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MINING IN PALAWAN: EFFECT ON ENVIRONMENT, LIVELIHOOD, EMPLOYMENT AND HEALTH

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Abstract:

Mining activities are important in the economic development of any country endowed with mineral resources. This is due to the economic benefits made available to countries involved in the extraction of mineral resources, internal and external. Internally, employment and revenue generation; externally, a substantial foreign exchange is available to such countries. This research work examined the ore extraction and mining operations of the three (3) largest Mining companies in Palawan, Philippines, and their effect on the environment and the people. This research work undertook a thorough and broader outlook into the environmental implications of Mining on the island of Palawan, both negative and positive. The study utilized the descriptive-evaluative research design while using a combination of quantitative and qualitative methodology. A total of one hundred eighty-eight respondents from four different communities in four municipalities in the Southern part of Palawan were contacted for relevant information through questionnaire administration and interviews. A researcher-made questionnaire was formulated to gather data on mining and ore extraction methods employed by different mining firms in the Province of Palawan, their effect on the environment and people. The study is well-aimed to find out whether the mining companies are compliant with the different government regulations. Findings show that the community members were aware that mining companies employed surface mining as their method of mineral extraction, as revealed by a weighted mean of 2.66. Surface mining causes air/noise pollution, water pollution, and siltation of rivers, and land degradation. Mining companies have attempted re-afforestation of the mined-out areas (2.57), resettle affected communities and other measures (2.28), provided livelihoods (3.14) and satisfactory crop compensations (2.85), employment, and other benefits (3.22). They also provided development projects, school buildings as well as healthcare facilities. Mining companies are compliant with all the mining regulations set by the government. It has been recommended stringent and rigorous efforts at re-afforestation, resettlement of affected communities, and other measures aimed at restoring back degraded lands to their proximate state after mining activities should be intensified by the mining companies and additional health facilities be built which will particularly be made accessible to non-workers and other neighboring municipalities at very affordable charges.

Keywords: Mining, Environmental effect, Island of Palawan, Compliance with Government regulations

1. INTRODUCTION

In achieving economic development, many countries resort to various activities to exploit natural resources. One such activity is Mining. Consequently, Mining is an important economic activity that can contribute to the development of areas endowed with a resource. Mining activity is the removal of minerals and metals from the earth's crust in the service of man (Abdullah, 1995).[1] It is generally very destructive to the environment and one of the major causes of deforestation. In order to mine, vegetation and trees are cleared and burned. With the ground completely bare, large-scale mining activities use giant bulldozers and excavators to extract the metals and minerals from the land. In order to amalgamate the extractions, miners use chemicals such as methylmercury or mercury, and cyanide. These chemicals go through tailings (pipes) and are often discharged into streams, bays, oceans, and rivers. This pollution resulted in contamination of living organisms within the body of water and the people who depend on the fish for their primary source of protein and their economic livelihood (Peterson, 2001).[17]

The adverse environmental effect of mining activities on the environment is well documented in the studies of Heath et al. (1993); Warhurst 1994).[10, 25] Particular attention has been directed towards the impacts of large-scale and small-scale mining activities on environmental contamination. While the land degradation caused by Mining is pronounced, chemical contamination from the removal process causes a burden on the environment, with harmful health implications for people residing close to such activities (Yelpaala, 2004).[27]

The deforestation that has emanated from surface mining has long-term effects even when the soil is replaced, and trees are planted after mine decommissioning. The new species that will be introduced have the potential to influence the composition of the topsoil and then determine soil fertility and fallow period for specific crops. In addition to erosion when surface vegetation is depleted, there is deterioration in the viability of the land for agricultural activities and loss of habitat for birds and other animals. This has degenerated into destroying the luxuriant plant life, biodiversity, cultural sites, and water bodies (Shiva, 2002).[21] Erosion may cause significant loading of sediments (and any entrained chemical pollutants) to nearby water bodies, especially during severe storm events and rainy seasons. Sediment-laden surface runoff typically originates as sheet flow and collects in rills, natural channels or gullies, or artificial conveyances. Historically, erosion and sedimentation processes have caused the build-up of thick layers of mineral fines and sediment within regional flood plains, the alteration of aquatic habitat, and the loss of storage capacity within surface waters (Heath et al., 1993).[10]

In the Philippines, Mining has an abysmal record due to the massive social and environmental problems it has caused over time. United Nations Environmental Programme (UNEP) records revealed the Philippines to be among the worst countries in the world about tailings dam failures (CTDFP, 1982-2002),[5] which also disclosed that the surface impoundments containing the toxic waste from the mining operations failed with disastrous consequences for local people and the environment. Despite this, since 1992, the Government of the Philippines has been pursuing an aggressive policy to revitalize the mining industry, potentially opening 30 percent of the country's land area to Mining. It has promised that Mining will be carried out to complete international standards and that environmental and social problems will be addressed effectively.

Palawan is composed of 1,768 islands, an archipelagic Province which is situated in the southwestern part of the country's island chain. The Palawan mainland is a narrow strip (625 km long and 40 km at its widest) in geomorphology. The Palawan islands have become a haven of rich biological diversity, mineral resources, and cultural diversity. Its terrain is 63 percent hilly to mountainous, with only 37 percent flatlands. (SPER, 2015).[22] Furthermore, Palawan also has been declared as having rich deposits of minerals. However, acknowledging the economic contributions of Mining, several economies lost sight of the environmental effects associated with mining activities. Researches conducted that looked into the environmental effects of Mining has found that such activities became much hazardous than a blessing to economic development. Several mining companies in the country claimed to have responded to this by instituting and implementing several measures to reduce the adverse environmental effects of their activities on the land, environment, and the people. However, whether some of these measures have or are capable of reducing the adverse effects of Mining on the environment is a matter of enormous regard.

This study examined the ore extraction and mining operations of the three largest Mining firms in Palawan, their effect on the environment, land, and people. This study as well identified the different government regulations related to mining operations enforced in the country by which these firms might or might not follow.

2. MATERIALS AND METHODS

2.1 Research design

This study used a descriptive-evaluative research design while using a combination of quantitative and qualitative methodology. It described the collected data and made adequate and accurate interpretations concerning the effect of mining operations and the compliance of the mining companies in the different government regulations. The data gathered using closed-ended questions were interpreted quantitatively, which made the data more clearly and understandable in any lens. At the same time, the participants' responses using qualitative questions or open-ended questions were interpreted qualitatively, which resulted in obtaining more profound thoughts and opinions from the chosen participants regarding the effect of mining activities on the environment and people.

2.2 Research site

The research was conducted in the four (4) Municipalities in the Southern part of Palawan, particularly in Narra, Bataraza, Sofronio Espaňola, and Quezon, Palawan. These geographic locations were the locations of the three (3) largest mining companies in the Province where the mining operations directly affect the community.

2.3 Participants

This study randomly involved respondents from the surrounding community where mining sites are located and chose officials concerned in the mining operations using a purposive method. After randomly selecting the community members along with the mine sites, One hundred eighty-one residents from four municipalities (subgroups) were reached to be involved in the conduct of the study by answering the questionnaire. The researcher further purposively selected two mining officials and five government officials to administer a detailed questionnaire using the interview method to ensure a hundred percent completion rate.

2.4 Instrumentation

A researcher-made questionnaire was used, consisting of three parts for quantitative and one for qualitative questions with 59 items and three items, respectively. There is only one set of quantitative questionnaires designed for the surrounding community of the mining firms, and another one set for qualitative questionnaires designed for the Government officials and some officials from the mining firm.

The first to third parts of the quantitative questionnaire was designed using close-ended questions. The first part is designed for mining activities and their effect on the environment; the second part consists of mining activities and their impact on people, specifically in livelihood, employment, and other benefits and health. The third part contains the compliance of mining companies to mining regulations imposed by the government agencies with a five-point Likert scale. The qualitative questionnaire consists of open-ended questions regarding the effect of Mining on the physical landscape of Palawan and Mining effects on land and its people. It consists of questions that match with that of the quantitative questionnaire for the surrounding community.

2.5 Validation of the instrument

Copies of the questionnaire were handed to three experts who went through the research questions and questionnaire carefully to ascertain the instrument's appropriateness, validity, and adequacy. After editing the questionnaire based on the experts' comments and suggestions, the questionnaire was tested on ten reliable individuals such as educationists, government employees, and students that answered all the given questions. Afterward, it was analyzed and validated using Cronbach's alpha. The Cronbach's alpha obtained for the instrument is 0.90, interpreted as excellent internal consistency. Likewise, three educationists validated qualitative questions and gave some comments and recommendations that made the questions more appropriate and accurate in answering the research questions.

2.6 Data analysis

The data collected were summarized and stored in statistical tables. Ranking and weighted mean for the treatment of the data were used in this study. Analyses explanations were done qualitatively and quantitatively.

3. RESULTS AND DISCUSSION

3.1 Level of awareness of the people in Palawan on the mining activities in the area

Table 1 Level of Awareness on the Mining Activities in the Southern Part of Palawan

Indicators	Weighted Mean	Level of Awareness	Rank
The following methods of mining activities are being conducted in our area			
a. Surface Mining	2.66	Aware	1
b. Underground Mining	1.89	Partially Aware	4
c. Dredging	2.31	Partially Aware	2
d. Blasting	1.62	Not Aware	5
e. Drilling	2.03	Partially Aware	3
Average wx	**2.10**	**Partially Aware**	

The majority of the respondents acknowledged that the Southern part of Palawan mining companies undertakes only surface mining within the mining area. However, some respondents were partially aware of the underground Mining, dredging, and drilling but not aware of blasting operations in the mining area. Typical surface mining methods include strip mining and open-pit Mining, dredge, placer, and hydraulic Mining in riverbeds, terraces, and beaches. These activities continually disrupt the surface and this, in turn, affects soils, surface water, and near-surface groundwater, fauna, flora, and all alternative types of land use (Fuggle et al., 1996).[8]

Table 2 Level of awareness on the possible environmental issues brought about by Mining operations in the environment

Indicators	wx	Level of Awareness	Rank
These environmental effects are being observed from mining operations in our area:			
a. Degradation of land and vegetation	3.00	Aware	1
b. Water pollution	2.70	Aware	3
c. Air and noise pollution	2.81	Aware	2
d. Siltation of rivers	2.61	Aware	4
e. Erosion and Sedimentation	2.09	Partially Aware	5
Average wx	**2.64**	**Aware**	

According to the respondents interviewed at the four communities, one of the significant effects of surface mining is land degradation. Accordingly, the continuous excavation of land (topsoils), trees, and vegetation with machines used for Mining reduces the land's nutrients and makes it uncultivable for agricultural purposes. Aside from forest cover loss, the substantial impacts of Mining are the siltation of rivers that has its concomitant effects on the primary industries located in the lowlands and coastal areas. The loss of biodiversity also has to be factored in. Without safety nets to ensure best practices in Mining, the uplands down to the coastal areas will continue to be threatened by ecosystem degradation (Fuentes et al., 2011).[7]

Mining disrupts the aesthetics of the physical landscape and along with it disrupts the soil components such as soil horizons and structure, soil microbial populations, and nutrient cycles of those are crucial for sustaining a healthy ecosystem and thus results in the destruction of existing vegetation and soil profile (Kundu and Ghose, 1997).

Mineral resources are richly deposited in Palawan's high mountains, with sufficient nickel, chromium, iron ore, and limestone deposits. However, it is acknowledged that land degradation is considered an unavoidable by-product of mining activities and could reach an alarming proportion if not appropriately regulated. Open-pit Mining in areas with forest cover causes deforestation and soil erosion as well (PCSD, 2016).[16]

Table 3 Level of awareness on the cause/s of Land Degradation

Indicators	wx	Level of Awareness
The following practices could be a possible cause (s) of land degradation:		
a. Presence of tailing dams	2.56	Aware
b. Use of toxic materials	2.23	Partially Aware
c. Use of heavy machines	2.51	Aware
d. Clearing of Vegetation	2.30	Partially Aware
e. Long period of extraction	2.21	Partially Aware
Average wx	**2.36**	**Partially Aware**

It was revealed that the respondents are partially aware (2.36) of the mining firms' practices, specifically, in terms of using toxic chemicals, the clearing of vegetation, and the long extraction period. On the other hand, they are aware that the presence of tailing dams (2.56) and the Use of heavy machines (2.51) can cause land degradation.

Soil/Land degradation is a severe global problem of modern times (Lal, 1998).[14] Steiner (1996) noted that 5 to 7 million hectares of agricultural land worldwide become unproductive every year due to physical and chemical degradation.[23] The problem is apparently much more severe in tropical areas than in temperate areas since tropical soils are prone to degradation because of their properties and prevailing climatic conditions (Scherr, 1999).[20] The identified significant factors that cause soil degradation include deforestation, industrial activities, Mining, and waste disposal, which all involve the use of heavy machines and tailings dams to neutralize the wastes from the mining activities.

Clearing of vegetation cover and landscape destruction were the two significant effects of Mining. This is so because once the vegetation cover is destroyed for Mining, surface mining activities leave the landscape with excavated pits and trenches. As explained by P6: "*the possible effect of mining is devegetation of the forest, but it is minimal since it has been solved through the company mining forest program.*"

Table 4 Level of awareness on the attempts made by mining companies to mitigate adverse Environmental effect of mining activities

Indicators	wx	Level of Awareness	Rank
The mining firm made attempts to do the following measures to reduce or curtail the adverse environmental effects of mining activities:			
a. Re-afforestation	2.57	Aware	1
b. resettlement of affected communities	2.28	Partially Aware	5
c. Providing alternative sources of drinking water	2.39	Partially Aware	2
d. Compensation to affected communities	2.30	Partially Aware	4.5
e. Reviewing or varying methods of operation	2.24	Partially Aware	6
f. Creation of Silt Containment Pond	2.37	Partially Aware	3
g. Neutralization of Acidic Tailings	2.30	Partially Aware	4.5
Average wx	**2.35**	**Partially Aware**	

The respondents are aware that the mining firms in Southern Palawan have made attempts to do re-afforestation in the mined-out areas. This is also called as tree planting where the mined-out areas are being rehabilitated after it has been mined out with trees to restore the forest into its proximate form. This is evident by the 2.57 average weighted mean.

There is evidence that forests significantly reduce soil erosion and prevent soil runoff after heavy rains (Gensiruk et al., 1999; Anderson, 1987).[9,2] The purpose of afforestation hinders the choice of species to be planted in the mined-out areas and the location, tree-growing conditions, and some other factors. It was found out that Carbon sequestration positively correlates with the growth rates of trees; it is therefore advocated to plant the most fast-growing tree species where appropriate (Kooten, 2004; Nijnik et al., 2008).[11,15]

Nevertheless, as the overall level of awareness of the surrounding community, there is partial awareness of the other attempts such as the resettlement of the affected communities (2.28), providing an alternative source of drinking water (2.39), the compensation to affected communities (2.30), reviewing or varying methods of operation (2.24), creation of silt containment pond (2.37), and the neutralization of acidic tailings (2.30).

The community, especially the Indigenous People (IPs) that are being affected by the mining operations, are being resettled in areas where they can still have their own homes and being provided with livelihood to sustain their daily needs and being compensated whenever their source of living has been affected temporarily by the mining operations.

The creation of a silt containment pond is available in areas of mining operations. Nevertheless, the community is only partially aware of the attempts and practices that the mining companies are doing, and thus, they must be proactive in communicating with the residents and conduct awareness campaigns for every activity they are doing in the areas.

3.2 Effect of the mining activities in terms of livelihood, employment, and health

Table 5 Perceived effect of Mining on livelihood

Indicators	Weighted Mean	Agreement
A. LIVELIHOOD		
1 Mining has provided livelihood activities	3.14	Agree
2 There is proper/satisfactory crop compensation	2.85	Agree
3 There are short access to farms	2.71	Agree
4 Crop yields are high	2.67	Agree
5 The mining firm gives seed plants for free	2.86	Agree
Average Rating	**2.85**	**Agree**

Table 5 revealed that the respondents agree (2.85) on the livelihood activities that the mining companies were providing to them. As can be gleaned, the majority of the respondents agreed on the livelihood activities (2.85) followed by the free seed plants given to them (2.86). Also, the respondents agree that there are crop compensations when their livelihood activities are being affected by the mining operations. Further, the mining companies ensure short access to farms and that the farmers' crops remain high.

The result implies that the mining companies in the Southern part of Palawan were conscientious when providing livelihood to the community and very generous in proper compensation.

Based on an interview made with some of the respondents, they disclosed that *"the mining companies provide us livelihood by giving us free seedlings and plants such as rubber trees, kasoy, rice grains, okra, and seaweeds to be used and sold to sustain our daily family needs."*

This was supported by P7 that says, "*some mining companies provide bell pepper, okra and other plants for their livelihood."*

Table 6 Perceived effect of Mining on employment and other benefits

Indicators	wx	Agreement	Rank
B. EMPLOYMENT AND OTHER BENEFITS 1 Employment Opportunities	3.05	Agree	4
2 Scholarships	3.44	Strongly Agree	1
3 Healthcare	3.17	Agree	3
4 Development Projects	3.22	Agree	2.5
5 School Buildings	3.22	Agree	2.5
6 Potable water and repairs	2.85	Agree	5
7 Repair of roads	2.75	Agree	6
8 Electricity at low cost	2.40	Disagree	7
Average wx	**3.22**	**Agree**	

The scholarship is one of the benefits that the mining companies are providing to the residents of their areas of operation, and it is evident by the 3.44 weighted mean, which revealed that respondents strongly agree with the scholarship benefit offered to them.

Other benefits that affect the lives of the people by which the majority agrees were the development projects, including the gym and other projects that are being provided to them as part and being shared with the Social Development and Management Program (SDMP) of their Barangays. This was supported by the statement of P7, who clarified that *"The mining companies have the main responsibilities in complying with the SDMP. They need to provide infrastructures and the 1.5% share from their operating costs."* This was revealed at 3.22, the same as with the school buildings. Another is the healthcare; the mining firms provides hospital, health centers with doctors and nurses. Potable water and repairs and the repair of roads came last in ranking since the mining companies have minimal intervention in these services.

The company provides employment in various forms to citizens in the surrounding communities and those outside the communities. As mentioned by P5: "*We provide direct employment with compensation and benefits (as required by labor standards), employment from contractors and service providers as well."* They also respond to societal needs by providing schools, clinics, and places of convenience. The people in the communities have access to the hospital and clinics provided by the mining firms. It serves as a referral point for several hospitals in the Province, and it also provides on-call ambulance services in emergencies to the people in their respective areas. They contribute to economic development as well by means of royalties in different forms to government and local authorities for onward development. On the other hand, most respondents disagreed on the electricity at low cost (2.40) because accordingly, there is no provided electricity that the residents may consume/avail for less.

Table 7 Perceived effect of Mining on health

Indicators	wx	Agreement
C. HEALTH 1 The following diseases are frequently being contacted by your family:		
a. Malaria	2.04	Disagree
b. Diarrhea	2.19	Disagree
c. Skin Disease	2.45	Disagree
d. Fever	2.62	Agree
e. Colds and mucus/phlegm	2.70	Agree
f. Pulmonary infection disease	1.98	Disagree

2 The disease(s) that your family frequently contact are related to mining activities.	2.22	Disagree
3 The mining firm did anything to address the health needs of the community.	2.67	Agree
4 The mining firm built any health facility in your community for the service of both workers and people in the community.	2.81	Agree
5 The mining firm carries out a health campaign program to educate people in the community.	2.63	Agree
Average wx	**2.53**	**Agree**

The table shows that the respondents disagree with the diseases enumerated as being contacted by their families. Only the fever and colds and mucus/phlegm since according to the residents, *"it is normal that people contacts those kinds of diseases due to changing weather conditions regardless of mining activities.*" Respondents disagreed that the frequently contacted diseases are caused by mining activities, as evident by the 2.22 weighted mean.

The mining firms are continuously doing anything to address the health needs of the community as well as building/providing health facilities for the service of both workers and people in the communities. The respondents further agreed that the mining companies regularly carry out campaign programs to educate people in the community (2.63). As P5 noted: *"the mining firm has its own hospital to cater health and hospitalization needs not only of the employees but their dependents and community members as well."* Further, they also have their safety and health programs to educate the people in the community regularly. This was also supported by P3, who disclosed that: *"the mining companies in Southern part of Palawan have spent much budget in the health. This is the companies' primary responsibility that their operations will not adversely affect the local communities."*

Table 8 Summary

Activities	Weighted Mean	Agreement	Rank
A. Livelihood	2.85	Agree	2
B. Employment and other benefits	3.22	Agree	1
C. Health of the People	2.53	Agree	3
Overall Rating	**2.87**	**Agree**	

The study revealed that respondents from different communities in different municipalities agree on its impact on mining activities on the land, environment, and the people. First in rank is the employment and other benefits (wx=3.22), livelihood (wx=2.85) as second, and lastly, health (wx=2.53). With an overall rating of 2.87, it is enough to say that Mining positively affects the environment and people in Palawan.

3.3 Compliance of mining companies in different government regulations

Table 9 Compliance of mining companies in different government regulations

Government regulations	Weighted Mean	Description	Rank
1. Philippine Mining Act of 1995 (RA 7942)	3.67	Compliant	2
2. Strategic Environmental Plan for Palawan (RA 7611)	3.61	Compliant	3.5
3. Local Government Code of 1991 (RA 7160)	3.79	Compliant	1
4. Indigenous Peoples Rights Act of 1997 (RA 8371)	3.61	Compliant	3.5
Overall rating	3.67	Compliant	

Mining firms are compliant in terms of RA 7160 (3.79), RA 7942 (3.67), RAs 7611, and 8371 (3.61). But the government agencies are encouraging the mining companies to strive more to be proactive more than just being compliant.

As far as ECC is concerned, as required by the Philippine Mining Act of 1995, all the mining companies operating in the Southern part of Palawan have obtained their own. P3 also supported this: "*The mining companies have been subjected to quarterly monitoring of their compliance through MMT or the Multipartite Monitoring Team's Activities, and so far the result is positive, they are compliant."*

The respondents marked the mining firms that were operating in the Southern part of Palawan as Compliant in the Strategic Environmental Plan for Palawan as revealed by a 3.61 weighted mean. Specifically, they were most compliant in terms of the protection of the tribal people and the preservation of their culture, followed by the preservation of biological diversity and the maintenance of sustainable yield. The data imply that the mining firms operating in their respective areas do not disregard the community's safety and welfare. The biodiversity may be disturbed due to mining operations; nonetheless, it is still being preserved by the mining companies to be compliant with the enforced law.

It is evident from Table 9 that most of the respondents were aware of the level of compliance of the mining firms in the Local Government Code of 1991, which is revealed at a 3.79 weighted mean. It only implies that the mining

firms did the consultation to the LGU regarding the development initiatives of operations within the jurisdiction; they complied with all the necessary permits that the Unit was enforcing and paid the proper taxes and obedience to the rules and regulations of the LGU.

P7 explained that "*The mining companies do the consultation with the barangays and municipal office with regards to the infrastructures and other projects that may be provided thru the SDMP."*

Most of the respondents were aware of the level of compliance of the mining firms in the IPRA of 1997, as revealed by the weighted mean of 3.61. IPRA lays down the legal framework for the rights about the culture and land tenure of the indigenous peoples (IPs) in the Philippines. The mining companies are very meticulous when it comes to the welfare of the Indigenous People in the areas where they are conducting their mining activities. They make sure that IPs are on top of their priorities, especially in terms of employment opportunities; they make sure to employ the locals as long as they are needed.

P6 noted that: *"our company creates employment especially to the people in Palawan and even outside Palawan. Moreover, employees are given benefits such as food allowance, housing, and other medical benefits."* This statement was supported by P1 that states: *"Employment opportunities for the livelihood and lowlanders were given by the mining companies especially for the IPs, the presence of the companies themselves while operating provides employment and they are claiming that 80% to 90% of their employees are locally hired.*" Locally hired employees refer to the employees being employed from and within Palawan.

There are just questions on the areas where mining companies are operating beyond zones that are being prohibited as per SEP law of 1992.

P1 disclosed that: "*The Palawan Council for Sustainable Development (PCSD) mandates Environmentally Critical Areas Network which is the mechanism of the implementation of Strategic Environmental Plan (SEP). There are different zones such as core, restricted, controlled, and traditional, and multiple-use zones. Core zones and restricted use zones are meant for preservation, the economic activities in those areas are lesser, but in fact, in core zones, practically, there are no economic activities at all. However, we have a Mineral Production Sharing Agreement (MPSA) within the zones because before the SEP of the ECAN was implemented, the MPSA was already awarded to specific companies; thus, the economic activities there were allowed before. Nevertheless, from the time when the ECAN of SEP was implemented, we are strictly enforcing and making sure that there will be no operational expansion of the mining firms within the core and restricted zones."*

Therefore, on those claims, the PCSD has nothing to do with it since the mining areas have been approved even before the existence of ECAN or the Environmentally Critical Areas Network.

4. CONCLUSION

Mining activities have resulted in land degradation caused by the presence of tailings dams and the Use of heavy machines, which led to the deprivation of the land of its nutrients and rendered the land infertile for agricultural purposes. There is also an incidence of pollution of varied kinds (air, noise, and water) to the environment. Water pollution and siltation have primarily affected water resources within the areas. However, given the problems associated with mining activities, there was no evidence that their operations have culminated into health problems. There is no prevalence of Malaria, Diarrhea, skin diseases, and just a minimal occurrence of fever, and colds, and mucus/phlegm. To ensure better conditions for residents within the mining area, public sector mining industry support organizations play specific roles in diverse ways. Despite these organizations' efforts to ensure that mining activities are carried out on a sustainable basis without severe problems to the environment and the host communities, the public is yet to feel the impact of their activities. Therefore, a critical assessment of their activities shows that there is more to be achieved than what has been accomplished so far as environmental problems in the mining industry are concerned.

5. RECOMMENDATION

The following recommendations are made to address the environmental and health problems created by the mining operations:

a. stringent and rigorous efforts at re-afforestation, resettlement of affected communities, and other measures aimed at restoring back degraded lands to their proximate state after mining activities should be intensified by the mining companies. These will not only reduce the adverse effect on the environment and health of the people, but the land would also be available, particularly to farmers for agricultural purposes. In addition, employment opportunities will receive a significant boost to trim down the high unemployment rate in the Province.

b. similarly, the Mines and Geosciences Bureau, a regulator who has the right to regulate all minerals in trust for all Palaweňos, in collaboration with the DENR and PCSD, should be strict in legal compliance during application for lands or concessions before granting it to the mining companies in the Province. This is necessary in order to ensure the compliance of mining companies in all the regulations; to continuously avoid the adverse environmental effects of mining activities, particularly to those living in the surrounding communities, and to a greater extent, the country at large.

c. on health, some mining companies are commended for their efforts to provide hospitals, clinics, health posts, and the health campaign program initiatives; it is recommended that additional health facilities be built that will particularly be made accessible to non-workers other neighboring municipalities at very affordable charges. This is crucial because, in places where there are mining operations, no private and government-owned hospitals are available; the few government-owned health centers alone cannot adequately serve the health needs of all residents in the municipalities. Moreover, the different Municipal Health Centers should institute periodic free medical check-ups for mining-related diseases among the populations to detect and cure severe cases early enough before they escalate into mortality situations. With such programs initiated, sponsorship can be sought from the mining companies and other donor agencies.

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