can still present destructive effects on the ecosystem. These effects may be due to problems with the mine structures or the lack of policy enforcement of the existing mining laws.

From the chronology of implementation of the identified mining and environmental-related policies, critical juncture and path dependence were observed with the determined significant events. The enactment of policies like the PD 1586, RA 7942, or the Mining Act of 1995 intends socio-economic development consideration and safeguards the environmental aspect. However, changes in governance affected its strict implementation, policy changes, and translation in local settings, specifically in the case of MMC in Boac, Marinduque. The significant events in the timeline of the Marcopper disaster shaped the people's awareness, local government empowerment, and MACEC as an active civil society in the area to pursue environmental justice. The small wins, such as the Declaration of the 50-year moratorium on mining, have been achieved amidst roadblocks, and policy changes can be considered critical junctures in their fight for justice. Analysis of the 11 policies related to the mining in Boac, Marinduque suggests a path dependence tendency due to policy changes such as the EO no. 130, which the past President Duterte enacted. The latter also suggests the need for a more vigilant watch both at the local government and civil society of Boac, Marinduque to keep their flight for justice, which includes persistent implementation of the Moratorium on No-Mining in Marinduque and rehabilitation of the Boac river system, among others.

The change in the processes of mining applications to the implementing agencies for their subject functions indicates that the present mining laws are still not permanent, and revisions still must be made that could cater to the best interest of the Filipino people. Regardless, the policies enacted by Marinduque signify their objection to mining in their territories, which is evident in the policies that transpired in the latter parts of the discussion; however, their indefinite effectivity due to the nature of the policies still persists.

### **3.3 Challenges in Policy and Program Implementation Toward Long-Term Rehabilitation of Mine-Affected Areas**

The challenges in policy and program implementation toward the long-term rehabilitation of mine-affected areas in Boac River, Marinduque, due to the 1996 Marcopper mining disaster, are identified through a thematic analysis of the answers obtained from the KIIs. The themes were plotted based on their human-environment system, and the variables' linkages were color-coded according to their social structures. From the identified themes, the linkages between three major impact areas were observed:



environmental, health, and governance. The interrelationships of relevant themes from these areas are interlinked through a causal loop diagram in a Cultural Adaptation Template (CAT) that presents the entire problem space for further analysis (See Figure 5).

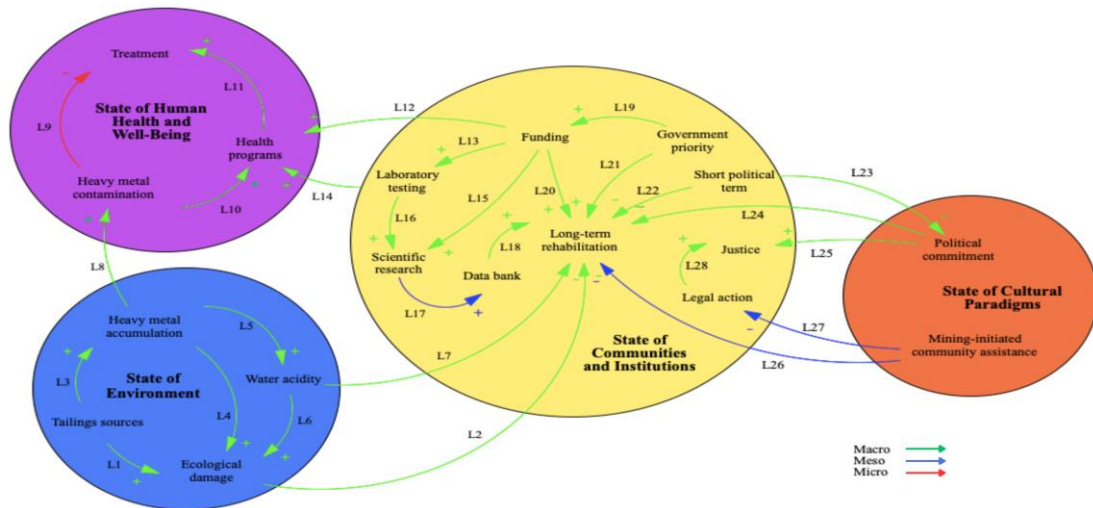


Figure 5. Causal loop diagram of the identified challenges in policy and program implementation toward long-term rehabilitation

The environmental challenges encapsulated in the state of the environment in the CAT are exhibited from links 1 to 8 in the causal loop diagram (See Table 1). The feedback loop trend depends on each variable's direction, wherein reinforcing trends respond similarly while balancing trends exhibit opposite outcomes (Crabolu et al., 2023). The variables include the tailings source, ecological damage, heavy metal accumulation, and water acidity.

Table 1.

Linkages in the Environmental Challenges of Policy and Program Implementation

| Link | V1                           | V2                           | Trend       | Description                                                                                                                                                                                                                                                 |
|------|------------------------------|------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L1   | Tailings sources (+)         | Ecological damage (+)        | Reinforcing | The presence of this tailings source leads to the increasing ecological damage that is being felt by the people in Marinduque (KI006).                                                                                                                      |
| L2   | Ecological damage (+)        | Long-term rehabilitation (-) | Balancing   | The increase in ecological damage to the Boac River would make long-term rehabilitation efforts more difficult due to the rise in destruction to marine life, plants, and sediment deposition (KI010).                                                      |
| L3   | Tailings sources (+)         | Heavy metal accumulation (+) | Reinforcing | Another implication of the existence of the mine tailings source is the continuous heavy metal accumulation in the downstream areas due to the ridge-to-reef nature of the tailings source flowing towards the downstream and coastal areas (KI001, KI004). |
| L4   | Heavy metal accumulation (+) | Ecological damage (+)        | Reinforcing | The heavy metal accumulation in the Boac River leads to persistent ecological damage to the river system (KI001, KI010).                                                                                                                                    |

Table 1 cont.

| Link | V1                           | V2                            | Trend       | Description                                                                                                                                                                                                                                                                 |
|------|------------------------------|-------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L5   | Heavy metal accumulation (+) | Water acidity (+)             | Reinforcing | Heavy metal accumulation, combined with the process of acid mine drainage, makes the river waters acidic (KI010).                                                                                                                                                           |
| L6   | Water acidity (+)            | Ecological damage (+)         | Reinforcing | The acidity of river waters causes ecological damage as freshwater fishes and plants die due to the change in water pH level (KI010).                                                                                                                                       |
| L7   | Water acidity (+)            | Long-term rehabilitation (-)  | Balancing   | The effects of water acidity in the water prohibit long-term environmental and ecological rehabilitation as long as the water remains too acidic for marine life and plants to live in (KI010).                                                                             |
| L8   | Heavy metal accumulation (+) | Heavy metal contamination (+) | Reinforcing | Heavy metal accumulation in rivers leads to heavy metal contamination in the residents living in the area. The accumulation of heavy metals causes contamination in the river water that some residents still use for washing clothes, bathing, and fishing (KI010, KI012). |

The determined root cause of the environmental challenges of the rehabilitation of the Boac River is the source of the 1996 disaster that continues to leak heavy metal-laden tailings into the river system. The Tapan Pit containing the mine tailings from MMC's operation decades ago leads to the increasing ecological damages felt in Marinduque (L1). Almost all the key informants expressed their opinion that contamination would continue if the source of tailings were not contained. This leak in the tailings source has contributed to the lack of fish and plants in the river and water contamination on the island, even in distant areas from the tailings source, and affected river systems (Mandia, 2023), leading to ecological damage.

An increase in ecological damage caused by destroying the naturally existing vegetation in mineral-rich areas due to extensive mining activities exhibits a balancing trend toward long-term rehabilitation (L2). The lack of natural tree species in the mine areas because of the deforestation activities for mining that destroy vegetation covers makes it challenging to conduct reforestation activities (Zambales, 2021) on the source of tailings. The destruction caused by mine activities on vegetation covers lowers the soil quality of the area, causing the soil to become more permeable to water (Murtinah & Komara, 2021), which allows water and tailings seepage into the soil, creating further ecological damage. Reforestation activities would be challenging given the poor soil quality in mined-out areas.

The continuous leak or seepage from the tailings dam leads to heavy metal accumulation (L3) in the downstream areas of the river. Heavy metal accumulation in an area poses various environmental and health risks that become more concentrated when deposited into the sediments, causing these damages (Liu et al., 2018). The high heavy metal concentration along the downstream areas of the Boac River has already been documented by the study of Mandia (2023), even more than two decades after the 1996 disaster. According to the participants of the FGD, MMC enforced dredging activities to remove the tailings



from the river. However, they were only piled at the side of the river and abandoned, which led to the eventual release of the tailings back into the water. The participants noted that the dredging activities disperse the tailings into the river more.

Heavy metal accumulation leads to persistent ecological damage to the Boac River system (L4). Heavy metal accumulation in water causes heavy metal toxicity in fishes, eradicating their presence in affected waters (Mandia, 2023). The lack of fish in the Boac River is observed by the key informants residing in Marinduque until now, as fish used to be present in different parts of the river. The absence of fish also indicates heavy metal accumulation in the waters of the Boac River, as heavy metals settle for hundreds of years in disturbed ecosystems when not acted upon through remediation activities. This was also mentioned by the participants of the FGD, who recounted the eventual disappearance of fish in the river. Moreover, the decline in the agricultural lands in the area and the change in the color of the waters support their observations of heavy metal-induced ecological damage.

There is a high possibility of heavy metal contamination, leaching, and accumulation in areas with acid mine drainage due to acidic conditions (L5). This acidic conversion is caused by acid mine drainage that results in sulfuric acid from the natural process of the reaction of sulfur-bearing minerals with oxygen, acidophilic iron-oxidizing bacteria, and moisture (Skousen & Ziemkiewicz, 1996). The expert key informants in the study have reported the acid mine drainage in the Boac River.

The acidity of the Boac River due to the acid mine drainage leads to ecological damage to the river (L6). The change in the water's pH kills fish and plants in the river. This is validated by the findings of Plumlee et al. (2000) where the acidic nature of the mine tailings led to the death of marine life in the Boac River. Rivers are considered dead with the death of aerobic microorganisms that naturally restore the pH of river waters. Therefore, the increase in acidity of the Boac River hinders environmental and ecological long-term rehabilitation (L7) as damages become more irreversible for rehabilitation efforts.

Lastly, a balancing trend is observed with the effects of heavy metal accumulation on health. Heavy metal accumulation leads to a decline in the health of residents using the river for water sources (L8). Some residents living near the river still use its waters for bathing, washing, and fishing. With continuous use, the body can absorb heavy metals, leaving various skin conditions and other documented health diseases with heavy metal accumulation. The intake of heavy metal-induced fish also leads to bioaccumulation of heavy metals in the body, which would cause future health implications for the residents. The study conducted by Zaynab et al. (2021) validates these findings, whereas the bioaccumulation of heavy metals increases mortality.

The health challenges are encapsulated in human health and well-being and communities and institutions exhibited in links 9 to 18 (See Table 2). The variables included in human health and well-being are heavy metal contamination, treatment, and health programs.

*Table 2.*

Linkages in the Health Challenges of Policy and Program Implementation

| Link | V1                               | V2               | Trend     | Description                                                                                                                                                                                                                                                                                                                |
|------|----------------------------------|------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L9   | Heavy metal contamination<br>(+) | Treatment<br>(-) | Balancing | Due to the negative health impacts of heavy metal accumulation, the increase in the cases of heavy metal contamination leads to a decrease in the treatments available for the disease. The geographical location of Marinduque makes it somewhat challenging to acquire treatments for heavy metal contamination (KI002). |

Table 2 cont.

| Link | V1                            | V2                      | Trend       | Description                                                                                                                                                                                                                                                         |
|------|-------------------------------|-------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L10  | Heavy metal contamination (+) | Health programs (+)     | Reinforcing | The increase in patients with potential exposure and contamination with heavy metals prohibits immediate access to health programs for all patients upon necessity (KI012).                                                                                         |
| L11  | Health programs (-)           | Treatment (-)           | Reinforcing | With the limited slots, technological issues, and other factors in implementing the available health services for heavy metal contamination, the limitation of access to health services leads to the limitation of treatment access (KI012).                       |
| L12  | Funding (+)                   | Health programs (+)     | Reinforcing | With the necessity of acquiring treatment for contamination-related diseases, increasing government funding in the health sector leads to increased health programs available (KI012).                                                                              |
| L13  | Funding (-)                   | Laboratory testing (-)  | Reinforcing | Lack of government funding for the health sector impedes the establishment of a testing laboratory in the province in which the diagnosis and results of the residents with symptoms of heavy metal contamination will be received later (KI009, KI012).            |
| L14  | Laboratory testing (-)        | Health programs (-)     | Reinforcing | The absence of laboratory testing centers impedes the medical processes of the available health programs because almost all medical processes in line with the diagnosis and treatment of heavy metal contamination are procured in mainland Luzon (KI009; KI0012). |
| L15  | Funding (-)                   | Scientific research (-) | Reinforcing | A decrease in funding prohibits the continuation of research studies and projects that hinder community development (KI011).                                                                                                                                        |
| L16  | Laboratory testing (-)        | Scientific research (-) | Reinforcing | However, the absence of local laboratory testing centers also leads to delays in conducting research, as laboratory testing is pivotal in the data gathering process and data analysis towards more comprehensive results (KI009; KI011).                           |



Table 2 cont.

| Link | V1                         | V2                              | Trend       | Description                                                                                                                                                                                                                                                                                           |
|------|----------------------------|---------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L17  | Scientific research<br>(-) | Data bank<br>(-)                | Reinforcing | The result of the various research conducted in the province leads to the lack of relevant data that should be stored in data banks. The key informants expressed their dismay in not being given the results of the data gathering of researchers in Marinduque (KI001; KI003; KI009; KI011; KI012). |
| L18  | Data bank<br>(-)           | Long-term rehabilitation<br>(-) | Reinforcing | The absence of data banks impedes the long-term rehabilitation of the Boac River. The data banks will contain different research and relevant data that are pivotal in crafting rehabilitation strategies that will be problem-fitted to the case of the affected areas (KI09).                       |

The health impacts of heavy metal contamination have a balancing trend with acquiring treatment. The increase in the number of patients with potential exposure and contamination with heavy metals leads to a decrease in the available treatments available for the patients (L9). Treatments for heavy metal contamination are not widely available and would have to be requested from laboratories in mainland Luzon. With many heavy metal-contaminated patients, treatment would be scarce until supplies are brought to the island, affecting the patient's recovery time from the contamination (KI009; KI012).

In addition to the problems of treatment procurement in Marinduque are the health programs necessary to treat the disease. The increase in the health decline of people due to heavy metal contamination would need more health programs available in the province (L10). When there were persistent cases of heavy metal contamination in Marinduque, the available health program was through Teleconsult services, where the patients would have online consultations with experts in Luzon. There are limited slots per day with the Teleconsult services that impede the number of patients that could receive immediate attention for their illness. The findings of the FGD data indicated health problems such as skin diseases and death from open wound contamination. After the disaster, the included health effects were malnutrition, cancer, and high blood pressure. No details on the health programs present at that time were provided, but the presence of these diseases would entail the need for heavy metal contamination health programs for mining areas.

The limited slots for health services available to patients with heavy metal contamination led to limited treatment access (L11). To receive treatment, patients must first have prescriptions for their indicated condition. However, the overall process of getting a consultation for the procurement of treatment was described to be long due to the unavailability of experts in the province and local sources of treatments.

An increase in government funding for the health sector leads to an increase in the health programs available (L12) that could lessen the waiting time for patients needing treatment. During the prevalence of heavy metal contamination in Marinduque, the health sector was described as reactive as funding was made available but it is now not that reactive because of the low to almost no identified cases with very limited funding. Moreover, increased government funding for the health sector led to establishing a testing laboratory in the province (L13). The presence of a testing laboratory for health would shorten the medical processing time that it would take to acquire treatments, as diagnostics of diseases could be done locally.

On the other hand, the absence of laboratory testing centers leads to a longer medical process for the health programs available (L14). Before the Teleconsult services, the health services would need samples from the island and sent to testing laboratories in Luzon Island before official results could be released for treatment. The enforced health services had long processes because the province needed more human and technological capacity to diagnose heavy metal diseases. This is still relevant in Marinduque today.

Conducting research in disaster-induced areas is critical for the development of strategies for rehabilitation. However, a decrease in funding prohibits the continuation of research studies and projects that hinder community development (L15). The decrease in funding was attributed to the change in funding allocation of the government to cater more directly to the people in need of immediate assistance, which neglected some research initiatives; however, no negative remarks were made as the funds were for the personal development of affected residents. Local laboratory testing centers would also benefit research as the absence of local laboratory testing centers leads to delays in the data gathering process and data analysis in research (L16). This was evident in the first fact-finding missions, wherein results concluded normal results in the state of the river waters; however, this was proven incorrect with the following fact-finding missions. If not tested, more people would have gotten heavy metal contamination from the river.

Various research has already been conducted in Marinduque relating to the Marcopper mining disasters; however, the results still need to be shared or returned to the province. The absence of research results leads to the lack of relevant data that should be stored in data banks (L17). Having no results at hand impeded their ability to enforce faster actions in relevant program implementations. Moreover, the absence of data banks impedes the long-term rehabilitation of the Boac River (L18). Since the locality did not acquire the relevant research data needed due to the lack of a local data bank, they were not able to act immediately to resolve the problems brought about by the disaster, which led to more heavy metal contamination cases and a wide scope of ecological damage restricting long-term rehabilitation efforts (Mandia, 2023).

The identified variables under governance are mostly encapsulated in the state of communities and institutions and span the entire state of cultural paradigms exhibited in links 19 to 28 (See Table 3). The identified variables under governance are government priority, funding, short political term, political commitment, mining-initiated community assistance, long-term rehabilitation, legal action, and justice.

*Table 3.*

Linkages in Governance Challenges of Policy and Program Implementation

| Link | V1                      | V2                           | Trend       | Description                                                                                                                               |
|------|-------------------------|------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| L19  | Government priority (+) | Funding (+)                  | Reinforcing | Government priority determines the funding given to the research or project for implementation (KI011, KI012).                            |
| L20  | Funding (-)             | Long-term rehabilitation (-) | Reinforcing | The lack of government funding leads to the delay in enforcing long-term rehabilitation efforts for the Boac River (KI003, KI009, KI010). |



Table 3 cont.

| Link | V1                                           | V2                              | Trend       | Description                                                                                                                                                                                                         |
|------|----------------------------------------------|---------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L21  | Government priority<br>(-)                   | Long-term rehabilitation<br>(-) | Reinforcing | Lack of government priority leads to the delay in the long-term rehabilitation of the Boac River (KI011).                                                                                                           |
| L22  | Short political term<br>(+)                  | Long-term rehabilitation<br>(-) | Balancing   | Based on the answers gathered from the key informant interview, the short political term of government leaders impedes long-term rehabilitation efforts as short-term rehabilitation efforts are preferred (KI010). |
| L23  | Short political term<br>(+)                  | Political commitment<br>(-)     | Balancing   | The short political term of government leaders leads to their limited commitment per administration or term (KI009).                                                                                                |
| L24  | Political commitment<br>(-)                  | Long-term rehabilitation<br>(-) | Balancing   | The lack of commitment to doing so impedes long-term rehabilitation initiatives. Long-term projects and plans will cease if there is little to no rehabilitation commitment (KI006, KI009).                         |
| L25  | Political commitment<br>(+)                  | Justice<br>(+)                  | Reinforcing | The firm commitment of government leaders and officials leads to the attainment of justice (KI009).                                                                                                                 |
| L26  | Mining-initiated community assistance<br>(+) | Long-term rehabilitation<br>(-) | Balancing   | The increase in community assistance the mining company gives decreases their initiative to conduct a long-term rehabilitation plan for the Boac River (KI001, KI010).                                              |
| L27  | Mining-initiated community assistance<br>(+) | Legal action<br>(-)             | Balancing   | The increase in mining-initiated community assistance has prohibited legal action in the past (KI010).                                                                                                              |
| L28  | Legal action<br>(+)                          | Justice<br>(+)                  | Reinforcing | The initiation of legal actions leads to the attainment of justice (KI003, KI005, KI011).                                                                                                                           |

The significance of funding was articulated in the health challenges that prove its importance in conducting research and projects. The higher the government's priority toward a project or program, the higher funding is distributed (L19). If the government does not prioritize the rehabilitation of mine-affected areas, little to no funding will be given. The lack of government funding leads to the delay in enforcing long-term rehabilitation efforts for the Boac River (L20). Marcopper should be liable for funding the long-term rehabilitation of the Boac River, whereas the government's role is to pressure and negotiate compensation from the company. However, acquiring funding from MMC has been a difficult challenge for the provincial government. Without enough funding, long-term rehabilitation will not be achieved since a huge amount of money is necessary for long-term efforts towards rehabilitation. According to KI003, a previous estimation on the Boac and Mogpog Rivers rehabilitation would amount to 430 million USD. At present, it was mentioned by some of the key informants that the long-term rehabilitation of the Boac River is not at

the top of the priority list due to other social problems that need more attention for interventions. Therefore, the lack of government priority toward long-term rehabilitation efforts prohibits enforcing long-term rehabilitation plans (L21). The government prioritized ensuring people were safe and well during the disaster. Aside from the 1996 disaster, other calamities take up much of the government's funding for human development, impeding environmental aspects.

Another factor that was determined in the enforcement of rehabilitation plans is the short political term of government leaders. The short political term of government leaders impedes long-term rehabilitation plans (L22). Some key informants observed this as government officials would want faster rehabilitation alternatives spanning the entire scope of their term. This impedes long-term rehabilitation efforts due to the prioritization of short-term alternatives. Moreover, the short political term of government leaders leads to limited commitment to enforcing various long-term solutions to problems (L23). Due to the short political term, some politicians might not feel the need to commit to the responsibilities that are asked of them fully. However, if they were to commit fully, it was determined that they would prefer short-term efforts that would span the scope of their administrative term, impeding long-term efforts.

The lack of commitment to implementing programs and projects prohibits long-term rehabilitation initiatives (L24). Lack of commitment may be due to other factors, but officials are expected to fully commit to the best alternatives when it comes to service. In the case of Marinduque, it was deemed that government officials are willing to commit; however, factors such as lack of funding and relevant data in crafting rehabilitation plans rule out their commitment to implementing long-term rehabilitation. Moreover, the firm commitment of government leaders and officials leads to the attainment of justice (L25). In the context of Marinduque, environmental justice and justice for the plaintiffs from the mining disasters are aspired. However, it was found that in previous administrations, a lack of commitment to pursuing the mining corporation led to their escape, and the abandonment of the mine left Marinduque without any human and environmental justice.

Answers from the key informant interview and the FGDs also revealed the various community assistance that MMC provided during their operation. It was found that the increase in community assistance led to a decrease in their initiative to conduct a long-term rehabilitation plan for the Boac River (L26). The community assistance given or enforced during the operation of MMC took up costs from their rehabilitation funds, leaving the company with only a little more to give during the disaster for compensation and rehabilitation, urging them to propose short-term and cheaper alternatives. In addition, some key informants expressed that the increase in mining-initiated community assistance prohibited legal action in the past (L27). This is due to the cultural value of *utang na loob* (debt of value) of the officials and people from MMC's assistance to Marinduque. Due to the infrastructures built by MMC and the economic development they brought to Marinduque, it was shared that the previous administrations found it hard to act against the mining giant as they felt indebted. This impeded the justice of Marinduque.

Despite the pending status of the cases filed against Placer Dome, now BarrickGold, some key informants still hope for Marinduque's attainment of justice for the people and the environment through continuous legal action and proceedings. The initiation of legal actions against the mining company leads to the attainment of justice (L28). Through the help of the provincial government, various cases and claims have already been filed against BarrickGold, but justice remains far from sight even decades after their court filing. Stronger evidence that can be obtained from continuous research is needed. However, the long-term rehabilitation of Boac River should also not be sidelined throughout the legal processes.



### **3.4 Recommendations for Policy and Program Mechanisms for the Facilitation of Long-Term Rehabilitation**

Programs and policy recommendations were crafted from the answers acquired from the key informants of the study, including experts on mining, health, and the environment. The top three challenges identified through the thematic analysis and their relationships presented in the causal loop diagram are matched with the program and policy-fit recommendations that can be used to facilitate the long-term rehabilitation of the Boac River, Marinduque.

Pivotal to the overall environmental recommendation, the National Government should obtain access to the Marcopper mine site to assess the dam structures that were documented to have leakages that continuously allow contained mine tailings to flow to the river. The accumulation of heavy metals in the river should be addressed by containing the tailings sources through the joint initiative of the local government and rehabilitation experts. Upon government's and experts' access and assessment, well-recommended engineering plans should be made to reinforce the dam structures with heavy-duty, durable materials to ensure their strength and reinforcement. The containment of the heavy metals from the reinforcement of the dam structures will suspend the flow of heavy metals to the river, which will halt their accumulation and deposition on the riverbed.

To support government initiatives in controlling and handling heavy metal contamination, the provincial government should establish a provincial health and environmental testing laboratory to address heavy metal-related challenges that provide access to provincial testing and research (Mandia, 2023). A local testing laboratory ensures the validity of the data collected from the experiments. Moreover, it will also provide additional job opportunities to the residents in the testing and maintenance department. Experts are needed in the operation of a testing laboratory. Therefore, the government should partner with the academe and other experts to undertake the laboratory activities and ensure the project's success.

Most of the recommendations prescribed under governance were from the KIIs, as the residents' insights in the study locale provided more accurate views on past and current initiatives related to governance. To attain the long-term rehabilitation of the Boac River, the national government should prioritize the policies and programs in rehabilitating heavy metal-contaminated areas, among other current priorities. This is crucial for the province's development as it will be a step toward a different direction in terms of social-ecological functions on the island. Prioritizing long-term rehabilitation plans would mean creating new opportunities for the people if the recommended health and environmental mechanisms are enforced. Moreover, the elected officials of Marinduque should ensure and strengthen their commitment to their no-mining policies with the continuous reiteration of the 50-year mining moratorium.

Further recommendations from the researcher for the findings in the challenges and policy gaps are presented in the succeeding entries for the policy reform of existing and proposed mining policies. The challenges identified matched the gaps in policy in the environmental, health, and governance areas for creating problem-fit policy reform recommendations (See Appendix B).

The open access to mine sites is not included in the key provision of PD No. 463 with the state ownership of abandoned mine improvements. Free access to mine sites, especially in legacy mines, should be incorporated into the Philippine Mining Act of 1995 as a policy reform. Incorporating the policy reform will enable authorities to examine the mine infrastructures for reinforcement and land area for rehabilitation to contain the mine tailings from leakage or seepage into the surrounding ecosystem.

The identified mining policies lack the inclusion of health aspects concerning the effects of mining, whereas socio-economic and environmental factors are recognized. Access to both health and environmental data and relevant research is still a concern in the policy and program implementation of Marinduque. The Mining Act of 1995 includes research on Section 71, where funding will be gathered from the mining company's mine rehabilitation fund. However, the conduct of scientific research can be assured through its inclusion in a designated section for mine operations monitoring and overall impact

the determination that includes health. This ensures a scientific approach in action plans concerning mining operations and prospects for rehabilitation.

An identified challenge under governance for the long-term rehabilitation of the Boac River is political commitment. The wide range of discretion of the president in the national mining policies determines the implementation of mining operations concerning national development. Given the extensive effects of mining, this may need to be aligned with environmental protection. Therefore, limiting the wide range of discretion only to applicable mineral reserves should be a revision of the key provision to ensure ecological protection in reserves and environmentally critical areas.

The most critical policy alternatives concerning the long-term rehabilitation and contamination in the Boac River are presented below (See Appendix C). These policy alternatives can also address the environmental contamination in other mine-affected areas in the country.

The most critical problem with the ongoing environmental contamination in Marinduque is the existence of mine tailings with continuous leaks and seepage from the abandoned tailings dam of MMC and the widespread mine tailings in groundwater sources. The Abandoned Mines Rehabilitation Act further strengthens this provision as a policy alternative to the provision on the abandoned mine rehabilitation of EO No. 270. The Abandoned Mines Rehabilitation Act focuses on rehabilitating abandoned mines, including health and socio-economic and environmental aspects of mine-affected areas. This includes establishing a local health and environmental testing laboratory for the mine-affected areas to determine the current and future state of the environmental integrity of the mined-out areas, renewable every 10 years after assessing heavy metal accumulation and contamination. The enforcement of local health units in dealing with heavy metal contamination is also an essential provision of the act to ensure the health capacity of the residents. Rehabilitation priority is ranked according to the present ecological damage of the abandoned mines and the scope of impacts of heavy metal contamination in mine-affected areas for a more systematic rehabilitation plan for the numerous legacies and abandoned mines in the country.

To ensure the enforcement of this act, national funding will be allocated to rehabilitating abandoned mines that span the socio-economic, environmental, and health programs to be implemented following the provisions of the law. The act's enforcement will be directed to an established Mine Rehabilitation Agency Task Force composed of experts with specialties in health and the environment to examine and implement various systematic rehabilitation alternatives that are problem-fit to the challenges of the abandoned mines.

The second-ranked challenge in the existing mining policies in addressing heavy metal contamination in mine-affected areas is the wide range of discretion of the president. The policies analyzed exhibit an economic priority of the Government in mining, where the policy commitments on mine safeguards and the environment may be changed accordingly. A policy alternative, "Amending the Key Provisions on Presidential Authority in the Institutionalization of Mineral Agreements," is proposed to ascertain a balanced commitment to economic development and environmental safeguarding. This policy enables the president to establish mineral extraction in the country for economic development but will only be allowed in identified mineral lands. Therefore, proclaimed reserves, critical areas, NIPAS, and small islands in the country will not be open to mineral agreements and are excluded from the president's discretion. This ensures the ecological conservation and preservation of fragile ecosystems that balance the economic priorities with the government's environmental priorities. Moreover, to account for the no-mining moratoriums of some provinces in the Philippines, the act will abide by the provisions of the Local Government Code of 1991. Mineral agreements will not be allowed in provinces with no mining moratoriums, such as Marinduque, and areas without local community consent.



One of the most critical problems in implementing long-term rehabilitation plans for the government to address the ongoing contamination in Marinduque is the lack of funding. With all the social problems in the country that take up some of the national budget, it is not easy to obtain enough funding for long-term rehabilitation as it would take billions of dollars, as estimated by a partner agency of the KI from MACEC. To ensure that funding is attainable for long-term rehabilitation of mine-affected areas, the Multinational Mining Agreements Act is a policy alternative.

This act still retains the provision of a 40% maximum share ownership of multinational mining companies in mineral agreements. The taxation calculation for the mineral agreement in the local government will also be updated following the inflation rate from establishing the Philippine Mining Act of 1995. However, the effectiveness of mineral agreements shall be lessened to 10 years, which could be renewable if the integrity of mined-out areas is ensured for another decade of mining activities and future-proofing of the land area. During entire mining operations, the mining company will continuously enforce land and water rehabilitation efforts to ensure the ecological integrity of the mine areas. Moreover, the auxiliary rights presented in the Philippine Mining Act 1995 will be amended. They will no longer be exclusive to the mining companies as shared equity will be provided to the mining communities.

In ensuring economic development, the tax incentives institutionalized by existing mining policies will be repealed by the no-tax incentive provisions of this law. Given Marinduque's present legal problems with Barrick Gold, accountability and funding are perceived as difficult to achieve. Therefore, it is included in the provision of this act that withdrawal of shares and abandonment from operations shall not be approved unless all financial obligations, including long-term rehabilitation funding and compensation to affected residents, are fully paid. This ensures that funding will be available for implementing and enforcing long-term rehabilitation plans for abandoned mines. In eliminating corruption and bribery attempts of mining companies, the Supreme Court will constitute a national task force under the National Bureau of Investigation (NBI) that deals with reports of corruption in the extractive industry. This national task force will coordinate with the Presidential Commission on Good Governance (PCGG), which will be restructured as the anti-corruption body of the Philippines that focuses on the thematic areas of corruption in mining. Lastly, perpetual responsibility must be recognized by both local and multinational mining companies that will be passed on to companies that will buy or merge with the companies proven guilty of inflicting human and environmental damages on their host countries without any exemptions.

#### **4. Conclusion and Recommendations**

The significant events in the Marcopper mining disaster cannot be separated based on the answers gathered. Each significant event was deemed equally significant with the others in the unfolded chain of events. The most significant event determined was the 1996 disaster itself, followed by the enactment of the 50-Year Mining Moratorium in Marinduque. The identified policies displayed varying government priorities at their establishment, and conflicts of interest were also observed. The disasters resulting from MMC's mining activities were determined to have contributed to establishing the Philippine Mining Act of 1995 as a critical juncture, yet succeeding policies exhibited path dependence from the status quo. Moreover, the continuous effort of the national government to enhance economic development through the establishment of extractive industries persists despite the people's opposition. Lastly, the challenges identified showed the interrelationship between the environment, health, and governance. All variables showed linkages with the long-term rehabilitation of the Boac River. These challenges can be resolved through proper policy and program implementation of long-term rehabilitation efforts with the aid of the proposed recommendations in the discussion problem-fit with the challenges determined in the study.

Given the identified continuous fishing in heavy metal-contaminated areas of the Boac River and the consumption of the caught fish, determining the specific health effects will help enforce policies and programs that will lessen and hopefully eliminate the conduct of such activities. It was determined from the KI that the people are still fishing because no documented health effects through scientific studies are available to the local communities. The conduct of this study will be essential to the health of the people in Boac. The findings of heavy metal seepage in groundwater sources were validated through the

answers of the KIs and the experts' KIs in the study. This is a crucial problem as groundwater is used in drinking, bathing, and other household uses. It is recommended for the academe to conduct continuous monitoring of the groundwater sources which can be in the form of research or laboratory assessment that could be incorporated into the curriculum of MSC-CES. By doing so, the local and provincial governments can be informed of the current state of the groundwater systems to enforce programs that would solve the widespread heavy metal contamination.

A more comprehensive policy analysis could be done using a causal loop diagram. The methods would involve identifying themes from the key provisions of the mining and environmental-related policies to determine the relationships between the identified themes. Plotting the themes in a Cultural Adaptation

Template would also be helpful in the analysis of the interrelationships of the variables in a problem space between the three human-environment systems. This could further guide policy revisions and alternatives in the future. Lastly, a study aiming to identify the local and national government's capacity to address long-term problems will be beneficial for enforcing long-term policy and program mechanisms. This will inform the government of its strengths and weaknesses in enforcing programs geared toward specific problems. The recommendations from this study will help strengthen the capacities of the national and local governments in addressing long-term problems in the country.

## Acknowledgment

The authors thank their colleagues from the Department of Social Development Services, College of Human Ecology, University of the Philippines Los Baños, and the College of Environmental Studies, Marinduque State College, for their support during the study. They would also like to thank the Provincial Government of Marinduque, the Municipality of Boac, and the Marinduque Council for Environmental Concerns for their cooperation and guidance in the research process.

## Declaration of Conflict of Interest

The authors declare that there is no conflict of interest in the conduct of the study.

## Funding

The authors declare that this study did not receive any funding.

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## Appendices

### Appendix A. Mining and environment-related policies relevant to the case of Marcopper mining disaster in Marinduque

| Law/ Policy                              | Year | Key Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Strengths                                                                                                                                                                                                                                                                                                                                                                                                                       | Loopholes                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Commonwealth Act No. 137: The Mining Act | 1936 | <p>All private and government-owned mineral lands for mining purposes are for the utilization of Filipino citizens or with at least 60% ownership in corporations or associations.</p> <p>The President can proclaim lands as mineral reserves, alter the boundaries, and revoke mineral land proclamations.</p> <p>The Secretary of Agriculture and Commerce shall implement the provision of the act with the Director of the Bureau of Mines under his control.</p> | <p>Government officials or employees whose function is related to the processing of mineral resources are kept from possessing mineral lands in the country.</p> <p>The government has the right to regulate the water rights of the lessee and distribute the water supply equitably to prevent water use monopoly.</p> <p>Rules and regulations on mine sanitation, tailings disposal, and easement drainage are present.</p> | <p>When portions of mineral lands become qualified as reserves after being leased, the holders of the location will still have the exclusive right of use over the resources in the proclaimed reserve.</p> <p>Reserved lands not intended for mineral use can be reverted for mineral use when deemed more valuable for their mineral contents.</p> <p>United States citizens have the same benefits as Filipino citizens under the proclamation of the law.</p> |



| Law/ Policy                                              | Year | Key Provisions                                                                                                                                                                                                                                                                                                    | Strengths                                                                                                                                                                                                                                                                                                                                  | Loopholes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PD No. 463: Mineral Resources Development Decree of 1974 | 1974 | <p>All mineral deposits, whether in public or private lands, are owned by the State.</p> <p>Mineral deposits open to location and lease shall be free for utilization.</p> <p>The president has the authority to convert reserved lands to mineral reservations upon validation of valuable mineral contents.</p> | <p>Mineral land deposits are excluded from Rights to Lands.</p> <p>Safe operation, sanitation, and pollution control laws and regulations shall be in compliance with a mining operation.</p> <p>Infrastructural and mining improvements shall be owned by the Government if not removed by the contractor one year after abandonment.</p> | <p>The government can use closed mineral deposits through the operation of selected agencies or contractors.</p> <p>The amount of registration and filing fees are subject to the prescription of the Director of Mines.</p> <p>Contractors can operate on one or more mining locations in a province.</p> <p>The mining lessee may withdraw from the operation once the non-profitability of the mining operation is proven at any time.</p> <p>Tax exemption for five years except for income tax</p> |

| Law/ Policy                                                                                                                                             | Year | Key Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Strengths                                                                   | Loopholes                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| PD No. 1586:<br>Establishing an Environmental Impact Statement System, Including Other Environmental Management-Related Measures and for Other Purposes | 1978 | <p>Establishment of an Environmental Impact Statement System as a requirement for all entities engaged in environment-altering operations.</p> <p>Undertakings or procedures that are critical in critical areas require an Environmental Compliance Certificate as per the Presidential Proclamation of Environmentally Critical Areas and Projects.</p> <p>The administration of the EISS and the processing and evaluation of the environmental impact statements shall be done by the National Environmental Protection Council in addition to the implementation of the rules and regulations of the PD.</p> | Recognizes and balances environmental protection with socio-economic growth | Declared non-critical projects, undertakings, and areas do not require the procurement of an ECC. |



| Law/ Policy                                                                     | Year | Key Provisions                                                                                                                                                                                                                                                                                                                                   | Strengths                                                                                                                                                                                                                                                                                                          | Loopholes                                                                                            |
|---------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| PD No. 2027:<br>Granting Tax Relief<br>to Distressed Copper<br>Mining Companies | 1986 | <p>Suspension of distressed copper mining companies' accumulated taxes, duties, fees, and other charges.</p> <p>The evaluation and certification of copper companies for the vitality of this PD will be done by the Ministry of Trade, as well as promulgating the implementing rules.</p>                                                      | Enacted as a cushion for copper investments                                                                                                                                                                                                                                                                        | Non-inclusion of further or more specific criteria for evaluating distressed copper mining companies |
| Local Government Code of 1991                                                   | 1991 | <p>Local autonomy shall be given to territorial and political subdivisions of the State, whereas local government units have control over their resources</p> <p>The responsibility of maintaining and managing the ecological balance of territorial jurisdictions shall be shared by the local government unit and the national government</p> | <p>Recognizes the autonomy of Local Government Units and their responsibility and jurisdiction over their territories</p> <p>Inclusion of local sustainable development in its implementing principles and decentralization</p> <p>Incorporation of non-government organizations as representatives in the LGU</p> | Outdated calculations and tax recommendations for local economic improvement                         |

| Law/ Policy                             | Year | Key Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Strengths                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Loopholes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RA. 7942: Philippine Mining Act of 1995 | 1995 | <p>The State owns all mineral resources in the country and is responsible for promoting “rational exploration, development, utilization, and conservation” to enhance national growth through safeguarding mechanisms and the right protection of affected communities.</p> <p>The Mines and Geosciences Bureau oversees “geological, mining, metallurgical, chemical, and other research as well as geological and mineral exploration surveys.”</p> <p>Any technically and financially capable person can undertake large-scale mining.</p> <p>Anti-pollution technologies and rehabilitation of mined-out and tailings-affected areas are required for operation.</p> <p>Foreign contractors shall have forty percent of the mineral production-sharing agreement.</p> <p>One year shall be given to the contractor to remove mining infrastructures and facilities upon withdrawal or abandonment otherwise, the said properties shall be turned over or donated tax-free to proper national or local government authorities.</p> <p>Technical and biological rehabilitation of mined-out and tailings-covered areas shall be implemented through a designated mine rehabilitation fund.</p> <p>An environmental clearance certificate is required upon application based on an environmental impact assessment and procedures.</p> | <p>Recognition and protection of indigenous cultural communities’ rights to their ancestral lands.</p> <p>Opening of ancestral lands for mining operations shall be upon the jurisdiction of the indigenous cultural community concerned.</p> <p>Mineral agreements shall not be undertaken in “old growth forests, proclaimed watershed forest reserves, wilderness areas and other areas under the National Integrated Protected Areas System (NIPAS)”</p> <p>The mining contractor shall undertake community development of mining communities.</p> | <p>Royalties and other fees with indigenous cultural communities shall be determined by the negotiation of the mining company and the said community.</p> <p>Mineral resources can be utilized for mining operations through mutual agreements.</p> <p>A panel of arbitrators is responsible for resolving disagreements between mineral permittees and private parties.</p> <p>Assignment or transfer of mineral agreement is subject to the approval of the Secretary but is deemed automatically approved 30 working days after application.</p> <p>Auxiliary mining rights shall be provided exclusively for the mining entities.</p> |



| Law/ Policy                                                                  | Year | Key Provisions                                                                                                                                                                                                                                                                                                                               | Strengths                                                                                                                                                                                                                                                                                                                                    | Loopholes                                                                                       |
|------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| EO No. 270: National Policy Agenda on Revitalizing Mining in the Philippines | 2004 | <p>The government shall promote responsible exploration, development, and utilization of mineral resources for economic growth enhancement.</p> <p>Formulation of a Mineral Action Plan (MAP) as an implementing guidance for mineral exploration, development, and utilization.</p> <p>The DENR is the implementing agency for the MAP.</p> | <p>Prioritizing the remediation and rehabilitation of abandoned mines to address their negative impacts.</p> <p>Promotion of the adaptation of efficient technologies for optimum mineral resources</p> <p>Pursues sustainable frameworks that support environmental and social development as equally significant with economic growth.</p> | Lacks in specifying the provisions of the law and its components                                |
| SP Res. No. 379 S. 200: Declaration of 50-year Moratorium                    | 2005 | <p>Declaration of the Province of Marinduque as a mining-free zone wherein mineral extraction is banned except for gravel and sand quarrying</p> <p>Reiteration of the declaration is done every succeeding year to maintain and uphold the moratorium.</p>                                                                                  | <p>Promulgated from several resolutions in the province prohibiting the conduct of mining operations</p> <p>Deemed in Marinduque as the “most significant mining law” (Mandia, 2023)</p>                                                                                                                                                     | Provincial moratoriums can be overthrown by national laws unless enacted as a congressional law |

| Law/ Policy                                                                                                                                                                                                                   | Year | Key Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Strengths                                                                                                                                                                                                                      | Loopholes                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| EO No. 79:<br>Institutionalizing and Implementing Reforms in the Philippine Mining Sector Providing Policies and Guidelines to Ensure Environmental Protection and Responsible Mining in the Utilization of Mineral Resources | 2012 | <p>Closure of critical, protected tourism areas and prime agricultural lands to mining applications.</p> <p>The DENR is the implementing agency of the rules and regulations of the EO.</p> <p>Existing mine corporations can continue to undergo mining operations but are subject to monitoring and review by the DENR.</p> <p>Conduct public bidding for the opening of mineral resources and disposition of abandoned ores and mine wastes.</p> <p>Establishment of a one-stop shop for all mining applications and procedures.</p> | <p>Encourages public consultation with all concerned stakeholders in the development of Mineral Reservations.</p> <p>Acknowledges climate change with the establishment of the Mining Industry Coordination Council (MICC)</p> | Fastens mining application duration through the one-stop shop initiative. |



| Law/ Policy                                                                                                                                                                                                                                                                                                         | Year | Key Provisions                                                                                                                                                                                                                                                                                                                                                          | Strengths                                                                 | Loopholes                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EO No. 130:<br>Amending Section 4<br>of EO No. 79, S.<br>2012,<br>Institutionalizing and<br>Implementing<br>Reforms in the<br>Philippine Mining<br>Sector, Providing<br>Policies and<br>Guidelines to Ensure<br>Environmental<br>Protection and<br>Responsible Mining<br>in the Utilization of<br>Mineral Resources | 2021 | New mineral agreements, subjected<br>to the Philippine Mining Act of<br>1995, may enter with the<br>government.<br><br>The DENR is the implementing<br>agency in formulating terms and<br>conditions, undertaking reviews for<br>negotiations, rationalizing revenue-<br>sharing schemes and mechanisms,<br>and implementing mine safety and<br>environmental policies. | Inclusion of mine safety and<br>environmental policies into<br>the policy | Granting the entire<br>authority and<br>implementation<br>process to only one<br>governing agency<br><br>Disregarding the<br>jurisdiction of local<br>autonomies as<br>prescribed in the<br>Local Government<br>Code of 1991 |
| Resolution No. 2021-<br>074: A Resolution<br>Declaring the Protest<br>and Opposition of the<br>Municipality of Boac<br>to EO No. 130, S.<br>2021, and Reiterating<br>the Stand of the<br>People of the Boac,<br>Marinduque Against<br>Mining                                                                        | 2021 | Objecting to the lifting of the 50-<br>year mining moratorium in<br>Marinduque                                                                                                                                                                                                                                                                                          | Supports the no-mining<br>direction of the province of<br>Marinduque      | Policy in the form<br>of a municipal<br>resolution                                                                                                                                                                           |

## Appendix C. Policy reform recommendations from the challenges and gaps in mining policy

| Findings      |                                                                     |                                                                                                                                                                                                                              | Recommendations                                                                                                                                                                                                                                               |
|---------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Domain / Area | Challenges                                                          | Policy Gaps                                                                                                                                                                                                                  | New Policies / Policy Reforms Recommended                                                                                                                                                                                                                     |
| Environmental | Open access to the mine site to relevant authorities                | PD No. 463 states that abandoned mine improvements shall be owned by the Government. However, it does not include the abandoned mine site, thus limiting authorities' free access to the mine site.                          | Review the Philippine Mining Act of 1995 as the primary mining policy to include provisions where the state should be given free access to legacy mines.                                                                                                      |
| Health        | Access to data and relevant research for health and the environment | The research for “social, technical, and preventive aspects of rehabilitation” is stipulated in the Mining Act of 1995 where the funding will come from the mine rehabilitation fund of the mining company.                  | Inclusion of a designated section for the conduct of research that could be a part of the monitoring process of mining operations and the effects on health and the environment with mine disasters on mining policies.                                       |
| Governance    | Challenges with political commitment to national development        | The identified national mining policies state the wide range of discretion of the President in institutionalizing mining in various state lands regardless of classification when deemed essential for national development. | Mining policies may state the discretion of the President in institutionalizing mining operations; however, the discretion should be limited to the mineral lands that are open to mining, excluding NIPAS and other reserves for environmental safeguarding. |



Appendix D. Most critical policy alternatives to address the ongoing environmental contamination in the Marcopper Mine Disaster

| Rank | Need/Problem                                                                             | Policy Alternative                 | Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------|------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | The existence and the widespread of mine tailings on the bodies of water and groundwater | Abandoned Mines Rehabilitation Act | <ul style="list-style-type: none"> <li>• Strengthens the prioritization of abandoned mines rehabilitation stated in EO No. 270.</li> <li>• Rehabilitation of abandoned mines includes the socio-economic, environmental, and health aspects of mine-affected areas.</li> <li>• Criteria for priority ranking abandoned mines for rehabilitation include the present ecological damage and scope of impacts.</li> <li>• Placement of government funding allocation for rehabilitation.</li> <li>• Establishment of a Mine Rehabilitation Agency Task Force that functions as the main rehabilitation governing agency in implementing and enforcing the law.</li> <li>• Inclusion of a local health capacity in mine-affected municipalities through enforcing local health units on heavy metal contamination and establishing a local health and environmental testing laboratory.</li> <li>• Enforcement of long-term rehabilitation plans through the mine rehabilitation agency.</li> </ul> |

| Rank | Need/Problem                                                                                                             | Policy Alternative                                                                                     | Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2    | Wide range of discretion of the President to change policy commitments on mine safeguards and environmental conservation | Amending the Key Provision of Presidential Authority in the Institutionalization of Mineral Agreements | <ul style="list-style-type: none"> <li>• The president may establish mineral extraction in identified mineral lands.</li> <li>• Mineral agreements shall not be undertaken in proclaimed reserves, critical areas, NIPAS, and small islands in the Philippines to conserve and preserve fragile ecosystems.</li> <li>• Mineral extraction is recognized as a source of economic growth balanced with social and environmental safeguarding.</li> <li>• Provinces with no mining moratoriums shall also be included in the prohibited areas for mineral agreements.</li> </ul> |



| Rank | Need/Problem                         | Policy Alternative                  | Provisions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------|--------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3    | Funding for long-term rehabilitation | Multinational Mining Agreements Act | <ul style="list-style-type: none"> <li>• Multinational agreements shall account for a maximum of 40% shares to mining ownership.</li> <li>• The high value of minerals is recognized; hence, institutionalized tax suspension incentives in the mineral extraction industry shall be repealed by this act.</li> <li>• Updated taxation calculations on the mining operation of local and multinational mineral agreements will be provided to the corresponding local governments.</li> <li>• Mineral agreements shall be effective for a maximum of 10 years to ensure the environmental integrity of the mined-out areas. They can be renewable every 10 years after the environmental integrity of the mined-out areas is ensured.</li> <li>• Continuous enforcement of land and water rehabilitation efforts in mine-affected areas.</li> <li>• Auxiliary rights of the mining companies will be shared equally with the mining communities.</li> <li>• Withdrawal of shares from and abandonment of the mining operation can only be approved once all financial obligations of the mining company are settled, which encompasses social and rehabilitation funding mechanisms.</li> <li>• Establishment of a national task force component of the NBI that deals with reports of corruption within the extractive industry in coordination with a restructured PCGG.</li> <li>• Perpetual responsibility shall be given to all company shareholders during a mining-induced disaster.</li> </ul> |