Shaping Traditional and Modern Approaches to Mitigate Impacts of Mining Industry: A Case Study of Karen Village, Lower Klity Creek, Thailand

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Abstract: *Shaping Traditional and Modern Approaches to Mitigate Impacts of Mining Industry: A case study of Karen Village, Lower Klity Creek, Thailand aims to analyze the effectiveness of mitigation measures, in the past and at present, for solving the problems of contamination of lead in waste water releasing from mines into the creek. Secondly, this project also aims to present mitigate measure that is the hybrid of traditional folk wisdom and modern technology in solving the problem. The study is carried out under documentary research, interview approach and participant observation. The descriptive analysis is designed to analyze the data. As the villagers have to rely on the creek not only as their main food source but also in other consumer activities, they are poisoned by lead contamination in the creek. This resulted in both physical and mental illness, especially in children; some children died from such contamination, while some became disabled. As for the environmental aspect, the ecosystem is severely damaged. This impact resulted in mitigation measures from various sectors to tackle the issue. However, these mitigation measures were not successful due to lack of consistency in operations and follow-up, lack of long-term relief budget plan, failure to understand the villagers' ways of life, and lack of integration and extension of further knowledge and practice. Thus, the measure presented in this research is that of a hybrid between the folkways and modern technology in order that the villagers and responsible organizations will be able to adapt it to achieve the effective solution of the problem in the future.*

Keywords: *adaptive capacity; local governmental agencies; water shortage; local tourism industry*;

Introduction

Rapid industrialization, including the development of mining industry, has started since the 1st National Economic (and Social) Development Plan (NESDP). The early 5 Plans witness a prosperous era of tin mining due to the fact that it brought about a number of income and investment, high gross domestic product (GDP) as well as gross national product (GNP). However, far too little attention has been paid to environment and society. As the 6th -7th Plans, mine became more important for domestic industry. Laws and regulations were revised to take charge with community conflict. The plan took more interest in the environment, still, the social and health aspects had no quite large considered. The 8th NESDP until present, sustainable development and sufficiency economic play a central role of development. The balancing among economic, environment along with society are taken into account in order to develop the country. Above mentioned, from 8th NESDP(1992) to 11th NESDP (present) the aims of plan are shifting from economic growth to human-centered development and sufficiency economic. Simultaneously, Millennium Development Goals also ensure environmental sustainability by 2015. As a result, constructing of large projects such as mine began questioning worldwide and it is not easily accepted as the previous decade. One of the most important environmental cases is Klity; the major population of Klity village, the Karen ethnic people, who could be regarded as marginal people because they are powerless in terms of political power, social power and power of knowledge to make a demand for justice and compensation from mine company and governmental organizations. The Klity case reflects not only the development discourse but also the justice system.

Lead Concentrate Thailand, the lead mine, had closed in 1998, on the orders of Thailand's Department of Mineral Resources, however more than 165,720-552,380 milligrams per kilogram of lead resiment still remains in the creek (Kaeometha Luakpornpipat,2007). The lead pollution leaked out from the mine from the early 1980s until the late 1990s. Several Karen ethnic villagers, particularly at Lower Klity village, have died from lead contamination while a great number of people, particularly women and children, are suffering from acute lead poisoning because of their daily activities such as drinking, fishing and washing in Klity creek. Nearly 100 cattle have died. In 1991, Provincial Electricity Authority gave 50 ducks to villagers, within a week, all of them were died. Many villagers, mostly women and children, became physical and mental disabled. There is an increasing significance concerning toxicity as related to sickness. Stories of people suffering from mining began to get published by media in 1998 and have brought about the government's orders to close the mine.

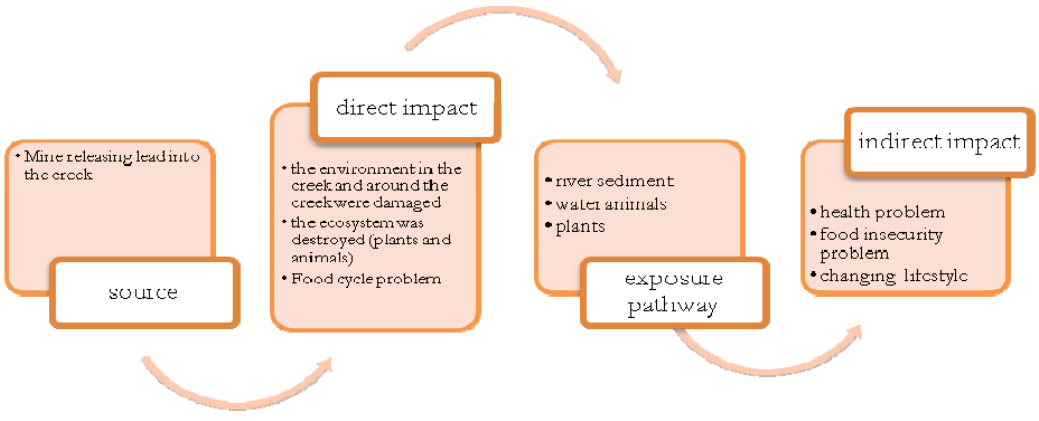
This study is highlight on develop the measures to mitigate impacts of mining industry for Klity area. It is carried out under documentary research, interview approach involved villagers, environmentalists, local government officials and academician during the October 2010 to February 2012 and the study areas for participant observation were Klity community, Tong Pha Phoom district, Kanchanaburi during November 2010 to January 2012. The descriptive analysis designed to analyze the data.

Community setting

Klity community located in Tong Pha Phoom district, Kanchanaburi province, Eastern, Thailand. At present, Klity village is home to the total of 82 houses, 327 people; most of them are Pow Karen. The main occupation is farming corn and rice. The main source of their food are animals in the creek. Although they are aware of lead contamination in water they have no other choice but to still use the water. In addition to food, the villagers also use the creek in daily activities such as washing clothes and bathing. This causes them to be prone to high risk of lead exposure. Their quality of life is getting worse.

From 1998 to present, studies found that the level of lead in the water decreased; however, the amount of river sediment did not decrease at all. Severe contamination of lead in the creek causes direct impact to the environment, ecosystem and food cycle. Fresh water animals and plants absorb contaminated water in their bodies and when the villagers consume these animals and plants they also accumulate lead in their bodies as an indirect impact. In addition, activities of the villagers such as bathing, washing or the children swimming in the water are also activities that could result in lead exposure. Lead poisoning causes the villagers to suffer from physical illness, for example, acute headache, sore joints, disability and even death. In some new-born children, disability in brain and body already developed.

Figure 1. From polluted source to other negative impacts



Main research finding

Mitigation measures

Measures to help reduce the impact from the government and the mine itself have many aspects: health, environment, ways of community and food stability. Each measure has different levels, from the measures in terms of education and monitoring to practical measures as can be seen from the following table:

Table 1 shows the mitigation measures from various sectors

Ministry	Department/Office	Measures	Duration
Ministry of Public Health	Public Health Office of Kanchanaburi	Put the sign about stop using the water from the creek	1999
	Public Health Office of Kanchanaburi	Examine blood to identify the level of lead (monitoring)	From 1999 but 3-4 years recently none comes for a check-up
	Paholpolpayuhasaena Hospital		
	Thung Sue Ton Health Station		
Ministry of Agriculture and Cooperatives	Department of Fisheries	Build the fish pond	2000
Ministry of Natural Resource and Environment	Pollution Control Department	Implement water filter	2009
Private Sectors			
Mine	Mine acting on its own	Compensation	2000
Mine	MIne (order from Pollution Control Department)	Buried contaminated soil	2001
Mine	Mine (order from Pollution Control Department)	Building damn to filter sediment	2001
Educational Sectors			
Office of The Higher Education Commission	National Center of Excellence for Environmental and Hazardous Waste Management , Chulalongkorn University Science and Technology Postgraduate Education and Research Development Office, Office of the Higher Education Commission	Educate through posters	2002
Public Sectors			
Public	General Public	Educate on how to make soy protein	1999

Mitigation measures in the aspect of health

Practical measures from the government

Public Health Office of Kanchanaburi by the order of the Ministry of Public Health has conducted blood tests and health check-up for the people of Klity since 1999. Sometimes, the test results were not disclosed to the villagers and the office did not have concrete treatment plan, hence, recently, the villagers have not been very cooperative.

Mitigation measures in the aspect of environment

Practical measures from the mine company

Pollution Control Department has ordered the mine to build a small dam to filter the sediment in the area of the creek above Klity village; however, with strong current and lack of consistent maintenance, the dam collapsed, and at present, no governmental sectors or mine resume the responsibility to fix the dam. According to the plan drafted by Pollution Control Department, building damn will be carried out at the same time as burying lead contaminated soil (sediment soil which got stuck in the dam) by burying them soil 100 meters far from the creek, but what really happened was that the mine company placed the soil only about 1 meter from the creek.

Educational measures from educational institutions

Using posters for education

Educational organizations have examined the lead level in the water, soil, sediment, animals and plants in the creek area to promote public awareness through education by using posters. In the posters, the level of lead in the creek, plants and animals are identified. This is the foundation to assist the villagers in deciding to use the creek; however, a number of the villagers cannot read Thai and even some of them could read and learn of the lead level, they do not know whether with such indication it is safe or not to use the creek. They do not know which level is safe for consuming and which is not, as well as what would danger they are prone to once they consume the products from the creek. The poster also did not inform them of how to notice if the body has received lead in the quantity that is dangerous to health. Such important information does not show up in the posters and no the organizations so far have tried to educate the villagers. In addition, there is the lack of public announcement and informer, thus the villagers do not pay enough attention to the posters.

Mitigation measures by avoiding the usage of the creek

"Stop using the water and catching fish" sign erected part of the campaign run by Public Health Office of Kanchanaburi to communicate with the villagers in the community and to create awareness in avoiding the usage of water and stop consuming the fish from the creek which will lead the villagers to be prone to poison exposure. Then again, there is not plan for using alternative water sources and alternative food instead of fish from the creek.

Mitigation measures in the aspect of the ways of the community

Practical measures from the government

Building water reservoir

The project in building water reservoir and connecting water pipes to deliver water to houses (mountain water) initiated by the district council's support in 1996. This project connected the water pipes from the upstream on the mountain above the village to houses. In that time, every house (about 40 roofs in total) got the pipelines in order to avoid using water in the creek; the number of the houses at that time is still low so the water management could cover every house. At present, however, new houses were built (after 1997, about 40 houses were built) and these new houses do not have those water pipes, this drives them to rely on the creek. Also, the old houses with water pipes are facing problems as the amount of water is insufficient (except in rainy season) and the pipes started to clog due to limestone and some parts of the pipes are also damaged. Houses which are located on higher mound often get no water as the water pressure is not enough. For houses situation lower, they sometimes get the water and sometimes do not. Now, there are about 82 houses and almost all of them need to rely on the creek, especially in summer. Currently, the pipelines are not repaired as the villagers do not have sufficient fund and they cannot agree upon who would be the one responsible for paying the cost of repairment.

Using water filter

The villagers have requested to have a big water filter connected to the water pipelines on the mountain to filter out lead but Pollution Control Department only granted them with small water filter with the objective to see the villagers consume clean water. They implemented the water filter in front of the community temple which is about 1-2 kilometers far from their houses. The village's geographical landscape is slopes and hills, so it is inconvenient for the villagers to get the water there. Now, no one use the water filter.

Mitigation measures in the aspect of food stability

Practical measures from the government

The Department of Fisheries built the fish pond with plastic covered the bottom of pond to prevent contamination of lead. This project aims to build food stability so the villagers would not have to risk their health by catching and consuming the fish in the creek. However, the problem persists as the fish died within the first 2 weeks due to lack of water circulation in the pond because of insufficient water source. Also, the department granted catfish, which eat meat, for the villagers to raise and, the villagers do not have enough money to buy food for those fish.

Practical measures from private sectors

The promotion of eating food that is free from lead started with public sectors educating the village in making soy protein. Nonetheless, as the supporters of project are general individual, they had limited fund, so when the fund is depleted they did not continue their project.

Lessons learned from present measures

1 Inconsistency in operation and follow-up

Inconsistency in hospitalization, hospitalization without treatment plan from beginning to the end, lack of follow-up and plan for prevention and alleviate illness caused the villagers to still suffer from lead poisoning. Additionally, building dam to filter sediment and reservoir with water pipelines to houses lack maintenance and follow-up from the government. This causes the measures to fail to achieve the planned goal and the budget is unfortunately lost in futility.

2 Lack of planning for long-term relief budget

By not planning for the mid and long-term budget, only the short-time measure is used and when the short-time measure failed it is impossible to be changed and improved as the budget is already depleted. This resulted in inconsistency in operations and no further project in the aspect of knowledge and operational practice.

3. Lack of understanding the villagers' traditional ways of life

It is important to take the villagers' ways of life in consideration when using any measures. To prohibit them from catching fish but do not provide any alternative ways to food stability, or to let them raise the fish without taking the fact that water is deficient, or to use posters with formal language which the villagers cannot understand or read to raise awareness, these measures ignore the ways of life and the limitations of these villagers, so they cannot achieve their purposes.

4 Lack of knowledge integration with practice

Operations of each organization is rather specialized and does not cover the over-all picture of the problem or cooperate with other organizations, all the measures thus became clusters of jigsaws unfit in the bigger picture and unable to solve the holistic problem. Moreover, lack of cooperation and integration causes repetition in procedures. This resulted in no further knowledge integration and practice, blocking the progress of mitigation measures.

Mitigation Measures: Lessons to be learn

The previous mitigation measures lack efficiency due to inconsistency in operations and result follow-up, no long-term relief budget plan for villagers, lack of understanding of the villagers' ways of life and lack of integration and extension of further knowledge and practice. Hence, the suggestions for mitigation measures for the Klity creek case must consider possibility in practice, ways of life and the objective of the measures. Suggestions for further mitigation measures are divided into 2 stages: firstly, short-term measures which will consider urgency consume short time and use limited budget, and secondly, mid-term measures which will consider necessity and budget.

Short-term measures

Measures for food stability

Raising tilapias in aquaculture (floating basket) in Klity Creek

Raising tilapia in floating basket in Klity creek aims to help solve food instability problem. Tilapias eat vegetable and fruits, the villagers do not have to spend money for food when raising them. Also, the suggestion to raise tilapias in Kilty creek is due to the fact that the villagers do not have sufficient water if they would like to raise the fish in the pond. The pH level in the creek is about 7, quite alkaline, because there is carbonate in the creek sediment will form. Lead sediment will not

disperse and dissolved into water. When the fish are raise in the floating basket, they will be safe to eat due to the fact that lead will not be dispersed. Raising tilapias in floating basket could only be done during summer (March to June) and winter (November-February) because during rainy seasons (July-October) the strong current will disseminate lead sediment, the water will be turbid with high lead level. This suggestion of raising tilapias in the floating basket in the creek will not change the ways of life of the Klity villagers as this could only be done for self-sufficient or family consumption and cannot become commercial as the creek is too small. This suggestion will help solve the problem of hardship in catching fish in the creek as now the number of fish decreases and their sizes also become smaller.

Measures to create the Klity network and develop the knowledge

This can be done by creating a network for people who work on and are interested in the Kilty issue. This project has the objective to promote information exchange and the development of knowledge base by using social network as a fuel in communication, brainstorming and further the knowledge database. At present, quite a number of people are interested in Klity case but they do not have sufficient contacts, working is, thus, done individually and this causes repetitions in the procedures resulting in a loss of time and money. In addition, there is no integration in terms of different fields making it impossible to gather and further the knowledge. Because of this, creating the network through social network is a good opportunity to bring those who are working to solve the Klity problems to exchange data, exchange knowledge through different fields and exchange experience, as well as becomes a fast and easy channel for communication; creating the network will then increase efficiency in solving the Kilty issue.

Mid-term measures

Measures to decrease exposure to lead

Building water pipelines and water storage are aims to make the villagers less dependent on the creek. At present, Kilty village has the water pipelines connected to the upstream in the mountain which was built in 1996 but some parts of the pipelines are already broken and clogged. Also, the number of the pipes is not keeping up with the number of houses in the village, this causes water scarcity and the villagers have to use the water from the creek. When the villagers use the water from the creek, they risk to be exposed to lead; so building pipelines will help lessen this risk exposure. This can be done by building the pipelines from the mountain to the village, connect the big water filter to filter out lead and limestone, then build water storage and connect the pipelines from the storage to houses. Houses which will use the water from the storage have to withhold the condition to frequently maintain and repair the pipes by themselves, even the damage is from breakage or clog due to limestone. The villagers have to take care and maintain the pipes by themselves and appoint people to take turns to examine the strength of the pipe system which is their capacity building.

Measures in hospitalization

Building health station in the village with an objective to holistic hospitalization is suggested. As of the present, the villagers have to travel to Thung Suae Tone health station which is 12 kilometers away and the entire route to the health station is made of gravels. Sometimes, when they arrive at the station there is no doctor on duty there and it is not possible to call for detail or make an appointment as the village does not have home telephone and there is no network coverage of mobile phone either. When the villagers become ill, it is then impossible to get to the doctor's hand immediately. The villagers concern that when the children become severely ill and require immediate and accurate treatment, they cannot correctly conduct first-aid practice before sending the children to the hospital. According to the statistics, during 1995 to 2001 is the time when the water in the creek was very turbid because the mine released great amount of lead contaminated waste water into the creek and during that period 29 children have died. In 2000, the maximum number of children died in the village is 6. (Jirawan Banthaothuk, 2007) If the village has its own health station, the treatment could be carried out in time and accurately; the villagers will have better life quality.
These measures will help mitigate the problems from the mine and build better life for villagers. It is important that these mitigation measures should open for the villagers to be a part of the project from planning, monitoring and follow-up.

Challenge in the plan to restore the creek

The plan to restore the creek must be beyond the mainstream economical value which only considers monetary worth. It

must recognize ethics and human rights. The mine must be responsible for restoring the creek as they released contaminated waste water. Governmental organizations should be responsible for granting a permission for the mine but do not have measures in assessment and follow-up and not solving the problem in time. Restoring the creek is not only a matter of money or environment but also to restore the ways of life, quality of life and community relation in the village, as well as the souls of the villagers. Moreover, it is also a matter of development of responsibility for both society and ethics.

Recommendation

There are various affected communities such as gold mine in Pijit which suffers from dust and contaminated ground water, Potash mining in Udonthani which has been threatening the villager's health both socially and economically since 1993, Mae Moh mining in Lampang, where heavy metals are found accumulated in sediment and Lower Klity in Kanchaburi, where the community are blighted by lead contamination. Over the past decade, there has been a dramatic increase in the negative effects of mining.

The step beyond the blockage in Kilty problem, we must consider the origin of the problem which are irresponsibility and lack of shame. Even these might be rather abstract, they caused the release of poison into the creek, destroyed environment and ecosystem, destroyed the small village and its villagers, killed the children and ruined the soul of the people of Klity that it is hard to heal. Despite an attempt to study the plan to restore the creek, it takes a long time as possibility of project and fund need to be taken in consideration. Moreover, economical thought that tends to ignore the dimension of social justice is also one of the obstacles of the consideration of the creek restoration project. Mitigation measures are thus required immediately in relieving the problems that the villagers are suffering from before the creek could be restored to better quality and be safe for the villagers to consume in their daily lives. The challenge from the lessons from Klity is that if we cannot avoid mining in the freedom of capital era or global economy, we can create initiate economic plan that accounts for sustainable mining with waste management and bypassing system that is friendly to the environment. The villagers can inspect and follow the operations of the mine. Moreover, the mine should not destroy the ways of life, social system and community culture. There should also be activities or plan that will offer benefit for the community as well. As for the governmental organizations, they need to investigate the ethics of the company that the concession is granted. They might consider reviewing the background and scrutinize whether the mine has caused problems for other villages or not and how is the acceptance from the previous community as one of the standards for consideration of granting concession. Moreover, they need to inspect and follow up the operations of the mine from the beginning to the restoration of the environment around the mine after the mine is closed. Mass media could be a great drive in examining the transparency of the mine and publishing information to the public whereas the strength of civil society will help balancing between the powers of the mine and the government in order to create, motivate and interrogate as to bring out social justice and social responsibility.

Conclusion

According to the well-known sociologists, Ulrich Beck and Anthony Giddens, risk is a major part of transition to modernity and there are two different kinds of risk; first, an external risks which are beyond human control such as natural disaster, and second, manufactured risks produced by modernization; for instance, genetically modified organism and toxic waste. "The environmental vulnerability is concerned with the risk of damage to the natural environment of a country. For the natural environment, the entities at risk, termed responders, include ecosystems, habitats, populations and communities of organisms, physical and biological processes, energy flows, diversity, genes, ecological resilience and ecological redundancy." (Ursula Kaly, 2002) Klity case is categorized as manufactured risk due to the fact that poisoning substance was released from the mine. The waste water containing lead causes risks for the villagers in Klity in the aspects of health, lifestyle, food and culture. The high-risk prone group consists of 3 big groups namely children, pregnant women, and mothers who are still in the stage of breastfeeding to their child. Each individual's way to cope with the risk depends on many factors such as lifestyle and the level of dependence to the creek. One of the most significant current discussions in legal and moral philosophy is who gets the benefit from mining industry, who should be responsible for cleaning up toxic waste, and who should provide compensation and rehabilitation care for the villagers. The measures to mitigate impacts of mining industry has existed for over a decade, yet, social and health problems still do not decrease. The issue has grown to importance in the recent years due to an increasing public awareness on industrious development and its impact on local environment and communities. Debates continue about the best strategies for the measures to mitigate the impacts of mining in Klity area. The villagers in this environmental are prone to risk in their

everyday life, thus measures to mitigate impacts of mining industry is considerably a big challenge for Klity villagers in order to survive with a satisfying quality of life.

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