ASSESSING THE POTENTIAL IMPACTS OF MINING ON THE SOCIOECONOMIC ACTIVITIES IN SUNGAI JONJANG CATCHMENT AREA: A PERCEPTUAL STUDY

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Assessing the Potential Impacts of Mining on the Socioeconomic Activities in Sungai Jonjang Catchment Area: A Perceptual Study

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ABSTRACT

(The objective of this study is to assess how mining operations are perceived by the affected communities. The factors examined in this study were demographic characteristics and the variables of community awareness and the residual impact generated from mining activities. Land utilization was an important factor studied as a majority of respondents rely on agriculture activities and forest products for their livelihood.) The respondents were highly concerned about their loss of livelihood due to mining activities. 87.27% responded positively to concern regarding displacement and loss of land. This shows that a majority are aware of the direct impact of open cast mining. The majority (89.1%) agreed to preserve the nearby forest as community forest. The loss of flora and fauna, aquatic pollution, and, changes of landscape are also major concerns of the community in terms of environmental impacts.

ABSTRAK

Objektif kajian ini adalah untuk menentukan persepsi terhadap operasi perlombongan emas oleh komuniti yang terjejas. Faktor yang dikaji termasuk ciri-ciri demografi dan kesedaran masyarakat terhadap kesan yang dijana daripada aktiviti perlombongan. Penggunaan tanah merupakan factor yang penting dikaji kerana majoriti daripada responden bergantung kepada tanah untuk menjalankan aktiviti pertanian dan mengutip hasil hutan. Responden bimbang akan kehilangan mata pencarian akibat daripada aktiviti perlombongan. 87.27% menunjukkan kebimbangan terhadap kehilangan tanah pusaka dan menunjukkan bahawa mereka sedan akan kesan langsung daripada aktiviti perlombongan. 89.1% bersetuju untuk mengekalkan hutan berdekatan sebagai hutan komuniti kerana kehilangan flora dan fauna, pencemaran air, dan perubahan landskap menjadi kebimbangan utama komuniti tempatan dari segi alam sekitar.
CHAPTER ONE
INTRODUCTION

1.0 Introduction

Tauli-Corpuz (1997) generalized that mining is a major economic activity in many developing countries. Operations, whether small or large-scale, are inherently disruptive to the environment as stated by Makweba and Ndonde (1996), producing enormous quantities of waste that can have deleterious impacts for decades (UNEP, 1997). The environmental deterioration caused by mining occurs mainly as a result of inappropriate and wasteful working practices and rehabilitation measures. Mining has a number of common stages or activities, each of which has potentially-adverse impacts on the natural environment, society and cultural heritage, the health and safety of mine workers, and communities based in close proximity to operations (Moody & Panos, 1997; Akabzaa, 2000). As indicated by Noronha (2001) the social and environmental impacts are more pervasive in regions where operations are newly established or are closing down. Authors such as Tauli-Corpuz (1997) and Filler (1998) have commented on the potentially-adverse impacts of mining, which include displacement of local people from ancestral lands, marginalization, and oppression of people belonging to lower economic classes.

The Bau Gold Prospect comprises of consolidated mining and exploration tenements. Its recent exploration focuses on the central part of the goldfield where there are three deposits, namely Jugan, Sirenggok and Pejiru. Pejiru gold deposit is located about 10 kilometres Southwest of Bau Town within the Jonjang River catchment area. Mining activities naturally gives a negative impression as it affects all components of the environment, be it air, water or soil. Its impacts are categorized as permanent or temporary,
beneficial or harmful, repairable or irreparable, as well as reversible or irreversible. Another major concern in the area is the deposition of naturally occurring arsenic into the water sources within the catchment.

1.1 Research Problem

Potential pollution from the proposed mining activities may affect the health of local communities in the mining area. Socio-economic activities of these communities may also be affected as high levels of natural arsenic deposits are found. The expected intensity of gold mining activity can be very high. As such the level of arsenic pollution in water ways are also expected to be high.

1.2 Research Questions

The Research Questions are:

i. what are the land utilization patterns among the local community?

ii. what is the level of awareness among the residents on the pollutants in the area?

iii. is there any significant relationship between awareness among the residents on the potential impacts of mining activities with socio demographic variables?

1.3 Objectives

Several objectives are identified for the study. The overall objective is to access how mining operations is perceived by the affected communities. The specific objectives are to:

i. compile the key land use activities in the study area;

ii. determine the level of awareness among the residents on the pollutants in the area;

iii. examine the level of awareness among the residents on the potential impacts of mining activities; and
iv. correlate the level of awareness among the residents on the potential impacts of mining activities with socio demographic variables.

1.4 Study Area

The Pejiru gold deposit is located about 10 kilometres Southwest of Bau Town within the Jonjang River catchment area. Communities assessed are within Sungai Nolan to Sungai Pedid in addition to 3 kilometers into Gumbang Road (Figure 1, Figure A, Appendix 2).

Figure 1: A map depicting the approximate Sungai Jonjang catchment area.

1.5 Research Significance

The project is carried out to evaluate the level of awareness on the potential impacts of mining among the local community. It is also carried out to determine the impact of land use on the water quality of the Jonjang River catchment. From the findings, it will indicated awareness and willingness inline to their livelihood activities. Future development plans taking place in the area will change the land use pattern. A large area is to be opened up for mining to meet the market demand. Hence, it does create
employment opportunities for the locals to enjoy better payment as compared to the salary that offered in oil palm plantation. The active working group migrate to town or bejalai attracted by higher wages and at the same time taking the chance to travel. On the other hand, opening up of lands for mining would impact the environment and this is usually more pronounced when open-pit mines are involved. Degradation of aquatic ecosystems and receiving water bodies due to sedimentation and deposition would result in reduction of water quality.

1.6 Limitation of the Study

The research was confined to the study of an effect to the community livelihood from the potential mining activities. No other variables will be studied in the same manner in this study.

The study was also subjected to other interpretation especially in terms of findings from questionnaires because the respondents’ responses may not reflect the real situations, and that their honesty will be beyond the researcher’s control. Besides, the respondents interpretations in terms of their perceptions on the accurate meanings of the words used in the Likert scale are subjective in nature, beyond the researcher’s control.
CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

The purpose of this chapter is to highlight the effects of mining activities on rural communities shown in findings made by earlier studies as well as the importance of conducting a social impact assessment before any mining activities.

2.1 Mining and Rural Development

Mining activities has often been met with negative views due to its impact on the environment and the society. Some may argue that there are benefits towards the affected communities such as an increase in land value, opening of new business establishments, infrastructural development, and increase in job opportunities.

Once an area has been established for mining operations, the surrounding surface area has to be cleared of all vegetation and buildings, therefore the affected community will have to be resettled. The ethnic people living in the designated areas depend generally for their livelihood on the land. Since, in mining areas the land is taken for mining and associated activities these people lose their livelihood.

There are three types of resettlement schemes in Malaysia, namely:--

i. Resettlement of farmers under modern agricultural and land development programs to grow cash crops;

ii. Resettlement of rural population in well guarded locations to isolate from communist insurgents;
iii. Resettlement and compensation of population displaced through resource exploitation such as construction of dams and mining.

The affected society falls under category (iii). In the 1940s, three Malaysian villages were affected by tin mining activities which encroached on their agricultural land. The villages of Batu Bertudung, Tekka and Jelutung were evacuated and sustained economic loss in the form of property, land, and crops. The social losses endured include loss of social networks, neighbourhood and stability. Out of the three villages, only two managed to successfully claim complete relocation and compensation from the tin mining companies through their newly formed village action committees in the 1960s. They were compensated in terms of planned resettlement, cash payment and replacement of their former plot with another piece of land. However, social needs were not accounted for in the compensation plan. Tekka and Jelutung had their houses rebuilt with stronger foundations and new materials, whereas those from Batu Bertudung were resettled in another village with cash to rebuild their own homes. There was insufficiency in basic amenities, with dirt roads and an overused standpipe. Only 5-6 years later were the most basic amenities provided under the rural development program (Khalid, 1992).

In terms of job opportunities, all managerial, skilled and semi-skilled manpower required for mining and associated activities would come from outside as trained manpower is usually not available in ethnic population (Saxena, 2010). This would bring an influx of foreigners into the area with people coming in not only for work but also commerce and trade. The population dynamics of the area undergoes major changes over the years with dilution of the ethnic population. This would also affect their culture and religion.
In India, through provisions in the Rehabilitation and Resettlement schemes, the project affected people are given jobs and are trained for self-employment (Saxena, 2010). This also allows the affected people to be employed in other development activities in the area.

Most societies affected depend on agriculture and forests for their livelihood. These societies tend to have a lower level of economic scenario, but with the influx of industrial and other associated activities in the area, there will also be an increase in the level of economic activities. The increase in the cost of living due to these activities will adversely affect the people not associated with these activities including the ethnic people.

2.2 Impact of Mining Operations on the Environment

Mining operations require clearing large amounts of land for the disposal of large quantities of waste produced by the industry. The industry produces so much waste that in some cases it contributes significantly to a nation’s total waste output. According to Matthews (2000), a large proportion of materials flows inputs and outputs in the United States can be attributed to fossil fuels, coal and metal mining. Gold is among the most wasteful metals, with more than 99 percent of ore extracted ending up as waste. By contrast iron mining is less wasteful with approximately 60 percent of the extracted ore processed as waste (Da Rosa, 1997; Sampat, 2003).

The disposal of such large amounts of waste is what significantly impacts the environment. The disposed waste can leach into the soil and contaminate water bodies. The degradation of these water bodies affect the aquatic environment and reduces water quality, causing major health problems to those in the area. Therefore water pollution can be seen as one of
the most severe potential impacts of metals extraction. Three primary factors that result in pollution of water bodies are sedimentation, acid drainage and metals deposition.

When material is disturbed in large quantities, as is in the mining process large quantities of sediment are transported by water erosion. Sedimentation occurs at some point downstream from the erosive source once the sediment drops out of the solution. The degree of erosion and sedimentation depends on the degree of surface disturbance, vegetative cover, soil type, slope length, and degree of slope. Erosion from waste rock piles or runoff after heavy rainfall often increases the sediment load of nearby water bodies. In addition, mining may modify stream morphology by disrupting a channel, diverting stream flows, and changing the slope or bank stability of a stream channel. These disturbances can significantly change the characteristics of stream sediments, reducing water quality (Johnson, 1997). The turbidity of natural waters increases with higher sediment concentrations, thus limiting light penetration to aquatic plants for photosynthesis (Ripley, 1996). Increased sediment loads can also smother benthic organisms in streams and oceans, limiting important food sources for predators and decreasing available habitat for fish to migrate and spawn. The depth of streams is also decreased, resulting in greater risk of flooding when the stream flow is high (Mason, 1997).

Acid drainage is another serious environmental impact caused by mining. When sulfide-bearing minerals such pyrite or pyrrhotite are exposed to oxygen or water, sulfuric acid is produced. Acidic water may then leach other metals in the rock, releasing them into the surface and groundwater. The sources of acidic effluents from a mine site include waste rock piles, exposed waste, mine openings and pit walls. The process occurs quickly and continues until there are no remaining sulfides, a process which can take centuries based on the quantities at some mine sites. Acid drainage impacts aquatic life as many fish are
highly sensitive to even mildly acidic waters. The low pH level affects their breeding, and some may die at a pH level lower than 6 (Ripley, 1996).

Besides water, land is also affected by mining operations. Land is one of the most important resource for human beings. Due to digging of open pits and dumping of rock mass, topography and land scenario will be changed. The land-use pattern also undergoes change due mining associated activities. Leachates from the waste rock masses and polluted water from the pits will affect the characteristic of the top-soil and affects the land use. The soil may lose its ability to support vegetation growth. Due to the alterations of surface topography the drainage pattern on the surface also undergoes changes, causing severe flooding during the rainy season and draught during dry months.

2.3 Perception studies on mining

A risk-perception study was carried out by Ackley (2008) in the cultural context of Fiji and the industrial context of gold mining. It conducted firsthand empirical research into the perception of environmental health risks in the communities surrounding Vatukoula gold mine in Fiji. The study was carried out for the purpose of developing audience-tailored risk communications program. A survey questionnaire was designed to quantify and evaluate perceived risks and environmental samples were collected to assess the extent of environmental impacts at the study site. The study results revealed that gender plays an important variable in risk perception in that women feel that they have less knowledge about the risks of mining compared to men, and they also feel that they have less control to avoid the risks of mining compared to men. The obstacles found in the study include the existing level of distrust between the community, former mining company, and the government.
2.4 Socio economic impact and Livelihood

The development of mining is seen as a potential boon for the economy and a contributor to addressing the challenges of rural development which has significant impact on poverty reduction. Mining development in the past has characteristically been synonymous with a disregard for its social impacts and affected communities. According to Killian (2007), mining companies have invested huge amounts of capital in African countries for mining development and openly stated that they are contributing to socio-economic development at a grass roots level in mine-affected communities. In reality, however, communities in the developing world have usually been completely bypassed by any development benefits from the project and are often left in a marginalised state, in which they are far worse off than before the mine opened.

Killian (2007) claimed that the surrounding communities generally develop around a mine and become dependent on the economic opportunities generated by it, especially within isolated rural areas. Apart from these dependencies and economic impacts, the social impacts are usually felt even more, i.e. squatting and low living standards, social ills (alcoholism, prostitution, drug addiction, women and child abuse, spread of disease, HIV/AIDS, etc.), disruption of traditional lifestyles and livelihood systems, increase in violence and crime, idleness and a disregard for traditional culture, etc. The challenge is to come up with innovative land uses, closure scenarios and waste management solutions that can promote sustainable development in affected communities.

These are key challenges for the mining industry, which must be incorporated into each mine’s planning and operational processes.
2.4.1 Key Aspects of a Mining Social Economic Assessment (SIA)

Some of the potential socio-economic impacts resulting from new and existing mining operations and from eventual mine closure are:

- The extent of general development in the area as a result of infrastructure and services provided by the mining operations, e.g. electricity, healthcare and transport;
- The economic changes that may occur or have occurred as a direct result of the opening of the mine, e.g. economic returns to local settlements through royalties and mine taxes, and mine development initiatives;
- The likely direct economic changes that may occur as a direct result of the mine closure, e.g. loss of jobs at the mine (permanent employees and contractors) and the impact of such changes on the local settlements, community organisation and lifestyles;
- The extent to which skills and enterprises in the local economy are dependent on the mine and its activities; influences from outside; interventions by government, industry, NGOs, etc.
- Cumulative impacts on the regions, i.e. the impact of the migrant labour system on labour-sending communities; and
- Cumulative impacts due to the development of numerous mining waste deposits in a given area.
- An analysis of alternatives for closure regarding infrastructure, livelihood projects, etc. and for land use for the establishment and re-mining of tailings disposal facilities.

Social impact assessment (SIA) is understood in different ways. However there is some agreement that all issues that affect people, directly or indirectly, as a result of a project or policy are pertinent to SIA (Burdge et al. 1995). According to Vanclay (2003) SIA includes the process of analysing, monitoring, and managing the intended and unintended social
consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment.

SIA involves the consideration of changes in one or more of the following aspects:

- people’s way of life, how they live, work, play and interact with one another on a day-to-day basis or summarized as livelihood strategy;
- their culture – shared beliefs, customs and values;
- their community – its cohesion, stability, character, services and facility; and
- their environment, the quality of air and water people use, the availability and quality of the food they eat, the level of dust and noise they are exposed to, the adequacy of sanitation, their safety and fears about their security and their access to and control over resources (Burdge et al., 1995 and Petts, 1999).

The broad ambit of SIA, along with the wide variety of quantitative and qualitative techniques available to SIA practitioners, allows SIA studies to focus on those changes that are most important within a community rather than on those that are easiest to measure or with which researchers are familiar (Burdge et al., 1995; Lockie, 2001). While there is some debate among SIA practitioners over the extent to which SIA should provide a forum for negotiation over the management of interventions, as opposed to the extent to which it should focus strictly on predicting the outcomes of those interventions (Craig, 1990; Dale and Lane, 1995), it is widely accepted that the conduct of SIA should be closely linked to processes of public participation. Unfortunately, there are many examples of EIA studies in which this is not the case, and where a narrow focus on technical issues has contributed to inadequate consideration of social impacts, ineffective public participation, and lost
opportunities to avoid negative social and economic consequences (Dale et al., 1997; Formby, 1990).

Apart from some common reliance on demographic data to describe community of interest, there is little integration or overlap of social and economic impact assessment techniques applied. This lack of integration and overlap may limit the usefulness of their application (Ivanova et al., 2005). Economic impact assessment may be too divorced from the communities of interest, with little direct input from the stakeholders of interest. Social impact assessment may identify many of the issues important to communities, but without any real assessment of how realistic tradeoffs should be made.

2.5 Indirect impact

In addition to environmental management issues, mines also pose social challenges due to potential disruptions to the local community establishment. Mining requires access to land and natural resources, such as water, which may compete with other land uses especially agriculture activities (Ashton et al., 2002). Although the size of most mining operations is small compared to other land uses (e.g., industrial agriculture and forestry), mining companies are limited by the location of economically viable reserves, some of which may overlap with sensitive ecosystems or traditional indigenous community lands. Often the larger-scale impacts from mining occur from indirect effects, such as road building and subsequent colonization. For instance, an area of approximately 400-2,400 hectares has been colonized in the Amazon Basin for every kilometer of oil pipeline built (Ledec, 1990). In the Philippines, upland ecosystems are under pressure as a result of the migration of small-scale farmers. Mining could threaten these sensitive ecosystems by stimulating additional migration (ESSC, 1999).
Recent concerns regarding the potential conflicts between mining and other land use has prompted some communities to pass non-binding referendums banning mineral development. For example, in June 2002 the Peruvian community of Tambogrande voted to reject mining in their community due to concerns regarding the projected displacement of half of its residents and fears regarding the potential impacts of mining on the community’s traditional livelihood (Oxfam, 2002). According to a study commissioned by the mining industry, displacement may result in serious social problems, including marginalization, food insecurity, lack of access to common resources and public services, and social breakdown (MMSD, 2002).

Developing countries often seek to exploit mineral resources as a way of providing much needed revenue. According to Davis and Tilton (2003), some mineral wealth is part of a nation’s natural capital and the more capital a nation possesses the richer it is.

Mining may also trigger indirect negative social impacts, such as alcoholism, prostitution, and sexually transmitted diseases (Miranda et al., 1998). In a worst-case scenario, mines have even fueled conflict in some developing countries by providing revenue for warring factions to purchase weapons. The best-known and publicized of these cases have been in Africa, where control over diamond mines has become an objective for rebels seeking income to finance civil wars (Sherman, 2002). Angola’s UNITA rebels derived approximately $3.7 billion in diamond sales between 1989 and 2000 to pay for continued resistance to the Angolan government—more than they received from anti-communist governments during the cold war. An estimated 500,000 Angolans died during this time period. In the meantime, the Angolan government itself allegedly used profits from oil development to procure weapons (Global Witness, 1999).